

PROGRAMMING AND OPERATION INSTRUCTION MANUAL

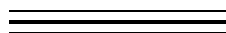
MODEL 730



'RADIODATA' ENCODER

Rev. 3 – February, 2010

(Advanced Scheduler • Increased RT+ and ODA Support)



—— USER'S RECORD ——

Model 730 – Serial No. _____

Date Purchased _____

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PROGRAMMING AND OPERATION INSTRUCTION MANUAL

MODEL 730



'RADIODATA' ENCODER



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Section I

INTRODUCTION

MODEL 730 ENCODER PRODUCT DESCRIPTION

The “Radio Data System”	The Radio Data System allows the FM broadcaster to transmit certain digital data along with his regular audio programming. Packets of data transmitted on a low-level subcarrier identify the station and its particular broadcasting ‘format,’ allow for transmission of song information, date and time of day, advertising and other text messages, and perform additional ID, control and housekeeping functions.
General	<p>The 730 Encoder is Inovonics’ top-of-the-line, full-function <i>dynamic</i> RadioData encoder capable of scrolling song titles and other information on the RDS radio faceplate. All of the important static IDs, traffic and other ‘flags’ are supported, as well as specialized ‘in-house’ applications.</p> <p>The front-panel LCD screen, built-in diagnostics and safeguards offered by the 730 Encoder allow for near-foolproof RDS implementation at any FM radio station. Every step has been taken to guarantee simple, straightforward and safe operation.</p>
Features	<p>Leading features of the Inovonics 730 include:</p> <ul style="list-style-type: none">• Conforms to European UECP standards and supports “RT+” applications and song ‘tagging.’• Works with virtually any broadcast playout (automation) system. A unique “No Headers” mode supports unformatted satellite-streamed text feeds.• Offers USB, RS-232 Serial and TCP/IP-UDP/IP network connectivity.• The front-panel LCD screen and jog wheel enable local, menu-driven data entry without need for a computer.• Internal firmware and software diagnostics guarantee fast network setup and foolproof encoder operation.• Easily set up to transmit song titles, contests, billboard updates, scrolling advertisements, etc. Operates with third-party hardware and software for increased functionality. Scrolling messages are automatically ‘parsed,’ or broken into 8-character word groups for transmission, or can be ‘safe-scrolled one character at a time.• A built-in Scheduler can automatically transmit pre-programmed scrolling messages or RDS commands based on day, date and time.• Convenient loop-through or failsafe ‘sidechain’ operation with any exciter/stereo generator combination.

730 ENCODER TECHNICAL SPECIFICATIONS

Full specifications of the 730 Encoder are really too numerous to list completely here in tabular form. Please use the Table of Contents and refer to in-depth descriptions of various features where they are described in detail.

Standards Supported:

European CENELEC/UECP; United States NRSC.

RDS Applications Supported:

PI, PS, PTY, TP, TA, RT, RT+, AF, DI, M/S, ODA. (A detailed explanation of these applications begins on Page 10.)

Operating Modes:

Loop-Through:

In loop-through operation, the RDS subcarrier is internally mixed with the MPX input and the combined signal is delivered to the RDS or MPX Output. The encoder has unity gain in the loop-through mode and accepts a maximum level of 5 volts peak-to-peak corresponding to $\pm 75\text{kHz}$ carrier deviation.

Sidechain:

In sidechain operation, only the RDS subcarrier appears at the RDS or MPX Output. The monitored MPX (or TTL sync) is used solely to synchronize the 57kHz RDS subcarrier with the 19kHz stereo pilot.

Pilot or MPX Input:

An unbalanced, bridging (BNC) input that accepts either the composite/multiplex (MPX) signal or 19kHz TTL-level pilot sync from the stereo generator. In the absence of a 19kHz signal, the 730 reverts to an internal crystal timebase.

RDS or MPX Output:

An unbalanced, 75-ohm (BNC) output to feed a wideband input of the FM exciter.

RDS Injection Level:

Subcarrier level is adjustable from the front panel or by software command between zero and 3V p-p. The LCD screen gives both bargraph and p-p voltage readouts.

RDS Data Delay:

Scrolling-PS, Radio Text and RT+ messaging may be delayed in one-second increments, up to 120 seconds, to match profanity and transmission diversity delays.

USB Port:

A front-panel USB port gives quick and easy access for encoder setup. All static messaging may be quickly set with a laptop PC.

Serial Data Port:

A rear-panel RS-232 port (DB9) accepts static encoder programming and dynamic messaging from station automation. The 730 accommodates all common data rates between 1200 and 115,200 baud. Supplied software features an automatic port and data rate ID utility to simplify initial connection and setup.

IP Network Port:

A rear-panel RJ-45 connector accepts multiple IP networking connections using both TCP and UDP protocols. Connected to a router, the 730 may be accessed over a station's Local Area Network or the Internet.

TA Switching:

The temporary TA flag is set either by a software command or with a contact closure through a rear-panel terminal strip. The 730 incorporates a programmable TA-timeout utility to preclude TA flag violations.

Supplied Software:

730 Encoder software runs on any PC using the Windows® XP or later operating systems and supports USB, serial (COM) port or

network (IP) connectivity. The software is intuitive, self-guiding and contains numerous pop-up and other Help files.

Power Requirements:

105-130VAC (0.250A Fuse) or 210-255VAC (0.125A Fuse), 50/60Hz; 10W.

Size and Shipping Weight:

1¼"H x 19"W x 8"D (1U); 8 lbs.

BLOCK DIAGRAM

Figure 1 is a simplified Block Diagram of the 730 Encoder. This product provides most of its functionality through firmware coding and utilizes a high degree of surface-mount device (SMD) manufacturing technology. There are so few user-serviceable components involved that schematic diagrams and circuit descriptions are not included in this manual.

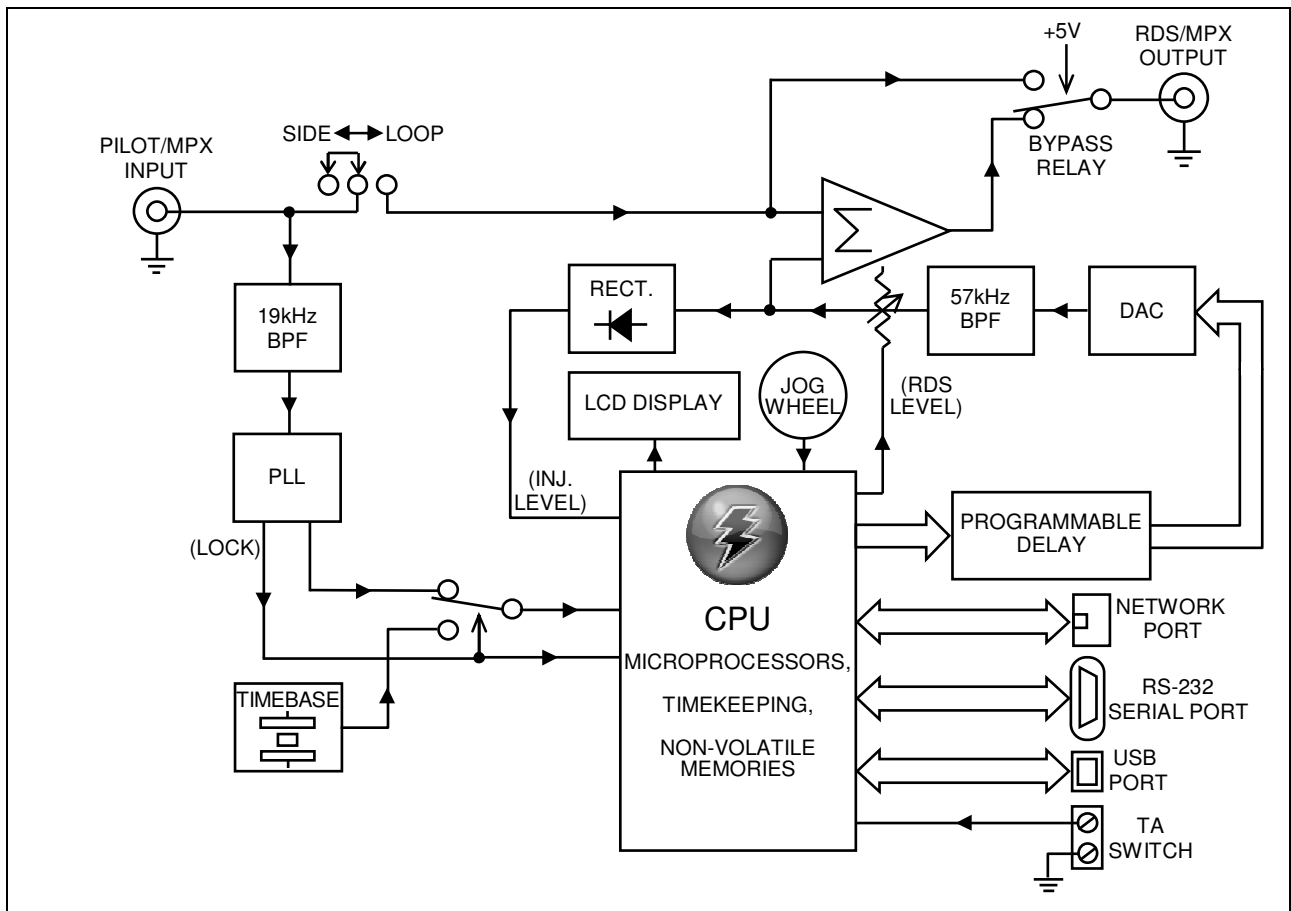


Figure 1 – Block Diagram, Model 730 RDS Encoder

UNPACKING AND INSPECTION

As soon as the equipment is received, inspect carefully for any shipping damage. If damage is suspected, notify the carrier at once, and then contact Inovonics.

We recommend retaining the original shipping carton and packing materials, just in case return or transshipment becomes necessary. If returned for Warranty repair, shipping damage sustained as a result of improper packing for return *may invalidate the Warranty!*

IT IS IMPORTANT to complete and return the Warranty Registration Card that accompanies this manual, or to register the Warranty on the Company's Website, www.inovon.com. This assures coverage of the equipment under terms of the Warranty, provides a means of tracing lost or stolen gear, and adds the user to a database to receive specific service instructions or software/firmware updates when issued.

THE RADIO DATA SYSTEM DEFINED

RDS is a digital data channel transmitted as a low-level subcarrier above the range of the composite stereo program signal in the FM broadcast baseband. The data transmission (baud) rate is comparatively low, yet it is quite robust because of redundancy and error correction routines. The injection level of the 57kHz RDS subcarrier is a relatively low 3% to 5%, thus it does not rob the broadcaster of significant program audio modulation.

It is not within the scope of this Manual to cover the details of RDS subcarrier coding and modulation. For this the reader is directed to the Specification appropriate to his location, either the CENELEC EN50067 Specification for Europe, or the United States NRSC Specification. It is assumed that the user has some familiarity with the concept of RDS as the balance of this Manual will deal exclusively with Inovonics 730 Encoder implementation.

In particular, the explanations of the various messaging and housekeeping functions afforded by RDS will help the reader become more familiar with what the system has to offer and how it can be used to the broadcaster's greatest advantage. These explanations begin on Page 9.

RDS: EUROPE vs. AMERICA

The European Broadcasting Union (EBU) and its member countries originated the concept of "Radio Data" transmission. The European RDS specification, CENELEC Standard EN50067, was first published in 1984, and was subsequently revised in 1986, 1990, 1991, 1992 and 1998.

European RDS rapidly grew in use following initial adoption of the Standard. RDS is nearly universal throughout Europe; it is almost impossible to find a European FM broadcasting station that does *not* carry a RadioData subcarrier.

The popularity of RDS in Europe is very much in contrast with initial reluctance on the part of US broadcasters to embrace this technology. This can be ascribed to material differences in broadcasting practices.

Almost without exception, FM broadcasting in the United States is ‘detached’ and independent; that is, each station originates its own programming. One exception might be America’s National Public Radio, although for most of the broadcast day even NPR stations originate, or at least schedule, their own programs.

Much of European broadcasting is similar to the concept of network radio that was common in the US prior to the 1950s. In Europe, a central program originator may feed many transmitting facilities of modest power situated throughout the country. The European disposition toward lower-power transmitters can be found on the ‘local radio’ level as well, with relay (re-broadcast) repeater transmitters at several different frequencies to blanket a designated service area.

The European concept of a *service area* equates to the US broadcaster’s *market*. The subtle difference between these designations further characterizes broadcasting practices and ethics. RDS benefits the European broadcaster through almost an altruistic endeavor to be of *service* to his listeners. The US broadcaster is *marketing* his programming, and is primarily interested in how he can promote his station through RDS ‘branding,’ as well as creating additional revenue through song ‘tagging,’ sending GPS-linked traffic updates and other interactive applications.

**RDS vs. RBDS
or “What’s in
a Name?”**

As the Radio Data System was developed in Europe, it is understandable that it is abbreviated RDS there. The first US implementation of RDS differed sufficiently from the European standard to warrant its being renamed the Radio *Broadcast* Data System, or RBDS to differentiate it from its European counterpart. Differences between the two standards have been reconciled and minimized over the years, yet RBDS prevails as the US designation. For the sake of clarity and simplicity, the more generic and established term RDS will be used throughout this Manual.

RDS APPLICATIONS SUPPORTED BY THE 730 ENCODER

The following is an alphabetical listing of RDS applications that are fully supported by the 730 Encoder. The standardized RDS application abbreviation is followed by an expansion of the application name and a short explanation of the function.

- AF List of Alternative Frequencies:** A broadcasting network, or a private broadcaster using low-power rebroadcast transmitters ('translators') to fill holes in his coverage area, can include a list of all frequencies where the identical program can be heard at that very time (synchronously). Upscale RDS receivers constantly search for the best signal that carries the very same program. When a stronger signal is found, the radio re-tunes to it with no audible interruption. The principal utility of this RDS function is with European radio networks and US stations with translators. The 730 can hold as many as 25 Alternative Frequencies.
- CT Clock Time and Date:** The Radio Data System is capable of setting the date and time on RDS receivers equipped with a clock. The 730 Encoder may be manually set to the current correct time, or it will check the time and date automatically if connected directly to the Internet. Provision is included for automatic changeover between Standard Time and Daylight Saving Time (DST). This is detailed on Page 37.
- DI Decoder Information:** This is one of several 'flags' that convey yes/no or other very basic data. This particular flag is meant to tell the receiver whether the broadcast is monaural or is being transmitted in any of several methods of stereo or binaural broadcasting. This is a rather esoteric and little-used function, and only monaural and conventional stereo transmissions are supported by the 730 Encoder.
- M/S Music/Speech Switch:** This flag indicates whether music or speech is the primary programming. The purpose of this function is not covered well in the respective Standards, so it comes as no surprise that it is not widely understood. In general, only all-news or talk-radio stations would fly the Speech flag.
- ODA Open Data Applications:** The 730 Encoder provides a method of transmitting 'raw,' proprietary hidden data within legitimate RDS groups, including ODA, FFG and TMC applications. This is a special use of the encoder for non-standard applications. Additional notes can be found on Page 62.
- PI Program Identification:** This block of data identifies the broadcast station with a hexadecimal numerical code representing the 'digital address' of the station. The receiver processes the PI code to assist automatic tuning features (station memories), and to prevent false switching to alternative frequencies that might be shared by broadcasters in nearby regions. The code is assigned by the broadcasting authority in most countries, but in the US and in Canada it can be calculated from a numerical encoding of station call letters. Encoder software does this automatically as described on Page 42.
- PS Program Service Name:** This is the station's 'street name' that might typically appear on the receiver faceplate display. The PS can be up to eight characters in length (including spaces) and can be as simple as the station's call letters (*KWOW* or *KWOW FM*) or a slogan (*NEWSTALK* or *LIVE 95*). As the Program

Service Name is displayed even on automobile receivers, it was really meant to remain 'static.'

Because of driving safety considerations, broadcasters have, from the beginning, been discouraged from making the PS 'dynamic'; that is, to send long messages in a succession of 8-character frames. As a matter of note, it remains a violation of both the CENELEC and the NRSC standards to flash or scroll the PS display. Nevertheless, this nefarious practice of 'Scrolling-PS' has become ubiquitous, both in the US and abroad. The 730 Encoder has various modes for message scrolling that offer a safe alternative to the static PS display. These are described beginning on Page 44.

PTY **Program Type:** The PTY data flag identifies the station format from a list of pre-assigned categories. Many RDS receivers are able to seek the listener's preferred listening preferences automatically. This helps a broadcaster catch a certain transient audience share... long-distance truck drivers for instance. Two distinct lists, one for RDS and the other for RBDS, remain a major disparity between the two systems. A listing of all PTY categories is given in the Appendix.

PTYN **Program Type Name:** This is an 8-character identifier that may be used to further define the Program Type. It is not used by the receiver to search for a specific format, but once the receiver is tuned to the station the Program Type Name can further detail the type of programming. Further notes are found on Page 42.

Under some programming circumstances, the PTY identifier may be made dynamic, changing between categories for a station that 'dayparts' (changes its format for specific time periods). However, the PTY code is not meant to change from song to song or to accommodate a top-of-the-hour newscast.

RT **Radio Text:** This is a 64-character block of plain text that the listener is able to select for visual display, but on only those radios that have an INFO or a TEXT button. Radio Text should not be confused with scrolling-PS; they are two separate and distinct messaging utilities that are available simultaneously.

The Radio Text function is not typically available on automobile receivers for legacy safety considerations. This has precipitated the frowned-upon practice of instead scrolling the PS field for song titles and other 'dynamic' messages. Radio Text has become relegated to the display of static information, such as the station's call-in phone number or Web address, unless the station runs RT+ applications.

RT+ **Radio Text Plus:** RT+ allows newer RDS radios, as well as cell phones and MP3 players (equipped with FM receivers) to give the listener interactivity with specific elements within the Radio Text message. For example, RT+ enables song 'tagging' or direct access to telephone numbers or Internet addresses that appear in Radio Text. See Page 70 for further details.

- TP Traffic Program Identification:** The TP flag identifies the station as one that routinely broadcasts traffic bulletins for motorists as part of its normal, everyday programming. When the TP flag logo is displayed on the receiver faceplate, the radio is searching for traffic announcements. The radio keeps track of TP stations offering this service to speed up the search-and-switchover process.
- TA Traffic Announcement:** This is a *temporary* flag added to the RDS data stream *only* as a traffic bulletin is being aired. Some RDS car radios can be set to search for traffic bulletins among various TP stations (see **TP** below) while tuned to a listener's preferred program, or even while playing a CD or MP3. As soon as any TP station broadcasts a traffic bulletin, the receiver *temporarily* switches-over to receive it. When the bulletin is finished, the receiver switches back to the listener's original entertainment choice.

The 'takeover' nature of the TA function has spawned numerous abuses, mostly in a misguided and evil attempt to 'steal' listeners. A naughty broadcaster might tease a listener he has just 'grabbed' by mentioning some hot pop star interview that's up next on his station as he goes into his traffic update. Or he might simply leave the TA flag on inadvertently (or not!). The 730 Encoder incorporates a TA countdown timer that limits the traffic announcement to a user-programmed maximum number of seconds.

Section II

INITIAL ENCODER SETUP

♪ GETTING TO KNOW YOU ♪

This section of the manual will make you familiar with the 730 Encoder by taking you step-by-step through an initial programming (setup) procedure. The encoder may then be connected in the station's airchain and placed in working service.

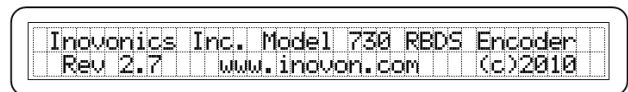
This initial setup procedure is all done from the front panel using the LCD display and jog wheel. No computer or other tools are required at this point, and setup may be done on an office desktop or lunchroom table.

Later sections of the manual will give instructions for loading and using the supplied Windows® software, which actually offers a streamlined way to program the unit. But performing the initial setup 'by hand,' as explained in the following steps, will best familiarize the user with the equipment in a relaxed atmosphere and without fear of making embarrassing mistakes.

SETTING THE REGIONAL MODE: RDS OR RBDS

Despite the reconciliation of Standards between the historic European Radio Data System (RDS) and the North American Radio Broadcast Data System (RBDS), some differences do remain. These must be factored into encoder setup before the 730 can be programmed properly. This is easily done, and once the regional mode is selected, this needs never to be addressed again.

Plug in and turn on the 730 Encoder. A "splash screen" will first appear and, after a short interval, will revert to the sequence of numbered menus.



"Splash Screen"



Menu Sequence

With any numbered menu showing, push and *hold down* the jog wheel. After several seconds, the splash screen will again appear. *While continuing to hold down the jog wheel*, turn it until the proper designation appears in the top-right corner of the display; either RBDS Encoder for North America, or RDS Encoder for the Rest of the World, as shown here:



FRONT-PANEL PROGRAMMING

The 730 Encoder may be programmed almost entirely from the front panel, although this is more tedious than using a computer and the supplied Windows® software or the built-in Terminal utility. But because an understanding of the LCD display is essential regardless of how the encoder is initially programmed, this method explains the LCD screens and teaches how to program the unit locally if a computer is not available.

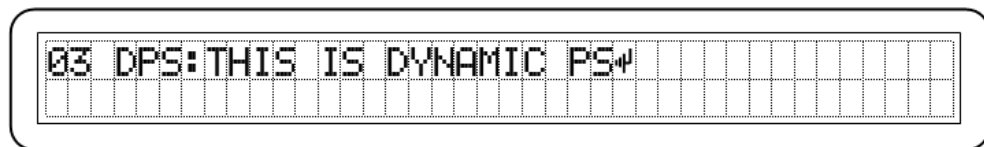
Navigating and Editing With the Jog Wheel

The jog wheel, marked ←SELECT→, allows the user to scroll up and down through the 81 menu items. Once landing on one of the menus that can be edited, pushing the jog wheel will then enter that menu, and a flashing cursor 'block' will mark either a value that can be changed or the first alphanumeric character that may be entered or edited. (The jog wheel may be locked against inadvertent 'bumping' in Menu 77.)

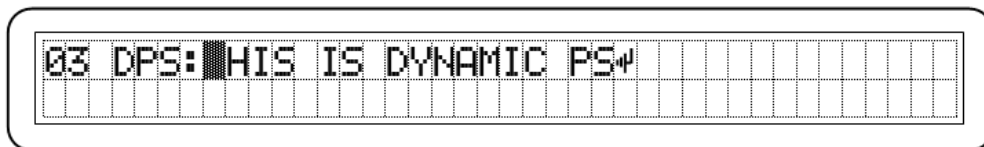
The ASCII Character Set

Characters in the ASCII set are in an order established by some arcane Standard. You will notice that the uppercase and lowercase components of the alphabet are separated by blocks of numerals and symbols, some of which may conjure up images of satanic rituals.

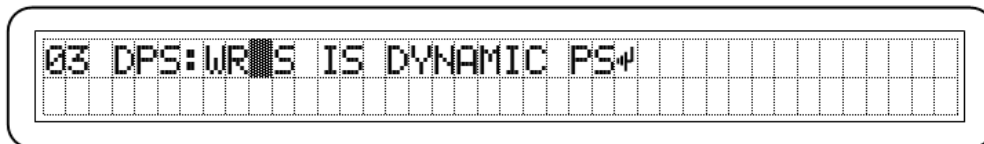
For practice, turn the jog wheel to Menu 03, the Dynamic PS, or DPS field. This field holds up to 128 characters, which can show anything from a static 8-character PS 'street name' to whatever scrolling-PS text is resident in the buffer. As received, the 730 Encoder should show this:



Now push the jog wheel to enter the menu. A blinking cursor will cover the first character that can be edited:



At this point the jog wheel can be turned to bring any ASCII character into view. Put in your call letters, starting with a K, or a W if you are on the east coast or a C if you are Canadian, and then press the jog wheel again to go to the next character.



Change the text however you like, pushing the jog wheel to navigate to the remaining characters until you have completed your entry in the DPS field.

**The Essential
Enter Character**
↵

To back up to a previous character, push and hold the jog wheel down. The cursor will back up one character at a time at a fixed rate. If the blinking cursor backs up all the way and leaves the screen on the *left*-hand side of the data entry area, any changes that have been made will be cancelled. (This is also the way to exit the screen without making any changes if the screen was entered inadvertently.)

Once the field is filled-in, you *must* insert an 'Enter' character, the little arrow pointing to the left in the illustrations. The Enter character ↵ is for internal housekeeping only and will not show on the listener's radio. You'll find the Enter character with the jog wheel as the fifth character following the lower-case 'z.'

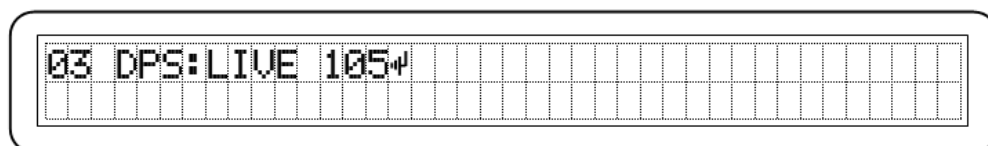
Once ↵ has been dialed-in, the next push of the jog wheel will erase any leftover characters to the right of your entry and display the word **Set!** in the corner of the display as the encoder accepts the entry into memory.

If you are simply changing letters in an entry, it is not necessary to re-enter them all. Just press the jog wheel repeatedly until the blinking cursor reaches the ↵ and exits the display on the right-hand side.

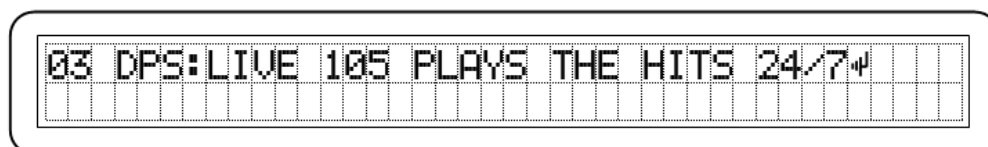
At this point the jog wheel is once again free to navigate among the menus.

This ↵ operation is essential in many of the menu data-entry fields, as noted under the various menu items described from here on.

Here's an example of an 8-character 'static' PS that simply identifies the station:



And a 'Dynamic-PS' scrolling message that will repeat over and over:



This is the general procedure for jog wheel editing, but there are some variations and exceptions that will be discussed under the appropriate headings in the menu list that follows.

**Using Uppercase
Letters**

We advise using all uppercase (capital) letters with any RDS messaging application. Many radios cannot show the full ASCII set because of their own display limitations. Lowercase letters and special symbols may not show at all on these radios.

730 ENCODER MENU ITEMS DEFINED

The following tabulation defines and discusses the 81 separate menus that may be called up for display on the front-panel LCD screen. Many of these menus may be set or edited with the front-panel jog wheel. This allows on-site programming without the necessity of connecting a computer, although the supplied Windows® software does much of this automatically and far more easily.

The jog wheel is rotated to select the menu for editing, pushed to enter the menu, and then rotated or pushed again to navigate through the menu. Generally a final push accepts the entry and displays: **Set!** on the LCD screen. The jog-wheel editing procedure will be detailed for each of the menu listings that follow.

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
01	<p>The STATUS menu screen is intended as the 'default' display of the 730 Encoder. This screen:</p> <ul style="list-style-type: none">a) ...shows whether the encoder is locked to the stereo pilot or is running off the encoder's internal crystal timebase;b) ...displays the static or dynamic PS messaging that is being sent over the air at that precise instant;c) ...gives a flashing alarm for the duration of a TA flag;d) ...shows when Scheduler events are being transmitted;e) ...shows when the RDS subcarrier has been turned off.	No jog wheel action is associated with this menu screen.
02	<p>This screen displays the incoming programming data from a controlling computer or the station's playout system. Programming data is shown in real time as it is received through any of the encoder's data ports. What appears here is exactly what the encoder is receiving; OK and NO responses are displayed after each incoming command, showing that commands are valid or not. The screen automatically clears after two minutes of inactivity. A complete encoder data refresh will generally scroll rapidly across the LCD and spill out of the window. When commands are sent one-at-a-time using the software Terminal utility (Page 31), the data and its syntax can be read completely. This screen is useful for troubleshooting the possible corruption of data sent from the studio to the transmitter site via an STL serial data link, local area network or Internet, and to verify command syntax.</p>	No jog wheel entry is associated with this menu screen, but pushing the jog wheel will clear the screen of data prior to the two-minute timeout.

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
03	<p>DPS is the Dynamic PS message (e.g.: song title and artist information) that will be parsed as required and scrolled across the faceplate of any RDS radio. DPS messaging is normally sent from the station's playout system, but it also may be entered manually from a computer. There is also provision for a default DPS message, which is sent if a normal DPS update is not received within a specified time period (see Menu 04).</p> <p>Up to 128 characters of DPS messaging may be sent to the 730 Encoder in one data transfer. The message is held in encoder memory and parsed according to the DPSS rate setting (see Menu 07). The LCD screen limits this display to the first 72 characters of the DPS message.</p>	<p>The DPS message may be entered or edited with the jog wheel exactly as the PS entry was done in the example at the beginning of this section. Refer back to this exercise for instructions on text entry.</p> <p>When a DPS message is entered or edited with the jog wheel, an <u>Enter</u> command must be the very last character. An <u>Enter</u> command is the little arrow that hooks down and to the left: ↵. This is the fifth character following the lowercase 'z' in the character selection order. After entering text, dial up ↵ as the final character and press the jog wheel. This will finalize the entry and exit the operation. If simply editing an existing message, as a final action navigate to the ↵ at the end of the text string and press the jog wheel.</p> <p>To clear the entire field, simply dial-up ↵ as the first character in the field and press the jog wheel again. This <u>Enter</u> command will clear the following character entries.</p> <p>Following a jog wheel data entry exercise, you'll appreciate that complex entries are best made using the encoder software, where messages may be typed and uploaded quickly and easily.</p>
04	<p>The 730 Encoder includes a novel feature that can save your station from an embarrassing situation. In the event that playout system data is interrupted (a data link loss for example), rather than have the last song title show on the listener's radio indefinitely, a DPSDEFAULT message may be uploaded to the encoder, where it is held in nonvolatile memory. If a dynamic PS message is not updated within a predetermined period of time (Menu 05), the default message is substituted and sent out until a new DPS message is received.</p>	<p>Again, the jog wheel may be used to enter the default DPS message, in which case the rules in the previous instruction for DPS apply. The 730 Encoder Windows® software also has an entry field for DPSDefault under the Tools menu. This message may range from a static station PS 'street name' entry to a station promo announcement... whatever wants to show on the listener's radio when the encoder fails to receive dynamic messaging (DPS) after the determined interval.</p>
05	<p>DPSTIMER is the interval, in minutes, between receiving the last legitimate DPS message and the substitution of the DPSDEFAULT message when this feature is enabled.</p>	<p>Push the jog wheel and set the DPSTIMER to any value between 1 minute and 255 minutes, and then push the jog wheel again to set the selected time. Set the time to 0 (zero) minutes to disable the feature. When disabled, the last DPS message received will be sent continuously until a new one is sent to the encoder.</p>

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
06	<p>'Parsing' is the utility built into the encoder that breaks a scrolling DPS message of up to 128 characters into groupings of words that will fit the 8-character display common to all RDS radios. Words in excess of 8 characters are side-stepped across the radio faceplate.</p>	<p>Push the jog wheel to select among the nine parsing options, and then press the jog wheel again to enter the selection. The most popular options are listed here, all nine variations are explained on Page 45.</p> <ul style="list-style-type: none"> 0 "Automatic" Multiple short words are grouped together, longer words are displayed individually, and the remainders of words in excess of 8 characters are 'side-stepped' across the radio faceplate. This is the most common setting. 1 Side-steps the message one character at a time, much like the scrolling displays on airport buses, except much slower. This is a "safe-scrolling" mode that is less distracting to the driver of a car, but it does take longer to display the entire message. 2-7 Side-steps the message two to seven characters at a time (special use). 8 "Block" mode of transmission, breaks the message into 8-character segments without regard to spaces and word breaks. Useful only if the message is pre-parsed by station automation.
07	<p>The DPSS setting enables scrolling-PS text and sets the rate at which successive blocks of dynamic PS text are sent to listeners' radios.</p> <p>A DPSS setting of 0 is a very slow scrolling-PS transmission rate, 9 is the fastest. Some RDS radios cannot keep up with a very fast transmission, and the display on the faceplate may garble or freeze. We recommend the factory-default setting of 6.</p>	<p>Push the jog wheel and rotate it to choose a DPS transmission rate. 6 is the recommended rate, as faster rates are sometimes garbled by the RDS radio's own inability to keep up with a very quick refresh.</p>
08	<p>TEXT is the Radio Text field, an independent 64-character message field that can only be read on radios with a TEXT or INFO button. Radio Text is transmitted as a complete 64-character message, which is then parsed and displayed as determined by the manufacturer of the specific radio. Unless the station runs RT+ applications (see Section VIII, Page 70), Radio Text is generally reserved for a message that does not change often, such as the Web address and phone numbers for the station.</p>	<p>Use the jog wheel to enter a static Radio Text message exactly as instructed for Dynamic PS messages, including a final ↵ at the end of the text string. Of course the software method of entering Radio Text is easier. RT+ applications require the special message formatting described in Section VIII.</p>
09	<p>RTDEFAULT is much like the PSDEFAULT discussed under Menu 04. A default RadioText message may be entered with the jog wheel or using the Windows® software, and will be held in encoder memory. When this feature is enabled, the fixed RT default message will be sent after the interval preset in Menu 05, until a fresh RT message is received by the encoder.</p>	<p>Use the jog wheel to enter the default RT message, following the entry rules in the previous instruction for TEXT. The Windows® software has an entry field for RTDefault under the Tools menu. This static default may show the station's telephone number or Web address, or a program promo announcement.</p>
10	<p>RTTIMER sets the interval between receipt of the last RadioText message and transmission of the RTDEFAULT message.</p>	<p>Push the jog wheel and set the RTTIMER to any value between 1 minute and 255 minutes, and then push the jog wheel again to set the selected time. Set the time to 0 (zero) minutes to disable the feature. When disabled, the last RadioText message received will be sent continuously until a new one is sent to the encoder.</p>

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
11	DRTS sets the interval that the Radio Text message is retransmitted (refreshed) to listeners' radios. The setting has a nominal range of 1 to 9, similar to the DPSS setting.	Push the jog wheel to set the DRTS (RadioText refresh) rate. A the default setting of 3 should be adequate for static messaging, or a 6 or 7 for RT+ applications. Radio Text transmission can be turned off entirely with a DRTS setting of 0 (zero). If your station elects not to send a RadioText message at all, setting DRTS to 0 will maximize throughput of other RDS functions.
12	<p>The PI code is the station's 'digital address' and is unique to each station. The PI code is a 4-character hexadecimal code, which is calculated from call letters in the US and Canada but is assigned by the local Broadcasting Authority in other parts of the world.</p> <p>When the 730 Encoder is in the RDS mode, only the top line of the Menu 12 screen will be active. This is where the hex code is entered.</p> <p>For North American broadcasters (RBDS mode), the 730 has a built-in utility to calculate the PI code from station call letters automatically. The call sign may be entered directly in the lower line of the LCD screen after passing through the PI field.</p>	<p>Push the jog wheel to enter the PI: area. The blinking cursor can be set to any hexadecimal value between 0 (zero) and F on the upper line of the LCD. The hex code will always contain just the numerals 0 through 9 and letters A through F, and will consist of 4 characters.</p> <p>To enter North American call letters in the RBDS mode, push the jog wheel repeatedly until it enters the CALL-LETTERS: area. Note that the first letter is restricted to a C, a K or a W. Enter the three- or four-letter call sign. (A blank for a 3-letter call follows 'Z'.) The conversion utility automatically pops-up the proper hex value in the PI: area on the upper line of the LCD.</p>
13	PTY, or Program Type, indicates your station's programming format. This allows RDS radios to seek a particular genre of programming automatically. PTY codes come from a list appropriate to RBDS (North America) or RDS (Rest of the World) Standards. A listing of these PTY codes is shown in the Appendix. The proper list is automatically selected when the 730 Encoder is initially set for RDS or RBDS operation as described in the first part of this section.	<p>Push the jog wheel to enter the PTY code appropriate to your station. As the jog wheel is rotated, the 730 displays the format description on the lower line of the LCD. When the proper format is displayed, press the jog wheel again to set PTY.</p> <p>Refer to the list in the Appendix; some additional information appears on Page 39.</p>
14	PTYN is an 8-character identifier that further defines the PTY listing. PTYN is not used in the RDS 'search' mode, but once a station is tuned-in the PTYN designation may be displayed on some receivers. The PTYN function is shown either Enabled or Disabled.	Push and turn the jog wheel to enter up to 8 characters that will help identify a program type and enable the PTYN function. To clear the entry and disable the PTYN feature, enter spaces for all characters.
15	The Music/Speech switch is one of the 'flags' that supposedly helps the receiver understand what it is tuned to. Further information may be found on Pages 10 and 39.	Push the jog wheel and rotate it to select 0 or 1, depending on your station being talk-only or having music programming, respectively. Push again to set the flag.
16	The Decoder Information flag is another obscure feature of the original RDS Standard (see Pages 10 and 39).	Push the jog wheel and rotate it to select 0 or 1, depending on your station being monaural or stereo, respectively. Push again to set.
17	TP (Traffic Program) identifies your station as one that supplies routine traffic announcements as part of the station's normal programming. This mode must be enabled to use the TA function (Menu 18). See Page 49 for further explanation and cautions.	Push the jog wheel and select 1 (or 0), depending on whether your station DOES (or does NOT) broadcast regular traffic announcements. Push the jog wheel to accept the selection and to verify the setting on the second line of the LCD.

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
18	<p>TA (Traffic Alert) is an announcement broadcast to warn of congested or dangerous road conditions. The TP flag (Menu 17) must be set in support of routine Traffic Program announcements for the TA flag to become active. See Page 49 for a complete description of this utility and the cautions to be addressed for using it.</p> <p>If TP is set to 0 on Menu 17, then this Menu 18 screen will indicate that Traffic Alerts are NOT supported. When TP is set to 1 on Menu 16, this Menu 17 screen will normally say that the Traffic Alert is Off. When a Traffic Alert is Active, however, this screen will show the TATIME countdown (Menu 18).</p>	<p>The TA flag is preferably set with a manual switch at the operator's position (Page 56), but also may be set with software (top of Page 50). The TA flag cannot be initiated locally with the jog wheel.</p>
19	<p>TATIME is the timeout setting for the TA flag. This is a safety feature built into the 730 Encoder that prevents it from sending a 'never-ending' TA flag if, for example, the manual TA switch is inadvertently left in a closed position or a software TA command is not cancelled. See Page 50 for additional notes.</p>	<p>Push the jog wheel and rotate it to choose an appropriate TA auto-timeout interval. 30 seconds should be sufficient to accommodate most important traffic announcements. Push the jog wheel to save the selection. The timer will be reset to this figure each time the TA switch is closed, or each time a TA software command is received.</p>
20 TO 44	<p>The Alternative Frequency list is the RDS utility that allows a receiver to keep track of all frequencies that carry the very same broadcast at the very same time (synchronously). The receiver holds this frequency list in memory, and can scan the frequencies and select the strongest signal that carries the program. This utility is used by European broadcasting networks and by US stations that have 'translators' to fill holes in their coverage area.</p>	<p>If you have one or more qualifying Alternative Frequencies, press the jog wheel and then turn it to select the frequency of your translator. Press the jog wheel again to save the frequency. Then go to the next AF menu screen and do the same for any other translators.</p> <p>NOTE: Be sure to include the primary station frequency in this list!</p> <p>To remove a frequency from the list, simply change the setting to NONE. The 730 Encoder automatically resorts the list to eliminate gaps. RESORTING will show as this is being done.</p>
45	<p>DHCP is an automatic IP network configuration feature. With DHCP enabled, the 730 Encoder (client) receives its IP address and other configuration information automatically from the server or network router.</p>	<p>Push the jog wheel and select either 0 (or 1) to disable (or enable) DHCP. Push again to accept the setting. The lower line of the LCD will indicate the choice.</p>
46 TO 49	<p>When DHCP is <i>not</i> used to configure the network connection, these four fields must be programmed manually. This is best delegated to your Network Administrator, who should be familiar with this type of setup.</p>	<p>Push the jog wheel to access the data areas and enter the relevant information. Proper values are critical to solid network connection. To abort data entry at any time during the process, hold the jog wheel down and allow the blinking cursor to 'fall off' the left-hand side of the LCD screen.</p>
50	<p>The MAC address shown on the upper line of this screen is the unique hardware ID of this particular 730 Encoder. A unique MAC address is essential to network connectivity. This registered address is assigned during the manufacturing process and cannot be changed.</p> <p>On the lower line, this screen also displays the External IP address of the local network that the encoder is connected to.</p>	<p>The MAC address is unique to the encoder and cannot be changed. However, pushing the jog wheel will re-acquire the External IP address shown on the lower line.</p>

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
51 TO 53	<p>The 730 Encoder offers three IP (Internet Protocol) networking ports for interconnection with a LAN (Local Area Network) or the Internet. All three ports are accessed via the one rear-panel RJ45 jack.</p> <p>Two ports are common TCP (Transmission Control Protocol) ports for 2-way communication with the encoder. The other is a UDP (User Datagram Protocol) port, which also may be used for 2-way communication, but it will support 1-way network connections that are restricted to inbound (to the encoder) communication.</p> <p>The two TCP ports may be protected by a password, which may be set on Menu 76 or by using the Windows® software.</p>	<p>Using the usual jog wheel procedure, Ports 1, 2 and 3 may be assigned any number between 1 and 65535. A setting of 0 (zero) disables the port. Port settings should be verified by the Network Administrator. Factory defaults are 10001 and 10002 for the two TCP ports and 10003 for the UDP port.</p>
54 TO 57	<p>'Dynamic DNS' is a feature of the 730 that allows continuous Internet connection with a unit working behind a dynamic (changing) IP address. Most residential (and some other) Internet connections (e.g.: DSL) assign the user an IP address that changes, from every several hours to every couple of days. This would prevent continuous communication between the playout system and the encoder when a dynamic-IP Internet connection is used to link the two.</p> <p>Fortunately there is a series of third-party Internet DNS 'forwarding' sites. Registering with one of these providers enables the site to 'follow' the encoder. The 730 alerts the site each time the IP address changes, and the site then redirects incoming data to the encoder's new IP address.</p> <p>Mode: is a status message associated with the Dynamic DNS function. Status symbols are tabulated on Page 68.</p>	<p>On Menu 54, push and turn the scroll wheel to select among these IP-address forwarding sites:</p> <ul style="list-style-type: none"> DynDNS:0 (feature is turned off) DynDNS:1 (dyndns.org) DynDNS:2 (no-ip.com) DynDNS:3 (dnsomatic.com) <p>It will be necessary for the user to log onto one of these sites with a computer and register:</p> <ul style="list-style-type: none"> A Dynamic DNS Hostname A Dynamic DNS Username A Dynamic DNS Password <p>This information is then entered into Menus 55, 56 and 57, respectively, either with the jog wheel or by using the Windows® software or Terminal utility.</p> <p>When using the jog wheel to set the DNS information, you must enter a ← at the end of each field.</p>
58 AND 59	<p>While the 730 Encoder has an active Internet connection and the Clock-Time function has been enabled (Menu 62), the date and time are set automatically. This will be verified on the lower line of the display, which will either say: Date/Time is set via INTERNET, or Date/Time is set via INTERNAL CLOCK.</p> <p>Even a temporary connection to the Internet will set the encoder's internal clock. Once Menus 58 and 59 show that Date and Time have been '...set via Internet,' the Internet may then be disconnected if desired, and the 730 will maintain the time and date settings with reasonable accuracy using the encoder's internal real-time clock.</p>	<p>Before setting the time and date, navigate to Menu 60 and make sure that the UTC offset is programmed properly as described in the instructions for that menu. Then return to these menus and push and turn the jog wheel to set the date, and time in hours, minutes and seconds to the correct local time. Push again to accept the setting.</p> <p>Time is entered and sent in the 24-hour clock format. The jog wheel may be used to set the time manually when an Internet connection is not available.</p>
60	<p>A proper time zone offset must be entered here to ensure proper operation of the RDS Clock-Time function. The offset from UTC (Universal Coordinated Time, formerly Greenwich Mean Time) is shown in this window, as well as the selected time zone locale.</p>	<p>Press and turn the jog wheel to set the UTC offset. Note that the offset is in one-half-hour increments, as required in some parts of the world. The more familiar locale for the local time zone is shown on the lower line.</p> <p>Do not make any allowance for Daylight Saving Time (Summer Time) here. This is done in Menu 61.</p>

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
61	<p>Daylight Saving Time (DST) is a seasonal one-hour offset from local Standard Time observed in some, but not all, time zones. What's more, the date for the beginning and end of DST is variable. Because this offset is not universal, Internet timekeeping does not automatically take DST into account. This means that the 730 Encoder must be manually programmed for the beginning and ending dates and times for DST, depending on its location.</p> <p>The Menu 61 window indicates whether or not DST is currently observed, and also shows whether or not a DST schedule has been entered.</p>	<p>The jog wheel can be set to observe Daylight Saving Time or not, but a DST schedule must first have been uploaded to the 730 Encoder. Because of DST scheduling complexity and variability, no provision is made to set the dates and times for the DST transition with the jog wheel. Instead, the supplied Windows® software includes a utility that either uses the computer's operating system to set the schedule automatically, or enables manual entry of local beginning and ending dates and times for Standard/Daylight Saving changeover (see Page 37).</p>
62	<p>This screen simply indicates whether the Clock-Time RDS function is enabled or disabled. The 730 Encoder must either be set manually with good accuracy or, preferably, receive time updates from the Internet. Also, it must be programmed with the proper offset from UTC. Otherwise listeners may register angry and valid complaints when their radio clocks change to an incorrect time.</p>	<p>Push and turn the jog wheel to choose whether to Enable or Disable the RDS transmission of timekeeping data to RDS receivers equipped with clocks.</p>
63	<p>When enabled, Terminal Echo returns data sent to the encoder back to the originating computer. When using a Terminal Program or the Terminal utility included in the 730 software, Echo shows what is being typed on the terminal screen.</p>	<p>Push and turn the jog wheel to Enable or Disable the Terminal Echo. ECHO:1 is the factory default and will give a proper response when using the Terminal utility or a terminal program. The only reason to turn ECHO off is if it confuses station automation.</p>
64	<p>The 57kHz RDS subcarrier may be turned on or off, either locally or by a software command. This screen shows whether or not the subcarrier is being broadcast.</p>	<p>Push and turn the jog wheel to Enable or Disable the RDS subcarrier. In loop-through mode, this will not affect the FM multiplex signal routed through the encoder.</p>
65	<p>UECP, or Universal Encoder Communication Protocol, is a means of communicating with multiple RDS encoders in a 'harmonized' fashion. This is used widely in Europe and has universal application for third-party RDS data providers.</p>	<p>Push and turn the jog wheel to enable the UECP mode for various combinations of 730 Encoder ports. With UECP:0 the feature is disabled</p>
66	<p>The Site Address is unique to UECP-mode operation of the 730 Encoder.</p>	<p>Push and turn the jog wheel to set the UECP-mode Site Address to the assigned value between 0 and 1023.</p>
67	<p>The Encoder address is unique to UECP-mode operation of the 730 Encoder.</p>	<p>Push and turn the jog wheel to set the UECP-mode Encoder Address to the assigned value between 0 and 63.</p>
68	<p>The 730 Encoder has a "no headers" mode (Headers Disabled), which converts unformatted incoming data (e.g.: satellite-streamed song titles) directly to dynamic (scrolling) PS. Headers Enabled is the normal and preferred mode, which enables all features of the 730 Encoder, but of course this mode requires scrolling messages to be formatted properly and carry the appropriate preambles.</p>	<p>Push and turn the jog wheel to select between Headers Enabled or Headers Disabled operation.</p> <p>WARNING: With Headers Disabled, any data received by the encoder will be parsed and sent as a dynamic PS message, <i>including all programming commands!</i></p>

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
69	The baud rate of the RS-232 serial interface is shown on this screen. It may be any customary value between 1200 and 115200. The baud rate may be set locally or through any port using the Windows® software or the Terminal utility. The software features a function that automatically finds the proper port and baud rate (see Page 59).	Push and turn the jog wheel to choose the baud rate manually; push again to set.
70	RTP refers to "RT+," the RDS feature that enables song tagging and other 'interactive' applications. This menu shows the numerical value of RT+ data packets as they are received and queued for transmission (see Section VIII beginning on Page 70).	You may use the jog wheel to set values manually in the RT+ tagging register. Although tagging is normally a dynamic function, static values may be entered to tag a telephone number or Web address, for example. This also may be set by software (Page 72).
71	RTPDEFAULT is the optional RT+ tagging data for the default RadioText message set in Menu 09. Tags for the station's phone number or Web address may be set here.	This register is set in much the same manner as the previous Menu 70, and is easily set using the Windows® software. See Page 74.
72	This is the RT+ configuration screen showing the RDS Group and Message Bit assignment, and also whether RT+ configuration is enabled.	The RT+ group and message-bit information may be set manually here. The factory default will be the proper setup for most applications, but see Page 73 for details.
73	Shows whether the RT+ Running Bit is being broadcast or not (see Section VIII).	Push and turn to jog wheel to set the running bit to 0 (Low), to 1 (Auto), or to 2 (Force Low). See Page 73.
74	Shows how the RT+ Toggle Bit is set (see Section VIII).	Push and turn to jog wheel to set the toggle bit to 0 (Never Toggle), to 1 (Auto), to 2 (Force Low), or to 3 (Force High). See Page 73.
75	When enabled, the built-in Scheduler can send pre-programmed scrolling-PS messages at specific times on certain dates or days of the week. Scheduler programming is explained beginning on Page 34.	Push and turn the jog wheel to enable or disable scheduled events locally.
76	This screen shows whether a NETPASS (network password) has assigned to protect the two TCP ports (Menus 51 and 52). The password will not be displayed, just a star for each character. (This will at least give a hint to jog the user's memory.)	The password is most easily set using 730 Encoder software or the Terminal utility (see Page 66). The jog wheel may be used, however, by entering the desired letters and/or numerals, up to 16 characters. At the end of the password string you must enter a ↵ (Enter) to save the password to encoder memory.
77	The front-panel jog wheel (Knob) may be locked-out of the editing mode so that current menu settings can be navigated and read but not changed. Although the lockout may be reversed locally with the jog wheel, this measure does guard against 'bumping.'	Push and turn the jog wheel to Disable and Enable Knob Editing.
78	Transmission of Scrolling-PS, Radio Text and RT+ information may be delayed in 1-second increments, up to 120 seconds, so that these fields will be synchronous with the analog FM program that itself has been delayed by profanity or digital-radio 'diversity' delay.	Push and turn the jog wheel to dial-in the number of seconds for the RDS delay. Push again to set the value.

<u>Menu No.</u>	<u>Menu Item Description</u>	<u>Jog Wheel Editing Procedure</u>
79 AND 80 81	<p>The ODA (Data groups) may be arranged to repeat automatically with both the interval and 'burst' set by the user. This may be of help in reducing the load and data traffic of systems generating the ODA packets.</p> <p>The injection level of the RDS subcarrier may be read here, both as a peak-to-peak output voltage and as a relative bargraph display. The level may also be set here, or it may be set by software command. Refer to Page 57 for setting the proper RDS injection level.</p>	<p>This is a display of the encoder setup only; no jog wheel action is associated with these two menus. Setup is outlined on Page 62.</p> <p>Push and turn the jog wheel to set the subcarrier injection level. Push again to accept the value.</p> <p>This adjustment affects only the level of the RDS subcarrier. It makes no change to the composite/MPX level in the loop-through mode.</p>

HOOK IT UP OR KEEP PROGRAMMING?

If all flags and registers of the 730 Encoder have been completely and conscientiously programmed per the foregoing tutorial, the unit may now be connected in the station's air chain. If this is the case, you may skip Sections III and IV and go directly to Section V, which describes installation and connection.

If, however, you have skipped over some of the more tedious data entry in deference to using the much-acclaimed 'faster and easier' Windows® software, the next section covers software installation and application. Again, this can be done on a desktop or workbench using a laptop PC and direct connection to any port of the 730 Encoder.

Section III

SOFTWARE INSTALLATION AND INITIAL ENCODER SETUP

NOTE: It is important to pre-program the 730 Encoder before it is placed in the air chain. Programming loads your station-specific data into non-volatile memory within the 730 Encoder itself. Default register settings and messages are programmed-in at the factory as part of the final checkout process. Although benign in nature and intent, factory defaults could prove a source of confusion or embarrassment if put on-air in lieu of settings and messages appropriate to the installation. Section II has already described RDS data setup using the front-panel jog wheel.

COMMUNICATING WITH THE 730 ENCODER

ASCII Commands Outside of its use with European radio networks or with third-party data consolidators, the 730 Encoder will probably be addressed with ASCII commands. The 730 may be addressed through the front-panel USB port, by an RS-232 serial link, or it may be connected to a network: either a Local Area Network (LAN) or the Internet. Any port may be used to program the encoder if this has not already been done using the jog wheel as described in Section II. 730 Encoder software serves all connection options with an intuitive data-entry screen and self-guiding Help.

Scrolling song titles require interconnection with station automation or, in special cases, directly with the data port of a satellite receiver. Some RDS applications require continuous, on-line access to the RDS encoder by third-party service providers. The 730 Encoder offers these capabilities as it can be directly addressed through its serial or network ports by simple ASCII commands.

UECP Operation The Universal Encoder Communications Protocol (UECP) was developed during initial RDS implementation as a ‘harmonized’ means of linking encoders in European radio network applications. It is identified by the European RDS Subcommittee as document SPB 490.

UECP does not enable additional RDS features; it is simply a different means of communicating with the encoder that uses hexadecimal (hex) code rather than ASCII commands.

UECP operation is available on serial and network ports and is most easily set using the 730 Encoder software (see Page 38). It is also possible to toggle ports between UECP and ASCII opera-

tion by jog wheel selection using Menu 65, or by sending it a UECP= commands using the Terminal utility. (Terminal utility discussion begins on Page 31.) Once the UECP mode is enabled on a port or ports, the encoder will respond only to UECP hex commands on those ports. The 730 Encoder supports many of the UECP functions found in SPB 490.

The complete SPB 490 Specification may be downloaded from the RDS Subcommittee site:

www.rds.org.uk/rds98/pdf/UECP_6_02_final_060912.pdf

INSTALLING THE SOFTWARE

Install Software First!

The provided software supports Inovonics' 703, 720 and 730 RadioData encoders and runs on any Windows® computer with Microsoft's Windows® XP or later operating systems. Software should be installed on the computer *before* the computer is connected to the 730 Encoder. The same software is used for USB, serial or network connections between the computer and the 730 Encoder.

Microsoft .NET Framework

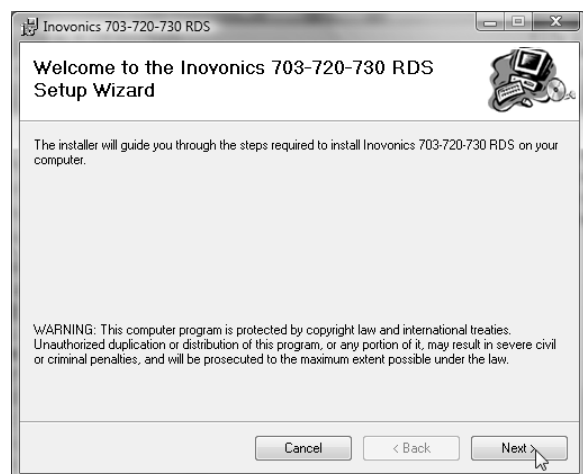
730 Encoder software utilizes components of Microsoft's .NET framework. This is a utility that has been distributed through routine Microsoft Updates, so it should already be resident on any properly-maintained PC.

If software installation pauses because .NET files are not found on the computer, .NET should be downloaded directly from the Microsoft Website. When encoder software is downloaded from the Inovonics Website, the .NET installation is automatic.

We recommend downloading any .NET updates following installation of the 'core' components required for encoder software installation.

Insert the CD-ROM into the computer's appropriate drive. The disc has an auto-run utility that will start the Windows Installer. If auto-run has been disabled, open the CD drive folder and double-click the setup.exe icon.

The image shown at the right should appear on your screen in short order. This is the 703/720/730 Encoder Setup Wizard that will guide you through software installation. For a typical installation, simply continue to click: Next> until the program has been completely installed, then click: Close to exit the Wizard.

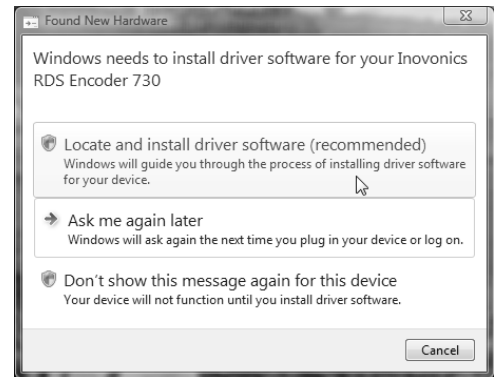


Software installation will place a shortcut on the computer Desktop. The icon indicates that the software program is common to several Inovonics RDS encoders. Do please resist the overwhelming temptation to double-click the icon at this time. The USB driver should first be installed, and we recommend installing this driver whether or not the encoder's USB port will be your primary means of addressing the unit.

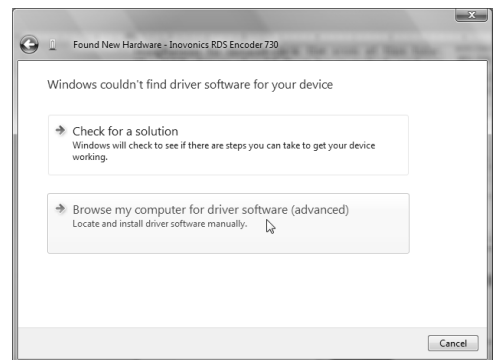
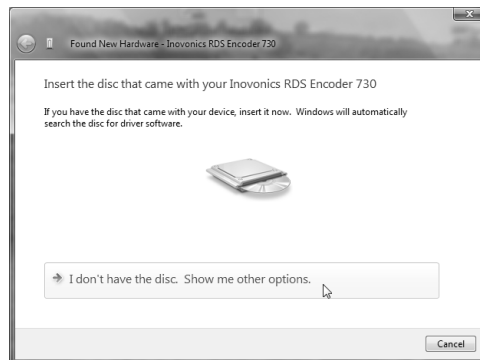


Installing the USB Driver

Power-up the 730 Encoder and connect it to the computer using the USB cable provided. 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. Click: Locate and install driver software (recommended).

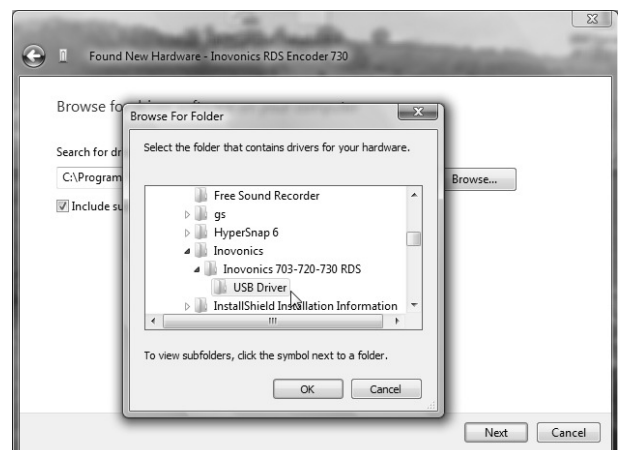


On the second installation screen (below, left), the Wizard will ask you to insert the provided CD. *Do not do this.* Instead click the box: I don't have the disc. Show me other options.



This will bring up yet another Wizard screen; click on: Browse my computer for driver software (advanced), as shown on the right, above.

Next you'll be prompted to find the location of the USB driver on your computer. Click: Browse and then navigate to the C:/Program Files folder where the software was installed, as shown here. Click on the subfolder named: USB Driver and continue clicking: OK and: Next until driver installation completes. At



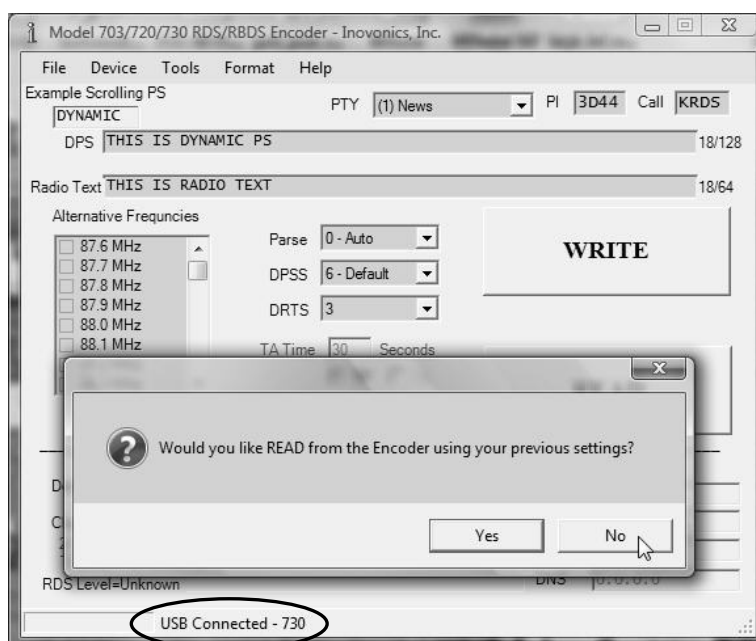
this point you will see another tray notification, this time advising that the new hardware is installed and ready to use.

RUNNING THE SOFTWARE

Even if you have no intention of programming the encoder through the USB port in everyday operation, we recommend that you become familiar with the data entry procedure using this easy connection. If you have followed this manual's sequence of encoder setup, the computer should be connected to the USB port at this time. A procedure for establishing serial (COM) port communications between the computer and the encoder begins on Page 59, network connection is addressed in Section VII, beginning on Page 66.

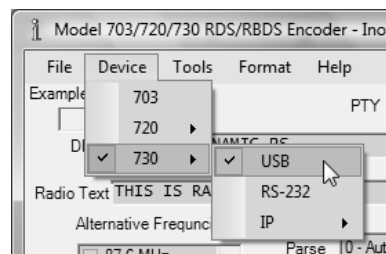


With the computer and encoder USB ports connected, double-click the 730 Encoder Desktop icon shown at the left to launch the program and bring up the initial data-entry window shown below.

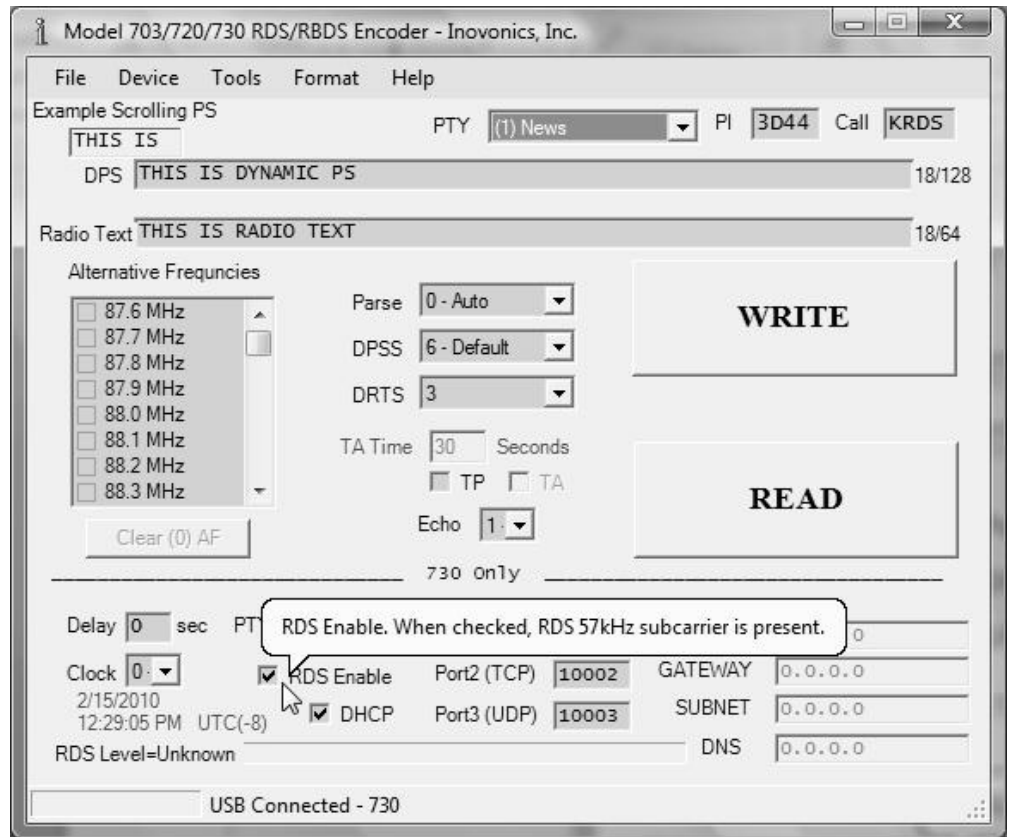


For now click: No in the secondary box with the question mark. Reading from the encoder at program launch is a safeguard feature that is covered later in the discussion.

The computer should have 'found' the encoder connected to its USB port. Check the notation at the bottom of the software screen (circled in the snapshot above). The USB communications option may be selected manually at any time with the drop-down Device menu at the top of the screen by clicking: Device/730/USB.

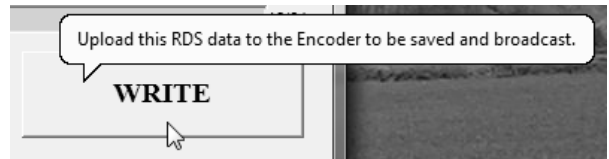


The software data entry screen is shown below. Most entry fields have ‘flyover’ Help balloons with a brief description of the associated RDS function, setup hints, and any restrictions. The Help balloon for the RDS subcarrier enable box is shown here.



WRITING TO AND READING FROM THE ENCODER

When using the 730 Encoder software program to address the unit from a computer, once any single or series of RDS parameters have been set and any text entered, it is always necessary to click: **WRITE** to send the data to the encoder. The data will be transferred to non-volatile memory within the 730 Encoder at that time.



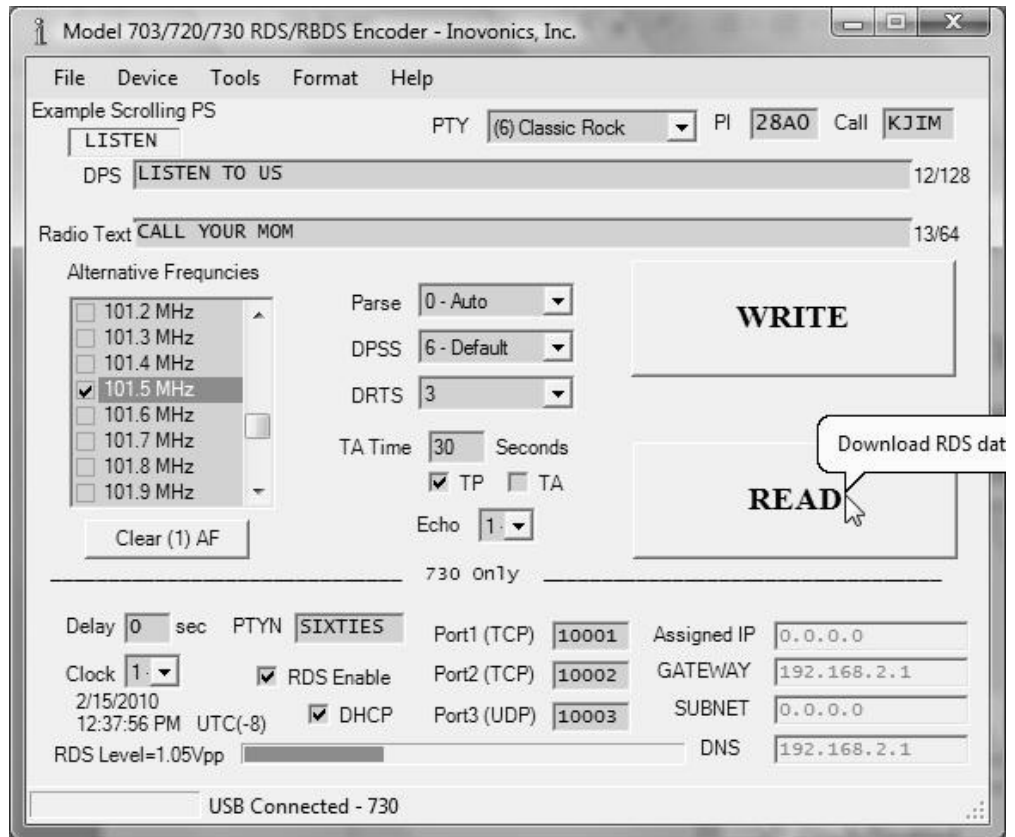
Keep in mind that when the **WRITE** button is clicked, the entire contents of the software screen will be re-sent to refresh encoder internal memory.

Similarly, clicking: **READ** will download the contents of the 730 Encoder memory back to the software where it can be read, changed or saved as a .rds file.

Reading From the 730 Encoder

If the jog wheel and LCD were used to enter at least some of the data as recommended and explained in Section II, you can click on: **READ** to download your encoder setup to the software

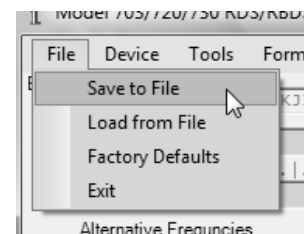
screen. The screen might look like the following snapshot if you became impatient with the jog wheel entry method.



The remainder of this section will explain 730 Encoder setup and housekeeping functions using the Windows® software. These procedures are common to USB, serial and network connection to the 730 Encoder.

FILE OPTIONS

Click the File tab at the top of the window. This brings down a sub-menu with choices for either saving programming setups *from* the encoder to a small file on the computer, or for uploading setups from a file on the computer *to* the encoder.



Files will be assigned a .rds extension, and you will be prompted to locate an area on your hard drive to save these. This file utility may be used to distribute a common encoder setup among stations in a network, or to more easily update non-dynamic scrolling-PS or Radio Text messages without having to type them in each time. .rds files may be stored and managed using the familiar Windows® file-making rules and procedures.

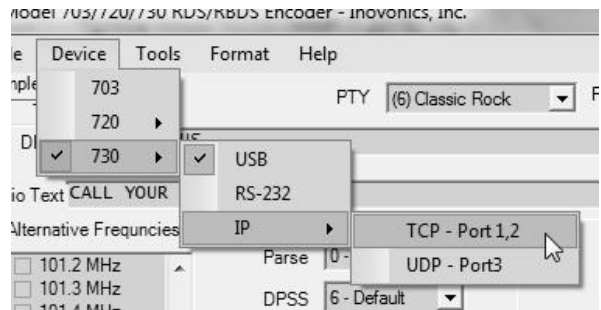
Reset to Factory Defaults

This menu tab also allows the user to reset the encoder to Factory Defaults. This command will re-initialize the encoder with factory settings and update the computer screen appro-

priately. There is a second prompt before execution to make sure that re-initialization is really what you want to do. *All programmed setup options are purged from non-volatile encoder memory when factory defaults are restored.* .rds files that have been saved to a folder will not be affected.

DEVICE SELECTION AND CONNECTION OPTIONS

The Windows® software supplied with the 730 is common to Inovonics Models 703, 720 and 730 RDS encoders. The Device tab at the top of the screen selects among the three units and their available connection options. This snapshot shows the present USB connection for the 730 Encoder, but has been expanded to show other options. Serial COM port and network connections will be discussed in their appropriate sections.

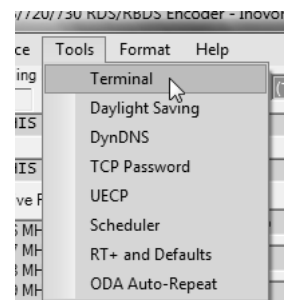


THE TERMINAL UTILITY

The 730 Encoder responds to simple ASCII commands, except when it is in the UECP mode (see Page 38). The Windows® software is a Graphic User Interface (GUI) that permits easy and intuitive entry of text and other programming instructions, complete with ‘flyover’ Help balloons. The GUI converts entries to the appropriate ASCII commands and sends them to the 730 Encoder when the **WRITE** button is clicked. Station automation sends ASCII commands directly. A complete listing of the encoder command set appears in the Appendix, beginning on Page 76.

Using the Terminal Utility

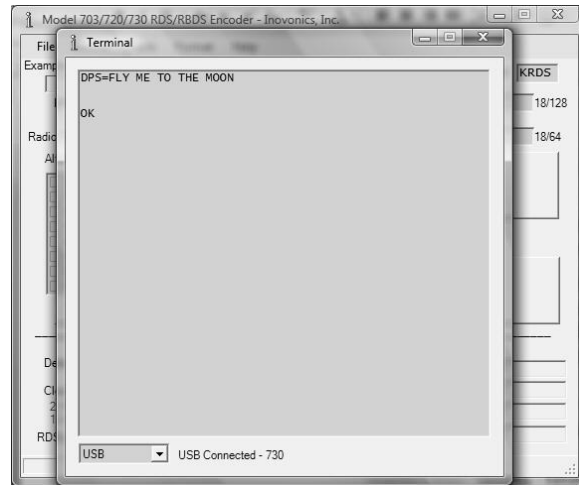
Clicking: Tools and then: Terminal will open a separate window that looks and acts very much like the Hilgraeve HyperTerminal utility that is distributed by Microsoft with some versions of Windows®. A PC running HyperTerminal (or any “dumb” ASCII terminal) may, in fact, be used to communicate with the 730 Encoder just as well.



The Terminal window is shown on the next page. ASCII commands may be typed directly into this window and are sent to the 730 Encoder as they are typed. An Enter command, represented in this manual with this symbol: ↵, ends the command string and tells the encoder to process the entries. The Terminal utility may be used with either USB, serial or network connections between the computer and the Model 730 encoder.

For the illustration that follows, it's best to restore the encoder to factory default values. Click: File/Factory Defaults and click: Yes when asked if you wish to continue.

Now open the Terminal window. Check for the USB Connected - 730 notation at the bottom of the window. Next type: DPS=FLY ME TO THE MOON↵ ; that is, the 'header' DPS, the equal sign, the song title and the Enter key. The characters will be displayed as you type. What appears in the window has been received, and is being 'echoed' (sent back)



by the 730 Encoder. This echo function is a factory default and is recommended, but it can be changed through software by selecting an option from the Echo drop-down menu, or by using the front-panel jog wheel on Menu 63.

When the 730 encoder recognizes an ASCII command as valid, it returns: OK. This is shown in the snapshot and should appear on your own screen. If the ASCII command is not valid because of an improper command or the wrong syntax, the 730 Encoder will send back: NO.

Now go to the 730 Encoder front panel and dial up Menu 01. **FLY ME TO THE MOON** should be scrolling in the lower-right corner of the LCD.

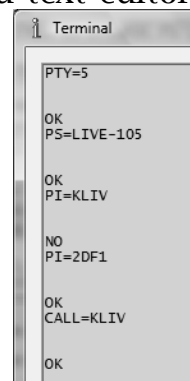
The Terminal utility may be used for updating any RDS message or flag, or for housekeeping functions such as changing IP passwords. To enter Radio Text, for instance, you could type: TEXT=PHONE IN YOUR REQUESTS TO 1-800-733-0552↵ . The encoder should send back an OK.

The encoder input buffer has a timeout of 25 seconds. Any command sent to the encoder needs to be entered completely, including the ↵ (Enter), within this timeout period.

Correcting Typing Errors

The Terminal utility window does *not* make a good text editor! Technical factors make typing errors difficult to correct here. Don't type really fast, and if you do make a mistake, just hit ↵ (Enter) and start over.

Each entry in the Terminal utility must be started with the appropriate header and ended with an Enter command. Look for OK or NO syntax verification returned from the encoder to the Terminal screen. The third entry shown here was an attempt to set the PI register simply by typing-in call letters. When a proper hex-value PI code is entered, however, the response is OK. Although



the attempted PI=KLIV is not valid, North American call letters may be typed in as CALL=, making use of the built-in conversion utility. This is shown as the final entry in this illustration.

Updating the AF List

To keep the 730 Encoder backward-compatible with earlier In-ovonics models, the Alternative Frequency list (AF) may be entered in either of two ways when using the Terminal utility.

- 1) Enter the frequency directly in MHz. Example: AF1=95.9↵ and AF2=97.1↵. Up to 25 Alternative frequencies may be entered in this manner. To clear the second entry from the AF list, for example, type AF2=0↵. The 730 Encoder will re-sort the list, so AF 'slot' numbers may change.
- 2) Enter the Alternative Frequency by direct entry of the *channel number* assignments listed in the RDS and RBDS Standards. Channel numbers are tabulated in the Appendix on Page 81. An example entry would be AF1=114↵ for 98.9MHz.

Sending the command: AF0=0↵ will clear *all* AF entries from the Encoder.

Saving to Non-Volatile Memory

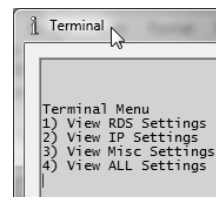
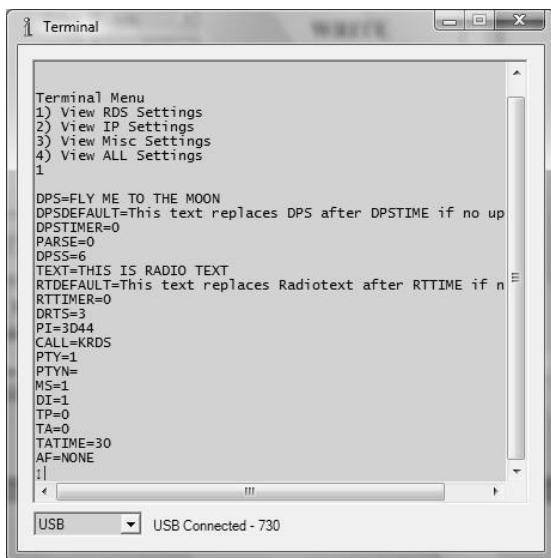
Most commands sent to the 730 Encoder as ASCII text strings with headers using the Terminal utility are automatically saved in non-volatile memory and will not be lost in the event of a power interruption. Exceptions are DPS=, TEXT=, and RTP= messages, which are considered temporary because they are typically streamed from station automation and are continually updated.

If, however, the Terminal utility is used to upload a scrolling-PS, RadioText or RT+ message that needs to be retained, simply type: SAVE↵ to transfer these data from the encoder's RAM to non-volatile EEPROM memory.

Interrogating the 730 Encoder

Typing: HELP↵, or simply: ↵ (Enter), into the Terminal window will bring up the menu shown at the right. Because the 730 Encoder memory contains a large number of messages and values, it has

been divided into four categories.

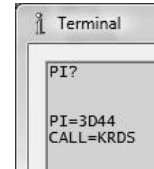


Typing: 1 will bring all the setting for RDS messaging into the window as shown at the left. At the top of the list you will see the DPS=FLY ME TO THE MOON entry that you previously sent to the unit. The other encoder register entries will be explained as they are addressed in their respective discussions.

The other numbered Terminal Menu categories contain IP communications settings; ‘miscellaneous’ settings relating to date-and-time, IP password, etc.; or the entire contents of the 730 Encoder internal memory.

Typing: ??↵ into the Terminal window (two question marks followed by Enter) causes the 730 Encoder to send a copy of *everything* in its memory back to the Terminal screen. Keep in mind that this is a great deal of data and will spill off the screen. Any single item on the list may be interrogated independently by typing its header, a question mark and Enter.

For example, typing: PI?↵ will bring up both the hexadecimal PI value and the associated call letters (North America only). Again, this command-set information is listed in the Appendix, beginning on Page 76.



ENCODER HOUSEKEEPING COMMANDS

Encoder Initialization Typing: INIT↵ is an “initialize” function, equivalent to executing the File/Factory Defaults command. This erases all user programming that has been uploaded to non-volatile memory and restores the encoder to factory-default settings.

To save an existing encoder setup, use the **READ** button on the software screen to bring encoder settings into the software program. Then click: File/Save to File to create an .rds file (see Page 30).

Encoder Reset Typing: RESET↵ performs a ‘soft restart’ equivalent to powering the encoder down and back up again. This reset command does *not* clear the registers of any programming commands that have been retained with a SAVE↵ command.

Firmware Version Type: REV↵ for a display of the encoder’s firmware version. This has importance in determining whether differences exist between 730 Encoder units purchased at different times. The latest firmware can be downloaded from www.inovon.com.

THE SCHEDULER

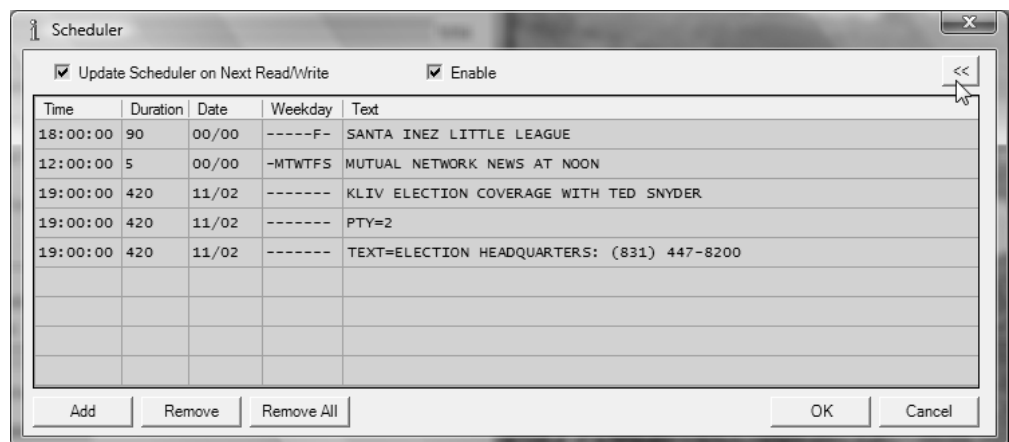
The 730 Encoder includes an on-board Scheduler that can insert dynamic PS (scrolling) messages or allow the encoder to respond to other programmed commands at specified times or intervals. This is useful when the station departs from its normal programming, either on a regular basis or for a one-time event. For example, rather than have the title and artist information scrolling from a playout system that’s been paused or cut-away-from for a special event, an alternative message can come on at the proper time and for the proper duration to scroll during a particular scheduled program.

While the primary utility of the scheduler is to change the scrolling-PS (DPS=) message to describe accompanying broadcast events (a weekly Little League ballgame, for instance), any encoder command may be scheduled as well. For example, if an all-music station were to devote an entire day to election coverage, the PTY code could be scheduled to change from 'Top 40' to 'Information.'

Similarly, any encoder command may be executed on a schedule simply by including the header (e.g.: PARSE= , PTYN= , AF4= , etc.). If no valid header is included, the encoder assumes the entry is a scrolling-PS message.

Up to 20 separate, 120-character messages or encoder commands may be uploaded to the 730 Encoder for scheduling by the onboard clock. Events or messages may be scheduled by the date and time or by the day(s) of the week and time.

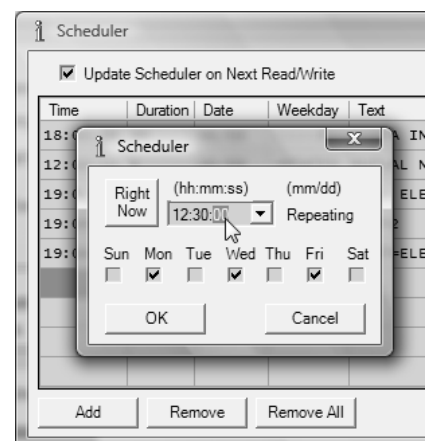
The Scheduler is accessed by clicking: Tools/Scheduler in the menu bar. The Scheduler screen in the example below has been programmed for five events: three alternative scrolling-PS messages that are associated with specific broadcasts, a PTY change for election coverage, and a Radio Text message also in connection with the election.



Note that the pointer arrow in this illustration hovers over a button that opens the window to its widest so that the complete text of messages is displayed.

Entering Schedules

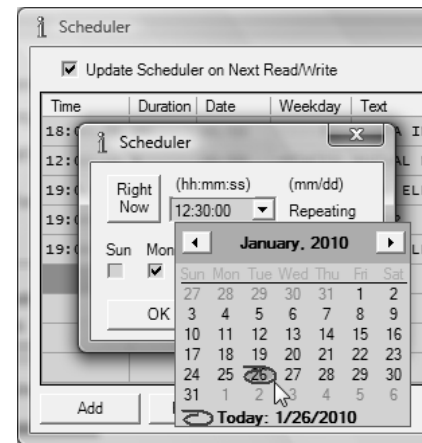
Clicking in the Time, Date or Week-day boxes will bring up the event entry box shown here. You may check any day of the week for a repeating event, from a single day to all seven days. To enter a starting time for this event, overwrite the desired time onto the current time shown in the hour, minute and seconds windows. The Right Now button brings the date and time up to the current PC clock time at the moment the button is clicked.



To schedule a one-time event, click the ‘down button’ to the right of the time display. This pops up a calendar for the current month, which may be changed with the left- and right-facing arrows at the top.

The current date will be circled, and any day from that point forward may be clicked. Use the left- and right-facing arrows at the top of the calendar to change months. Just as with repeating events, overwrite the starting time of the one-time event onto the current time.

The duration of the event, in minutes, may be entered in the Duration column. The scrolling message for the event, up to 120 characters in length, is typed into the Text column as shown in the previous illustration. The use of uppercase letters is recommended for the reasons given on Page 14.



Updating and Enabling Scheduled Events

There are two checkboxes at the top of the Scheduler window. ☒ Update Scheduler on Next Read/Write must be checked to upload scheduled events to 730 Encoder memory, and also to download scheduled events to a computer other than the one that was used to originally program the Scheduler, as explained in the **Scheduler Files** discussion that follows.

Checking the ☒ Enable box does just that, it instructs the 730 Encoder to observe the uploaded list of scheduled events and substitute the scrolling text for routine DPS messaging and specific encoder commands to override permanent settings. If this box is not checked, scheduled events may still be uploaded to the encoder, but they will not replace routine messages and encoder commands at the arranged starting times. The Scheduler may also be enabled or disabled locally with the jog wheel on Menu 75.

Scheduler Files

The computer creates a small file of scheduled events as they are entered. This file is automatically saved with the encoder program file, usually C:/Program Files/Inovonics/Inovonics 703-720-730 RDS/schedule.csv. The next time that the Scheduler is opened all schedules that have been entered and that remain in the queue will be displayed. (.csv files are ‘comma-separated value’ files and may be edited using a database program such as Microsoft Excel instead of the software screen if this is more convenient.)

If a second computer is used to change the list of scheduled events, schedule information will not be in residence on that machine. A **READ** command will duplicate the encoder-resident schedule listings on the second computer as long as the ☒ Update Scheduler on Next Read/Write box is checked. If this exercise is *not* performed, and a new scheduled event is uploaded to the 730 Encoder from the second computer, only that uploaded

event will be placed in residence in encoder memory – *all other scheduled events will be lost!*

**Priority of
Scheduled
Events**

Scheduled events always have priority over scrolling messages and other commands incoming to the 730 Encoder. When a scheduled event's time comes, it takes over the encoder, and contrary incoming commands of like kind are ignored for the programmed Duration period. To cancel a scheduled event, the Scheduler must be disabled, either from the front panel on Menu 75 or by unchecking the ☒ Enable box in the software interface and then clicking the **WRITE** button with the ☒ Update Scheduler on Next Read/Write box checked. The schedule field may then be edited, the scheduler re-enabled, and these changes uploaded to the 730 Encoder by clicking the **WRITE** button again.

**'Open-Ended'
Events**

If a Duration value of 0 (zero) for an event is entered into the Scheduler, the scheduled text will begin scrolling at the specified time, and will continue to scroll indefinitely until a contrary command (scrolling message or [header]=X) is uploaded to the 730 Encoder. Only when Duration is zero will an incoming command have priority over the scheduled event.

An example of the usefulness of zero-duration might be that Little League baseball game shown in the example schedule on Page 35. Game duration in that instance was fixed at 90 minutes by arrangement with the team and advertisers. A less formal schedule, with a 0 in the Duration column, would have allowed normal programming with its attendant scrolling message to commence at the end of the game.

DAYLIGHT SAVING TIME

Until fairly recently, Daylight Saving Time (DST) was less complex than it has now become. Different locales adopt DST on dates that change at the whim of government bureaucrats, as exemplified in the rules for the US and Europe reproduced here:

Most of the **United States** begins Daylight Saving Time at 2:00 a.m. on the second Sunday in March and reverts to standard time on the first Sunday in November. In the U.S., each time zone switches at a different time.

In the **European Union**, Summer Time begins and ends at 1:00 a.m. Universal Time (Greenwich Mean Time). It begins the last Sunday in March and ends the last Sunday in October. In the EU, all time zones change at the same moment.

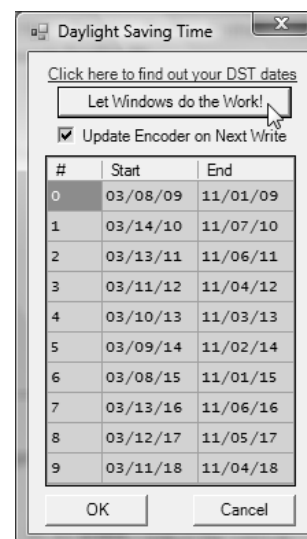
The real-time clock in the 730 Encoder is kept accurate automatically when the unit is connected to the Internet, or it may be set manually through the software interface or with the jog wheel on Menu 58. In any case, the time shown on Menu 58 is local time and must take both the offset with UTC (Universal Coordinated time) and DST (Daylight Saving Time) into account.

Clicking: Tools/Daylight Saving brings down the DST scheduling box. This is shown on the next page, filled-in for the next ten years according to current DST observance in the US. Note the valuable button at the top: Let Windows do the Work! Clicking this button will automatically program the DST Start and End

times according to the same rules that are in place for the connected computer.

There is also an Internet link at the top of the DST scheduling box. You may click on this link to confirm the proper DST “spring forward, fall back” date changes for your geographic area.

When the DST start and end times have been entered, check the ☒ Update Encoder on Next Write box and click the **WRITE** button to upload these settings to encoder memory. You may access Menu 61 with the jog wheel to confirm the upload; the next DST change will be shown in the menu.

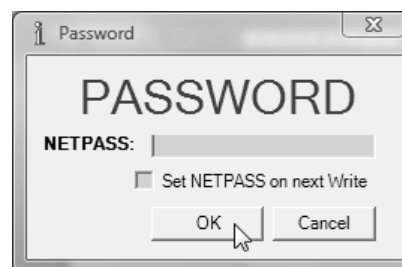


DYNAMIC DNS

Dynamic DNS is a feature of the 730 Encoder that allows continuous Internet connection with a unit working behind a dynamic (changing) IP address. This is discussed in further detail on Page 67 in the Networking section.

TCP MODE PASSWORD

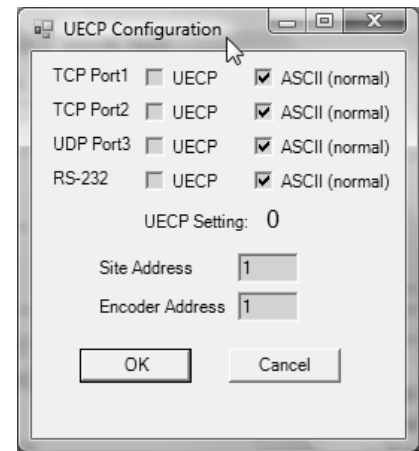
Because the 730 Encoder may be addressed over the public Internet, a password system has been incorporated in the TCP/IP operating mode to thwart hackers. Clicking: Tools/TCP Password in the software screen will bring up the box shown here, where a NETPASS: (network password) may be entered. Please refer to additional details and considerations in the Networking section on Page 66. Unused TCP ports may be turned off altogether by setting the Port No. to zero.



UECP PORT SELECTION

Click: Tools/UECP to bring up the port assignment utility shown at the top of the next page. All 730 Encoder ports are listed, and each port may be assigned as either a normal ASCII port or a UECP-enabled port. Ports assignments will be effective on the next **WRITE** command.

The port selection matrix is reduced to a hexadecimal value shown to the right of UECP Setting:. This single hex value (a zero when all ports are set to ASCII) describes how all ports have been assigned and may be used in alternate methods of addressing the 730 Encoder. The single-digit hex value may be entered with the jog wheel in Menu 65, or entered with the Terminal utility as UECP=X↵, where X is the hexadecimal value.



OTHER SETUP OPTIONS

The M/S Switch Click: Format/Station Type (M/S) to set this RDS flag to Music for the preponderance of today's FM broadcasting, or to Speech for an all-news or all-talk format, even allowing for jingles and promo ditties.

The DI Switch Click: Format/Txmtr Type (DI) to set this flag to Stereo unless all transmissions are monaural. The 730 does not support the other, somewhat esoteric DI options originally included in the CENELEC specification, which have all but been abandoned.

Regional Mode Click: Format/RDS/RBDS to verify that the 730 Encoder has been initialized for the proper RadioData standard, RBDS for North America or RDS for the rest of the world. This may be done manually as instructed on Page 13 at the very start of the exercise in Section II, holding down the jog wheel and making the proper selection.

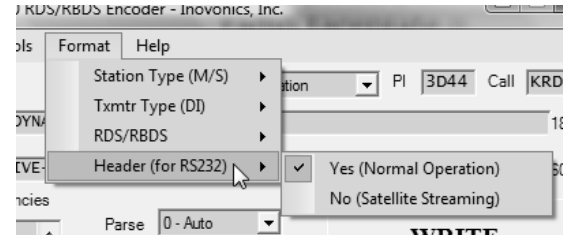
Header (for RS232) An important feature of the 730, and one that sets it apart from earlier models and most competitive products, is the ability to transmit scrolling-PS messages from unformatted ASCII text over a serial connection. In the normal and preferred mode of operation, scrolling-PS messages are preceded by the special header: DPS=. This prepares the encoder to receive, format and transmit the text string that follows so that it will appear properly on the RDS radio faceplate. This preferred mode is available with any connection to the encoder: USB, serial or network.

Satellite-delivery music services and some station automation equipment are able to output only raw, unformatted song title and artist information to accompany the audio programming. In these instances, sending the encoder properly-formatted data with the appropriate headers would require either an additional computer routine or the use of a third-party 'data consolidator' to perform off-site data formatting.

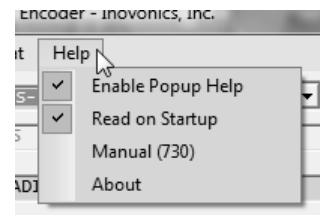
When the Format/Header (for RS232) selection is set to Yes (Normal Operation), the 730 Encoder responds only to scrolling-PS messaging that is preceded by the required DPS= message

header. When set to No (Satellite Streaming), all ASCII text received serially, when followed by an ASCII “carriage return” (with or without a bell going ‘ding’), will be accepted and parsed by the 730 Encoder for transmission as a scrolling-PS message. Remember, the ‘no headers’ mode is available only when using a serial (RS232) connection.

Needless to say, this software selection should be operated in the Yes (Normal Operation) mode except in those special installations that utilize unformatted streaming text. This mode keeps the encoder under stable control by station automation and prevents automation system ‘housekeeping’ commands from popping up on RDS radios. Once the encoder is set to the No (Satellite Streaming) mode and is receiving streamed text via the serial port, the 730 parses and shows *everything* that comes along. A special ‘escape’ sequence is needed to get it out of this mode when the encoder is being addressed only by a direct serial connection, and this escape sequence is explained on Page 61. However, the 730 Encoder software screen may be used to reset the selection back to Yes (Normal Operation) over any port connection at any time.



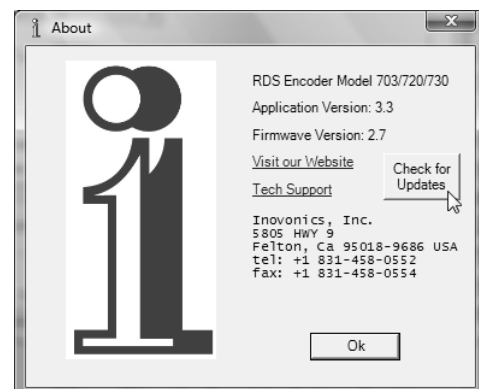
Help Under Help, the user may turn on or off the Help ‘balloons’ that pop up for a short time when hovering-over various areas of the data-entry screen with the mouse cursor.



A prompt to suggest a **READ** command every time the software is started may be enabled or disabled in the Help menu. It is a good practice to download the messages and settings in encoder memory to make sure that the PC interface is updated; this is especially important if the connected computer is *not* the one that has most recently communicated with the 730 Encoder.

A PDF file of the Model 730 Encoder manual opens when Manual (730) is selected.

About will disclose the current version of software and firmware, and even bring up hyperlinks that can be clicked for support, assuming that the controlling computer is connected to the Internet. The Tech Support hyperlink will initiate an e-mail to the RDS Support Team, automatically including current 730 Encoder settings. If you don’t use an e-mail client, like



Outlook, Eudora or Opera, the contents of the encoder memory registers are also automatically copied to your Clipboard, so that you can paste them into Webmail or print them out on the back of a postcard.

The Check for Updates button is an easy way to confirm that everything is current with respect to both the Windows® software installation and the firmware in the connected encoder. This utility checks the Inovonics server directly for any updates.

Section IV

SOFTWARE SETUP FOR ON-AIR OPERATION

PI AND PTY CODES

PI Code and the Built-In Calculator

As discussed on Page 10, the PI code identifies your station with a unique digital address. In many parts of the world this code is assigned by the national broadcasting authority or a regional standards group.

NOTE: A valid PI code is essential to proper RDS *system* operation. RDS radios may actually tune away from a station transmitting RDS data groups that do not include a valid PI code.

When the 730 Encoder is operated in the European RDS mode, the 4-character, hexadecimal PI code must be typed directly into the PI box. The box marked Call does not appear in the RDS mode.

In the US and Canada the PI code is derived from station call letters using complex mathematical routines that apply certain weighting to each letter in the station's call. The US and Canadian formulae are different, of course, and there is considerable room for error when manually calculating the hex value from call letters. We have not included these formulae here, but interested parties can refer to the appropriate Standard for a full and somewhat confusing explanation of how the PI is actually calculated. (Have your scientific calculator ready!)

730 Encoder software contains a nifty built-in calculator that makes PI code entry entirely automatic in North America. When the encoder is in the RBDS mode, US or Canadian call letters may be typed directly in the Call box. As soon as valid call letters are entered, the corresponding hex code will magically appear in the PI box. US and Canadian calls always begin with K, W or C.



NOTE: The 730 software calculator will not respond to call letters assigned in countries other than the US and Canada.

PTY and PTYN Format Identifiers

The PTY (Program Type) code identifies the station's programming format from lists that have been compiled as part of the RadioData standards. There are two lists, one for the European RDS system and one for the North American RBDS specification. The two lists are shown side-by-side in the Appendix on Page 80.

The appropriate PTY list is automatically loaded when the 730 is set for the proper regional mode (RDS or RBDS). With the proper encoder mode set, choose the station format from the drop-down list.

Take care in choosing the PTY identifier. Categories can be ambiguous; this is one of the reasons for the additional PTYN identifier discussed below. What if your station is on a college campus and relays NPR programming? How about Rock and Top 40 crossovers? Just what are “Adult Hits,” anyway, music heard in the halls of a retirement home? For clarifications on these and other burning questions, refer to the appropriate RBDS or RDS Standard, or put your question directly to the appropriate Standards Group. We regret that the Inovonics Tech Support hotshots are not certified to fathom such conundrums.

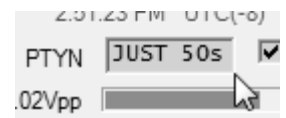


The PTY identifier can assume a semi-dynamic function. The RDS and RBDS Standards permit a PTY change from one format category to another if the station ‘dayparts,’ altering formats during specific, *extended* segments of the broadcast day. The PTY should not change from song to song or to accommodate a 5-minute newscast.

The 730’s built in Scheduler may be used to create a changing PTY. A discussion of this option begins on Page 34.

The optional Program Type Name (PTYN) identifier enables the station to send an additional 8-character descriptor that can describe the broadcast format in greater detail. For example, PTY code 14 in the US denotes a Jazz format. The PTYN could further define this as ‘Big Band’ to show the station’s main emphasis. The Jazz PTY will be used by RDS radios to search among the clearly-defined categories of programming, but if the receiver has a function to display the search criteria, once the station is tuned the PTYN name would be presented.

The PTYN, or Program TYPe Name is typed into the box near the bottom of the 730 Encoder software screen. It should always agree with, and further define, the selected PTY code. In the example shown here the PTY is Oldies, the PTYN is ‘JUST 50s’. Any characters entered in the PTYN field will constitute a Program TYPe Name. The built-in Scheduler can create a ‘dynamic’ PTYN, or one that changes with the programming. The PTYN field should be cleared completely if it is not to be used.



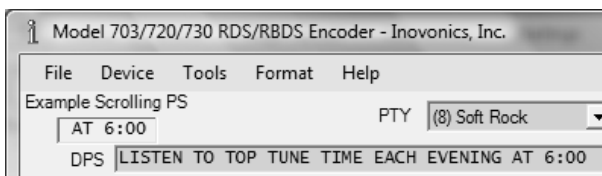
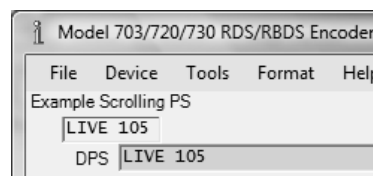
NOTE: The PTY codes relating to emergencies are reserved for *true emergency and emergency test situations only*. Consult the appropriate Standards group before you even think of sending these PTY codes.

THE PS FIELD - STATIC OR SCROLLING

PS, or Program Service Name, was initially included in the RDS specification strictly as a fixed station identifier of 8 characters or less on the RDS radio faceplate. As of this writing, anything other than a static display is still ‘forbidden’ by the RDS and RBDS Standards, although the scrolling of song titles and even advertising messages is practiced on all continents.

The 730 has a PS register that will hold up to 128 characters. Into this field you may enter either a fixed, 8-character station-ID or station ‘street name’ that will remain static on the radio faceplate, or a longer message that ‘scrolls’ in one of a number of manners.

If the entry into the DPS field is 8 characters or less, the PS display on the radio will remain static; that is, it will not scroll. If, on the other hand, a longer message is typed-in, it will automatically be ‘parsed,’ or broken into word groups that will be shown sequentially until the entire message has been displayed, and then repeat over and over until updated. There are a couple of options to this mode, which will be addressed later.



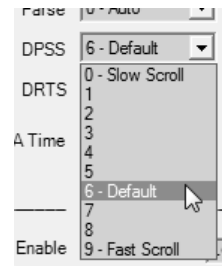
An entry typed into the DPS field will be entered into non-volatile encoder memory once a **WRITE** command sends it to the 730. This allows the user to program the encoder with a fixed static or scrolling message at the studio and then relocating it to the transmitter site. Left undisturbed, the encoder will scroll the same message endlessly.

In full dynamic operation, the encoder is addressed by station automation through the COM (serial) or IP (network) ports. Each data transfer of up to 128 characters will clear the contents of the DPS register and replace it with the new song title or other information, which then repeats until new data are received. What is manually typed into the register at this time will be saved until new data are sent to the encoder, either by re-typing manually into the 730 Encoder software screen, by being replaced by data from the serial port, or with a default message if that feature is enabled (see Page 46).

We heartily recommend using all-caps for either a short-form PS entry (8-characters or less) or for longer scrolling-PS messages. Some RDS radios cannot display lowercase characters and the presentation may not show up as you intend.

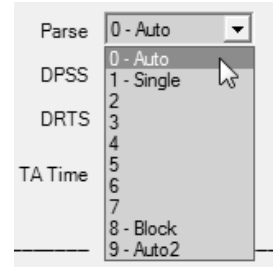
Scrolling Speed

The rate at which longer messages scroll across the radio faceplate is set in the DPSS entry box. Click this box and select a drop-down scrolling speed about midway in the list. The 730 can perform very rapid transmission of the scrolling-PS message, but some radios cannot keep up with a really fast scroll. We recommend a '6' as a quick and reliable default scrolling speed.



Parsing

Parsing is the encoder's 'smart' mode of message transmission. Parsing breaks messages down into meaningful character groups for efficient display on the 8-character alphanumeric readout common to all RDS radios. Once the parsing options are set, the parsing function is valid for any scrolling-PS message, whether it is manually typed and uploaded to the DPS register or received as ASCII text from station automation.



Click: Parse to bring down the parsing options box.

'Auto' Modes

0 - Auto is the most-used 'Auto' Parsing mode. This is the best option for static-PS 'street names' of 8 characters or less, and also the one that groups and sends short words together. *THIS IS* consists of seven characters, including spaces, that would be sent as a group. The same holds true for *OF THE* or *NOW HERE*. Words, up to and including 8 characters, are sent individually: *WARNING* or *DOUGHNUT* or *BICYCLE*.

In the 0 - Auto mode, words that exceed 8 characters are 'side-stepped' through two or more consecutive displays. Examples might be *EMERGENC* followed by *MERGENCY*, or *SUPERMAR* followed by *UPERMARK* and *PERMARKE* and *ERMARKET*. This method of splitting words gives a good sense of continuity and readability.

The 9 - Auto2 mode is quite similar to 0 - Auto, but treats longer words a bit differently. Rather than side-stepping the remainder of a longer word through several individual display screens with a one-character-at-a-time shuffle, Auto2 presents the remainder of the long word as a single group of characters, centered in the next display. In this case you would see *SUPERMAR* followed by *KET*. In addition, a delay is also introduced before the scrolling message repeats.

The 730 affords several parsing modes that may be selected from the drop-down menu.

1 - Single introduces what we call our "safe scrolling" parsing method.

"Safe Scrolling"

We developed Safe Scrolling over of our concern for distracted automobile drivers. When viewing a message composed of complete words or groups of words, a driver must pay close attention to the radio display, or risk missing part of the message. Although the message may be repeated over and over, the driver may tune in at the end of a song, and in trying to

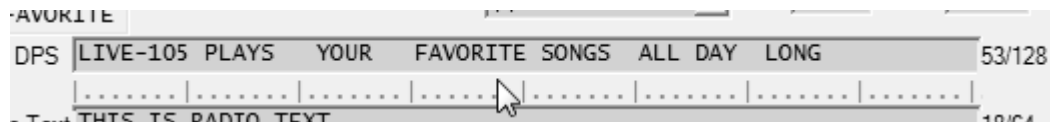
find out who sang the number he could easily rear-end the car ahead.

With parsing set to 1-Single, Safe Scrolling marches the message across the display screen one character at a time, just like soldiers passing a reviewing stand. Any message will require a much longer transmission time in this mode, but a quick glance at the radio display every ten to fifteen seconds still allows the driver to get the full message without missing any words.

The scrolling modes represented by 2 through 7 simply expand on this theme, moving the message by the selected number of characters (and spaces) at a time.

'Block' Message Transmission

When Parse is set to 8 - Block, the incoming text is simply broken into 8-character-and-space blocks with no regard to word breaks. This mode is useful only if the messaging is pre-parsed by station automation. When this mode is selected, a series of tic marks appears below the message entry area as an aid in manually parsing a typed-in message, as was done in the illustration below.

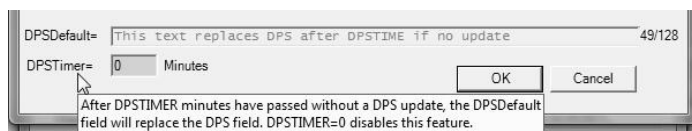
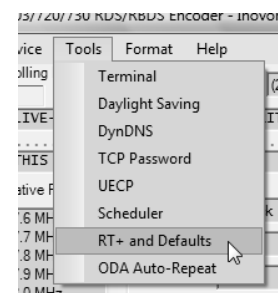


THE DEFAULT SCROLLING-PS MESSAGE

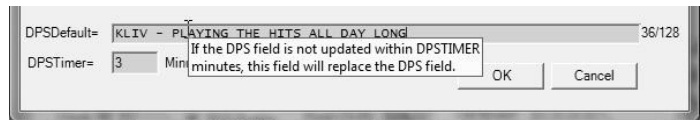
The 730 Encoder includes a provision to transmit a default scrolling message if the DPS field is not refreshed within a specified length of time. For example, the RDS serial or network data link to the transmitter might fail, or the playout system or third-party data consolidator might develop a problem that would interrupt data transfer to the encoder. Rather than have information about the last song transmitted indefinitely, a default scrolling message may be substituted following a reasonable interval, maybe 3 minutes. This default message would continue to be sent until the DPS field is refreshed when the data link is restored.

Click the Tools menu tab at the top of the software screen and then click: RT+ and Defaults. This brings up a secondary data-entry screen. The field for entering a DPS default message is at the bottom of this screen.

Note that the factory-default message already in the DPSTimer field is grayed-out. To enable the default scrolling-message function, it is first necessary to enter a time, in minutes, into the DPSTimer box. The default message is disabled with a value of zero.



With a time-in-minutes entered, clear the factory-default message



text and type-in a default message of your own, up to 128 characters. This can be a scrolling promo message, as shown here, or a static, non-scrolling PS entry of 8 characters or less, such as LIVE-105 for this station example.

After entering the default message, click: OK to save it to software memory. The message will be uploaded to the encoder's own memory with the next **WRITE** command.

If the DPSTimer is reset to zero to disable this function, the message will still remain in memory and may be enabled later, either with a software command or by using the jog wheel in Menu 05. You must initiate a **WRITE** command to send the default message to the encoder whether or not the feature is enabled at this time.

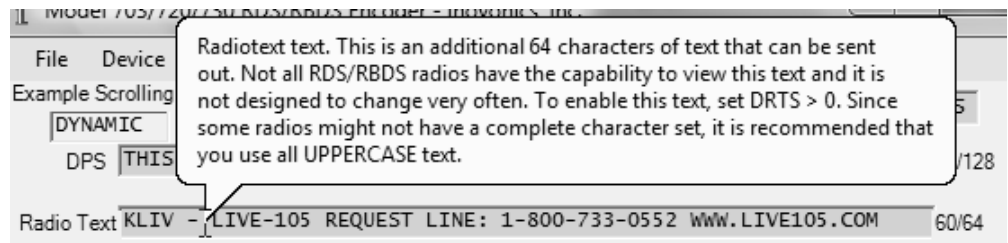
RADIO TEXT AND 'RT+'

Radio Text is a 64-character block of text that is separate from the DPS (scrolling PS) message field. Radio Text is transmitted to the receiver as a complete message and is not parsed by the 730 Encoder. The Radio Text message is held in buffer memory within the RDS radio, and then scrolled or otherwise displayed in a manner determined by the receiver manufacturer.

Some automobile receivers do not display Radio Text at all, and others require the listener to press an INFO or TEXT button to see the Radio Text message.

Radio Text may be a static message, perhaps with station contact information or a general station promo slogan. Alternatively, Radio Text may take the form of dynamic "Radio Text Plus" (RT+) that allows song 'tagging' and other interactive applications. This is detailed in Section VIII, which begins on Page 71.

A static Radio Text message is entered manually in the main software data-entry screen and may be updated whenever the information changes.



Click into the Radio Text field, clear the factory-default message and type in your own. The character counter to the right of the field shows the number of characters entered out of the maxi-

mum of 64. Note that hovering over the field will bring up a Help balloon.

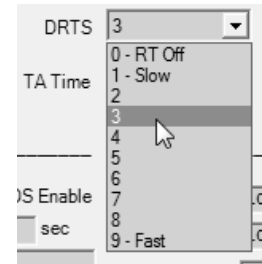
Although we extend our recommendation of using uppercase characters for this field, receivers with Radio Text capability are generally the higher-end radios that will display lowercase characters properly. Use lowercase characters at your discretion.

DRTS Radio Text Speed

Although Radio Text is sent to the receiver as a complete message and is not parsed by the encoder, the repetition rate at which the Radio Text message group is refreshed is a user-defined variable.

Once a station is tuned-in, the time interval before a Radio Text message is displayed will depend on how frequently this RDS data group is transmitted and how the receiver manufacturer has elected to display the message. When Radio Text is a static message relegated to ‘secondary’ information, the refresh rate does not need to be very fast.

Click: DRTS to show the drop-down menu. On the DRTS (Dynamic Radio Text Speed) scale of 1 to 9, a setting of 2 or 3 is usually quite adequate. Keep in mind that with a faster refresh rate Radio Text will monopolize transmission resources and may compromise the speed of scrolling-PS messaging.



With RT+ applications, DRTS should be set to a higher rate. A setting of 6 is recommended. (RT+ operation is discussed in its own section beginning on Page 70.)

The DRTS drop-down menu can also be set to zero. This turns Radio Text off completely, graying-out the text entry field, and inhibiting RT+ packets regardless of data in the RTP field.

The Radio Text message and its selected refresh rate will be uploaded to the 730 encoder on the next **WRITE** command.

Radio Text Default Message and Tags

Provision for a default Radio Text message is included, which is very similar to the scrolling-PS message default utility discussed on Page 46. The utility is called-up by clicking: Tools/RT+ and Defaults.

With a time (in minutes) set at any figure other than zero, the default Radio Text mes-

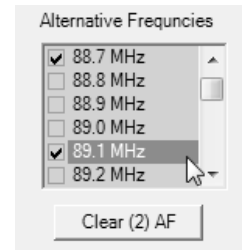


age will be sent if the dynamic Radio Text field is not updated by station automation within the programmed time period. “Tags” for the default Radio Text message may be included as well; for example, to tag the station Web address or telephone number in the generic station promo message in the example. Tagging options are discussed in detail in Section VIII beginning on Page 70.

ALTERNATIVE FREQUENCIES

As first mentioned on Page 10, the 730 accommodates as many as 25 Alternative Frequencies, the maximum number supported by the RDS/RBDS specification. These are other dial locations where the very same program can be heard at the very same time (in sync!). The RDS radio hunts for the strongest signal that carries the program and seamlessly switches to it. This feature is used by European radio networks and by independent stations that have one or more rebroadcast ‘translators,’ extending coverage to areas where the main signal cannot be received well.

Enter your Alternative Frequencies by checking a box for every dial location that carries the program. Always include the main transmitter frequency, otherwise the RDS radio will not switch back when it should. A button below the Alternative Frequencies box allows all checks to be cleared at once. The AF list is up-loaded with the next **WRITE** command.

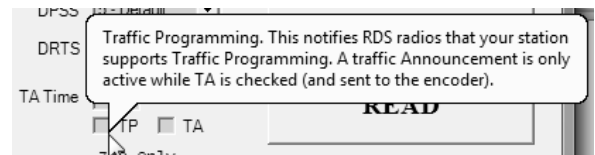


TRAFFIC ALERTS

The TP/TA function is a useful provision of the RadioData System, but one with potential for abuse. This is detailed on Page 12, along with a description of the TA Timeout Timer, a safeguard built into the 730 Encoder to prevent such abuse.

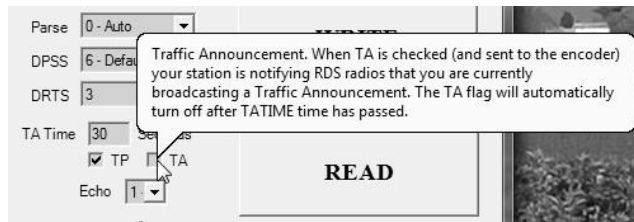
For a station to air TA (Traffic Alert) messages it first must be listed as a TP (Traffic Program) station; that is, a station that routinely includes traffic updates in the normal programming schedule. RDS radios keep track of TP stations and ‘look’ for a TA flag only from among those stations.

If your station does air routine traffic announcements, check the TP box. This will then permit the encoder to send TA flags on demand.



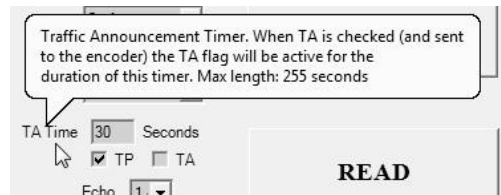
In keeping with RDS and RBDS regulations, the TA flag is to be sent only for critical traffic-related announcements, and then only for the actual duration of the accompanying voice message. We recommend using only the direct-connected, hardware-switch activation of the TA flag described on Page 56. However, as the encoder may be installed some distance from the studio and addressed by a serial or network connection, provision has been made to set the TA flag with a software command.

You can check the TA box on the 730 software screen to initiate a TA flag, the flag is then raised immediately when the **WRITE** button is clicked. To clear the flag when the announcement is finished, uncheck the TA box and click: **WRITE** once again.



TA Timeout

The 730 is equipped with a built-in timer that limits the maximum period that a TA flag may be continuously transmitted. This guards against a short-circuit in a hardwired-switch installation, or the possibility that a software ‘turn-off’ command is not received at the end the TA announcement. TA may be set to time out after a period of up to 255 seconds, with the 30-second factory-default value a typical setting. The TA timeout is set in the TA Time box; a Help balloon gives additional hints.



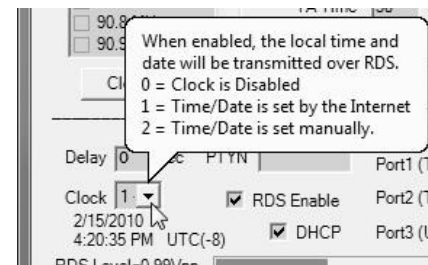
Once the TA has timed-out, the TA function is reset and has to be re-initiated to proceed with another announcement.

CT - CLOCK TIME AND DATE

The 730 Encoder gives full support to the RDS/RBDS timekeeping function. As described on Page 21, the time and date may be set manually in Menus 58 and 59. Even though these are set to local time, the proper offset from Universal Coordinated time (UTC) must be entered in Menu 60 to ensure timekeeping accuracy.

The CT function is enabled from the front panel through Menu 62, or by selecting one of the options on the software screen as shown here.

When the encoder has access to the Internet, either with a direct connection or through a local network that it is connected to, timekeeping will be automatic and invariably accurate. But when Internet access is not available, time from the controlling computer’s internal real time clock may be used to set the encoder’s internal timekeeping utility.



The encoder’s internal clock can maintain reasonably good accuracy once the time and date are manually set. When Clock-Manual is selected, clicking the **WRITE** button uploads the time, date and UTC offset from the computer’s clock.

Incidentally, the time shown on the software screen is always computer time, even when the encoder is set by the Internet. The encoder does not update the software screen in this regard.

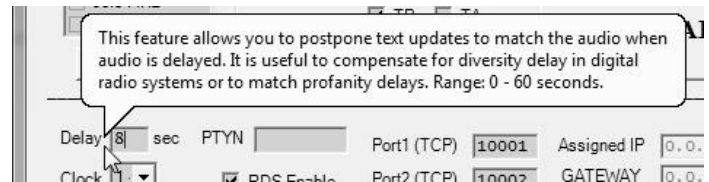
SETTING THE RDS DATA DELAY

Generally, any RDS message or command is sent instantaneously to the listener once it has been executed. There are situations, however, when this is not the right action.

Diversity and Profanity Delays

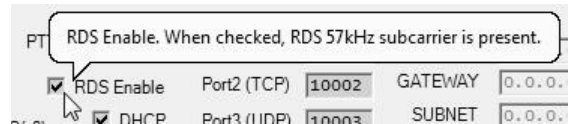
The coding, decoding and error-correction methods used in Digital Radio transmission systems introduce a significant delay in the program audio; upwards of eight seconds in the case of the HD Radio® system used in the United States. Alternatively, and possibly in addition to the diversity delay, ‘profanity’ delay devices are used in the on-air studio to enable censorship of callers’ comments or language on call-in ‘talk’ shows.

So that content-related RDS messaging, such as song titles, do not appear on the radio faceplate in advance of the event, the 730 Encoder has a provision for delaying transmission of the dynamic messaging registers (scrolling PS, Radio Text and RT+data). The delay, in seconds, may be set from the front panel on Menu 78, or entered into the Delay box on the software screen as shown here.



ENABLING/DISABLING THE RDS SUBCARRIER

Just as Menu 64 may be used to turn the 57kHz RDS subcarrier on and off, the software ☒ RDS Enable box can perform this same function from a remote location. Only the subcarrier is turned on and off, there will be no change to the composite/MPX signal when the encoder is used in the loop-through mode. When the RDS subcarrier is disabled, a message to that effect is shown on the front-panel LCD display on the status screen, Menu 01.



Section V

ENCODER INSTALLATION

IMPORTANT INSTALLATION SEQUENCE NOTE

This section covers connecting the encoder into the transmission path and comes with these precautionary notes:

- 1) The encoder must be programmed (set up) before placing it in the air chain, otherwise factory default entries and settings will be sent to your listeners. See the previous manual sections for the initial, front-panel programming procedure and for encoder programming using the supplied software.
- 2) Please resist the temptation to forge ahead without reading the instructions. *Software should be loaded onto the computer before connecting it to the 730 Encoder for the first time.* See Section IV for software installation instructions and for programming the 730 using the Windows® software.

MOUNTING

Rack Requirement

The 730 Encoder mounts in a standard 19-inch equipment rack and requires only 1¾ inches (1U) of vertical rack space. We recommend plastic or fiber washers to protect the painted finish around the mounting holes.

Heat Dissipation

Consuming less power than a table radio, the 730 itself generates negligible heat. The unit is specified for operation within an ambient temperature range extending from freezing to 120°F/50°C. But because adjacent, less efficient equipment may radiate substantial heat, be sure that the equipment rack is adequately ventilated to keep its internal temperature below the specified maximum ambient.

AC (MAINS) POWER

Fuseholder

The fuseholder is at the far left of the front panel. Apply downward pressure and pull the cap outward to access the 5mm mains fuse. Note that the cap has space for a spare fuse as well. The cap is reseated by reversing the removal process. This fuse also serves as a front-panel emergency power disconnect for the 730 Encoder.

Mains Voltage Selector

Unless specifically ordered for export shipment, the 730 is set at the factory for operation from 115V, 50/60Hz AC mains. This can be confirmed by checking the designation next to the

mains connector on the rear panel. The *inappropriate* voltage and fuse value will have been crossed out at the factory with a black marker.

To change the mains voltage, first remove the top cover of the unit. A clearly marked slide switch is right behind the AC mains connector on the encoder circuit board. *With the mains disconnected*, use a small screwdriver to set the switch for 115VAC or 230VAC operation.

Be sure to install the appropriate fuse listed on the rear panel. You can remove the factory strikethrough with solvent, and then cross out the inappropriate marking with an indelible felt pen.

Power Cord The detachable IEC-type power cord supplied with the encoder is fitted with a North-American-standard male plug. The individual cord conductors may be color-coded in either of two ways:

1) In accordance with US standards:

BLACK = AC "HOT" WHITE = AC NEUTRAL
GREEN = EARTH GROUND

2) To European CEE standards:

BROWN = AC "HOT" BLUE = AC NEUTRAL
GRN/YEL = EARTH GROUND

RADIO FREQUENCY INTERFERENCE (RFI)

Location Although it is expected that the 730 may well be installed alongside powerful FM transmitters, please practice care and common sense in locating the unit away from *abnormally* high RF fields.

Ground Loops Because the unbalanced input and output of the 730 Encoder are chassis-ground-referenced, a mains frequency or RF ground loop could be formed between the input or output cable shield grounds and the AC power cord ground. A 'ground-lifting' AC adapter may well remedy such a situation, although the chassis must somehow be returned to earth ground for safety. Generally, being screwed-down in the equipment rack will satisfy the safety requirement.

SELECTION OF OPERATING MODES

"Regional Mode" Selection The "regional mode" setting for the 730 Encoder; that is, RBDS for North America and RDS for the rest of the world, is an important firmware setting already discussed. The proper regional mode may be selected either by the front-panel jog wheel (Page 13) or by using the Windows® software (Page 39).

**Jumper
Placement for
Sidechain
Connection**

Configured for sidechain operation, the rear-panel PILOT OR MPX INPUT connector simply bridges the output of the stereo generator and monitors the composite/MPX signal to derive timing information from the 19kHz stereo pilot. Alternatively, a TTL-level 19kHz sync squarewave may be applied to this input. We do not recommend this, however, because of possible phase ambiguities between the synchronizing squarewave and the 19kHz pilot component in the composite, multiplex output of the stereo generator.

In sidechain operation the encoder's RDS OR MPX OUTPUT will contain *only* the RDS subcarrier. With a sidechain connection the composite/MPX signal is *not* routed through the 730. Sidechain connection insures multiplex signal integrity and uninterrupted program transmission in the highly unlikely event of an internal encoder failure.

NOTE: As delivered, the 730 is configured for sidechain operation.

Referring to Figure 2, locate the 3-terminal jumper strip, situated behind the rear-panel RDS OR MPX OUTPUT connector on the circuit board. The shorting shunt is positioned to the *right* for sidechain operation.

**Jumper
Placement for
Loop-Through
Operation**

With the 730 Encoder jumpered for loop-through operation (shorting shunt to the *left*), the RDS subcarrier is internally combined with the composite/MPX signal and the RDS OR MPX OUTPUT *will include* the composite/MPX program signal at unity gain. The 730 provides a relay bypass of the composite/MPX signal in the event of power loss.

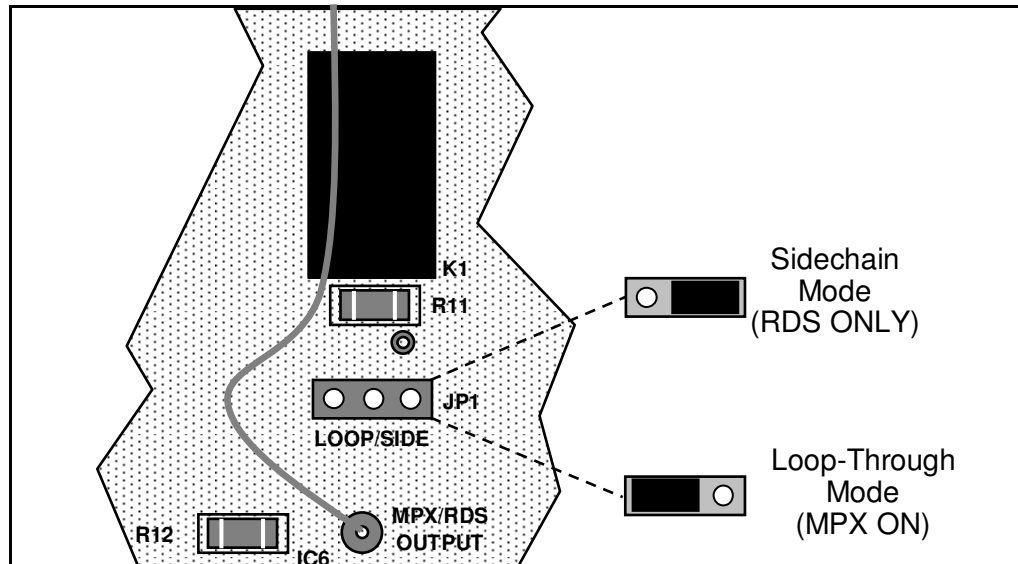


Figure 2 – Encoder Mode Jumpering

CONNECTING THE 730 ENCODER

Check That Jumper!

It is essential that the 730 Encoder is properly configured for the desired connection mode: sidechain or loop-through. Consult Figure 2 to confirm that the encoder circuit board is properly jumpered before connecting the 730 Encoder to other air-chain equipment.

Sidechain Connection (Preferred)

Using a BNC 'T' adapter at the composite/MPX output of the stereo generator, connect one side of the 'T' directly to a wideband (composite/MPX) input of the FM exciter and the other side to the PILOT OR MPX INPUT of the 730 Encoder as shown in Figure 3. This is a bridging (high impedance) 'sync' connection when the circuit board is jumpered for sidechain operation and has no effect on the composite/MPX signal.

Cable the RDS OR MPX OUTPUT of the encoder to a second wideband (subcarrier) input of the FM exciter.

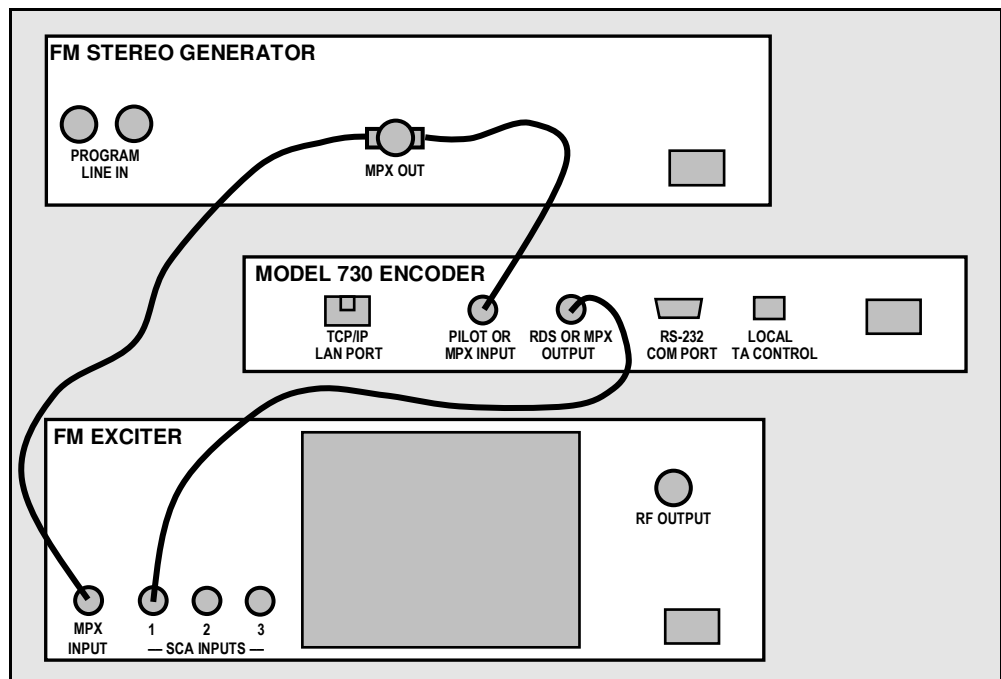


Figure 3 – 'Sidechain' Encoder Connection

Using a Dedicated 19kHz Sync Source

A stereo generator's 19kHz RDS SYNC output *may* be connected to the encoder PILOT OR MPX INPUT for sidechain operation. We do not recommend this, however, as this output may not have an accurate phase relationship with the stereo pilot in the composite/MPX output signal.

Loop-Through Connection

In the loop-through mode, the output of the stereo generator is cabled directly to the PILOT OR MPX INPUT of the 730 Encoder as shown in Figure 4 on the following page. Connect the RDS OR MPX OUTPUT of the encoder to a composite/MPX wideband input of the FM exciter. When internally jumpered for loop-through operation, the composite/MPX signal *passes through* the encoder with unity gain and the RDS subcarrier is added. In the event of encoder power loss, the composite/MPX signal

is routed directly through the encoder by the bypass relay.

Composite STL

If a composite STL is used between the studio and the transmitter site, the 730 Encoder may be kept at the studio for direct connection with station automation. Figures 3 and 4 still apply, with the STL transmitter taking the place of the FM exciter.

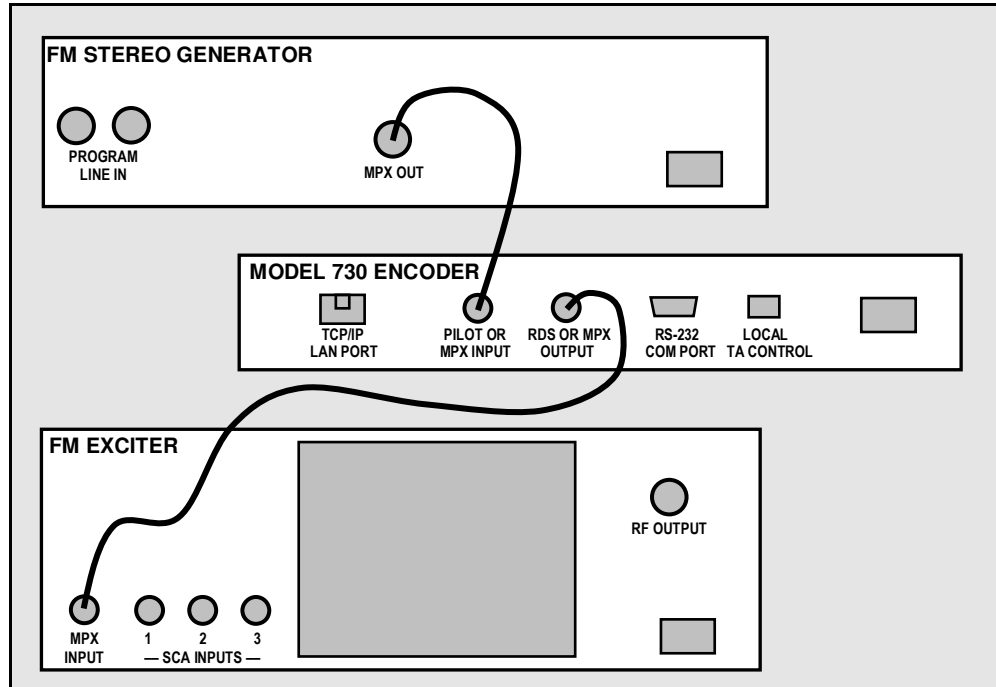


Figure 4 – Loop-Through Encoder Connection

Manual Activation of the TA Flag

The Traffic Announcement feature is a *temporary* command, and this flag must coincide with the actual voice warning of a notable road traffic condition for the reasons explained on Page 45. The encoder has a rear-panel connector to activate this flag with a manual switch closure, which will doubtless prove faster, more convenient and more reliable than software control of the TA function, which nonetheless is provided.

A cable may be taken from the LOCAL TA CONTROL terminal strip on the rear panel of the encoder to a normally open *momentary* (spring-return) pushbutton switch located conveniently at the announcer's operating position. The screw-terminal part of this connector unplugs from the rear panel to make connection easier. A twisted pair is acceptable for a short run, but anything more than about 20 feet should probably be a shielded (coax) cable; shield grounded, of course.

The TA flag will be activated for as long as the switch is held down. *It is important that this alert is active only for the duration of a traffic announcement.* The TA flag should be *turned off immediately* after completing the verbal traffic warning, which should be automatic if a spring-return switch is used.

The 730 does incorporate a down-counting TA timer to prevent a continuous switch closure from signaling a permanent TA flag. This timer may be user-programmed for a specified time in seconds, after which the TA flag is automatically turned off

until the switch is opened and then closed once more. Programming of this timer is discussed under Menu 18 on Page 20, and may also be set using the 730 encoder software as described on Page 50.

SETTING THE SUBCARRIER INJECTION LEVEL

The injection level of the 57kHz RDS subcarrier is controlled by encoder firmware, and may be set directly by the front-panel jog wheel under Menu 79 (Page 24) or by clicking within the RDS Level= bargraph at the bottom of the software screen. Note that ‘hovering’ within the bargraph brings up balloons for the value that will be set when the mouse is clicked. You must initiate a **WRITE** command before the selected level will be uploaded to the encoder and displayed on the bargraph. Menu 79 always shows the actual peak-to-peak amplitude of the RDS subcarrier at the rear-panel RDS OR MPX OUTPUT connector.



In the *sidechain* mode of operation, the RDS subcarrier is the only signal that appears at the rear-panel RDS OR MPX OUTPUT connector. Because some exciters require a high signal level at auxiliary wideband (SCA) inputs, the RDS signal has been made adjustable between zero and 3.3 volts, peak-to-peak.

In *loop-through* operation of the encoder, the composite/MPX program signal that is fed to the PILOT OR MPX INPUT appears with unity gain at the RDS OR MPX OUTPUT. The level of the composite/MPX program signal will typically be in the 3- to 5-volt p-p range. The same 0-3.3Vp-p RDS subcarrier level capability of the 730 is available in the loop-through mode as well, so obviously the level will have to be adjusted to a much lower value, in the 0.16 volt p-p range corresponding to the typical 3% to 5% RDS injection.

Setting Subcarrier Amplitude

57kHz subcarrier injection is best set with a modulation monitor that includes a subcarrier measurement utility. Alternatively, a basic mod-monitor can be used alone, but program modulation and the stereo pilot must be turned off to resolve the low RDS injection level.

NOTE: If using a mod-monitor without a separate subcarrier measurement capability, keep in mind that mod-monitors are *peak-responding* for total modulation readings near 100%, but may be *average-responding* for low-level measurements. Because the RDS subcarrier is a complex waveform, an *average* reading of 3% RDS injection can represent a level that is substantially higher when measured peak-to-peak. The *peak* level is of concern in broadcasting.

**The On-Screen
RDS Level
Display**

If the peak-to-peak level of the composite/MPX for 100% carrier deviation is known, the RDS level may be set with reasonable accuracy using the built-in subcarrier measurement utility of the 730. The composite/MPX is easily measured by bridging the input of the exciter with an oscilloscope using a BNC “T” adapter. Monitoring normal program material that has passed through a typical audio processor, the 100%-modulation value will be apparent on the ‘scope. Take this peak-to-peak figure and multiply it by 3 to 4 percent, and then set the injection to the calculated value. For example, if the composite/MPX level is 4V p-p at 100% modulation, set the RDS level to $4 \times .035$, or 0.14V p-p for 3.5% injection.

RDS injection is not particularly critical, but should be maintained in the 3% to 5% range. Too little or too much injection will make messaging unreliable.

In the United States, the FCC permits an extra 5% total carrier modulation for each added FM subcarrier, with total modulation not to exceed 110% with two or more subcarriers. Consult current local regulations regarding this matter.

Subcarrier Phase

According to the RDS and RDBS Specifications, the 57kHz RDS subcarrier may be either in phase or in quadrature with the 19kHz stereo pilot. These two phase relationships are shown in Figures 5 and 6, respectively. Note that the quadrature relationship in Figure 6 yields a slightly lower peak level, which suggests the possibility of marginally greater carrier modulation by the program audio signal.

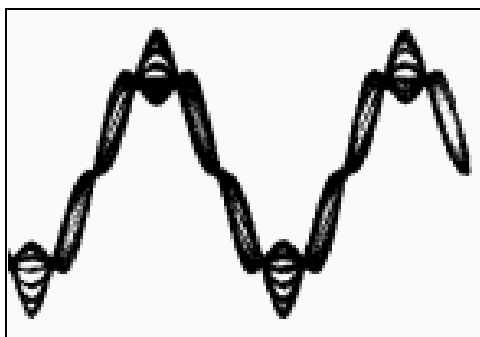


Figure 5 – Subcarrier In Phase

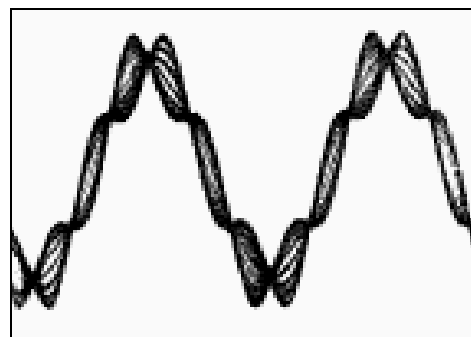


Figure 6 – Subcarrier In Quadrature

The 730 Encoder is skillfully and meticulously aligned at the factory to ensure that the subcarrier has the proper phase relationship with the stereo pilot, whether the encoder is used in the sidechain or in the loop-through operating mode. Although some stereo generators are equipped to supply a pilot-sync reference for RDS (usually a TTL-level squarewave), this reference may or may not be in exact phase with the actual stereo pilot component in the composite/MPX signal. For this reason we recommend using the composite/MPX signal for synchronization. In the sidechain mode, the 730 Encoder simply bridges the output of the stereo generator and does not load or otherwise compromise the composite/MPX signal.

Section VI

CONNECTING THE 730 ENCODER TO AUTOMATION

A serial (RS-232) connection is the easiest and thus the preferred method of communicating with the 730 Encoder when it is co-located with the station playout system, or whenever an RS-232 link is available between automation and the encoder. IP-network connection of the 730 Encoder is detailed in the next section of the manual.

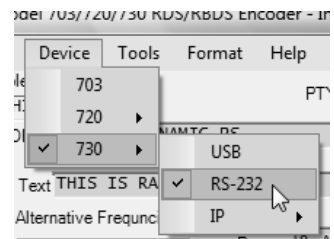
The software that already has been detailed in the USB discussion is the same used for serial communication. As previously recommended, initial setup is easiest with a USB link. The following tutorial will give instructions on serial connection with the 730 Encoder.

SERIAL CONNECTION

If currently connected, disconnect the USB cable from the encoder. Using the DB9 serial cable provided, connect the computer to the 730 Encoder.

The factory default for RS-232 serial communication speed is 9600 baud. Acceptable baud rates are 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200. The 730 Encoder may be addressed at the highest, 115200 baud speed, but the trifling amount of data that is ever uploaded to the encoder really makes the highest speed a matter of supreme overkill. Even the default 9600 baud setting is lightning-fast for encoder programming. Modest baud rates may prove far more dependable, especially with long data cable runs. The lowest baud-rate settings are useful when the encoder is addressed using a dial-up modem or a slow data channel that is part of an STL radio link.

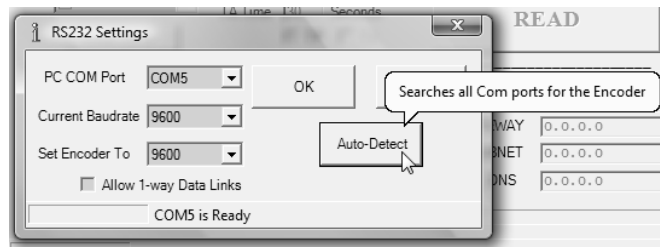
In the Menu Bar, click: Device and then 730 and finally RS-232. This will bring up a box labeled RS232 Settings. In this box the baud rate of the computer and encoder ports may be set manually using drop-down menus, or a handy built-in utility will automatically determine settings.



COM Port Auto-Detect

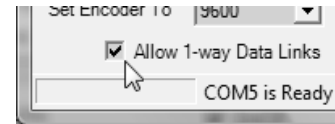
Clicking: Auto-Detect starts a software utility that will interrogate all computer COM ports, determine which one is connected to the 730 Encoder, and set the computer's baud rate to match the encoder. A valid connection will be confirmed by a notification at the bottom of the window showing auto-detection progress. Keep the on-screen warning in mind; this

auto-detect utility will interrogate all serial ports of the computer, and other serial connections may experience data flow interruption during this process. When the port is shown as Ready, click: OK to accept the setting.



1-Way Data Links

Note the check box: Allow 1-way Data Links. This permits use of the Windows® software program with encoder when the encoder is addressed over a one-way (outgoing) STL or other serial data link. Note that this pertains to a serial (COM port) connection only.

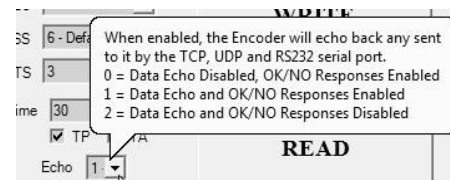


2-way communications is not essential in uploading messages and commands to the 730 Encoder. However, the Windows® software program does require a 'handshake' to function properly. When the encoder is used with the Terminal utility, or when station automation controls the encoder, the encoder responds to commands properly, but the NO and OK responses that are normally returned will either be ignored by automation, or will not show up in the Terminal window.

When the Allow 1-way Data Links box is checked, the software is essentially 'flying blind'; that is, it is sending commands to the encoder, but is *assuming* a proper response. In this mode, the READ button is grayed-out, as it is not possible to read the contents of the encoder registers or check the injection level.

Disabling Responses

The NO and OK acknowledgements from the encoder may be disabled with the Echo box on the software screen, or with jog wheel in Menu 63. A setting of 2 will inhibit the encoder from sending back the responses. This may be necessary with some automation systems, particularly when successive commands are sent back-to-back with no pause in between.



Changing Baud Rates

When changing the baud rate of the encoder, be advised that the 730 Encoder will not respond to an improper incoming baud rate. You will have to know the present baud rate setting (this is visible in Menu 69). Once communications is established at the present rate, you may then reprogram the 730 Encoder for a new rate. Following this the computer baud rate can be reconfigured to be the same as the updated encoder baud rate value. USB or network connections can always be used to reset the encoder's baud rate quickly, or the built-in Auto-Detect utility used with a serial connection.

Once COM port communication has been established, data entry using the 730 Encoder software may be done in exactly the same manner as already described for the USB connection.

**Multiple
Addressability**

With the 730 connected to station automation via the serial port, a computer may still be used with the front-panel USB port or with a network connection for editing static messages and flags without taking the encoder offline. Serial, USB and IP network connections may all be active concurrently.

AUTOMATION SYNTAX REQUIREMENTS

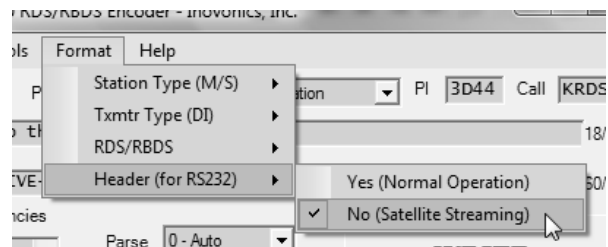
The Dynamic PS (DPS) field will probably be the primary one addressed by station automation for sending song title and artist, station promo or similar information. RT+ ‘tagging’ applications are addressed separately in Section VIII, beginning on Page 70.

In normal operation using headers, a typical automation command could be a song title such as the one used earlier: DPS=FLY ME TO THE MOON BY FRANK SINATRA↵. Inovonics has collaborated with many of the automation system vendors to make sure that the 730 and other Inovonics encoders are compatible with all popular systems. Similarly, the 730 Encoder operates with third-party data consolidation services such as Center Stage Live from Arctic Palm www.arcticpalm.com.

The use of headers allows the encoder to ignore commands that are not properly formatted. This way housekeeping or other miscellaneous data streamed by the automation system will not appear on RDS radio displays.

**‘No Headers’
Operation**

When the 730 is configured for ‘no headers’ operation, everything in the serial data stream that is sent to the encoder via the RS232 port will be parsed and will appear as a scrolling-PS message on RDS radios, contingent upon appropriate settings in the Parse and DPSS fields. This can be tested by setting the 730 for this mode (click: Format, then: Header, and check: No (Satellite Streaming)). Then send a **WRITE** command. Once in this mode, and communicating through the RS232 port, bring up the Terminal utility and type your text into the box. On an Enter command the typed-in data will be sent, parsed and transmitted.



To escape from the ‘no headers’ mode when using the Terminal utility, press the keyboard Escape key three times and then press Enter. The Terminal will answer back with READY, indicating that it is back in the Yes (Normal Operation) mode. However, the 730 Encoder software screen will require a **READ**

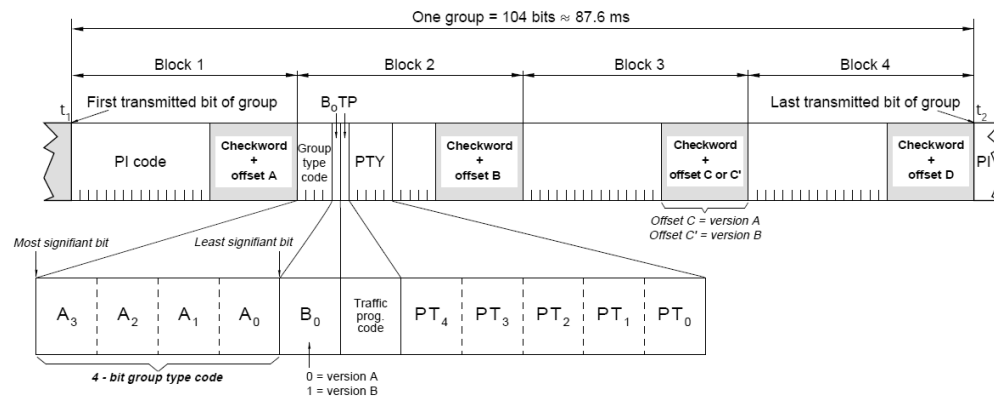
command to update the software to the headers mode once more.

Remember, the 'no headers' mode is available only when using a serial (RS-232) connection to communicate with the encoder.

THE ODA 'FREE FORMAT' GROUPS

Under the RDS and RBDS Standards, the Radio Data System is able to transmit unspecified data groups for in-house remote control, song-tagging, traffic conditions (TMC), power grid load management, restricted paging or similar proprietary applications. These data can be static, with the same information transmitted repeatedly, or controlled by an external application as a dynamic function, or scheduled by time, day or date.

As a point of reference for this discussion, consider this diagram of a 'generic' RDS packet:



RAW= Certain 'free data' groups are specified in the RDS and RBDS Standards. The 730 Encoder addresses these as a generic 'RAW' data group consisting of three hexadecimal ASCII blocks (or packets) of hexadecimal values; that is, three groups of four hexadecimal characters, which comes out to 3 x 16 bits. To enter data into these groups, send: `RAW=bbbbccccdddd`. The blocks represented by bbbb, cccc and dddd are the RDS/RBDS B, C and D data packets, which are described in the relevant Standard and shown above as Blocks 1, 2 and 3. RAW= sends the data in these packets only once, as soon as the command is uploaded to the encoder.

RAW(n)= The 730 Encoder offers a useful variation of the RAW= command: RAW(n)= , where (n), a number larger than 1, corresponds to the number of times RAW= will be sent in quick succession, up to 9 times. (RAW1= would be the same as RAW=.) This redundancy helps ensure that data will be received. Thus the command RAW6=(data) will send (data) on six successive transmissions of that group.

Certain hexadecimal values in RDS/RBDS packets are already in use for RDS functions supported by the 730 Encoder. Block A, for instance, which precedes packets in the RAW group, contains the PI code, which is programmed into encoder memory.

But other groups can be altered on a temporary basis without compromising functions that regularly depend on data in these groups.

Like the PI code, the PTY and TP data are always populated automatically by the encoder and cannot be changed with the RAW= command. Although values programmed into these slots will be ignored, it is best practice to set these values to 0 (zeros) in the RAW packets, just as a point of consistency in assignment.

ODA Auto-Repeat Feature

This feature allows either one or two individual ODA packets to be re-sent (repeated) at a user-defined interval. This can be thought of a variation of the RAW(n)= command, which repeats the transmission of raw data a set number of times. With Auto-Repeat, the data in these groups are repeated a specified number of times in a 'burst,' equivalent to the (n) value in RAW(n)= , and the *burst* is then repeated at a programmed *interval*. The transmission of these ODA groups is open-ended; they will continue to repeat until replaced.

ODA Auto-Repeat is useful as a "heartbeat" function, where data relating to a particular proprietary application are repeated over and over so that an RDS radio, which is scanning the dial for this application, will have a better chance of identifying the transmission. This may be helpful, for instance, to some providers of song 'tagging' to identify the station as one that supplies the song tags in their format.

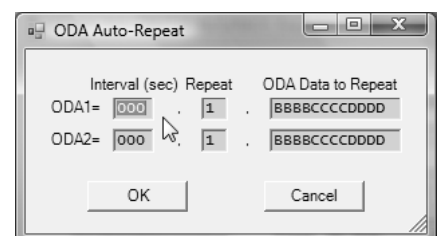
Perhaps a better example might be a utility company that does power-grid 'load management' using RDS/RBDS.

Say the utility company wants to cut back on commercial air conditioning use during critical parts of the day when the load is critical. The A/C units are controlled by special RDS radios and respond to commands from the utility company. But rather than an active data link between the utility company and one or more radio stations, an ODA Auto-Repeat command needs to be sent only once to the encoder(s). Once the command is uploaded, the 730 Encoder will continue to transmit the control data to the A/C units in the field until the command is replaced or disabled.

ODA Auto-Repeat transmissions are sent to the encoder either from the software screen, or as an ASCII command using the Terminal utility, or from direct connection with controlling equipment.

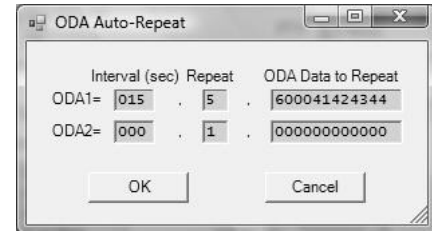
Click: Tools/ODA Auto-Repeat at the top of the Windows® software screen. This brings up the box shown here.

Either ODA1= or ODA2=, or both, may be programmed. Disable either (or both) by entering 000 in the Interval (sec) box.



Interval (sec) is the period, in seconds, between repeated transmissions of data bursts. Any value between 001 seconds and 999 seconds (16+ minutes) may be entered here. Repeat is the number of data repetitions in each burst, equivalent to (n) in RAW(n)= . A number between 1 and 9 is entered here. ODA Data to Repeat is the same “RAW” data discussed earlier, for the B, C and D RDS data groups.

For example, the sample entry shown here would send the three hexadecimal values 6000, 4142 and 4344 in the B, C and D RDS groups of the 6A (‘In-House’) packet, respectively. Each burst, or successive repetition of the groups, would repeat the data 5 times, and this would keep repeating every 15 seconds. In this example the ODA2= group is disabled, although it could be programmed for another application.



To format this same information using the Terminal program, the command would be: ODA1=015,5,600041424344. This same formatting would hold true for a controlling computer or process-instrumentation system.

The Scheduler utility built into the 730 Encoder may also be used to transmit these ODA1= and ODA2= commands automatically, according to a day-or-date and time schedule. This option is described on Page 34.

DATA INTERCONNECTION

For dynamic operation of the 730, the rear-panel RS-232 SERIAL DATA INTERCONNECT port is addressed in simple ASCII text. The primary utility of this port is to connect with station automation for uploading scrolling-PS and Radio Text messages. Communication syntax for direct connection with automation was explained on Page 59 and in the Appendix.

The various RDS flags and other static data should already have been programmed per the instructions in Section III.

Computer or Terminal Requirements

Although the supplied Windows® software and front-panel USB port afford the easiest method of entering static RDS data, the encoder may also be addressed serially using the Terminal utility in the 730 Encoder software (see Page 31). A simple “dumb” RS-232 terminal and, of course, station automation may also address the encoder directly. The encoder can accommodate multiple baud rates with a factory default setting of 9600 baud. Set terminal or automation for: 9600-baud/8 data bits/no parity/one stop bit (9600,8,N,1).

Interconnect Cables

When the 730 is connected to a computer for static programming, the front-panel USB port is by far the most convenient means, and a USB cable has been included with the encoder. Serial-port connection with station automation for dynamic

messaging requires a 'straight-through,' pin-for-pin DB9 extension cable, and a short one has been provided with the 730 Encoder. Serial cable pinout is diagrammed in Figure 7A.

Modem Link

A modem link also may be used for addressing the encoder from a remote location. When properly configured, a modem link will appear 'transparent,' as if the encoder were connected directly to the controlling computer or automation system. Figure 7B shows proper pin connections for the cable used to connect the 730 Encoder to a conventional external modem. The three conductors shown are the only ones actually required in this case.

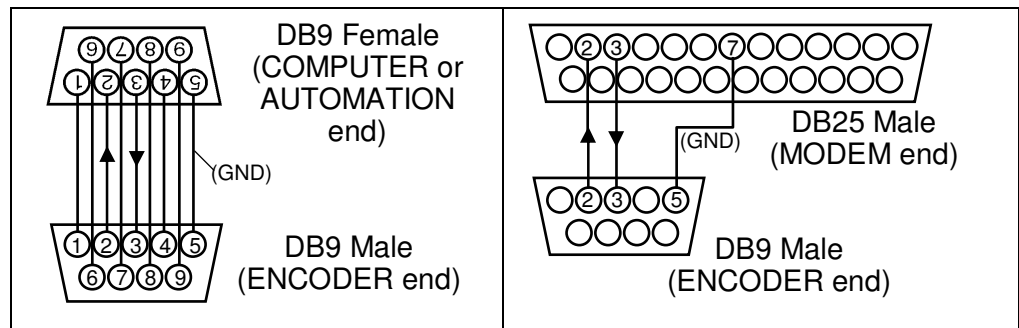


Figure 7A
Computer or Automation Cable

Figure 7B
Modem Cable

STL Receiver Cable

Figure 7C diagrams the cable normally required to interconnect the 730 Encoder with an STL receiver. Only three connections are actually required for this RS-232 interface, plus a pigtail jumper in the end that goes to the STL to fool the receiver into a proper 'handshake' routine.

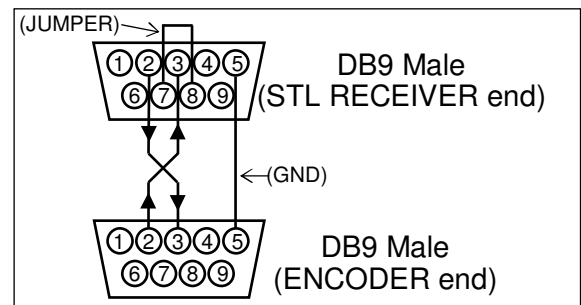


Figure 7C
STL Receiver Cable

Section VII

NETWORKING THE 730 ENCODER

PORTS

Port Assignments

The 730 Encoder has three network ports available through the single rear-panel TCP/IP LAN PORT RJ45 connector. Two of these are conventional TCP (Transmission Control Protocol) ports. The other is a UDP (User Datagram Protocol) port, which is best suited for unidirectional (one-way) connections that are restricted to data incoming to the 730 Encoder only, although 2-way connections may use this port as well.

The three ports have the factory-default numerical assignments shown here, but these may be changed from the front panel on Menus 51, 52 and 53, or through the software interface, or with a Terminal utility command (e.g.: `PORT1=10018` . The command: (e.g.) `PORT1=0` disables the port).

Port1 (TCP)	10001
Port2 (TCP)	10002
Port3 (UDP)	10003
<input checked="" type="checkbox"/> DHCP	

IP Address Assignment

The IP (network) address of the 730 Encoder may be assigned manually, or it may be automatically assigned by Dynamic Host Configuration Protocol (DHCP). With DHCP enabled, the network router or server assigns the address. DHCP may be turned on and off locally through Menu 45, by using the software screen, or with the Terminal utility command: `DHCP=1` or: `DHCP=0`.

When DHCP is *not* enabled, an IP address may be entered from the software screen, or through the Terminal utility with an `IP=` command. Similarly, the Gateway and Subnet (subnetwork mask) may be entered if these are required, as established by your Network Administrator.

P) 10001	Assigned IP	192.168.1.1
P) 10002	GATEWAY	0.0.0.0
P) 10003	SUBNET	0.0.0.0
<input type="checkbox"/> DHCP	DNS	0.0.0.0

NETPASS Password Protection

The two TCP ports have optional password protection, the UDP port does not. By definition, UDP (Datagram) is a 'connection-less' protocol; the UDP port may be disabled by setting the address to 0 (zero).

The TCP password may contain letters and numbers, up to 16 case-sensitive characters in length. Click: Tools/TCP Password to open the entry box shown here. Type in the desired password, and then check the box: Set NETPASS on next Write. Click: OK and the password will be uploaded to the 730 Encoder on the next **WRITE** command.

1705/1707/730 KDS/KBUS encoder - Inovonics, Inc.

Device Tools Format Help

Scrolling PS PTY (1) News

THIS

xt THI

rnative

87.6 M

87.7 M

87.8 M

87.9 M

88.0 M

88.1 M

PA TIME 100 000000

Password

PASSWORD

NETPASS: *****

☒ Set NETPASS on next Write

OK Cancel

Once a password has been assigned, both TCP ports are protected.

When network ports are password-protected, a user will be prompted to enter the password at the beginning of each session when attempting to **READ** from or **WRITE** to that port. This is the case when using either the Windows® software or a Terminal utility with at TCP connection. For greatest security the password should be uploaded to the 730 Encoder using a USB or serial connection to the computer. The password may also be set using the Terminal utility with a **NETPASS=** command.

To change the password over a TCP port that is already password-protected, you must first establish communication using the existing password to gain access to the encoder. Then click: Tools/TCP Password, clear the password field, enter a new password, check the Set NETPASS on next Write box, click: OK, and then execute a **WRITE** command to upload the new password to the encoder. A USB or serial connection, or the unprotected UDP port, may be used to clear an existing password and enter another if the existing password has been lost.

Automation and Passwords

As of this writing, no known automation systems support remote passwords. Playout system commands will thus be denied if attempting to use a password-protected network connection. When automation must connect over an open network, the unused TCP and/or UDP port may be turned off by setting their port addresses to zero. As station automation is then directed to the single unprotected port, outside access to that port will be somewhat more restricted simply through its being busy much of the time. A direct serial connection with the encoder is always recommended when network security is an issue.

DYNAMIC DNS

The 730 Encoder features a utility that will maintain a constant network connection when the encoder has been assigned a 'dynamic' IP address.

Dynamic DNS Defined

Dynamic IP addresses allow multiple networked devices to share limited address possibilities, thus obviating the need to assign fixed (static) IP addresses to each network device. Dynamic IPs are common on LANs and broadband networks. Dynamic IPs are usually assigned by DHCP servers. With respect to the Internet, most DSL connections have dynamic IP addresses that may change daily or even more frequently.

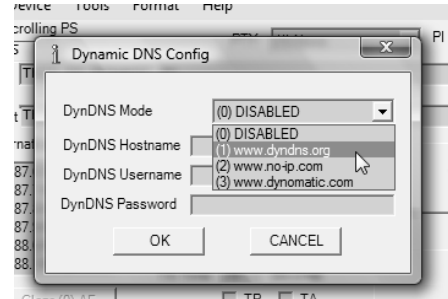
It would not be possible to address an encoder with a changing IP address if it were not for IP-forwarding providers available on the Internet. This service, generally free of charge, allows the 730 Encoder to keep the provider apprised of its reassigned IP address whenever the address changes. Instead of address-

ing the encoder directly, the sender (automation system) sends data to the IP forwarding provider, which automatically keeps track of encoder's changing IP address and sends the data to the encoder's current IP address.

Dynamic DNS Providers

There are three popular forwarding services available over the Internet. These services require registration on the appropriate Website and, as of this writing, are free of charge.

Click: Tools/DynDNS to bring up the Dynamic DNS Config window shown here. The particular forwarding provider is selected by clicking on the name. This may also be selected locally with the front-panel jog wheel, as described under Menu 54 (Page 21), or even assigned using the Terminal utility with a DYNDNS= command.



A Hostname, Username and Password specific to your 730 Encoder will be determined when you sign up on the provider's Website. This information may then be entered into the software window, set locally with the jog wheel under Menus 55, 56 and 57, or may be entered using the Terminal utility.

Dynamic DNS System Abuse

Each IP address renewal utilizes some small part of the forwarding provider's processing resources. These providers don't take well to repeated and unnecessary IP address renewals. The 730 encoder will normally advise the provider only when the IP address changes, but it also must sign on following a power interruption and whenever the DynDNS Mode is changed. If a particular account makes a nuisance of itself, the provider may justifiably terminate the account. If this happens the front-panel display will show an appropriate status message in Menu 54 as explained below.

Status Messages

The Menu 54 window shows not only which dynamic DNS provider has been selected, but also displays a message number and 'short label' for a variety of conditions relating to the dynamic DNS service. A chart of these messages and their explanations is given here.

<u>Message ID</u>	<u>Status Explanation</u>
Mode:#0 OK	Update successful; hostname is now updated.
Mode:#1 OK	Update resulted in no change to settings. This is considered an 'abusive' use of the system and subsequent updates may cause the hostname to be blocked.
Mode:#2: BAD	The hostname has been blocked for update abuse!
Mode:#3: BAD	System parameter is not valid. Should be dyndns, statdns or custom.
Mode:#4 BAD	The user agent was blocked or otherwise not sent.
Mode:#5 Help!	The username and password do not match a real user.
Mode:#6 BAD	The user is not a credited user and an option available only to credited users (such as offline URL) was specified.

Mode:7 Help!	The hostname specified is not a fully qualified domain name; that is, not in the form of <hostname.dyndns.org> or <domain.com>.
Mode:8 Help!	The hostname specified does not exist in this user account or is not in the service specified in the system <domain.com>.
Mode:9 Help!	The hostname specified does not belong to this user account.
Mode:10 BAD	Too many hosts specified in an update.
Mode:11 Error	Unspecified DNS error encountered by the DDNS provider.
Mode:12 Error	There is a problem or scheduled maintenance with the DDNS server.
Mode:13 Error	Error communicating with the update service.
Mode:14 Zzz	The IP Check indicated that no update was necessary.
Mode:15 Error	Error communicating with Check IP service.
Mode:16 Help!	DDNS Client data is not valid.
Mode:17 Zzz	DDNS client has not yet been executed with this configuration.

To summarize:

Zzz signifies an idle mode. Either the Dynamic DNS utility is disabled, or it is waiting for the IP to change.

OK means that an update has just occurred and was successful.

Help! Shows that something is wrong with the Hostname, Username and Password fields, that they do not match the actual account information. This may be corrected by changing one or more of the three fields.

Help! or Error are generally responses that will yield to corrective action; BAD denotes a major failure.

Section VIII

“RADIO TEXT PLUS”

“Radio Text Plus” (RT+) is a system of RDS message ‘indexing’ originally conceived by the German public-broadcasting company, WDR; the German radio broadcast research center, IRT; and the Finnish mobile-phone manufacturer, Nokia.

RT+ may be simply described as a protocol that describes (to a computer, for example) what the Radio Text means and how it should be interpreted. For example, it can mark a certain part of the Radio Text as a song title and another part of the text as the artist.

RT+ extends the utility of the Radio Text message field by giving the user selective access to specific components within the 64-character message. This may be used to generate a more detailed data display on receivers with RT+ capability, and to permit message ‘tagging.’

Songs may be tagged for later download from sales Websites for a per-track charge. This frees the listener from having to remember and identify a song at a later time, find it in the catalog of a download provider and download it to his computer or MP3 player. Tags in other messages can reference telephone numbers or Web addresses. This entire process becomes totally automatic with RT+.

An ‘interactive’ application of RT+ is of particular value to listeners with mobile phones or other ‘personal’ 2-way communication devices equipped with built-in FM radios. It allow the downloading of individual stock market figures, weather forecasts or local telephone listings that are pertinent to a specific radio program or newscast being aired.

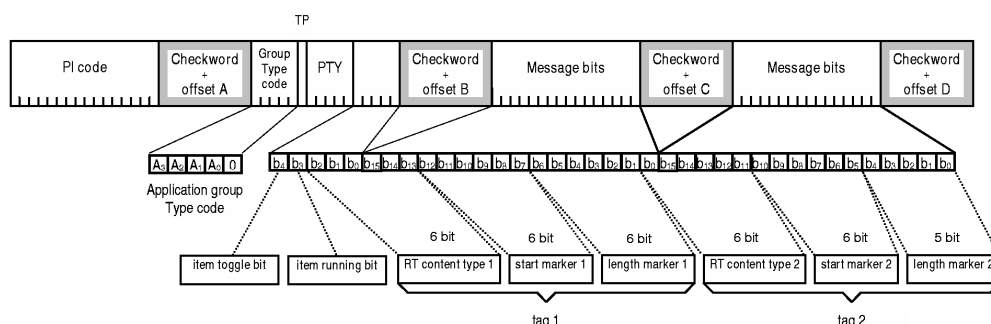
RT+ is an extension of the normal RDS Radio Text field. With respect to scrolling song titles, for instance, the Radio Text field must contain the artist and title information, even though this same information may already be scrolling in the Dynamic PS field where it will appear on all RDS radios. To support RT+ song tagging, station automation must be programmed to send TEXT= (title and artist), plus the appropriate RT+ ‘tag’ in the proper data group. Of course if the song information is to be seen on all RDS radios in the PS field, then DPS=(title and artist) must be programmed to run concurrently to the RT+ information.

RT+ TAGS

Each Radio Text Plus entry allows two RT+ tags to delineate the RT text. Each of these two tags consists of three ‘information elements’:

- 1) The RT ‘Content Type’ from a list of 64 possibilities;
- 2) The ‘Start Marker’ that points to the position of the first character of the ‘information element’;
- 3) The ‘Length Marker’ giving the number of characters *following* the Start Marker character, used to define the length of the ‘information element.’

The arrangement of RT+ data is diagrammed in the illustration below, which is part of the RT+ Standard:



Neglecting ‘housekeeping’ commands for the present, Content Type is defined by a list that is part of the RT+ Specification. This list is shown in the Appendix on Page 82. For the everyday example that we will illustrate below, refer to Page 82 and note that a Content Type is specified for ITEM.TITLE and ITEM.ARTIST. The song title and artist tags are sent in succession as six individual, two-digit numerical values.

An RT+ Tag Example

Here’s an everyday example of the Radio Text field showing this song data:

† NOW PLAYING: EYE OF THE TIGER BY SURVIVOR ON WNEW RADIO 96.1

First will be an explanation of how the tag is calculated numerically, followed by use of the Windows® software utility to perform the same operation.

The two pieces of information we want to tag are the song title and artist. The first tag, for the title, is composed of three, two-digit values. First the Content Type, which is ITEM.TITLE from the list on Page 82. It’s the first category so it carries a numerical value of 01. Next comes the Start Marker, the position of the first letter in the title name. Begin counting characters and spaces with the number zero for the first character showing in the RadioText field. With the N in NOW as zero, the Start Marker would be E in EYE, position 13. The song title has an additional 15 characters and spaces *after* the initial E, so the Length Market is 15. Our first tag thus has numerical values of 01, 13 and 15.

Next is the ITEM.ARTIST, fourth on the Page 73 list and calculated the same way. S in SURVIVOR is the next Start Marker in position 33. The artist's name has an *additional* 7 characters; hence this is the value of the Length Marker. Our second tag has the values 04, 33 and 07.

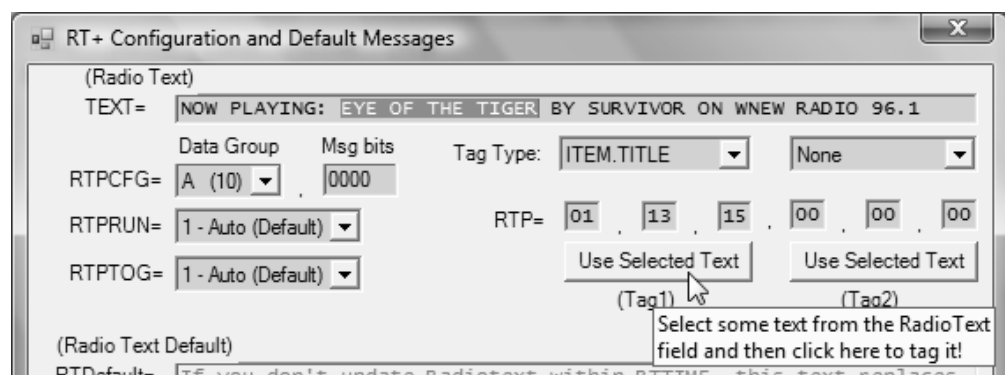
Note that both the Start Marker and the Length Marker have values of one less than the total number of characters involved in each case. This has been factored into the instructions by starting the count of the Radio Text entry starting with zero, rather than one, to arrive at the Start Marker, and also by counting characters following the Start Marker to obtain the Length Marker. This is the manner described in the RT+ Standard, although another way of looking at this would be to simply subtract one from an actual count.

The six numerical values that we have calculated manually in our example will have been embedded in the artist/title information that is loaded into the automation system. In similar fashion, other RT+ utilities that refer to on-air events will have embedded pre-calculated values for dynamic operation. The numerical value groups for our example are sent to the encoder with the serial data command string: RTP=01,13,15,04,34,07.

Using the RT+ Software Utility

Open the 730 software and click: TOOLS/RT+ and Defaults. This will bring up the RT+ Configuration and Default Messages window, which is shown below.

Whatever has been entered manually in the Radio Text software field will be transferred to the top TEXT= line of the configuration window. For this exercise, let's use the same song title and artist that we calculated manually in the previous example. This may be entered on the main data entry screen in the Radio Text field, or typed into the TEXT= line as shown here.



To tag the song title, the pull-down menu under the first Tag Type: was used to select ITEM.TITLE, which filled-in 01 as the type. The next step would be to highlight the title text, EYE OF THE TIGER, and then click the Use Selected Text button to bring up Start Marker 13 and Length Marker 15. These are all the same numerical values for the tag that we calculated manually.

The next step would be to pick Tag type: ITEM.ARTIST for the second field, highlight the artist's name, SURVIVOR, and click the Use Selected Text button.

Click the OK button at the bottom of the screen to accept the tags; this information will then be uploaded to the encoder with the next **WRITE** command.

These exercises have created a RT+ 'tag' sequence for just this sample song. In dynamic operation, the title and artist information, plus the tag values, would be associated with the song in station automation, along with the proper formatting to be fed to the encoder automatically.

In the event that only a single tag is used, Tag 1 should be configured with the information. Tag 2 should be set to all zeros 00 . 00 . 00.

COMMAND OPTIONS

Entry fields are provided for RT+ Configuration (RTPCFG=), to set the RT+ Running Bit (RTPRUN=), and the Item Toggle Bit (RTPTOG=). The default values which have been assigned these options are the proper choices for nearly all RT+ applications. Please refer to the RT+ Specification before changing these values.

RT+ Configuration

RTPCFG codes the Application Data group that precedes the RT+ command string. This is a work-in-progress of the RDS Standards groups as of this writing, and allows program 'templates' and other advanced features proposed for the RT+ Specification. Future refinements of RT+ commands and operation may be enabled without firmware updates.

The factory-default setting for RTPCFG is appropriate for encoder operation for the present. This setting can be confirmed on Menu 72 as **Grp:A Msg bits:0000**. If this setting is lost for any reason, it can be reset with the jog wheel, by using the software Terminal Utility and entering: RTPCFG=A,0000, or with the Windows® software in the entry field shown here.

Toggle and Running Bits

Referring back to the diagram on Page 71, note that an Item Toggle Bit and an Item Running Bit precede the transmission of the RT+ data that is based on Content Type.

The Item Toggle Bit is toggled from a 1 to a 0 or from a 0 to a 1 whenever a new RT+ item starts. The Item Running Bit is simply set to a 1 whenever an item is running; otherwise it is set to 0. These 'housekeeping' commands are handled automatically by the encoder whenever an RPT= string is sent. They may be set manually, however, either with the front-panel jog wheel in Menus 73 and 74, or by using the pull-down menus in the encoder software as shown here.

Always remember to click the WRITE button to send software entries to the 730 Encoder.

These examples detail RT+ formatting for typical current uses. It is not within the scope of this manual to go into greater detail, but the curious reader is invited to download and study the complete RT+ Specification, which may be found here:

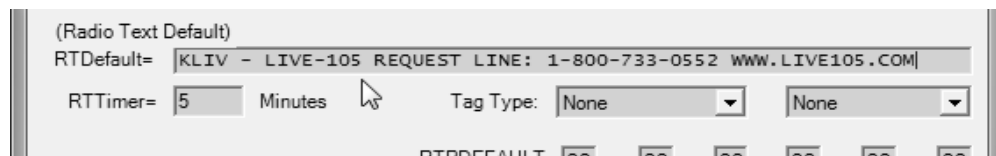
www.rds.org.uk/rds98/pdf/R06_040_1.pdf

THE DEFAULT RADIO TEXT MESSAGE

As described in-brief on Page 48, the 730 Encoder provides means to send a default Radio Text message when, during dynamic RT and RT+ operation, the incoming Radio Text message string is lost for a specified period of time.

The default message is entered in the RTDefault= area, and may be tagged using the software utility described earlier.

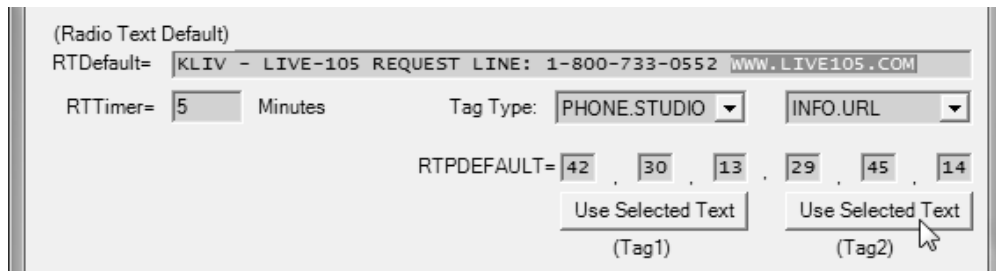
If this has never been done, the factory default message will be 'grayed-out' in the entry area. To enter data, it is first necessary to specify a timeout duration. This is the number of minutes that dynamic Radio Text can 'go missing' before the default message is substituted. In the RTTimer field, enter a number. Next clear the factory-default message and type-in your own. We'll use the same example presented earlier.



A **WRITE** command will upload this message to encoder memory. If dynamic Radio Text (or RT+) messaging is lost (not refreshed) for five minutes, the default message will be sent in the Radio Text field.

We can 'tag' this default message as well, providing links to the station's telephone number and Web address.

Select the Tag Type: from the pull-down list. Next highlight the appropriate text in the RTDefault= field and click: Use Selected Text. This has been done for both tags in the example below.



After programming this field, click: OK to close this screen and then initiate a **WRITE** command.

Section IX

APPENDIX

This section of the 730 Encoder Manual contains Certain Listings and Tabulated Items, plus an explanation of Inovonics' Most Generous Warranty Policy.

ENCODER COMMANDS AND PROMPTS

The following table lists programming commands and special commands to control the Model 730 Encoder, and certain responses that are received from the encoder. These are listed in the order received following a ??↵ (general interrogation) inquiry, which itself is explained under Special Commands.

Every command sent to the encoder must be followed by the equivalent of a keyboard 'Enter,' shown here as the symbol: ↵. This is technically either an ASCII CR (carriage return) or CRFL (carriage return + line feed).

COMMAND	PARAMETER	DATA ENTRY INFORMATION
DPS=	Dynamic PS	128 (max) characters for scrolling messages in the PS field; (e.g.): HERE COMES SUMMER SUNG BY JERRY KELLER
DPSDEFAULT=	Dynamic PS Default	128 (max) character message to scroll in the absence of a normal DPS message; (e.g.): TODAY'S HITS FROM LIVE 95
DPSTIMER=	DPS Default Timer	0 = Default PS Option Disabled; 1 - 255 = the "wait time" in minutes between receipt of the last incoming DPS message and the transmission of the DPS Default message.
PARSE=	Dynamic PS Method	0 = Auto-Parse; 1 = Single character 'Safe Scrolling'; 2-7 = Multiple character side-stepped scrolling; 8 = Unparsed block of 8 characters 9 = Auto2 word break option.
DPSS=	Dynamic PS Speed	0 - 9 = Speed of Scrolling-PS display, slowest to fastest; 6 recommended.
TEXT=	Radio Text	64 (max) character message to be displayed by the receiver if so equipped; (e.g.): KLIV (800) 733-0552 - www.kliv.com
RTDEFAULT=	Radio Text Default	64 (max) character message to display automatically if incoming dynamic RT messaging is lost.
RTTIMER=	Default RT Delay	0 = Default RT Disabled; 1 - 255 = the "wait time" in minutes between receipt of the last incoming RT message and the transmission of the RT Default message.
DRTS=	RadioText Speed	0 = RadioText OFF; 1 - 9 = Refresh rate for RadioText message transmission; 3 recommended for text messaging, higher values for RT+ applications.
PI=	Program Identification	4-digit HEX number corresponding to the station's 'digital address'; (e.g.): 689E

COMMAND	PARAMETER	DATA ENTRY INFORMATION
CALL=	Call Letters PI Calculator	For North American stations only! Call letters entered with this command will automatically be converted to the proper PI code; (e.g.): WHOO.
PTY=	Program Type (Format)	1 or 2 digit number from PTY list describing the station broadcast format; (e.g.): 9 for N. American "Top 40".
PTYN=	Program Type Name	8-character refined format definition; (e.g.): BIG BAND
MS=	Music/Speech Switch	0 = Speech only; 1 = Music programming
DI=	Decoder Information	0 = Monaural-only transmission; 1 = Stereo transmission
TP=	Traffic Program	0 = Station does not carry traffic info.; 1 = Station broadcasts routine traffic info.
TA=	Traffic Alert ON-AIR NOW	0 = Flag off; 1 = Flag on (Flag valid only when TP=1)
TATIME=	TA Timeout	0 = Timer off; 1 - 255 = seconds between start of TA flag and automatic reset to OFF; 30 is recommended.
AF=	Alternative Frequency List	Enter each AF (e.g.): AF1=88.1↵ To clear: AF1=0↵
DHCP=	Network Host Protocol	0 = Manual network address entry 1 = Network info assigned by server/router
IP=	IP Network Address	For manual entry of encoder IP address when DHCP=0, (e.g.): 192.168.1.6
GATEWAY=	Part of Network Address	(e.g.): 192.168.1.1
SUBNET=	Part of Network Address	(e.g.): 255.255.255.0
DNS=	Part of Network Address	(e.g.): 192.168.1.1
MAC=	Encoder's ID	Assigned at factory, cannot be changed.
PORT1=	TCP Port No. 1	Assign number from 1 to 65535 (e.g.): 10001 Assign 0 to disable port.
PORT2=	TCP Port No. 2	Assign number from 1 to 65535 (e.g.): 10002 Assign 0 to disable port.
PORT3=	UDP Port	Assign number from 1 to 65535 (e.g.): 10003 Assign 0 to disable port.
DynDNS=	Dynamic DNS Utility and Mode (status)	Selects dynamic DNS providers; 0 = Disabled; 1 = dyndns.org; 2 = no-ip.com; 3 = dnsomatic.com
DynDNSHost=	Dynamic DNS Host Name	Host name assigned by provider; 26 characters, max.
DynDNSUser=	Dynamic DNS User Name	User name assigned by provider; 26 characters, max.

COMMAND	PARAMETER	DATA ENTRY INFORMATION
DynDNSPass=	Dynamic DNS Password	Password assigned by provider; 21 characters, max.
TIME=	Current Local Time	Manual entry with Internal Clock (e.g.) 10:45:00 (hh:mm:ss). Entry is disabled with Internet connection.
DATE=	Current Date	Manual entry with Internal Clock (e.g.): 07/24/09 (mm/dd/yy). Entry is: disabled with Internet connection.
UTC=	UTC Offset	Offset in hours between local time and Universal Coordinated Time; (e.g.): -8 for Pacific, +5.5 for Mumbai.
DST=	Daylight Saving Time	0 = disabled; 1 = enabled using onboard 10-year database
CT=	Clock Time Function	0 = Clock Time Disabled; 1 = Internet Mode 2 = Manually Set
ECHO=	Terminal Echo	0 = no echo of sent data; 1 = sent data echoed to Terminal window 2 = data echo and responses disabled
RDS=	57kHz RDS Subcarrier	0 = RDS subcarrier turned off 1 = RDS subcarrier active
UECP=	Encoder Protocol	0 = UECP mode disabled; Hex code 1 through F enables UECP mode on various encoder ports.
SITE=	UECP Site Address	Site address assignment: 0 to 1023
ENCODER=	UECP Encoder Address	Encoder address assignment: 0 to 63
HEADER=	Headers Mode	0 = 'No Headers' mode for satellite- streamed DPS data; 1 = normal operation with headers.
SPEED=	Serial Baud Rate	Sets baud rate for serial-port communications (e.g.): 9600
RTP=	RT+ Tagging Data	Six, comma-separated 2-digit number groups of 'tagging' data for the Radio Text Plus field; e.g.: RTP=01,13,15,04,33,07
RTPDEFAULT=	RT+ Default Tagging Data	Six, comma-separated 2-digit number groups of 'tagging' data for the default Radio Text Plus field; e.g.: RTPDEFAULT=01,13,15,04,33,07
RTPCFG=	RT+ Configuration	For future use; default: A,0000
RTPRUN=	RT+ Running Bit	0 = Bit low; 1 = Auto (Default); 2 = Bit forced low.
RTPTOG=	RT+ Toggle bit	0 = Never toggle; 1 = Auto (Default); 2 = Force low; 3 = Force high.

COMMAND	PARAMETER	DATA ENTRY INFORMATION
SCHEDULE=	Scheduler Status	0 = Scheduler disabled; 1 = Scheduled events are active.
NETPASS=	TCP/IP Port Password	Up to 16 alphanumeric case-sensitive characters
DELAY=	Transmission Delay of Scrolling-PS, RT & RT+	0 to 120 seconds
ODA1= or ODA2=	ODA Auto-Repeat Groups	Repeat cycles, refresh interval and ODA (RAW) data.
RDSLEVEL=	Subcarrier Level	Peak-to-peak output level of the RDS subcarrier in volts; 0 to 3V p-p range

SPECIAL COMMANDS	
COMMAND	ACTION
↵ (Enter) or Help↵	Typing Help+Enter (or simply 'Enter') brings up a list of numbered encoder memory categories. Any number typed then displays the encoder settings for that group.
(HDR)?	Typing any header and '?' returns the status of the encoder memory for that specific parameter; e.g.: DI?↵ shows the Decoder Information setting.
??	Typing '??' returns all settings in encoder memory. This may be 'too much information' at one time. Typing 1, 2, 3, and 4 bring up sub-categories with fewer listings in each.
REV↵	Returns the firmware revision number.
SAVE↵	Transfers all settings from RAM to non-volatile EEPROM. This is automatic with all settings except for DPS= , TEXT= , and RTP= .
RESET↵	A 'soft' reset, as if AC power is cycled off and back on.
INIT↵	Deletes all user information from memory and resets the encoder to factory defaults.
LOG↵	Returns statistics on how many times certain commands have been sent to the encoder since the last time the LOG was cleared.
LOGCLR↵	Resets the LOG counter.

RESPONSES	
RESPONSE	MEANING
OK	The command received was properly formatted and was received and executed by the encoder.
NO	Incoming data is not properly formatted and hence was not accepted and executed by the encoder.
(none)	Data that has been sent either has not reached the encoder or the encoder has no response for that command. Also, the encoder may be set for ECHO=2 to inhibit its response to commands.

US AND EUROPEAN PTY LISTINGS

<u>PTY</u>	<u>US (NRSC) 'RBDS'</u>	<u>EUROPE (CENELEC)</u> <u>'RDS'</u>
0	None	None
1	News	News
2	Information	Current Affairs
3	Sports	Information
4	Talk	Sports
5	Rock Music	Education
6	Classic Rock Music	Drama
7	Adult Hit Music	Culture
8	Soft Rock Music	Science
9	Top 40 Music	Varied
10	Country Music	Pop Music
11	Oldies Music	Rock Music
12	Soft Music	Easy Listening Music
13	Nostalgia Music	Light Classics Music
14	Jazz	Serious Classics Music
15	Classical Music	Other Music
16	Rhythm and Blues Music	Weather
17	Soft R and B Music	Finance
18	Foreign Language	Children's Programs
19	Religious Music	Social Affairs
20	Religious Talk	Religion
21	Personality	Phone-In
22	Public Non-Commercial	Travel
23	College	Leisure
24	(unassigned)	Jazz Music
25	(unassigned)	Country Music
26	(unassigned)	National Music
27	(unassigned)	Oldies Music
28	(unassigned)	Folk Music
29	Weather	Documentary
30	Emergency Test	Alarm Test
31	Emergency!	Alarm!

ALTERNATIVE FREQUENCY CHANNEL NUMBERS

<u>MHz</u>	<u>CHAN</u>	<u>MHz</u>	<u>CHAN</u>	<u>MHz</u>	<u>CHAN</u>	<u>MHz</u>	<u>CHAN</u>
87.6	1	92.7	52	97.8	103	102.9	154
87.7	2	92.8	53	97.9	104	103.0	155
87.8	3	93.9	54	98.0	105	103.1	156
87.9	4	93.0	55	98.1	106	103.2	157
88.0	5	93.1	56	98.2	107	103.3	158
88.1	6	93.2	57	98.3	108	103.4	159
88.2	7	93.3	58	98.4	109	103.5	160
88.3	8	93.4	59	98.5	110	103.6	161
88.4	9	93.5	60	98.6	111	103.7	162
88.5	10	93.6	61	98.7	112	103.8	163
88.6	11	93.7	62	98.8	113	103.9	164
88.7	12	93.8	63	98.9	114	104.0	165
88.8	13	93.9	64	99.0	115	104.1	166
88.9	14	94.0	65	99.1	116	104.2	167
89.0	15	94.1	66	99.2	117	104.3	168
89.1	16	94.2	67	99.3	118	104.4	169
89.2	17	94.3	68	99.4	119	104.5	170
89.3	18	94.4	69	99.5	120	104.6	171
89.4	19	94.5	70	99.6	121	104.7	172
89.5	20	94.6	71	99.7	122	104.8	173
89.6	21	94.7	72	99.8	123	104.9	174
89.7	22	94.8	73	99.9	124	105.0	175
89.8	23	94.9	74	100.0	125	105.1	176
89.9	24	95.0	75	100.1	126	105.2	177
90.0	25	95.1	76	100.2	127	105.3	178
90.1	26	95.2	77	100.3	128	105.4	179
90.2	27	95.3	78	100.4	129	105.5	180
90.3	28	95.4	79	100.5	130	105.6	181
90.4	29	95.5	80	100.6	131	105.7	182
90.5	30	95.6	81	100.7	132	105.8	183
90.6	31	95.7	82	100.8	133	105.9	184
90.7	32	95.8	83	100.9	134	106.0	185
90.8	33	95.9	84	101.0	135	106.1	186
90.9	34	96.0	85	101.1	136	106.2	187
91.0	35	96.1	86	101.2	137	106.3	188
91.1	36	96.2	87	101.3	138	106.4	189
91.2	37	96.3	88	101.4	139	106.5	190
91.3	38	96.4	89	101.5	140	106.6	191
91.4	39	96.5	90	101.6	141	106.7	192
91.5	40	96.6	91	101.7	142	106.8	193
91.6	41	96.7	92	101.8	143	106.9	194
91.7	42	96.8	93	101.9	144	107.0	195
91.8	43	96.9	94	102.0	145	107.1	196
91.9	44	97.0	95	102.1	146	107.2	197
92.0	45	97.1	96	102.2	147	107.3	198
92.1	46	97.2	97	102.3	148	107.4	199
92.2	47	97.3	98	102.4	149	107.5	200
92.3	48	97.4	99	102.5	150	107.6	201
92.4	49	97.5	100	102.6	151	107.7	202
92.5	50	97.6	101	102.7	152	107.8	203
92.6	51	97.7	102	102.8	153	107.9	204

LIST OF RT+ CONTENT TYPES

Category	Code	RT+ Classes	MP3 id3v2	Description
Dummy	0	DUMMY_CLASS		To assign a class if the Radio text contains no RT+ information
	1	ITEM TITLE	TT12	Title of item: e.g. track title of an album
	2	ITEM ALBUM	TALB	The collection name to which this track belongs
Item	3	ITEM TRACKNUMBER	TRCK	The track number of the item on the album on which it was originally released.
	4	ITEM ARTIST	TFE1	The person or band/collective generally considered responsible for the work
	5	ITEM COMPOSITION	TT11	A complete composition (Classical Music broadcasters should use this item to identify the composition)
	6	ITEM MOVEMENT	TT13	A movement is a large division of a composition or musical form (Classical Music broadcasters should use this item to identify the movement)
	7	ITEM CONDUCTOR	TFE3	The artist(s) who performed the work. In classical music this would be the conductor
	8	ITEM COMPOSER	TCOM	Name of the original composer/author
	9	ITEM BAND	TFE2	Band/orchestra/accompaniment/musician
	10	ITEM COMMENT	COMM	Any comment related to the content
	11	ITEM GENRE	TCO1	The main genre of the audio, e.g. "classical", "hip-hop", "jazz", "oldies", "drama", etc
	12	ITEM NEWS		Message / headline
Info	13	INFO NEWS LOCAL		Local news
	14	INFO STOCKMARKET (4)		Quote information: either as one part or as several distinct parts: "name", "latest value", "change", "high", "low", "volume" (1)
	15	INFO SPORT (4)		Result of a game; either as one part or as several distinct parts: "match", "result", e.g. "Bayern München : Borussia 5:5"
	16	INFO LOTTERY (4)		Raffle / lottery: "key word", "values"
	17	INFO HOROSCOPE (4)		Horoscope: either as one part or as two distinct parts: "key word", "text", e.g. "sign of the zodiac: ... bla bla bla"
	18	INFO DAILY DIVERSION		Daily tip / diversion / joke ...
	19	INFO HEALTH (4)		Information about health: "key word", "info"
	20	INFO EVENT		Info about an event
	21	INFO SCENE		Information about scene (hot locations to be ...)
	22	INFO CINEMA		Information about: TV-movies
Programme	23	INFO TV		Information about: TV-movies
	24	INFO DATE TIME		Information about date and time (receiver to chose between date and time). Not CT (Clock Time) shall not be used to set the internal clock of a device
	25	INFO WEATHER (4)		Information about weather: either as one part or as two distinct parts: "key word", "info", e.g. "Rain ... 17C"
	26	INFO TRAFFIC		Information about traffic. This shall not replace TMC but rather alert users in case of exceptional traffic news
	27	INFO ALARM		Alarm information
	28	INFO ADVERTISEMENT		Info about an advertisement. May be in parallel to an audio advertisement
	29	INFO URL (4)		Link to url: either as one part or as two distinct parts: "key word", "url"
	30	INFO OTHER (4)		Other information: not especially specified: "key word", "info"
	31	STATIONNAME SHORT		Name describing the radio station (call letters)
	32	STATIONNAME LONG		Name describing the radio station
Interactivity	33	PROGRAMME NOW		EPG info programme now
	34	PROGRAMME NEXT		EPG info programme next
	35	PROGRAMME HOST		Part of the current radio show: e.g. one or more part of the PROGRAMME NOW
	36	PROGRAMME EDITORIAL STAFF		Name of the host of the radio show
	37	PROGRAMME EDITORIAL STAFF		Name of the editorial staff: e.g. name of editorial journalist
	38	PROGRAMME FREQUENCY (4)		Information about radio shows: A link towards another frequency with other content (not AF list). May be one part or two distinct parts: "key word", "frequency"
	39	PROGRAMME HOMEPAGE	WORS	Link to radio station homepage
	40	PROGRAMME SUBCHANNEL		For so-called multicasting applications: may be one part or two distinct parts: "key word", "subchannel"
	41	PHONE HOTLINE		The telephone number of the radio station's hotline
	42	PHONE STUDIO		The telephone number of the radio station's studio
Interactivity	43	PHONE OTHER (4)		Name and telephone number: either as one part or as two distinct parts: "key word", "phone number"
	44	SMS STUDIO		The sms number of the radio stations studio (to send directly a sms to the studio)
	45	SMS OTHER (4)		Name and sms number: either as one part or as two distinct parts: "key word", "sms number"
	46	EMAIL HOTLINE		The email address of the radio stations hotline
	47	EMAIL STUDIO		The email address of the radio stations studio
	48	EMAIL OTHER (4)		Name and email address: either as one part or as two distinct parts: "key word", "email address"
	49	MMS OTHER (4)		Name and mms number: either as one part or as two distinct parts: "key word", "mms number"
	50	CHAT		chat content: sent by users to a specific address and broadcasted by the radio station
	51	CHAT CENTER		Address, where replies to the chat shall be sent (may be url or sms)
	52	VOTE QUESTION		A question (typically binary), which can be answered by "yes" or "no" or "1" or "2"
rfu	53	VOTE CENTER		url or sms number to send the answer to
	54			Classes are reserved for future usage
	55			
Private classes (2)	56			
	57			
	58			
Descriptor (3)	59	PLACE		Adds info about a location
	60	APPOINTMENT		Adds info about date and time
	61	IDENTIFIER	TSRC	For music it is the International Standard Recording Code (http://www.ipi.org/isrc)
	62	PURCHASE	WPAY	Address where item can be purchased, can be an url or a sms-number
	63	GET DATA		Retrieves either via an sms or url-link more data about the other RT+ information element of the same Radio text message. (Info request via point to point - unicast)

(1) V = blank; two or more consecutive blanks act as a separator between several parts of the RT+ information element (see 4.2)

(2) Private classes may be defined by the service provider (see 4.1)

(3) Descriptor will always define the other RT+ information element of the same RadioText message

(4) For this classes the RT+ information element may be structured as described in 4.2



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 an “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 this product *must* be completed and returned to Inovonics, or the Warranty registered online at www.inovon.com, within 10 days of delivery.
 - B. This 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. This 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 label 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 **RETURNING 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.