PIRA32 RDS Encoder

Quick Installation Guide

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1 Using This Guide

1.1 Purpose

This guide covers PIRA32-based RDS encoders (both module and boxed versions). It provides the information needed to install the equipment and set basic RDS services in order to get your station RDS enabled quickly in a few steps.

Please read this entire guide and familiarize yourself with the controls before attempting to use this equipment.

Where not otherwise indicated, any information mentioned in relation to the **RDS** (Radio Data System) applies in full also to the **RBDS** (Radio Broadcast Data System).

If you have any questions or comments regarding this document, please contact us via email.
We welcome your feedback.

1.2 Additional Documentation

Visit the Website or browse the installation CD for the latest documentation version and the following additional documentation:
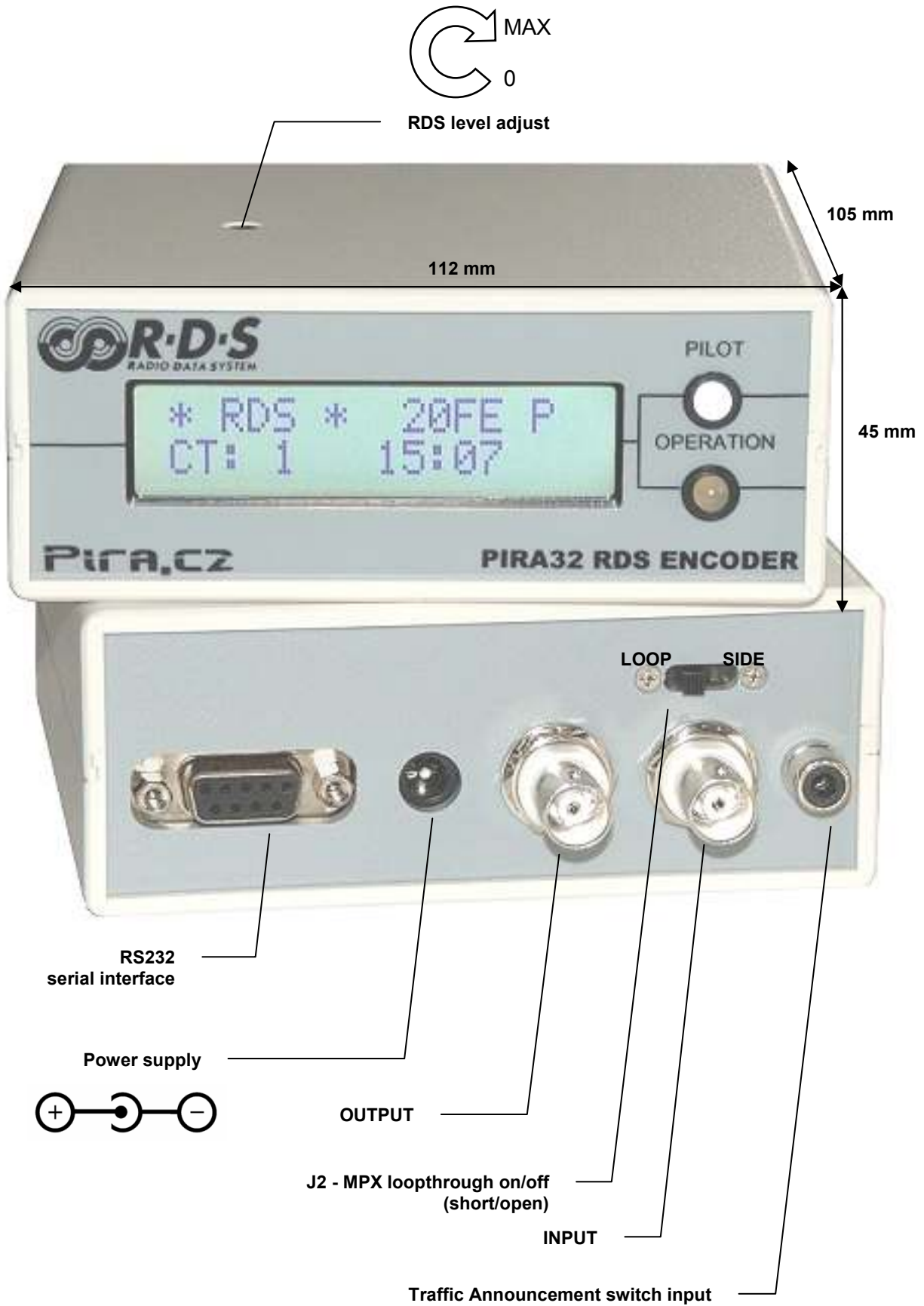
- PIRA32 RDS Encoder Technical Manual (includes troubleshooting on the last page)

- PIRA32 LCD Display Module

- Magic RDS Help

- Magic RDS Guide – How to... (http://pira.cz/rds/show.asp?art=magic_rds_how_to)

- Support section (http://pira.cz/rds/show.asp?art=rds_encoder_support)

1.3 Disclaimer

The equipment has been thoroughly tested and found to be in proper operating condition when shipped. The manufacturer is not liable for any damages, including but not limited to, lost profits, lost savings, or other incidental or consequential damages arising out of the use of this product.
No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or information storage and retrieval systems, for any purpose other than the purchaser's personal use.
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2 Physical Description

RDS level adjust

MAX

0

112 mm

105 mm

45 mm

PILOT

OPERATION

* RDS *   20FE P
CT: 1   15:07

PIRA32 RDS ENCODER

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LOOP   SIDE

**RS232
serial interface**

Power supply

OUTPUT

**J2 - MPX loopthrough on/off
(short/open)**

INPUT

**Traffic Announcement switch input**

3   Hardware Installation

3.1   Connecting the RDS Encoder

Basic rules applying for any RDS encoder's connection:

- The RDS signal must be fed into modulation signal (added to MPX signal if stereo encoder is used).
- If stereo encoder is used, one of its outputs (MPX or pilot tone) must be fed into the RDS encoder input to meet the synchronization requirement.
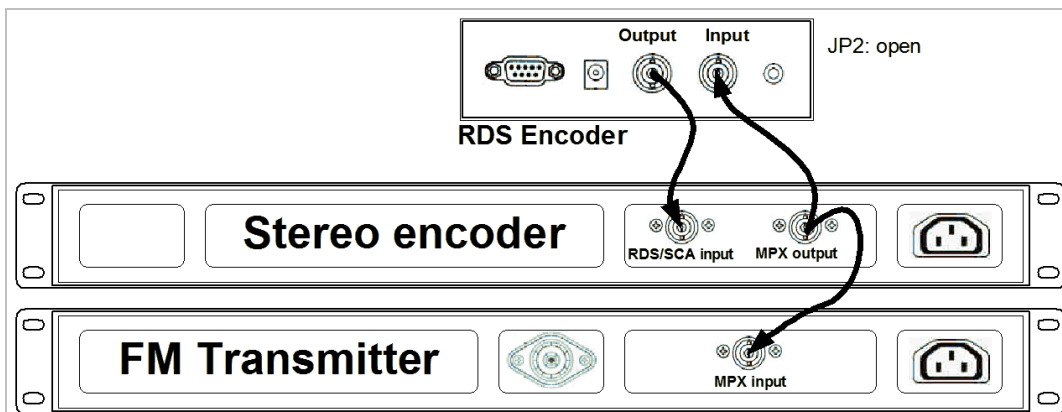
Following figures show various situations and corresponding methods of connection. Use shielded cables (e.g. RG58) terminated by BNC male connectors. The cables should be kept short in length.
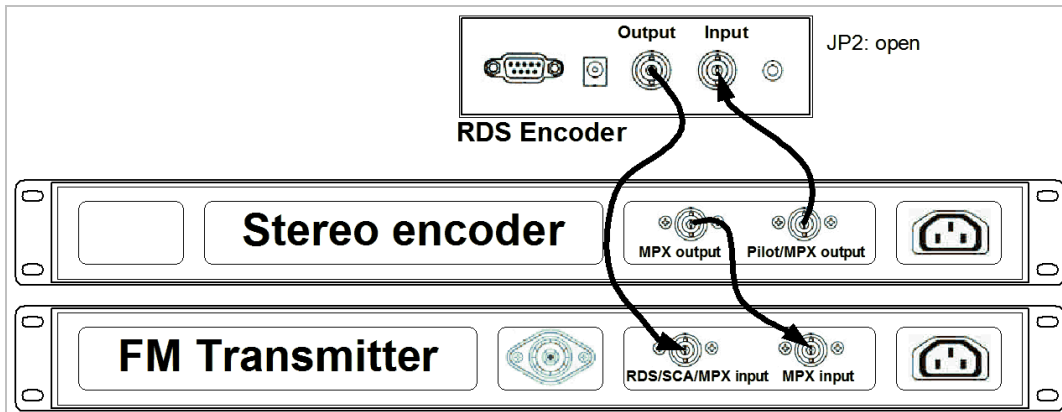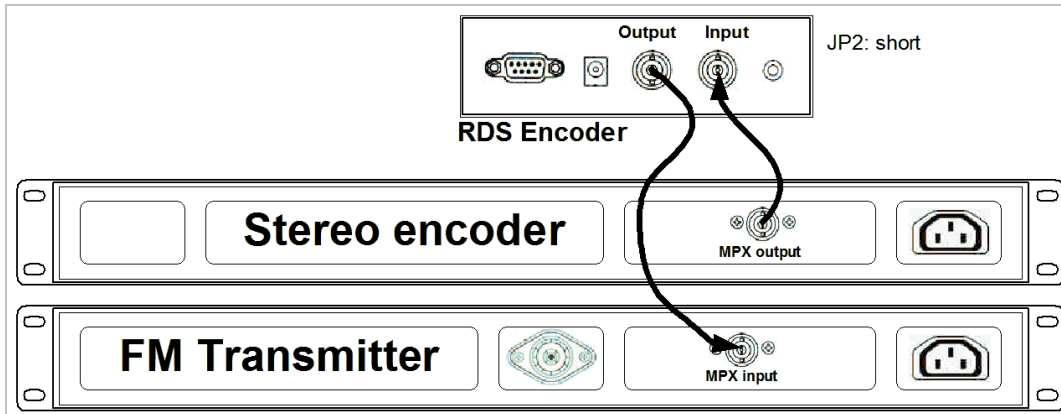

Separate stereo encoder - default connection.
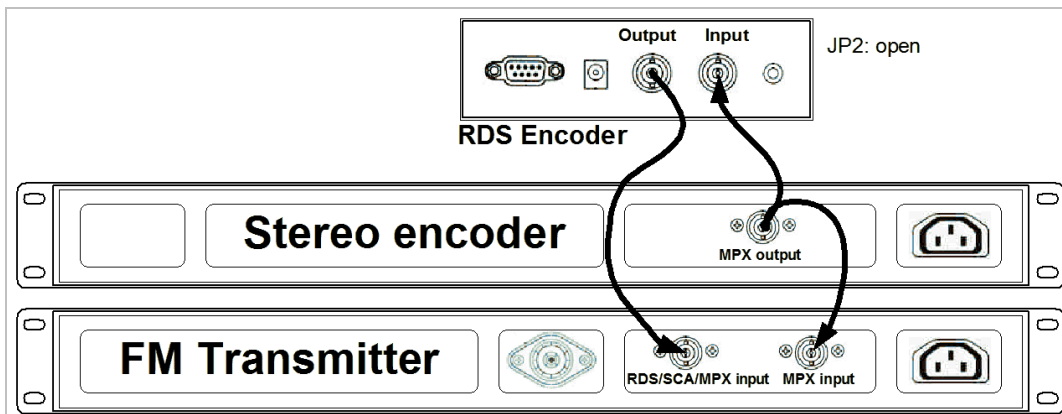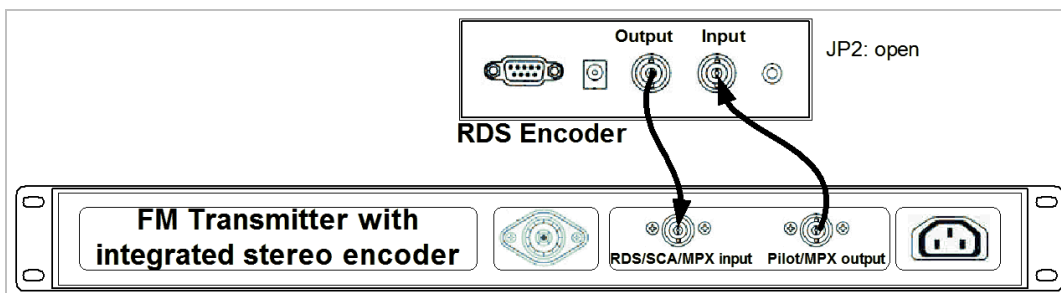

Stereo encoder with only one MPX output provided.

FM transmitter with only one MPX input provided.

Both stereo encoder and FM transmitter with only one MPX connector provided - loopthrough mode.
Use this mode only if no of the previous connection is possible.

FM transmitter with integrated stereo encoder.

In case of **mono** transmission (no stereo encoder used) the RDS encoder input may be left unconnected (since there is no need of external synchronization) or it may be used for the audio signal injection in the case that the FM transmitter has only one input connector.

3.2 Hardware Settings

3.2.1 JP1 - Analogue part power supply

The JP1 jumper is placed on-board. The jumper affects the analogue part supply voltage.

The jumper position depends on characteristics of the signal that is fed in the RDS encoder input.
Default jumper position is 1-2, allowing a non-stabilized power supply to be used.

RDS Encoder Input	Conditions	JP1 position
Not used	-	1-2
Pilot tone	-	1-2
MPX signal	Signal level ≤ 3.3 Vpp	1-2
	Signal level > 3.3 Vpp	2-3

Stabilized power supply and is required if the **JP1** is set to **2-3**.

Do not change the jumper position if the unit is powered! Disconnect the power supply first!

3.2.2 JP2 - MPX loopthrough

Turn on (short) this switch/jumper only if it's necessary to pass the input signal to the output of the RDS encoder (loopthrough mode).
In all other cases the JP2 must be turned off (set to SIDE position or no jumper present)!

Always make sure that the JP2 switch/jumper is securely fixed in the position desired and eliminate possibility of unwanted change of its state!

3.3   Power Supply

The RDS encoder can be supplied from any power supply, which delivers a voltage between 8 and 15 V DC and a current of at least 200 mA. Commonly available wall adapters are usually suitable for that purpose. The RDS encoder has polarity protection and own voltage stabilizer. The central conductor of the power supply connector is positive (+).

*Note: After first power-up the RDS encoder will start to generate the RDS signal with factory default values (PS: * RDS *, PI: FFFF). There is no need to configure anything to turn on the RDS subcarrier.*

3.4   RDS Level Adjustment

Note: There is no universal setting for the RDS level. Due to different input sensitivity of different FM broadcast equipment it's preferred always to check and adjust the RDS level.

The right level should be between 2 and 11 % of the audio multiplex signal, measured in peak-to-peak values. Recommended value is about 4 to 5 %, which results in 3.4 kHz deviation of the FM carrier. Don't forget that the maximum total FM carrier deviation with RDS and MPX signal is 75 kHz. It is much easier to use any FM broadcast analyzer to set the RDS level precisely.

Adjusting higher RDS level results in better RDS reception in areas covered with weak signal. This is especially important if using scrolling PS or sending a lot of text information. However consider following aspects before adjusting higher RDS level:
- the MPX (audio) level must be decreased a little to meet the overall FM deviation limit,
- automatic tuning using alternative frequencies (AF) will appear slower – the receiver will rate the signal reception as good although there may be a reason to tune to another frequency.

> The deviation range of the FM carrier caused by RDS/RBDS is **1.0 to 7.5 kHz**.
> The deviation range of the FM carrier caused by stereo pilot tone is **6.0 to 7.5 kHz**.
> The overall peak frequency deviation shall not exceed **75 kHz**.

3.5   Connecting the RDS Encoder to a PC

For configuration and control requirements the RDS encoder is equipped by industry standard RS-232 interface provided on D-SUB9 female connector on the rear panel of the RDS encoder. This connector allows direct connection to a PC using RS-232 cable or USB cable with built-in converter. (Depending on the RDS encoder model other interface types may be also present.)

3.5.1   Connection to a serial port of the PC

This is an essential connection method for all devices like RDS encoders. It does not require any PC driver, it has no configuration requirements and it is supported in all broadcast automation software. It can be simply converted to Ethernet using commercially available adapter.

On the PC side locate an unused COM port. If the free port exists in the form of a 25-pin connector, use a standard D-SUB9 (male) to D-SUB25 (female) adapter. Make sure the COM port is enabled in the PC's BIOS Setup.

RDS Encoder	PC
2 (TxD)	**2 (RxD)**
3 (RxD)	**3 (TxD)**
4 (DTR)	6 (DSR)
5 (GND)	**5 (GND)**
6 (DSR)	4 (DTR)
7 (RTS)	8 (CTS)
8 (CTS)	7 (RTS)

DB9 male   DB9 female
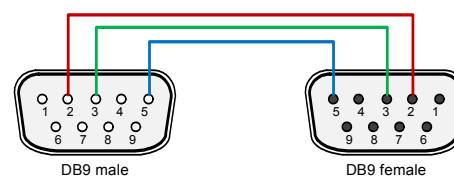
It's preferable to use standard direct RS-232 cable terminated with 9-pin female connector on the PC side and 9-pin male connector on the RDS encoder side. The table above represents the full connection diagram. In most cases (no flow control) the three highlighted wires are enough for the connection.

3.5.2   Connection to a USB port of the PC

Connection to USB port of your PC is possible via standard USB to RS-232 cable. This cable is supplied as optional accessories. It is also known as USB to RS-232 adapter.

USB driver must be installed prior to start communicating. Virtual COM port feature provides seamless compatibility with broadcast automation software.

4 Software Installation

4.1 Windows Control Software

1. To install the Windows control software called 'Magic RDS', run the setup exe file and go through the simple installation wizard.

2. In the case of USB connection install the USB driver now. Pure RS232 connection requires no driver.

3. Make sure the RDS encoder is connected and powered, all connectors are seated completely and where possible, use screws to fix the connection.

4. Run the Magic RDS software using Windows Start button.

5. Open the Preferences (Options - Preferences) and set up the connection parameters. If the RDS encoder is connected via USB and was recognized correctly in Windows, you may find/change the COM port number in Windows Control Panels - System - Hardware - Device Manager or simply click on the List button.

6. Close the Preferences. You should see "Connected" or "Opened" in the status bar. Now you are ready. The settings are saved automatically.

7. Configure the basic RDS services. You will find them on cards Program and System. Always confirm by clicking on Store button.
For beginners there's a very useful configuration wizard under menu item Help.
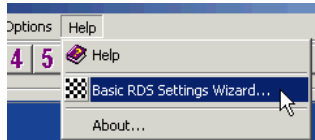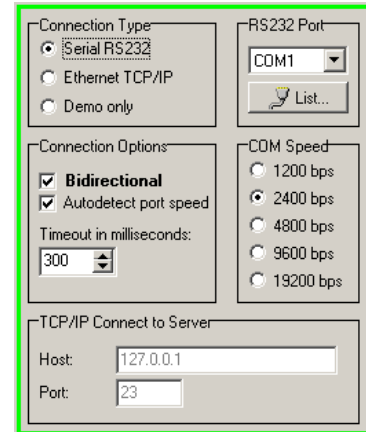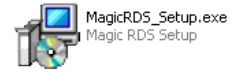
8. The status bar at the bottom of the window shows whether the data was sent successfully. If Communication Error! is shown, check the connection to the RDS encoder, its power supply and that the correct COM port is selected in the Preferences dialogue box.

9. Follow the instructions in the application Help.
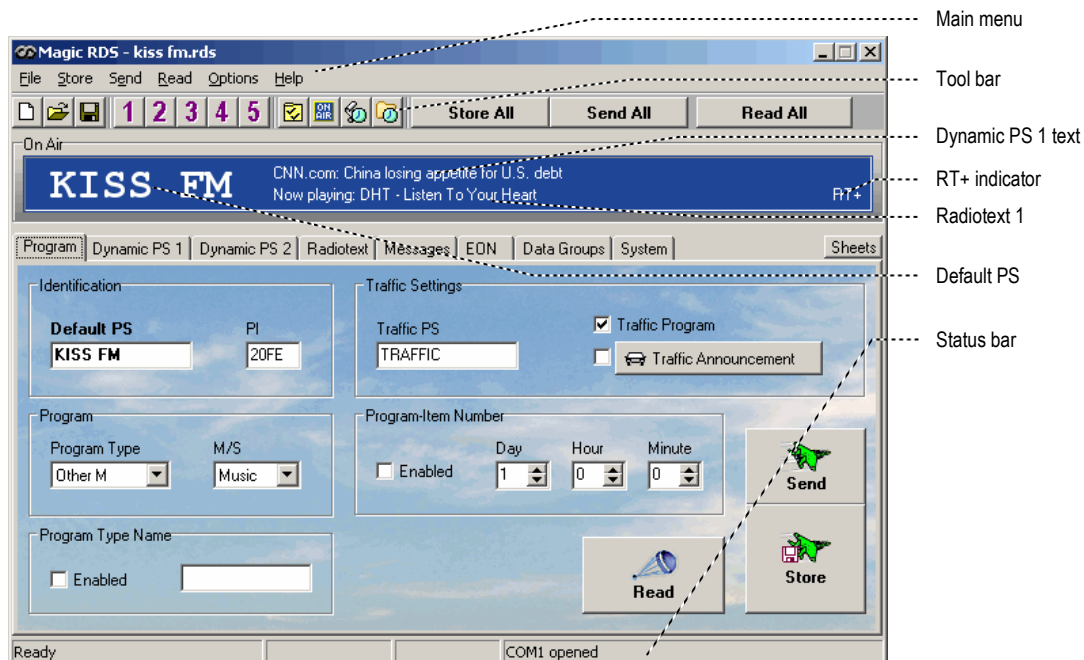
Magic RDS 3 - default Windows control software.

Note: The RDS encoder contains two types of memory. These are marked as RAM and EEPROM. Like any other computing system the RAM holds all operational data which are also used for transmission whilst the EEPROM is used for the data storage during power-off. By default the button Send will fill the RAM only. The button Store will fill the RAM and also stores the data into EEPROM. The Store button behavior can be changed in Options - Preferences - Buttons.
If the user forgets to store the data into EEPROM, the settings will be lost when the power is disconnected.

4.2   Device Setup

For setting of some additional communication parameters, open the Device Setup dialogue box (Options – Device Setup). If previous steps have been done right, you'll see the following window:

Store the settings to the encoder

Read actual settings from the encoder

Close the window without sending anything to the encoder
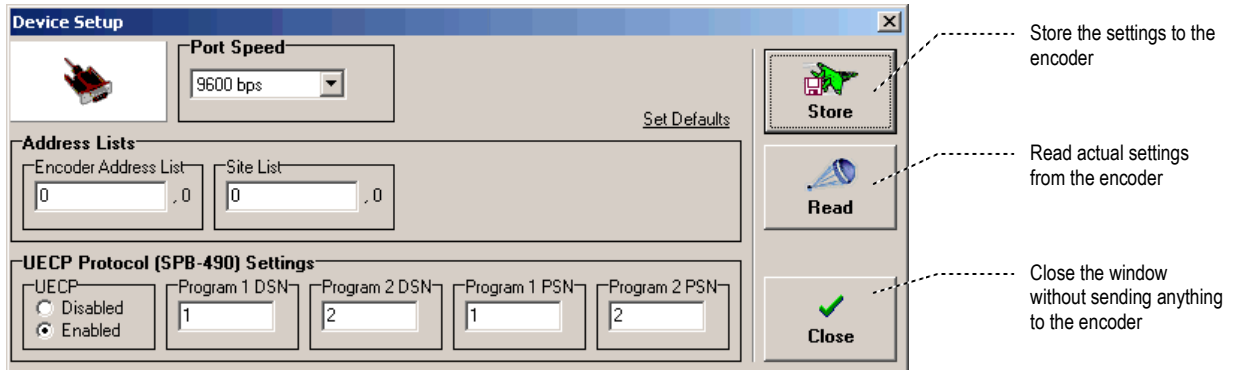
The Device Setup represents the encoder's port setup, Address List setup and UECP setup at one place. A description of each item follows:

Port speed	Here you may change the port speed if it is required by the application. Default speed is 2400 bps.
Encoder Address List	Up to two encoder address numbers in range 0 to 255, separated by comma. Default value is 0, which effectively disables the encoder addressing feature.
Site List	Up to two site address numbers in range 0 to 1023, separated by comma. Default value is 0, which effectively disables the site addressing feature.
UECP Enable/Disable	Enable the UECP if your broadcast automation system or RDS data provider uses this protocol. Leave disabled otherwise.
Program 1/2 DSN/PSN	Assigns DSN and PSN numbers to each program set. DSN and PSN values have effect only if they are supported by the UECP data provider.

4.3   Setting Basic RDS Data

Before getting on-air with the RDS signal, you will need to decide on the settings to be used. The following RDS services must be set as the first. Use the Windows control software and its GUI. For more experienced users or those without a Windows PC, any terminal programme can be used (see chapter 11 in Technical Manual).

4.3.1   PI (Program Identification)

Tip: The Magic RDS control software includes a wizard that calculates the PI automatically.

This is very important information that enables the receiver to distinguish between countries, areas in which the same program is transmitted, and the identification of the program itself. The code is not intended for direct display and is assigned to each individual radio program, to enable it to be distinguished from all other programs.
The PI code consists of four characters (hexadecimal numbers).

The first character identifies country:

0	*Cannot be assigned.*	8	PS, BG, LV, PT
1	DE, GR, MA, IE, MD	9	AL, DK, LI, LB, SI
2	DZ, CY, CZ, TR, EE	A	AT, GI, IS
3	AD, SM, PL, MK	B	HU, IQ, MC, HR
4	IL,CH, VA	C	MT, GB, LT
5	IT, JO, SK	D	DE, LY, YU
6	BE, FI, SY, UA	E	RO, ES, SE
7	RU, LU, TN, NL	F	EG, FR, NO, BY, BA

The second character identifies program type in terms of area coverage:

0	Local	Local program transmitted via a single transmitter only during the whole transmitting time.
1	International	The same program is also transmitted in other countries.
2	National	The same program is transmitted throughout the country.
3	Supra-regional	The same program is transmitted throughout a large part of the country.
4 to F	Regional	The program is available only in one location or region over one or more frequencies, and there exists no definition of its frontiers.

The third and fourth characters are used to clearly identify different stations within the area of coverage.

Important note: Meaning of some PI digits may be different for US RBDS.

Important note: If the station has only one transmitter, second PI digit must be zero (x0xx).

Important note: Factory default PI value is FFFF and it's needed to change it as soon as possible to avoid the situation that two different stations with common area of coverage have the same PI. For each station in the same location the unique PI must be assigned. Stations that carry different program must be unambiguously identified by the last two PI digits. In other case they are recognized as one station by car radios, regardless of any other service settings. If the broadcaster hasn't received the 4-digit PI from regulatory office, he must choose such number that is not in conflict with other stations in the location.

4.3.2 PS (Program Service name)

The PS name is max. 8 character long radio station name that will be shown most of the time on the radio display. Advanced use of the PS (Dynamic/Scrolling PS) is discussed in Technical Manual or Windows software Help.

4.3.3 PTY (Program Type)

The PTY code defines the type of the programme broadcast within 31 possibilities. See chapter 12.2 of the Technical Manual for a complete list. This code could be used for search tuning.

Important note: PTY number 1 (News) should never be left on all the time. Use PTY number 3 (Info) for this purpose.

4.3.4 TP (Traffic Program)

This is a flag to indicate that the tuned program carries traffic announcements. The TP flag should only be set on programs which dynamically switch on the TA identification during traffic announcements. The flag shall be taken into account during automatic search tuning.

4.3.5 MS (Music/Speech)

This is a two-state signal to provide information on whether music or speech is being broadcast. The signal would permit receivers to be equipped with two separate volume controls, one for music and one for speech, so that the listener could adjust the balance between them to suit his individual listening habits.

4.3.6 AF (Alternative Frequencies)

The Alternative Frequencies are used to tell receivers what frequencies they can receive the radio station on. This facility is particularly useful in the case of car and portable radios. For this to work, each transmitter must have RDS with the same PI code.

Important note: If second PI digit is set to zero (x0xx), this indicates that the station has only one transmitter and the AF list is ignored on most receivers.

For further RDS service description visit the Website, section Support.

5 Broadcast Automation System Link-up

To send dynamic data via the RDS it's very useful to link the RDS encoder with your broadcast automation system. This usually results in a possibility of sending commercials, actual song information, program announcements and more. Almost any broadcast system can be linked with your RDS encoder. The link may be either indirect or direct.

5.1 Indirect Link
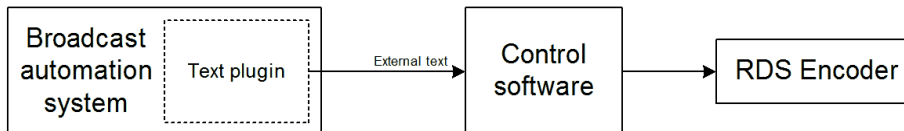
Default Windows control software for the PIRA32 RDS encoder is the **Magic RDS 3**. This application including documentation and examples of use can be downloaded from the Website, section Software, or can be found on the installation CD.

Since probably hundreds of automation systems are used around the world and new versions are released often, information in this guide cannot be full-scale. For more information about how to configure the broadcast automation system text output read its documentation, contact the vendor or visit the online forum provided at the Website.

5.2 Direct Link
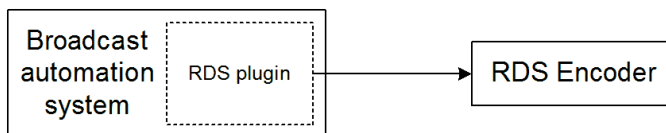
5.2.1 Recommended procedure step-by-step

1. For the present turn off the RDS encoder support in the broadcast automation system.
2. Connect the RDS encoder and configure all basic parameters like PI, default PS, text setup, individual text features enable settings etc. using the Windows control software or terminal application and command line. **Store** all setting into EEPROM. Exit the Windows control software or the terminal.
3. Find out the baudrate (speed) that is used by the broadcast automation system for communicating with the RDS encoder. If this parameter is not clear from the documentation and no baudrate control is provided in the broadcast automation system, configure the RDS encoder for the default value (2400 bps).
4. Turn on the RDS encoder support in the broadcast automation system.

Important note: By default only one software application can access one communication port at the same time!

For more information about how to control the RDS encoder contact the broadcast automation system vendor or visit the online forum provided at the Website.

5.2.2 Compatibility commands and UECP

To reach the best possible compatibility with broadcast automation systems, the PIRA32 includes a special set of compatibility commands as well as UECP support. In the systems where the PIRA32 is not directly supported (or the system is older version) the user may try to select another RDS encoder model to send text messages. Where possible, set the communication as unidirectional. The most frequent communication speed in this case is 9600 bps.