Radio Data System

RDS - encoder

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INTRODUCTION

The RDS - Encoder generates a high quality signal, according to CENELEC specification EN50067 and EBU Tech. 3244, with an apparatus of low cost and small dimensions. It is simple to installation and operation, easily on line and on field programmably by the user via a PC.
The RDS signal may be added to the stereo multiplex signal, by a high performance internal mixer circuit, without degrading the stereophonic characteristics of the signal, when used together with coders and transmitters not fitted with an input for RDS signal.
The excellent spectral purity of the signal generated locates this encoder for a low cost equipment, maintaining the highest quality of the stereo signal and low floor noise of the modulated RF signal, as required by the ETSI specification.
It is possible to keep the crosstalk over 60 dB and S/N>78dB after mixing with the RDS signal.

FUNTIONS AND SUPPORTED CODES

- PS (Programme Station)

Station name, length up to 8 characters. The encoder permits the transmission of a message up to 50 words, each 8 characters long. Ten different messages are separately programmable and can be selected via a front panel switch.

- PI (Programme Identification)

Programme identifier: contains the country, covered area and station identification code information.

- AF (Alternative Frequencies)

Alternative Frequencies list: it contains a list of all the alternative frequencies up to 25. Together with PI code, lets car radios fit with automatic scanning, to scan the frequencies for the best received frequency of the station.

- PTY (Programme TYpe)

Programme type is an identification to specify the programme . This code could also be used for search only to programme items of the same desired type.

- CT (Clock Time and date)

Real time coded transmission of time and date.

- TP   (Traffic Programme)

It indicates to the receiver that the station transmits traffic reports.

- TA (Traffic Announcement)

Shows to the receiver that a traffic announcement is currently on transmission. This function can be performed by an on line connected computer.

- DI (Decoder Information)

Indicates a mono or stereo transmitted programme, in combination with PI.

- RT (Radio Text)

Radio text, length op to 64 characters. Can be used for severial facilities for new home receivers, details of the programme or messages for example.

- M/S (Music/Speech)

Music/Speech provide information to the receiver on whether music or speech is beiing broadcasting and will change the volume controls. This function can be performed by an on line connected computer.

OPERATION

The CPU controls the digital generator of the RDS signal, made by a processor and a TIME KEEPER memory. The transmission data, programmed by the RS232 port, will be directly stored into the memory.

Generation of the RDS 57kHz carrier signal is made by a D/A converter and an EPROM memory, which contains the digitized signal. After converted followed by a linear phase bandpass filter at 57kHz. From this point the RDS signal, after regulated, is bufferd and sent to the RDS only output and MPX in/out mixer.

External it is possible to chance the TA and M/S funtion and to RESET the CPU, declaired by a LED indication if they are activaid, also a LED assigned for the POWER, rds send RATE and PILOT LOCK of the synchronisation unit. Also a 10 steps panel switch can be connected to select the different memory message of the Programme Station name. (PS)

The power consumption is only a positieve voltage between 12 to 15 Vdc, 200mA.

It is possibly with an external SYNCHRONISATION UNIT to locked the RDS 57kHz carrier in phase with the 19kHz pilot-tone. This synchronisation with the external pilot frequency is controlled by a PLL circuit, which act the voltage controlled crystal oscillator (VCXO) of the D/A converter. Inside the Synchronisation unit are some jumpers and a adjustment potentiometer to select the RDS signal phase at 0 or +/- 120 degr. and to select the 19kHz pilot frequency from a seperated input or from the multiplex signal on the input from de RDS encoder and to select the level, sinus or squarewave of the signal.

TECHNICAL SPECIFICATIONS

- RDS ENCODER

RDS signal	According to CENELEC NEN-EN 50067
Carrier frequency	57kHz
Modulation	DSB suppressed carrier
Bandwith	+/- 2.4kHz
RDS carrier at output's	0 - 0.4Vpp, ..-20dB
Spectral purity (spurious)	<-80dB outside 57kHz +/- 4kHz,
MPX input level	Max.10Vpp (+12dB), a-symetrisch
Input impedance	5 kOhm with 47pf parallel
RDS+MPX output level	Max.10Vpp (+12dB), a-symetrisch
In/out gain	1:1 (30Hz.. 80kHz, +/- 0,1dB)
THD in/out	<0.1%
Minimum load RDS+MPX output	600 Ohm
RDS only output level	0 - 0.4Vpp, ..-20dB
Minium load RDS only output	600 Ohm
Data and programme interface	RS232 on SUB D9 female connector
Data speed/format	9600bds
Indication	Data rate, Music/Speeds, TA.
Power consumption	+12.. 15Vdc, 200mA
Dimension RDS pcb	200x100mm

RDS - ENCODER

- SYNCHRONISATION UNIT

Synchronisation	Lock, Free
Pilot tone input	19kHz,+/- 0,5Hz
Pilot level	-20dB, -14dB, 1Vpp square wave
Phase 19-57kHz	+/- 120degr.
Power consumption	+12.. +15Vdc, 50mA (connected on RDS encoder)
Dimension SYNHR. pcb	80x100mm

RDS INSTALLATION

The RDS encoder can be installed on the MPX/SCA input of the transmitter. If the equipment don't have a MPX/SCA input, connect the encoder in the LF audio line which is directly connected at the oscillator input, after the audio filters and limiter.
By using a Stereo coder, a Synchronisation unit is recommended, there are two ways of installation the encoder on the transmitter with the Stereo-coder and Synchronisation unit.
Example 1, used Stereo coder without an external pilot output, the pilot will be measured and filtered at the MPX output signal on the RDS encoder.
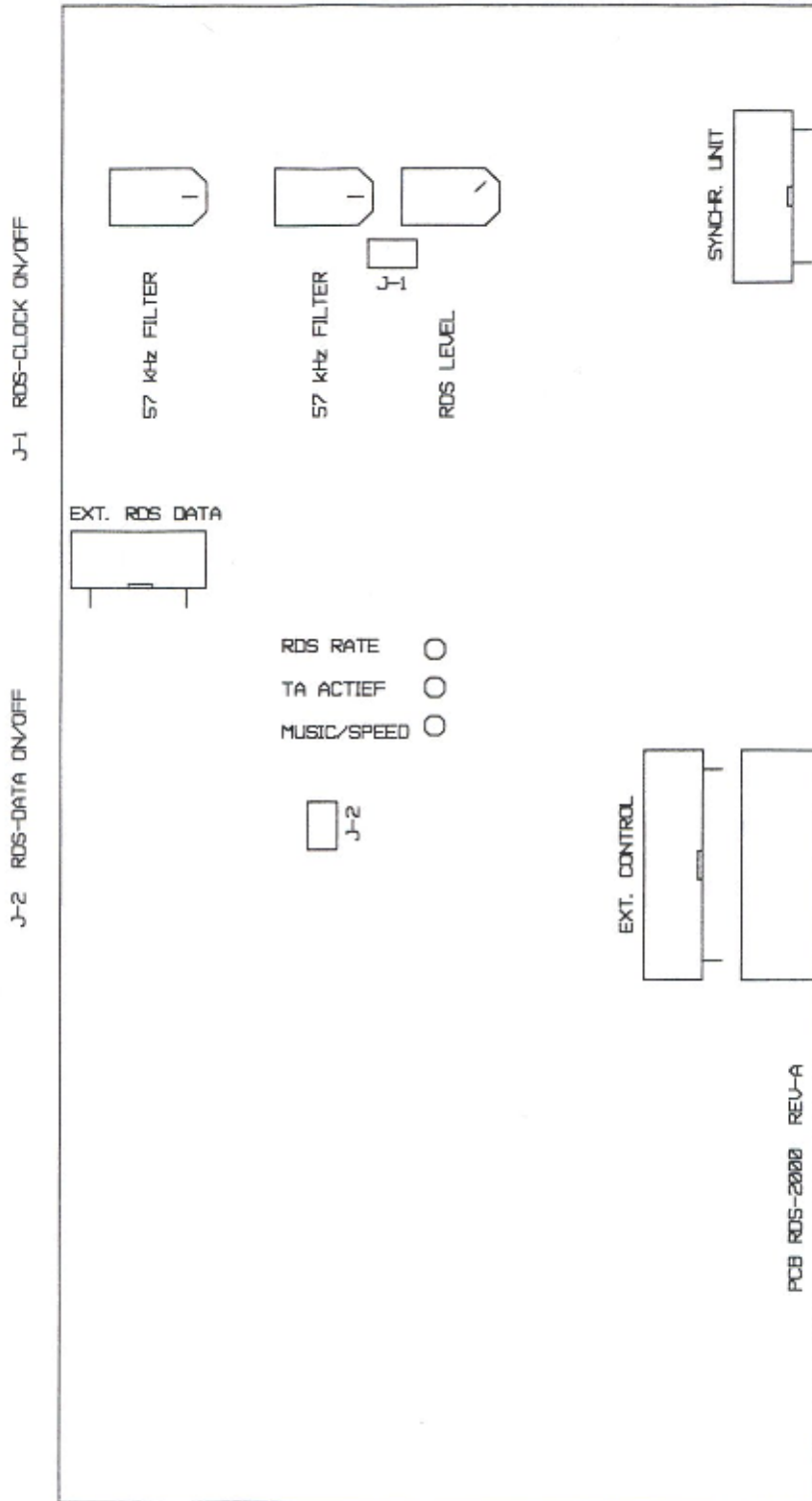Example 2, used Stereo coder with an external pilot output connected to the Synchr. unit. RDS only output connected at the RDS/SCA input from the Stereo coder. This way is recommended, the audio signals have no effect on the Synchronisation 19-57kHz.

SIGNAL LEVELS

The next values are given for example by a deviation of 75kHz, referred at the transmitter input 0 dB, 500Hz = 75 kHz deviation.
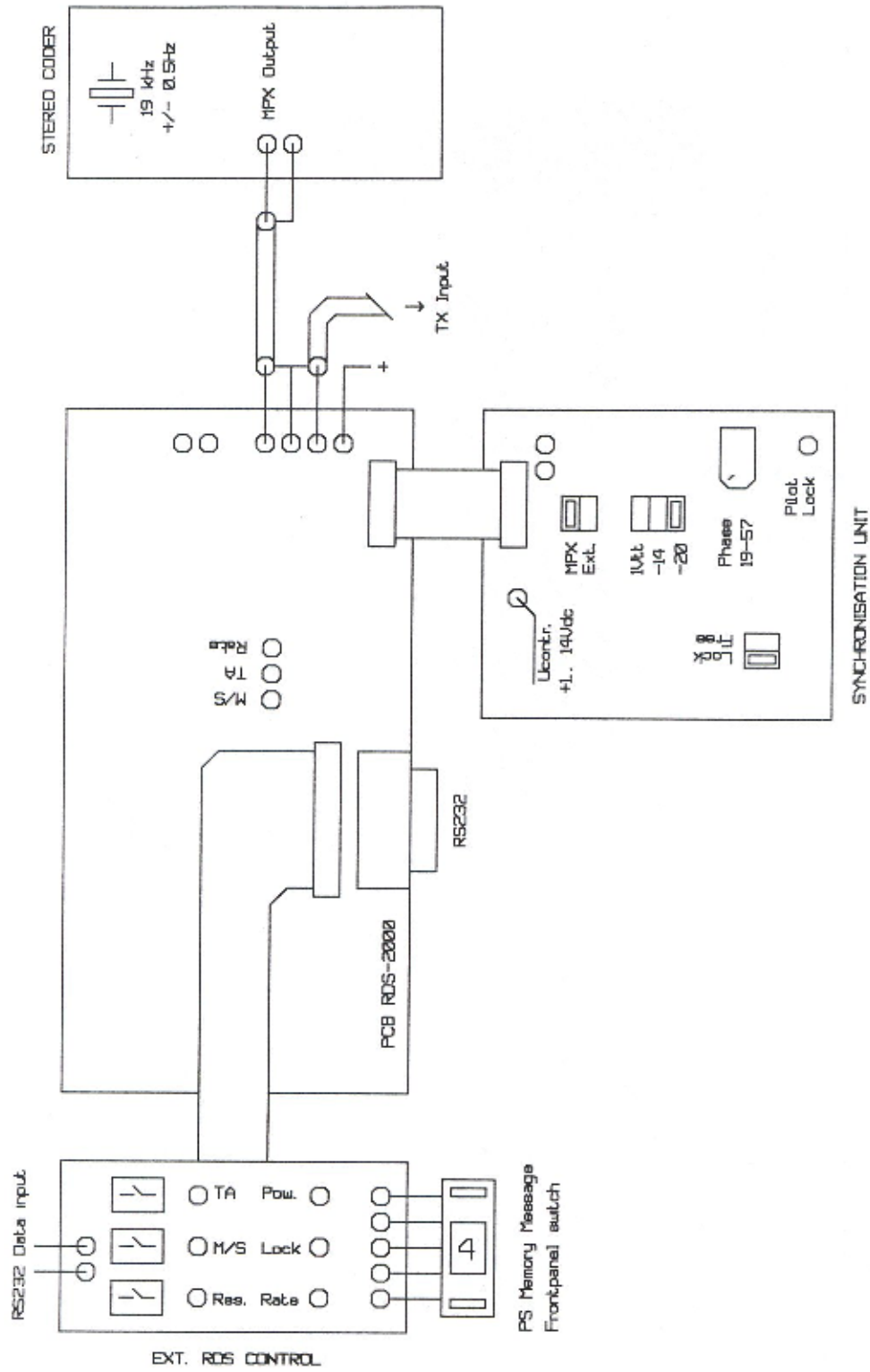
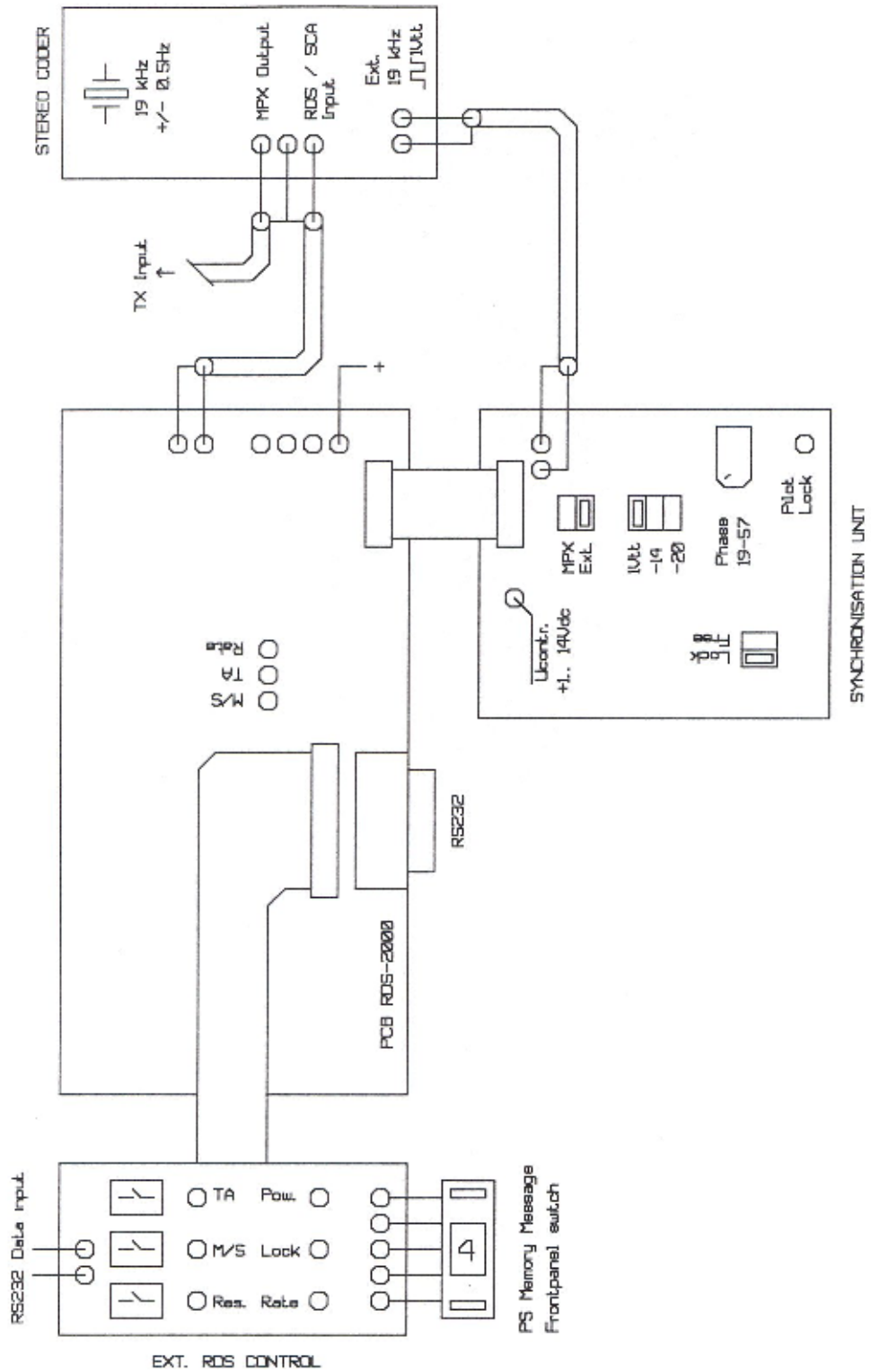|			
-	Left + Right (500Hz)	: -1.1 dB	(deviation 66,3 kHz)
-	Pilot tone, 19kHz	: -21 dB	(deviation 6,7 kHz)
-	RDS carrier, 57kHz	: -31 dB	(deviation 2,0 kHz)

- CONNECTOR AND ADJUSTMENT

J-1 RDS-CLOCK ON/OFF

J-2 RDS-DATA ON/OFF

57 kHz FILTER

57 kHz FILTER

RDS LEVEL

J-1

EXT. RDS DATA

RDS RATE

TA ACTIEF

MUSIC/SPEED

J-2

SYNCHR. UNIT

EXT. CONTROL

RS232

PCB RDS-2000 REV-A

RDS - ENCODER

STEREO CODER

19 kHz +/- 0.5Hz

MPX Output

TX Input

SYNCHRONISATION UNIT

MPX Ext.

Volt. -14 -20

Phase 19-57

Pilot Lock

Ucontr. +L. 14Vdc

Trig. Lock

PCB RDS-2000

RS232

M/S TA Rate

RS232 Data input

EXT. RDS CONTROL

TA Pow.

M/S Lock

Res. Rate

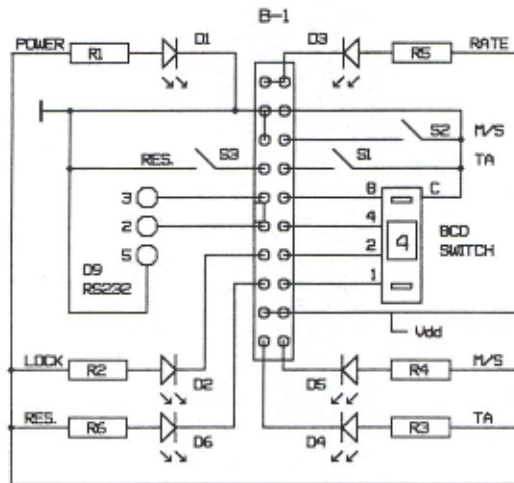PS Memory Message
Frontpanel switch

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- EXT. CONTROL CONNECTOR INFORMATION

EXTERNAL FUNCTIONS

RDS - ENCODER