



# **RDS Encoder**

## **Technical Manual**

Version 1.0c

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## Introduction

The RDS encoder is a result of last years experience collecting and meets requirements of most regional, local, RSL, LPFM and other small-coverage radio stations. New fully digital concept and effective design ensures high reliability, excellent signal characteristics and gives the user many advanced features while maintaining a low price.

## Basic Features

- Fully stand-alone - no computer needed for operate
- Low power consumption
- Not fixed to a specific transmitter type, can be used essentially with all FM transmitters
- Programming and setting via standard RS-232, full ASCII terminal control capability
- Automated firmware update and remote control capability
- Excellent spectral purity, direct digital RDS signal synthesis; no limitations in professional broadcasting use
- External TA and Program switch
- Switchable MPX loopthrough
- Internal real-time clock, showing real-time also as PS
- No special 19 kHz input needed - pilot tone filtered from MPX signal
- Digital 57 kHz phase locked loop - rock stable RDS subcarrier frequency

Please read this entire manual and familiarise yourself with the controls before attempting to use this equipment.

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.

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Revision 2005-03-12

## Technical Specifications

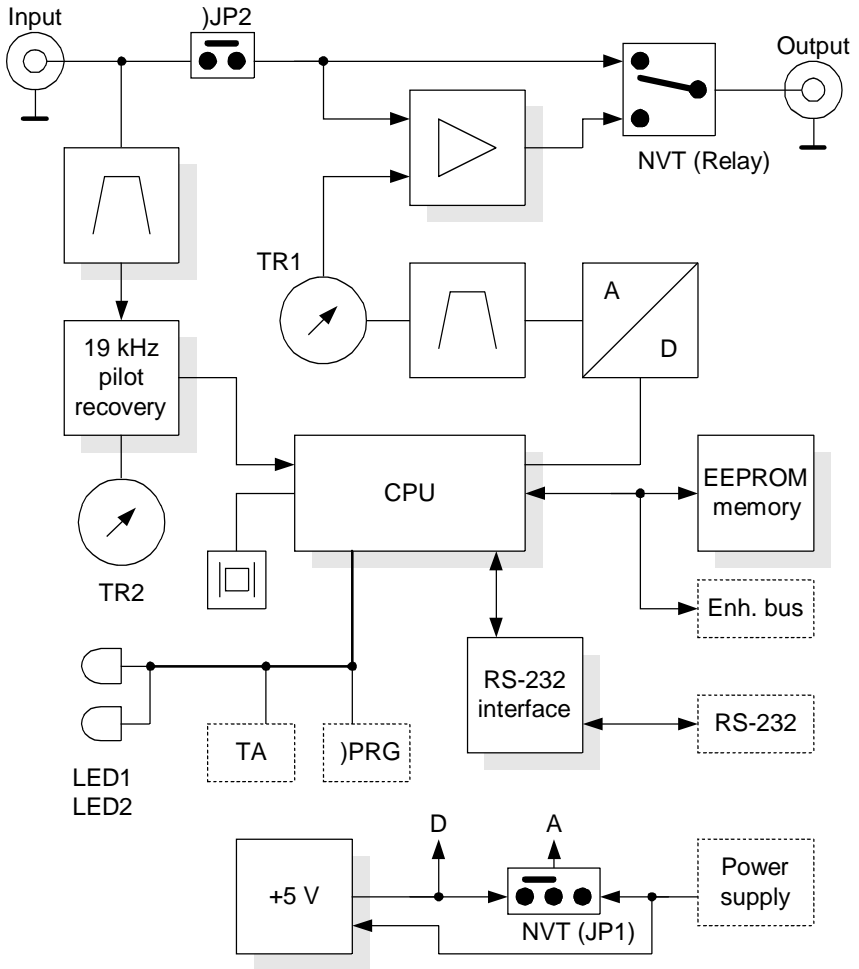
Parameter	Condition	Value
<b>General</b>		
Supply voltage	8 - 20 Vdc	
Supply current	12 V	70 mA
Signal connectors		unbalanced
Data connector		RS-232 (DTE, 9 pins)
Communication speed		software switchable 1200 - 9600 kbps
Communication mode		1 stop bit, 8 data bits, no parity, (no flow control)
TA switching		software or external switch
TA input		TTL with 10 kOhm pull-up, level or edge activated
Program switching		software or external switch
Program input		TTL with 10 kOhm pull-up, level controlled
Expansion bus type		IIC, 400 kHz
RDS Services directly supported		PI, PS, PTY, TP, AF, TA, DI, M/S, PIN, PTYN, ECC, RT, TDC, IH, CT, ODA
<b>RDS/RBDS signal</b>		
Subcarrier frequency $f_c$		57 kHz
Sampling rate		361 kHz
Bandwidth		$\pm 2.4$ kHz (50 dBc)
Output level adjust	default	0 - 1.4 V p-p
Phase shift adjust	stereo transmission	0 - 180 deg. in 9.5 deg. steps

<b>Audio/MPX/Pilot input</b>		
Recommended load	mono	< 10 kOhm
	stereo	< 5 kOhm
Recommended MPX voltage		
	12 V	1.1 - 8.0 V p-p (-6 - 9 dB)
Passthrough voltage gain	2 Hz - 100 kHz	1 (0 dB)
Pilot tone level		min. 110 mV p-p (-26 dB)
- recommended deviation		6.8 kHz
Pilot frequency		19000 Hz $\pm$ 4 Hz
	recommended	19000 Hz $\pm$ 1 Hz
<b>Output</b>		
Output impedance		100 Ohm
Recommended load		> 70 Ohm, < 1 nF
Max. output voltage (RDS+Audio/MPX)		
	12 V	9.0 V p-p
Recommended RDS level		3 - 11 % of Audio/MPX

Notes:

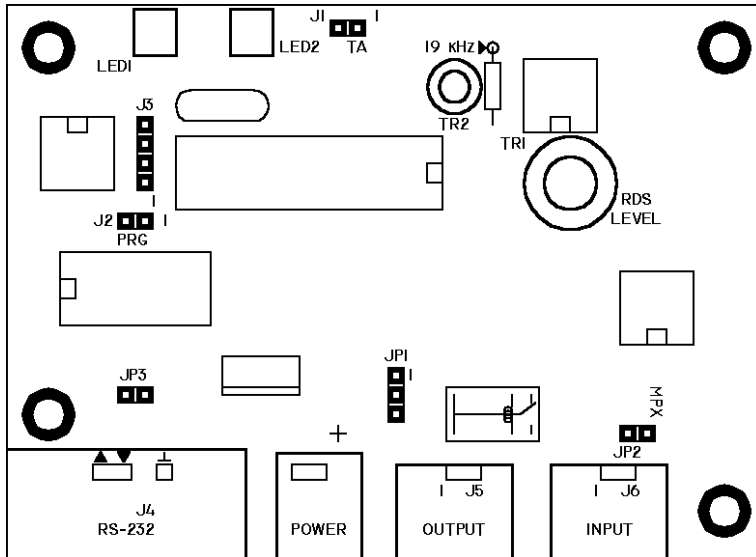
p-p - peak-to-peak value

### Block Diagram



## Physical Description

### Composition



### Connectors

#### **J1** - External TA switch

- 1: TTL input with 10k pull-up
- 2: Ground

#### **J2** - External Program switch

- 1: TTL input with 10k pull-up
- 2: Ground

#### **J3** - Expansion IIC bus

- 1: SDA (Serial Data)
- 2: SCL (Serial Clock)
- 3: Ground
- 4: +5 V

**J4** - RS-232 Interface

9pin D-SUB male (DTE) connector:

- 1: Not used
- 2: Receive Data (RDS encoder)
- 3: Transmit Data (RDS encoder)
- 4: Connected to pin 6
- 5: Ground
- 6: Connected to pin 4
- 7: Connected to pin 8
- 8: Connected to pin 7
- 9: Not used

**POWER** - Power supply connector

Central pin is positive (+)

**J5** - Output**J6** - Input**Adjustable Elements****JP1** - Analogue part power supply jumper

- 1-2: +5 V internally stabilized
- 2-3: Full power supply voltage

**JP2** - MPX loopthrough jumper

- short: on
- open: off

**JP3** - RS-232 pin 1 +5 V power supply for external device

- short: on
- open: off

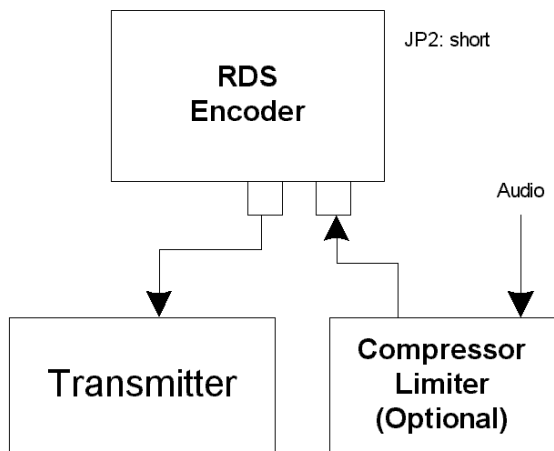
**TR1** - Output RDS signal level adjust**TR2** - 19 kHz free running oscillator adjust**LED Indicators****LED1** - Operation / Receive data / Error indication**LED2** - Pilot tone indication / Firmware update mode



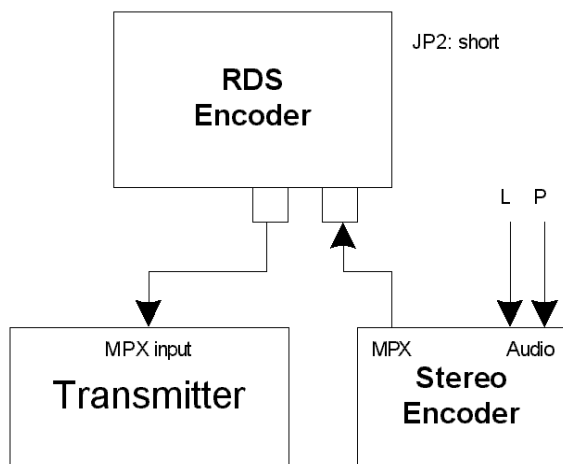
## Installation

### Connection

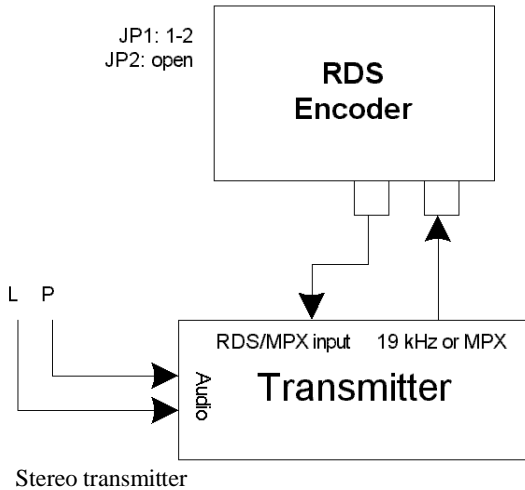
The following figures show various situations and corresponding methods of connection:



Mono transmitter and mono audio source



Mono transmitter with external stereo encoder



## Power supply

The RDS encoder can be supplied from any power supply, which delivers a voltage between 8 and 20 V DC.

The RDS encoder has polarity protection and own voltage stabilizer.

## Adjustment

### RDS signal output level

The right level should be between 3 and 11 % of the audio signal, measured in peak-to-peak values. Recommended value is about 6 %, which results in 4 kHz deviation of the FM carrier. Don't forget that maximum FM carrier deviation with RDS and audio signal is 75 kHz.

## Phase adjustment for stereo transmission

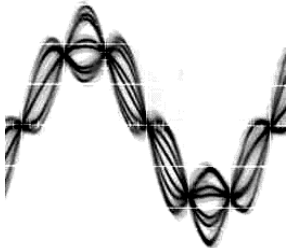
1. Connect the stereo encoder/transmitter to the RDS encoder. The LED2 should indicate pilot tone present . If not, set the TR2 trimmer to the position where the LED is burning or set 19 kHz ( $\pm 100$  Hz) on marked pin on the PCB without pilot tone present.

*Note: When you receive the RDS encoder, the trimmer TR2 is set to the right position so the RDS encoder requires no tuning.*

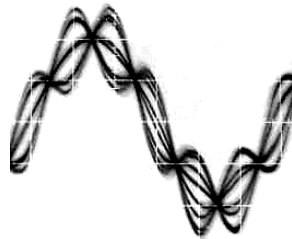
2. Adjust right phase shift (0 or 90 degrees phase shift between 19 kHz pilot tone and 57 kHz RDS subcarrier, measured on transmitter input, see the oscillograms). Use for example the PHASE command in a terminal application (see below). The phase adjustment could be difficult without an oscilloscope. Never mind if you don't have this equipment. It's also possible to set very low RDS level (when the signal strength is near error limit) and set the minimal error rate by adjusting the phase.

Some experiments performed in the field show that the conditions of RDS reception are not too much affected by the phase criterion. However, similar experiments have shown that right phase shift adjust offers a better behaviour of audio receivers, and notably the residues of audio intermodulation which can sometimes be observed, but with the aid of professional instruments only.

### Oscillograms



Pilot and RDS in-phase  
(0 degrees phase shift)



Pilot and RDS in quadrature  
(90 degrees phase shift)

## COM Port Communication

### Connecting the RDS Encoder to a PC

For configuration and control requirements a PC is connected to the RDS encoder via standard RS-232 interface provided by D-SUB9 male connector (DTE) on the RDS encoder side. On the PC side locate an unused COM port. If the free port exists in the form of a 25pins connector, use a standard D-SUB9 (male) to D-SUB25 (female) adapter.

It's preferable to use standard crossed serial "lap-link" cable also called as "null-modem cable" with two female connectors for the connection. Following table represents the full connection diagram. In most cases (no flow control) the three highlighted wires are enough for the connection.

<b>RDS Encoder</b>	<b>PC</b>
<b>2 (RxD)</b>	<b>3 (TxD)</b>
<b>3 (TxD)</b>	<b>2 (RxD)</b>
4 (DTR)	6 (DSR)
<b>5 (GND)</b>	<b>5 (GND)</b>
6 (DSR)	4 (DTR)
7 (RTS)	8 (CTS)
8 (CTS)	7 (RTS)

### Working with a Terminal Application

On the PC, run an application or program emulating or possessing an ASCII terminal. For example Windows HyperTerminal presents all the characteristics to easily communicate in ASCII mode with the RDS encoder. If you desire a higher level interface, user-friendly application is available. Please refer to the web site for more information.

In next step configure the communication parameters as follows:

Transmission speed	2400 kbps (default) (Generally one of 1200, 2400, 4800 or 9600 kbps speed is possible if previously set and stored into the RDS encoder memory.)
Data bits	8
Parity	None
Stop bits	1
Flow control	None
<i>Parity checking</i>	<i>No</i>
<i>Carrier detection</i>	<i>No</i>

Once configured, the terminal can be used. To check if the hardware and logic configuration work as planned, type for example `HELP` and press <Enter> to display the list of all commands. If no or unknown characters are displayed on the screen, try again a second time, otherwise, check the following points:

- RDS encoder turned on?
- Cable used
- Configuration of the terminal application

To display the commands entered at the keyboard on the screen, type the command `ECHO=1` followed by <Enter>. If all characters written are displayed twice, type `ECHO=0` and press <Enter>.

To store this parameter in EEPROM memory, type `*ECHO` and press <Enter>.

To display actual parameter value, type `ECHO` and press <Enter>.

Now you made first steps with the RDS encoder command interpreter.

## Command Interpreter

The RDS encoder command interpreter meets the following rules:

Any instruction sent to the RDS encoder must be validated by <Enter>.

Before validating you may correct the characters by pressing <Backspace>.

There are several methods of use for the commands:

- Query or command without argument, ex. `HELP`  
*Shows the parameter value or performs the operation.*
- Command with argument, ex. `ECHO=1`  
*Assigns the value to the parameter.*

- Memory store command, ex. \*ALL  
*Stores the parameter value(s) into the non-volatile EEPROM memory.*
- Memory store command with argument, ex. \*MSG01=  
*Assigns the value to the parameter and stores it immediately into the non-volatile EEPROM memory.*

Not all methods are available for all commands.

Depending on the command processing success, several characters (followed by two pairs of carriage return and line feed characters) can be returned by the RDS encoder:

+	Command processed successfully
!	Unknown command
-	Invalid argument
/	Command processed partially

The RDS encoder is case sensitive. All commands must be written in UPPER CASE.

If you wish to retain change of any parameter value during power off, don't forget to store it into memory!

### **Additional information**

- In addition to the <Enter> (char. 13, CR) used for command validating, character 26 (EOF) can be used. This allows to insert the validating character where char. 13 (CR) is not accepted. The RDS encoder ignores other characters in ASCII range 0-31.
- Space characters (char. 32) are ignored if typed immediately behind validating character on a new line.
- After validating, the RDS encoder ignores all incoming character until all command processing success characters are transmitted.  
If sending more commands to the RDS encoder immediately consecutive (e.g. from a batch text file) when the system doesn't wait for the command processing success characters, insert a number of spaces (char. 32) needed behind each validating character.
- The COM port time-out is 5 minutes. If no character is received during this time, the command line is internally cleared.

## List of Commands

### Command Summary

#### Basic:

AFCH	AFCH=	*AFCH
DI	DI=	*DI
DPS1	DPS1=	*DPS1
DPS2	DPS2=	*DPS2
DPS1MOD	DPS1MOD=	*DPS1MOD
DPS2MOD	DPS2MOD=	*DPS2MOD
DPS1REP	DPS1REP=	*DPS1REP
DPS2REP	DPS2REP=	*DPS2REP
LABPER	LABPER=	*LABPER
MS	MS=	*MS
PI	PI=	*PI
PS	PS=	*PS
PTY	PTY=	*PTY
PTYN	PTYN=	*PTYN
PTYNEN	PTYNEN=	*PTYNEN
RT1	RT1=	*RT1
RT1EN	RT1EN=	*RT1EN
RT2	RT2=	*RT2
RT2EN	RT2EN=	*RT2EN
RT2TYPE	RT2TYPE=	*RT2TYPE
RTPER	RTPER=	*RTPER
RSTDPS	RSTDPS=	*RSTDPS
SCRLSPD	SCRLSPD=	*SCRLSPD
SPSPER	SPSPER=	*SPSPER
TA	TA=	*TA
TATMOUT	TATMOUT=	*TATMOUT
TP	TP=	*TP
TPS	TPS=	*TPS
INIT		
		*ALL
HELP		

**Messages:**

MSGxx		*MSGxx=
MSGxxD		*MSGxxD=
MSGLIST		
DPS2MSG	DPS2MSG=	*DPS2MSG
RT2MSG	RT2MSG=	*RT2MSG

**System:**

COMSPD	COMSPD=	*COMSPD
CT	CT=	*CT
	DATE=	*DATE
ECHO	ECHO=	*ECHO
EXTSYNC	EXTSYNC=	*EXTSYNC
LTO	LTO=	*LTO
MJD	MJD=	*MDJ
PHASE	PHASE=	*PHASE
PILOT		
RDSGEN	RDSGEN=	
RESET		
STATUS		
TIME	TIME=	*TIME

**Advanced:**

ECC	ECC=	*ECC
ECCEN	ECCEN=	*ECCEN
	G=	
PIN	PIN=	*PIN
PINEN	PINEN=	*PINEN
PROGRAM	PROGRAM=	*PROGRAM
SHORTRT	SHORTRT=	*SHORTRT
UDG1	UDG1=	*UDG1
UDG2	UDG2=	*UDG2



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## Basic Commands

<b>AFCH</b>	<b>Alternative Frequency Channels</b>	<b>H (01-CC)</b>
List of alternative frequency channels in hexadecimal representation in range of 01-CC (87.6-107.9 MHz). Up to 25 items allowed.		
AFCH=01 , 3B	Sets the alternative frequencies to 87.6 and 93.4 MHz	
AFCH	Shows current AF list	
*AFCH	Stores the AF list into EEPROM	
AFCH=00	Not allowed (87.5 MHz)	
AFCH=CD	Not allowed (108.0 MHz)	
<b>DI</b>	<b>Decoder Identification</b>	<b>(0-15)</b>
Identification of the decoder to be used by the receiver.		
DI=1	Standard stereo transmission	
DI=0	Standard mono transmission	
<b>DPS1</b>	<b>Dynamic PS 1</b>	
Up to 255 characters long text message to be displayed on receiver instead of static PS name. Primarily used for song titles streaming etc.		
DPS1=Hello World	Set the DPS1	
DPS1=	Clear the DPS1	
<b>DPS2</b>	<b>Dynamic PS 2</b>	
Up to 255 characters long text message to be displayed on receiver instead of static PS name. Alternatively used in conjunction with <i>Messages Commands</i> .		
DPS2=Hello World	Sets the DPS2	
DPS2=	Clears the DPS2	
<b>DPS1MOD</b>	<b>Dynamic PS 1 Mode</b>	<b>(0-3)</b>
Display mode for the DPS1 text.		
0 - Scrolling by 8 characters		
1 - Scrolling by 1 character		
2 - Word alignment scrolling		
3 - Scrolling by 1 character, text separated by spaces at begin and end		
DPS1MOD=3		

<b>DPS2MOD</b>	<b>Dynamic PS 2 Mode</b>	<b>(0-3)</b>
Display mode for the DPS2 text.		
0 - Scrolling by 8 characters		
1 - Scrolling by 1 character		
2 - Word alignment scrolling		
3 - Scrolling by 1 character, text separated by spaces at begin and end		
DPS2MOD=3		
<b>DPS1REP</b>	<b>Dynamic PS 1 Number of Repeating</b>	<b>(0-255)</b>
Specifies number of repeating for the DPS1 text message. Has effect only if DPS2 is set.		
DPS1REP=1		
<b>DPS2REP</b>	<b>Dynamic PS 2 Number of Repeating</b>	<b>(0-255)</b>
Specifies number of repeating for the DPS2 text message. Has effect only if DPS1 is set or if DPS2MSG value is AUTO.		
DPS2REP=1		
<b>LABPER</b>	<b>Label Period</b>	<b>(0-255)</b>
Label Period used in DPS Mode 0 and 2. Increasing the value by 1 increases the period by approx. 0.54 seconds.		
LABPER=4	Each label is displayed for about 2 seconds.	
<b>MS</b>	<b>Music/Speech</b>	<b>(0, 1)</b>
Music/Speech switch.		
MS=0	Speech program	
MS=1	Music program	
<b>PI</b>	<b>Program Identification</b>	<b>H (0000-FFFF)</b>
Identification code of the radio station. Always contains four hexadecimal digits.		
PI=20FE	OK	
PI=0xxx	Not allowed (0 as first digit)	

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**PS                    Program Service**


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Static name of radio station that is displayed on receiver. Max. 8 characters long.

PS=OCEAN FM

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**PTY                    Program Type Number                    (0-31)**


---

An identification number to be transmitted with each program item, intended to specify the current Program Type within 32 possibilities.

Program type codes (Europe):

0 - (none)	16 - Weather
1 - News	17 - Finance
2 - Affairs	18 - Children
3 - Info	19 - Social Affairs
4 - Sport	20 - Religion
5 - Education	21 - Phone In
6 - Drama	22 - Travel
7 - Cultures	23 - Leisure
8 - Science	24 - Jazz Music
9 - Varied Speech	25 - Country Music
10 - Pop Music	26 - National Music
11 - Rock Music	27 - Oldies Music
12 - Easy Music	28 - Folk Music
13 - Light Classics Music	29 - Documentary
14 - Serious Classics	30 - Alarm Test
15 - Other Music	31 - Alarm

PTY=10

Sets the Pop Music Program Type

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**PTYN                    Program Type Name**


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Allows further description of the current Program Type, for example, when using the PTY code 4: SPORT, a PTYN of "Football" may be indicated to give more detail about that program.

PTYN=Football

---

<b>PTYNEN</b>	<b>PTYN Enable</b>	<b>(0, 1)</b>
Enables (1) or disables (0) the PTYN service.		
PTYNEN=1	Enables the PTYN service	
<b>RT1</b>	<b>Radiotext 1</b>	
Up to 64 characters long text message to be displayed on receiver in Radiotext format. Primarily used for song titles streaming etc. Car radios usually don't support this service, Dynamic PS can be used instead.		
RT1=Hello World		
<b>RT1EN</b>	<b>RT1 Enable</b>	<b>(0, 1)</b>
Enables (1) or disables (0) the Radiotext 1.		
RT1EN=1	Enables the RT1	
<b>RT2</b>	<b>Radiotext 2</b>	
Up to 64 characters long text message to be displayed on receiver in Radiotext format. Alternatively used in conjunction with <i>Messages Commands</i> . Car radios usually don't support this service, Dynamic PS can be used instead.		
RT2=Hello World		
<b>RT2EN</b>	<b>RT2 Enable</b>	<b>(0, 1)</b>
Enables (1) or disables (0) the Radiotext 2.		
RT2EN=1	Enables the RT2	
<b>RT2TYPE</b>	<b>Radiotext 2 Type</b>	<b>(A, B)</b>
A - RT2 type is the same as RT1. Each switching between RT1 and RT2 will cause the previous message to be overwritten on most receivers.		
B - RT2 type is different from RT1. Receivers usually leave both RT1 and RT2 texts displayed.		
RT2TYPE=B	Sets type B for the RT2	

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<b>RTPER</b>	<b>Radiotext Switching Period</b>	<b>(0-255)</b>
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Specifies the time in minutes between two switching of the Radiotext. The switching can occur between RT1 and RT2 or between *messages* specified for RT2.

RTPER=10	Sets the period to 10 min.
RTPER=0	Sets the period to 0.5 min.

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<b>RSTDPS</b>	<b>Reset Dynamic PS</b>	<b>(0, 1)</b>
---------------	-------------------------	---------------

1 - All new Dynamic PS texts will immediately start from begin  
 0 - Only changing of current Dynamic PS text (DPS1/DPS2) transmitted will cause its start from begin

RSTDPS=0

---

<b>SCRLSPD</b>	<b>Scrolling PS Speed</b>	<b>(0, 1)</b>
----------------	---------------------------	---------------

Sets high (1) or low (0) speed of scrolling PS transmission. Although setting high speed gives the result looking better, remember that on some receivers or under bad reception conditions the text may be unreadable. The reason is absolutely outside the RDS encoder and comes out from the fact that scrolling PS has never been included in RDS standard.

SCRLSPD=1

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<b>SPSPER</b>	<b>Static PS Period</b>	<b>(0-255)</b>
---------------	-------------------------	----------------

Specifies the time between two repeats of the Dynamic PS text. Static PS (PS/TPS) is displayed during this time. Increasing the value by 1 increases the period by approx. 2.7 seconds.

If value 255 is set, the Dynamic PS will be displayed only once if changed. RSTDPS parameter must be set to 1 in this case.

SPSPER=4	Sets the period duration to about 11 seconds.
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<b>TA</b>	<b>Traffic Announcement</b>	<b>(0, 1)</b>
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Indicates instantaneous presence (1) of traffic information during broadcasting. When this value is set to 1 by external TA switch, the value specified by TA command has no effect.

When this value is set to 1 by TA command, the value set by external TA switch has no effect.

TA=1



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## Messages Commands

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### **MSGxx**      **Message**

---

Specifies the message text. Since there is a place for 99 messages in memory, the number xx must be in range 01-99.

MSG01=Hello World

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### **MSGxxD**      **Message Destination**      **(0-3)**

---

Specifies the destination of the message used for automatic message switching. The number xx must be in range 01-99.

0 - Message not used for automatic switching

1 - DPS2

2 - RT2

3 - DPS2 and RT2

MSG01D=1

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### **MSGLIST**      **List of Messages**

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Shows all messages present in the memory and its destination.

MSGLIST

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### **DPS2MSG**      **Dynamic PS 2 Message Number**      **(0-99, AUTO)**

---

0 - Default DPS2 text specified by DPS2 command or last DPS2MSG command is selected.

1-99 - This message is selected for the DPS2.

AUTO - Messages are selected automatically in ascending order. Only messages chosen by the MSGxxD command are selected.

DPS2MSG=AUTO

---



---

### **RT2MSG**      **Radiotext 2 Message Number**      **(0-99, AUTO)**

---

0 - Default RT2 text specified by RT2 command or last RT2MSG command is selected.

1-99 - One of the messages is selected for the RT2.

AUTO - Messages are selected automatically in ascending order. Only messages chosen by the MSGxxD command are selected.

RT2MSG=1

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## System Commands

<b>COMSPD</b>	<b>COM Port Speed</b>	<b>(0-3)</b>
Specifies the COM port speed. If changed, any valid command must be sent to the RDS encoder on the new speed otherwise the speed will be set back to its previous value during following minute. This prevents setting an incorrect speed not supported by the communication channel that can result in connection lost.		
0 - 1200 kbps		
1 - 2400 kbps (default)		
2 - 4800 kbps		
3 - 9600 kbps		
COMSPD=1		
<b>CT</b>	<b>Clock Time and Date</b>	<b>(0, 1)</b>
Enables (1) or disables (0) time and date transmission in CT format.		
CT=1		
<b>DATE</b>	<b>Date</b>	
Specifies the actual date in DD.MM.YY format.		
The date value stored in memory is used on next power up.		
DATE=30.11.05	30 <sup>th</sup> of November 2005	
DATE	Not implemented, use MJD instead.	
<b>ECHO</b>	<b>Terminal Echo</b>	<b>(0, 1)</b>
Determines if the RDS encoder sends an echo (1) of each character or not (0), that it receives via COM port.		
ECHO=1		
<b>EXTSYNC</b>	<b>External Pilot Synchronisation</b>	<b>(0, 1)</b>
1 - Automatic external synchronisation if pilot tone present (default)		
0 - Forced internal clock source (for mono transmission only)		
EXTSYNC=1		



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<b>LTO</b>	<b>Local Time Offset</b>	<b>±(0-24)</b>
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Specifies the offset between the local time and the universal time (UTC).  
Expressed in multiples of half-hours.

LTO=+2

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<b>MJD</b>	<b>Modified Julian Day</b>	<b>H (00000, FFFFF)</b>
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Day, Month and Year coded as Modified Julian Day.

To find D, M and Y from MJD:

$$Y' = \text{int} [ (\text{MJD} - 15\,078,2) / 365,25 ]$$

$$M' = \text{int} \{ [ \text{MJD} - 14\,956,1 - \text{int} (Y' \times 365,25) ] / 30,6001 \}$$

$$D = \text{MJD} - 14\,956 - \text{int} ( Y' \times 365,25 ) - \text{int} ( M' \times 30,6001 )$$

If  $M' = 14$  or  $M' = 15$ , then  $K = 1$ ; else  $K = 0$

$$Y = Y' + K$$

$$M = M' - 1 - K \times 12$$

To find MJD from D, M and Y:

If  $M = 1$  or  $M = 2$ , then  $L = 1$ ; else  $L = 0$

$$\text{MJD} = 14\,956 + D + \text{int} [ (Y - L) \times 365,25 ] + \text{int} [ (M + 1 + L \times 12) \times 30,6001 ]$$

Y', M', K, L - intermediate variables.

MJD=00D1C8

30<sup>th</sup> of November 2005

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<b>PHASE</b>	<b>RDS Signal Phase</b>	<b>(0-18)</b>
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Fixes the relative phase shift between the pilot tone and the RDS signal.

Changing the value by one results in 9.5 degrees phase shift change.

The value serves only as a scale, it may not provide real phase shift value.

PHASE=8

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<b>PILOT</b>	<b>Pilot Tone Present</b>
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Indicates if pilot tone is present (1) or not (0).

PILOT

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<b>RDSGEN</b>	<b>RDS Generator</b>	<b>(0, 1)</b>
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Disables (0) or enables (1) the RDS subcarrier generator.

RDSGEN=0

---

**RESET          Reset**

---

Provokes a hardware reset of the RDS encoder and is equivalent to an "off-on" cycle of the RDS encoder.

---

RESET

---

**STATUS          RDS Encoder Status**

---

Shows the most important operating values of the RDS encoder.

---

STATUS

---

**TIME          Time**

---

Specifies the actual local time in HH:MM format.

The time value stored in memory is used on next power up.

---

TIME=16 : 40

## Advanced Commands

<b>ECC</b>	<b>Extended Country Code</b>	<b>H (00-FF)</b>
Uniquely determines the country in conjunction with the first digit of PI.		
ECC=E2		
<b>ECCEN</b>	<b>ECC Enable</b>	<b>(0, 1)</b>
Enables (1) or disables (0) the ECC feature.		
ECCEN=1		
<b>G</b>	<b>Group</b>	<b>H (000000000000-FFFFFFFFFFFF)</b>
Orders the RDS encoder to send directly RDS groups whose contents are free. The Group content is in BBBBCCCCDDDD format where BBBB, CCCC and DDDD represent the contents of the block B, block C and block D in hexadecimal expression. The RDS encoder calculates the CRC automatically. The block A has not been specified as it is always the PI code programmed with the PI command.		
The PTY and TP services set by the G command are ignored and are substituted according to the internal configuration of these services of the RDS encoder.		
Using this command, the RDS transmission can then be partially or fully controlled by an external application. For full RDS stream control, 9600 kbps com. speed should be used. Next Group can follow after previous command success characters.		
G=380215D1A531          Group 3B containing 02 15D1 A531		
<b>PIN</b>	<b>Program Item Number</b>	
The code in DD,HH,MM format should enable receivers and recorders designed to make use of this feature to respond to the particular program item(s) that the user has preselected. Use is made of the scheduled program time, to which is added the day of the month in order to avoid ambiguity.		
PIN=12, 16, 40		
<b>PINEN</b>	<b>PIN Enable</b>	<b>(0, 1)</b>
Enables (1) or disables (0) the PIN service.		
PINEN=1		

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<b>PROGRAM</b>	<b>Program</b>	<b>(0-2)</b>
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Specifies the program bank. RDS services in selected program bank are transmitted by the RDS encoder and can be modified and stored into EEPROM memory. If Program is set to zero (0), most of store operations is not allowed.

1 - Program 1 is selected (default)

2 - Program 2 is selected

0 - External program switch selects the program

---

PROGRAM=1

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<b>SHORTRT</b>	<b>Short Radiotext</b>	<b>(0, 1)</b>
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If enabled (1), all new inserted Radiotexts shorter than 60 characters will be followed by Carriage Return and the remaining spaces will be cut. Default value is 0.

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SHORTRT=1

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<b>UDG1</b>	<b>User Defined Groups 1</b>	
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Specifies up to 8 groups in BBBBCCCCDDDD format, which are repeatedly transmitted by the RDS encoder. BBBB, CCCC and DDDD represent the contents of the block B, block C and block D in hexadecimal expression.

UDG1=380215D1A531, 38058DB3B61E

Sets two UDG1 groups

UDG1=

Clears the UDG1 groups

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<b>UDG2</b>	<b>User Defined Groups 2</b>	
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Specifies up to 8 groups in BBBBCCCCDDDD format, which are repeatedly transmitted by the RDS encoder. BBBB, CCCC and DDDD represent the contents of the block B, block C and block D in hexadecimal expression.

UDG2=380215D1A531, 38058DB3B61E

Sets two UDG2 groups

UDG2=

Clears the UDG2 groups

---

## Other Features

### Bypass Relay

The RDS encoder board includes a bypass relay providing an alternative way for the audio signal on power supply failure.

### Showing Real Time in Dynamic PS

It's possible to show real time in Dynamic PS in mode 0 and 2. To show the time, the text must contain %HH-MM% string and this string must exactly fill the 8character window. Then on each string occurrence place the real time will be displayed. The separator between hours and minutes is user selectable.

### External TA Switch

External TA switch input allows you to control the Traffic Announcement parameter by an external device. This device can be a simple switch or a device with digital output. The TA input is level or edge activated, as specified by the TATMOUT command.

- If level controlled, the switch closure or logical 0 activates the TA (sets to 1). The switch shut-off or logical 1 deactivates the TA (sets to 0).
- If edge activated, any logical level change activates the TA. Then the TA is deactivated after the time specified by the TATMOUT command.

### External Program Switch

External program switch input allows you to select one of two program banks available by an external device. This device can be a simple switch or a device with digital output. The PROGRAM parameter must be set to 0 to enable this feature. The program input is level controlled, the switch shut-off or logical 1 selects the Program 1, the switch closure or logical 0 selects the Program 2.

### Expansion IIC Bus

The expansion IIC bus provided on connector J3 allows connect varied devices in future respecting the customer needs. For example LCD display, expansion I/O ports, memories etc.

## Firmware Update

The RDS encoder has a firmware update capability. This allows easily implementing of new features in future. When a new firmware version will be released, special simple Windows application will provide the firmware update. Please refer to the web site for more information.