

RDS Signal Generator

For the servicing and testing of RDS, including sensitivity, ARI and stereo functions for radio receiver

G_81300-C

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1 Basic Information

At the time this manual was printed, the following symbols and marks were used in all Götting KG documentations:

- ♦ For security advices, the following symbols stand for different degrees of danger and importance:

NOTE!



ATTENTION!



WARNING!



- ♦ Further information or advices are indicated as follows:

TIP!



- ♦ Program texts and variables are indicated through the use of the `Script Courier`.
- ♦ Whenever the pressing of letter keys is required for program entries, the required **L**etter **K**ey is indicated as such (for any programs of Götting KG small and capital letters are equally valid).
- ♦ Sections, drawings and tables are subsequential numbers throughout the complete document. In addition, each documents includes a list of contents showing the page numbers following the front. If a document exceeds 10 pages, it also has a drawings list and a list of tables on the last few pages. If required, in case a document is correspondingly long and complex, a index is added in the back.
- ♦ Each document shows a small table including meta information, such as developer, author, revision and date of issue, on the front page. The information regarding revision and date of issue are also included in the bottom line on each page of the document. This way it is possible to clear identify the source document for each bit of information.
- ♦ Online version (PDF) and printed handbook are always generated from the same source. Due to the consequent use of Adobe FrameMaker for these documentations, it is possible to use the cross hints and content entries (including page numbers of the index) of the PDF file for automatical transfer to the corresponding content.



2 Introduction

2.1 Delivered Parts

- ♦ RDS signal generator G_81300-C
- ♦ PC software RDS `Control` on CD or download it here from our internet pages
- ♦ 1 m connection cable with sub-D 9pin
- ♦ Power cable, grey, 1.5 m
- ♦ Extra caps for keys
- ♦ this instruction manual for the device and the software

2.2 Introduction

The RDS signal generator G_81300-C enables to check easily all functions normally provided by a modern radio including:

- ♦ sensitivity of RF receiver
- ♦ Traffic information and carrier switching
- ♦ ARI functions
- ♦ Stereo function
- ♦ the RDS functions (e.g. TP, TA, PTY, PS, AF, EON, DI and M/S), please also refer to chapter 6 „Specifications / Waste Disposal“ on page 36
- ♦ The PC software RDS `Control` enables to generate RDS signals. This includes RDS groups like:
 - PIN (program-item number)
 - RT (radiotext)
 - CT (clock-time and date)
 - TDC (transparent data channel)
 - IH (in-house application)
 - RP (radio paging)
 - EON (enhanced information on other networks)

The device distinguishes itself by means of a particularly simple servicing technique as described on the next few pages (chapter 3).

Furthermore, there is the more comprehensive usage of the RDS signal generator G_81300-C through a PC with the help of supplied software RDS `Control`, the operation which is described in chapter 4 beginning on page 15. All that is required is connecting a PC to the interface on the generator using the enclosed cable. On reception of the first command, the generator will automatically switch to PC operation.

Now the working frequency out of a range from 87.6 MHz to 107.9 MHz (in steps of 0.1 MHz) can be selected. In addition, it is possible to create any RDS program, work with the programs saved in the generator, delete or overwrite them.

ATTENTION! When returning to conventional mode, as described below, all self-generated programs will be deleted in the generator!



In order to switch the generator back into conventional mode, buttons *<Freq. A>* and *<Freq. B>* must be pressed simultaneously while switching power on. This will automatically restore the original programs in the generator.

3 Conventional Operation

3.1 Description of Operating Elements

To illustrate the operating elements, each one is explained in succession below.

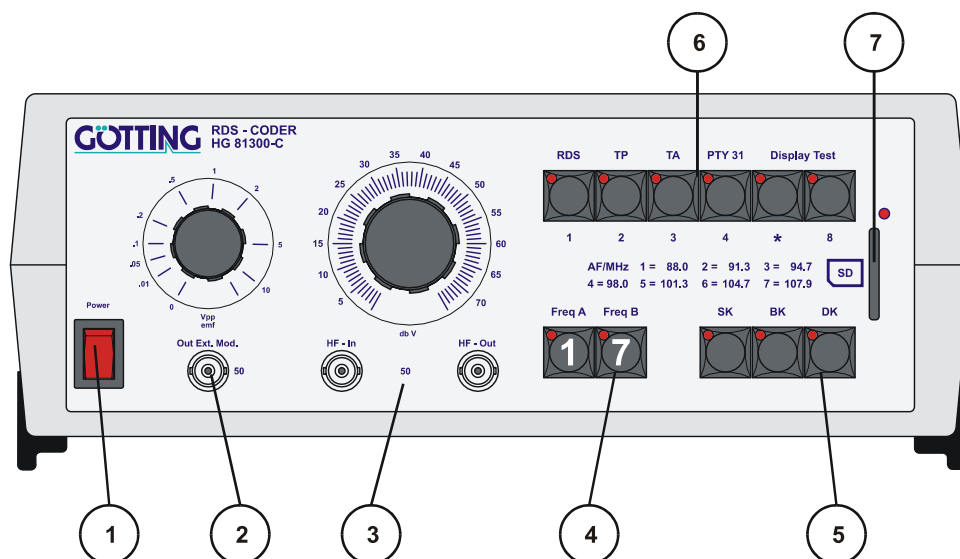


Figure 1 Front panel blocks of functions

The various functions are subdivided into six blocks, as described below:

Block	Function
Block 1	The <Power> switch is used for turning the RDS signal generator on and off. When the device is switched on, the switch is illuminated.
Block 2	A signal is given out from output <Out Ext. Mod.> which can be used for modulating an external HF generator. The output level is controlled by the potentiometer.
Block 3	Input <HF-In> enables for an external HF generator to feed in a signal. This signal is added to the internally generated HF signal, whose level can be adjusted by a potentiometer. It is then available at output <HF-Out> with a 10 dB transmission loss due to regulation.
Block 4	These buttons allow selection of the two working frequencies. Pressing both simultaneously while switching power on, will reset the generator from PC operation back to normal mode.
Block 5	These buttons serve to test ARI functions.
Block 6	These buttons serve to test RDS functions.
Block 7	Secure Digital Memory Card Slot: It is also possible to import RDS programs from a SD Card.

Table 1 Description of the front panel's blocks of functions

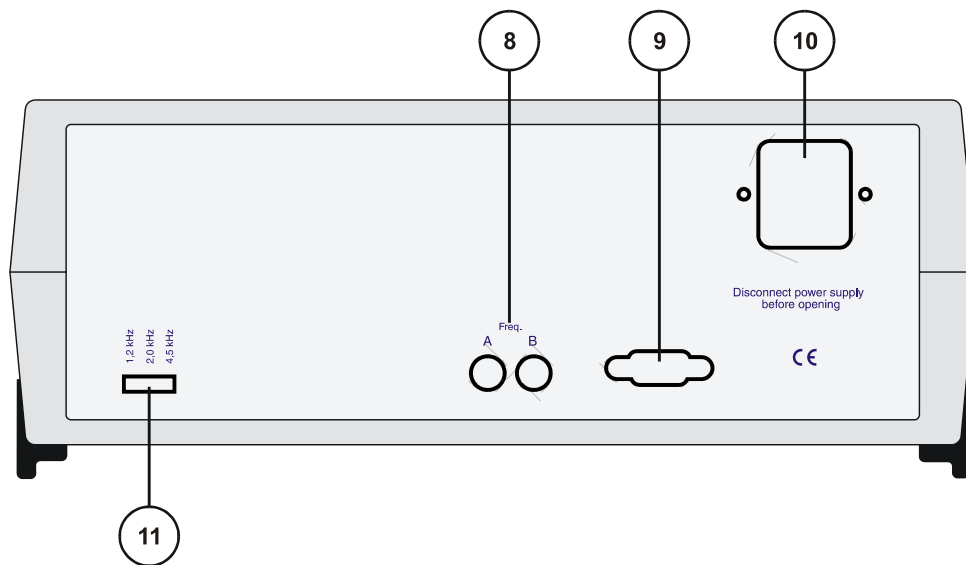


Figure 2 Blocks of functions on the back side

There are four additional blocks of functions on the back side:

Block	Function
Block 8	Rotating switch designed to select the two working frequencies out of seven available frequencies. This will allocate the two working frequencies to the front panel buttons described in Block 4.
Block 9	PC interface (serial)
Block 10	Mains connection with fuse holder
Block 11	Frequency shift for the RDS signal: 1.2 kHz, 2.9 kHz, 4.5 kHz

Table 2 Description of blocks of functions on the back side

3.2 Functions of the RDS Signal Generator

3.2.1 Frequency Selection

For testing the functions of a radio, the RDS signal generator supplies two working frequencies which can be selected out of a group of seven available frequencies. Each frequency is assigned a different number, as shown below:

Number	1	2	3	4	5	6	7
Frequency (MHz)	88.0	91.3	94.7	98.0	101.3	104.7	107.9

Table 3 RDS signal generator's frequencies

In order to avoid interferences during the function tests through scattering of strong local transmitters, the selection of the two working frequencies should be done when first setting the device into operation. For achieving this, simply turn the radio to each of the frequencies shown in Table 3 and note the two frequencies, which have the least field strength of unwanted signal. Then program these frequencies for the function keys **<Freq.A>** and **<Freq.B>** using the code switches at the back side of the device.

Now it will be possible to switch from one working frequency to the other by simply pressing the keys **<Freq. A>** and **<Freq. B>**.

NOTE!

In order to be able to easily recognize the used frequency, seven caps are enclosed. They are referring to the seven available frequencies and can be used for replacing the built-in caps. To do so, insert a screw driver between the LED and the cap and take off the cap.



3.2.2 HF Output Adjustment

The HF signal level can be adjusted using the HF potentiometer described in Block 3. This enables to cover a level range from 0 dBμV to 70 dBμV. In case an external HF signal is fed in, it will appear at the HF output attenuated by 10 dB.

3.2.3 Testing of Transmitter, Traffic Area and Traffic Announcement Identification Systems (ARI)

For testing the functions Transmitter Identification (SK), Traffic Area Identification (BK) and Traffic Announcement Identification (DK) the three keys described in Block 5 are used (refer to chapter 3.1 starting on page 7).

Key	Function
Transmitter Identification	Key <SK> activates the traffic program carrier with 57 kHz at 3.2 kHz frequency shift.
Traffic Area Identification	Key <BK> generates 60 per cent amplitude modulation of the traffic program carrier with 58.98 Hz (corresponds to area F) as long as traffic identification (SK) is active.
Traffic Announcement	Key <DK> generates 30 per cent amplitude modulation of the traffic program carrier with 125 Hz, as long as the transmitter identification (SK) is active.

Table 4 Keys for transmitter identification, traffic area identification and traffic announcement identification test

3.2.4 Testing of RDS Functions

To control the RDS function test, the buttons in Block 6 are used (refer to chapter 3.1 starting on page 7). In order to keep the front panel as clear as possible, each of the keys are assigned three function levels. To select between the different functions, use the **<RDS>** button. The states are valid as explained below:

Repeated pushing of the **<RDS>** key leads to the activation of one of the **three** function levels in sequence. The following table shows which functions are assigned to each of the buttons and which readouts are generated on the test radio when an individual button or a combination is pushed.

Push-button(s)	Function	Display	Function level
8.	display test	88888888	0 RDS LED off
*	display test	*****	
	RDS activated	HGTEST 1	1 RDS LED lit
TP	traffic program	HGTEST 2	
TA	announcement bit is set	HGTEST 3	
TP + TA	traffic announcement	HGTEST23	
PTY31	PTY31 Code (Alarm)	HGTEST 4	
PTY31 + TP	PTY31, TP bit set	HGTEST24	
PTY31 + TA	PTY31, TA bit set	HGTEST34	
PTY31 + TP + TA	PTY31, TP and TA bit set	HGTES234	
*	PTY4 Code (Sport)	PTY4	
* + TP	PTY4, TP bit set	PTY4TP	
* + TA	PTY4, TA bit set	PTY4TA	
* + TP + TA	PTY4, TP and TA bit set	PTY4TPA	
8.	PTY15 Code (Other Music)	PTY 15	
8 + TP	PTY15, TP bit set	PTY15 TP	
8 + TA	PTY15, TA bit set	PTY15 TA	
8 + TP + TA	PTY15, TP and TA bit set	PTY15TPA	

Table 5 Buttons of the signal generator and their functions (Part 1 of 2)

Push-button(s)	Function	Display	Function level
	EON level activated	EON 1	2 RDS LED blinks
TA	EON jump activated (resets automatically)	remains on EON1, in case the jump fails; changes over to the display of a second RDS decoder in case such is available and has been recognised.	
With all button combinations in this level, the display is not updated.			

Table 5 Buttons of the signal generator and their functions (Part 2 of 2)

3.3 Checklist for a Complete Test Run

3.3.1 General Reception Functions

1. Connect the input of the test radio with the *<HF-Out>* socket of the RDS signal generator using an appropriate cable (not included).
2. Connect a loudspeaker to the radio in order to be able to monitor the LF (or optionally to a frequency meter).
3. Switch on the RDS signal generator and the radio -> the RDS signal generator's RDS functions are deactivated (RDS LED off).
4. Adjust the maximum transmission level using the *<HF potentiometer>* (turn fully right).
5. Turn up the volume control of the radio. Now it must be possible to hear or measure a 1.90 kHz tone on the left channel and a 4.75 kHz tone on the right channel.
6. If the HF level is reduced, a boundary value will be reached, which should result in the radio switching to mono operation, thereafter muting itself (These boundary values and the behaviour due to weakening of reception are depending on which type of radio is used).

3.3.2 ARI Functions

1. Pushing the *<SK>* button one time activates the transmitter identification. The radio should display the recognition of this signal.
2. The traffic area identification is activated by pushing the *<BK>* button once. The recognition of the signal should be displayed by the tested device.
3. Pressing the *<DK>* button activates the announcement identification.
4. Pressing the *<SK>* button a second time will deactivate the ARI functions.

3.3.3 Display Test

The display of the radio may be tested by using the buttons **<*>** and **<8>** in Block 6 (also refer to section 3.1 starting on page 7). This is only possible in operation level 0 where the RDS LED is neither lit nor blinking. Pushing the button **<*>** should result in filling the entire display of the radio with asterisks. Pushing the button **<8>** should fill the entire display of the radio with '8'. This enables to detect easily any defects in the display.

3.3.4 RDS Functions

Transmitter Switching

1. To test the RDS functions a FM (has to be ready for modulation) HF generator is needed.
2. By pushing the **<RDS>** button once, the RDS functions of the RDS signal generator will be activated.
3. Use the HF potentiometer to adjust the maximum transmission level (turn fully right).
4. Adjust the connected radio to the frequency of the RDS coder.
5. From the linked up loudspeakers, a tone of 1.90 kHz should be heard or measured from the left channel and a tone of 4.75 kHz from the right channel.
 - Connect the output of the external HF generator with the HF input of the RDS signal generator. The level of the output signal should therefore be well refined, so that an adequate reception level can be seen on the test radio.
 - Connect the modulation output of the RDS signal generator with the modulation input of the external HF generator. The level of the modulated signal can also be adjusted by a potentiometer.
 - The operating frequency of the external HF generator has to be adjusted to one of the seven working frequencies of the RDS signal generator (also refer to section 3.2.1 starting on page 8)
 - Reduce the transmission level of the RDS signal generator slowly. When a boundary value is reached, the radio will leave the frequency of the RDS signal generator and change to that of the external HF generator. This can easily be heard or measured due to the different frequencies (0.678 kHz on the left channel and 3.16 kHz on the right channel).

Standard RDS Signal Groups

1. To test the standard RDS signal groups, push the button **<RDS>** once, this will generate the operation level 1 of this group of buttons. The LED of the **<RDS>** button will light constantly. The display will show the text 'HGTEST 1'.
2. Pushing the button **<TP>** (traffic program) will generate the transmission of the corresponding RDS code to the radio. The display will show the text 'HGTEST 2'.

3. Pressing the button **<TA>** (traffic announcement) will generate the transmission of the corresponding RDS code and the display will show the text 'HGTEST 23'. Please note that a radio traffic announcement may only come from a transmitter with a traffic information system program. In other words, when using **<TA>**, **<TP>** must also be set.
4. Finally PTY (program type) can also be tested. The TA and TP functions may be combined in any way with the PTY functions. The corresponding bit is set within the device and the radio will display the texts as shown in Table 4 on page 9. This will not influence the PTY functions. It is now possible to test the M/S functions (music / speech switch) together with the PTY functions. The M/S signal has two states that directly give information on whether music or speech is being sent. A receiver that recognises this signal can be adjusted to two different volume and tone settings and then switches automatically to the needed one. Since PTY4 is a speech transmission (sports) and PTY15 is a music transmission (other music), switching between them on the RDS service generator will enable testing the radio's M/S function
 - Push button **<PTY31>** (it is used for displaying the emergency message (Alarm)). The display will read 'HGTEST 4'.
 - Press button **<*>** (it is used for testing the RDS level PTY4 with a reference to sports transmissions). The display will read 'PTY4'.
 - Press button **<8>** (it is used for testing PTY15 with reference to an 'other music' transmission). The display will read 'PTY15'.

EON Functions

The new RDS signal generator G_81300-C can also test EON functions (Enhanced information on Other Networks) of RDS. This enables principal function tests to be carried out with an RDS signal generator and HF generator. For comfortable testing, it is however recommended that two RDS signal generators are used.

- a) If only **one RDS signal generator** is available, the test should run as follows:
 1. Connect the output of the HF generator with the HF input of the RDS signal generator. The output signal should be refined so that the test radio receives an adequate level of reception.
 2. Connect the modulation output of the RDS signal generator with the modulation input of the external HF generator. The level of the modulated signal may be adjusted with a potentiometer.
 3. The HF output signal of the RDS signal generator should be adjusted by means of the potentiometer to provide an adequate reception level for the radio.
 4. By pressing the **<RDS>** button twice, the EON level is activated (LED RDS blinks). The blinking TP-LED is insignificant to this test.

5. If now <TA> (radio traffic announcement) is pressed, the radio will change to the frequency of the external HF generator (different LF frequencies through left and right channels). Then it will jump back because no radio traffic announcement is recognized from the external generator.
- b) If a **second RDS signal generator** is available, the test should run as follows:
1. Connect the HF output of generator 2 with the HF input of generator 1.
 2. Generator 2 should be set to a different frequency than generator 1 and both generators adjusted to have a sufficient HF output level.
 3. By pushing the <RDS> button of generator 2, the RDS level will be activated (RDS LED lit constantly). Then activate radio traffic announcement with the buttons <TA> + <TP>.
 4. On generator 1 EON level is activated by pressing the <RDS> button twice (RDS LED blinking). The radio will then display the text 'EON 1'.
 5. If now the button <TA> is pushed on generator 1, the radio will change to the frequency of generator 2 and should display the text 'HGTEST 2'.
 6. The radio remains on the frequency of generator 2 until the TA function is deactivated there. It will then jump back onto the frequency of generator 1.
- c) For RDS radios that are fitted with **PTY data receiving** equipment:
1. Switch the radio to scanning for speech transmission and activate PTY4 (sports) on generator 2. The radio will then switch to the frequency of generator 2.
 2. Switch the radio to scanning for music transmissions and activate PTY15 (other music) on generator 1 by pushing button <8>. The radio will then switch back to the frequency of generator 1.

4 PC Operation

The PC operation of the RDS signal generator G_81300-C is characterized by a simple but multi-faceted handling. The supplied software `RDS Control` enables to, among other things, produce own RDS programs, revise existing programs of the generator, delete them or replace them with your own ones. Furthermore, both working frequencies can be freely selected out of the range from 87.6 MHz to 107.9 MHz in 0.1 MHz steps.

PC operation mode is automatically activated as soon as the device is addressed by using the program `RDS Control`.

NOTE!

The Coder is still compatible to the DOS Software RDS Control of the previous version HG 813BPC and can be controlled by this version as well. However it is not possible to use the new added functions, illustrated in the diagrams in Table 15.



In order to return to conventional mode, simply push the two buttons *<Freq. A>* and *<Freq. B>* simultaneously while switching power on. This also restores the original RDS programs automatically.

This third chapter is subdivided into four parts

1. basic operating elements and functional groups (analogous to sections 3.1 starting on page 7 and 3.2 starting on page 8)
2. structure of the program `RDS Control`
3. operation of the program in a concrete test run
4. description of all program menus and their functions

4.1 Altered Operating Elements

In contrast to conventional operation (as described in section 3.1 starting on page 7) the following operating elements of the RDS signal generator have altered functions:

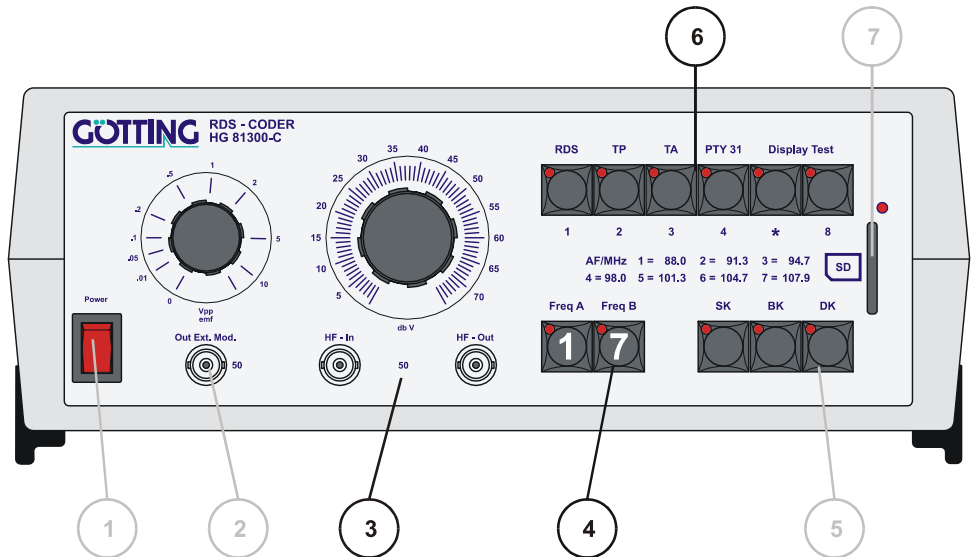


Figure 3 Blocks of altered functions in PC operation

Block	Function
Block 4	Conventional mode of operation is retained by simultaneously pressing both buttons <Freq. A> and <Freq. B> while switching power on.
Block 6	<p>Using these buttons, it is possible to activate every one of the 63 program slots. These buttons no longer possess their own RDS functions but a binary value. From right to left:</p> <ul style="list-style-type: none"> - button 8 -> 1 - button * -> 2 - button 4 (PTY 31) -> 4 - button 3 (TA) -> 8 - button 2 (TP) -> 16 - button 1 (RDS) -> 32 <p>With the appropriate combination of buttons, any of the 63 program slots can be selected. For example: push-buttons 4 & 2 = 4 + 16 = program slot 20</p>

Table 6 Meaning of altered function block in PC operation

NOTE! Before starting any adjustments read section 4.2 "Introduction to the PC Software RDS Control" on page 17. This will give an understanding of the program's principals of operation.



The adjustment of signal level and testing of transmitter, traffic area and traffic announcement identification functions all remain the same as it is described in sections 3.2.2 starting on page 9 and 3.2.3 starting on page 9.

The HF level (block 3) can be adjusted in dBµV steps through the PC as well as the level controller for the modulation signal. Furthermore the ARI function **Bk** (Range Identification) can be programmed for the five areas A-F. Thus the frequencies of the internal tone generators can also be modified.

The two working frequencies are no longer assigned to the buttons **<Freq. A>** and **<Freq. B>** by the rotating switch. They are directly controlled by the program RDS Control from the tab "Advanced Coder Settings" (see 4.2.5.2.2 on page 29).

4.2 Introduction to the PC Software RDS Control

To apply this software a PC with Microsoft Windows, at least Windows 98, is required. It has to have a free COM interface for the connection of the RDS Coder (it is also possible via USB /serial-adapter). The minimum standards for the system result from the minimum requirements for the used Microsoft version. The requirements can be checked on the websites of Microsoft at <http://www.microsoft.com>. net Framework can be found in the Download area. The program RDS Control will be described in version 1.1.0.

4.2.1 Installing the Program

The program will be installed from the supplied CD. Download the latest version at <http://www.goetting.de/de/download> (look for 81300). Then start the program G_81330-C_Setup_V1_1.exe. The following picture will be displayed:

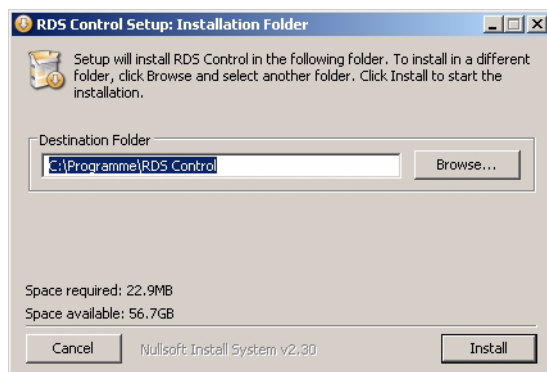


Figure 4 Screenshot: Step 1 of the installation of the program RDS Control

With the button **Browse** another directory can be chosen. Applying the button **Install** the following message will appear:

NOTE!

For running program RDS Control the runtime environment free of charge MICROSOFT .NET FRAMEWORK in version 2.0 or higher is required. Should a suitable version already be installed on the PC this version will be used and the installer skips the following steps:

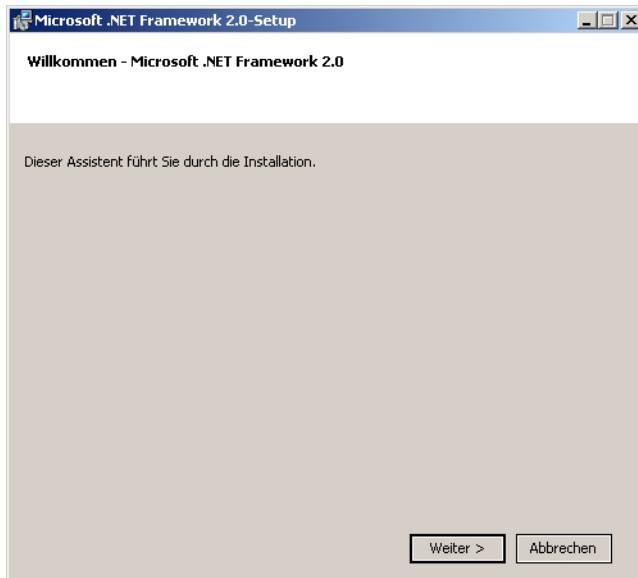


Figure 5 Screenshot: Step 2 of the installation process of the RDS Control program.
This assistant will lead through the installation process. Confirm with Go Button

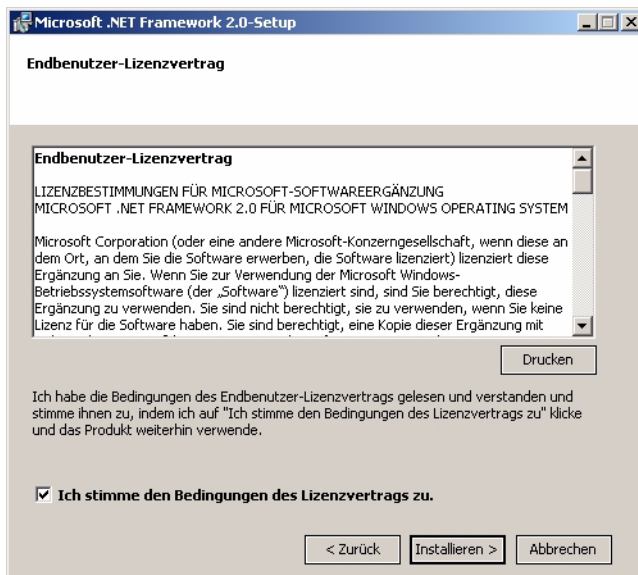


Figure 6 Screenshot: Step 3 of the installation of the program RDS Control

If you agree to the terms of the license agreement for the Microsoft software extension MICROSOFT .NET FRAMEWORK 2.0, the installation can be continued with the Install Button.

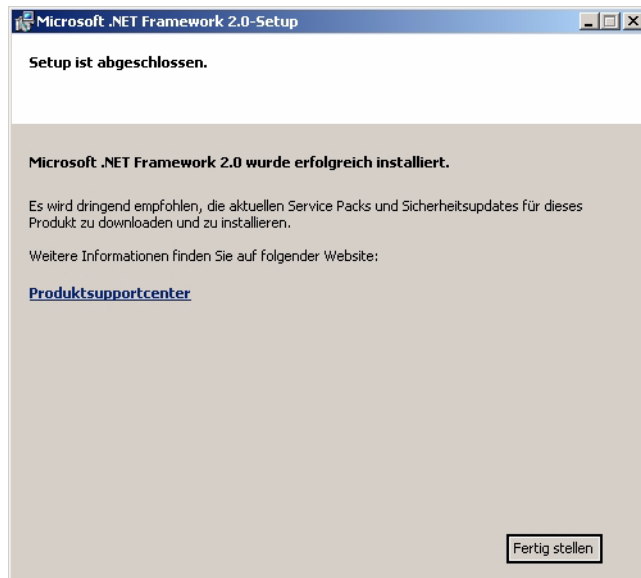


Figure 7 Screenshot: Step 4 of the installation of the program RDS Control

Click **Finish** to terminate the installation.

NOTE!

This installation generates no registry entries. The software will only be copied to the indicated locations and a new file `RDS Control` will be created with a link to the software. Furthermore a link on the desktop will be set up. For **uninstallation** simply delete the created files and the links.



Double-click on the link in the start menu or on the desktop to **start** the program.

4.2.2 General Program Concept

Before dealing with the operation of `RDS Control`, a little information on its concept should be known:

`RDS Control` is designed for easy entry and generation of RDS data. The data can be saved on disk and be reloaded. It may be programmed to any of the 63 program slots of the RDS signal generator G_81300-C in coded form. Data transmission is done over a serial interface or with the help of a SD card.

It is taken for granted that at least the basic structure of the RDS data is understood by the user. Most important: The RDS data is transmitted in the form of sequences of bit groups. Each group contains 104 bits is subdivided into four information blocks of 16 bits containing the RDS data. Each information block is followed by a 10 bit block

for error correction, to which is added an offset for synchronisation ($4 * (16 \text{ bits} + 10 \text{ bits}) = 104 \text{ bits}$). This channel coding is automatically executed by `RDS Control` before the data is transmitted to the RDS signal generator.

In the program `RDS Control` such a 104 bit sequence is called a **component**. It is the smallest unit out of which an RDS program is put together.

In the first information block of every component the PI (Program Identification) code is transmitted.

A component is assigned to a specific group type. RDS defines 16 group types (0 to 15), which are subdivided into types A and B, e.g. 14A. The group type number is transmitted in 5 bits of the second information block. Depending on the group type, the remaining bits of the four information blocks are interpreted in various ways. With PI code from the first block.

Since a component can normally only transmit a part of the complete set of data of a group type, `RDS Control` combines several components to an **RDS group**. In this program, unlike the norm, a group is understood as set of data which is assigned to exactly one group type. The data is organised into one or more associated components which belong together and which are all structured according to the group type. In `RDS Control` every RDS group is identified by its name which can freely be chosen.

Since usually several sets of data of different group types are to be transmitted together, while usually the components of the different RDS groups are also interlocked and/or mixed timewise, several groups can be combined in an **RDS program**:

An RDS program consists of a not empty sequential list of components with a not empty set of RDS groups.

The components contain the data of these RDS groups. Position and sequence of components of a group can be arranged in the component list as desired. Not all components from an RDS group need to be contained in the program. On the other hand, a component may be inserted in the list more than once. Every RDS program is identified through its name which can be freely chosen. Once a program has been programmed into the RDS signal generator its name will appear in the program slot list. The list of the defined groups and programs can be saved as .XML data based on a data carrier. From there they can be loaded and edited afterwards as well.

The programs will be transferred to the RDS signal generator by filing them in a memory location. From here the corresponding RDS program can be retrieved at any time.

Applying `RDS Control` the programs can be imported from the coder as well. Then the groups and components in the source listing can be rearranged. However, then it is not possible to modify these groups anymore.

4.2.3 Elements of the User Interface

Once the program is started all COM Ports available will be requested for a connected coder. As this process requires a certain time a display window will be shown in the meantime.

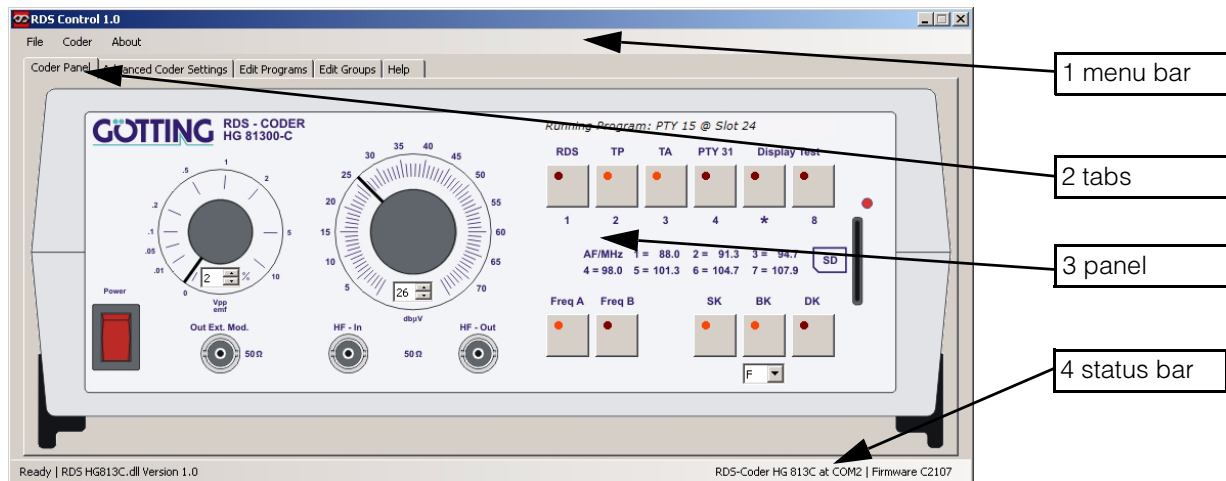


Figure 8 Screenshot: Main screen of the program RDS Control

1. Menu bar
In this menu bar all menus are listed. The menu items will operate the RDS Control program.
2. Tabs
Applying the tabs the coder will be operated and RDS data contents will be generated.
3. Panel
On this illustration of the front panel the different buttons and potentiometer can be activated directly by mouseclick.
4. Status bar
Here the DLL version as well as the applied COM port and the firmware version of the coder will be indicated.

4.2.4 A complete test run

The aim of this section is to illustrate the program `RDS control` by one specific example very clearly. This part of the program description is structured like a real test run.

This is the objective:

You have to generate a RDS group of type 0A, setting the text "Radio" as an identifier. Then you have to create two RDS programs in which the 0A-group and two RDS groups of type 2A (radio text) with two consecutive radiotext lines shall be connected in series (it is much easier than it sounds). You have to store these programs to slot 5 and 6 of the device. Then these programs shall be activated alternately so that the station identification and a total of 4 different radio text lines will be displayed on the radio, which can display radio text.

4.2.4.1 Creating a new type 0A group and 4 type 2A groups

Figure 9 Screenshot: Creating a new group

In order to generate a group you have to select the tab **Edit Groups**. If a group is not yet defined (like in the picture on the right), create a new input field on the tab (see Figure 10 starting on page 23) with **Add**. Enter the name **0A-TEST** in the **NAME** field. Choose the desired group **0A** in the **TYPE** field.

Below the **TYPE** field all parameters are listed which can be modified related to the desired group type **0A**. Parameters, specified by a push button **Get**, will lead to a particular input- or output dialog box. The other parameters can be selected by clicking them or by switching between several options.

Define the **PI Code** by clicking on button **Get** in field **PI Code**. A new window will be displayed. Choose from one of both lists: **Germany** and **Supra Regional**.

You can indicate the **PI-Code** directly in the input field as well. If you want to add a transmission identification, e.g. **21**, enter it directly into the input field.

In the **PI**- field the code **D321** should appear (**D** for **Germany**, **3** for **Supra Regional** and **21** for any transmission identification).

Set the remaining parameters as follows:

- The program type **PTY** on **NEWS (01)**
- The traffic identification (**Traffic Program Flag**) on **active**
- The traffic announcement identification (**Traffic Announcement Code**) on **active**
- Create a list of alternative frequencies **AF** with the following 8 frequencies according to method A. For this you have to click on the button **Get** next to the field **AF-Code**.
 1. Adding of Frequencies
Enter the desired frequency in the entry field **Frequency**. Clicking on the button **[+]** inserts the new frequency in the frequency list at the selected point.
 2. Shifting Frequencies
Applying buttons **[↑]** and **[↓]** allows you to shift the frequencies within the list.
 3. Removing Frequencies
First mark the frequency that has to be removed. Clicking on button **[-]** deletes the marked frequency from the list. Now copy the frequency list by clicking the button **ok**. Now the grey shaded display panel indicates the number of alternative frequencies
- Set the program segment **PS** to **Radio ??** (max. 8 characters).

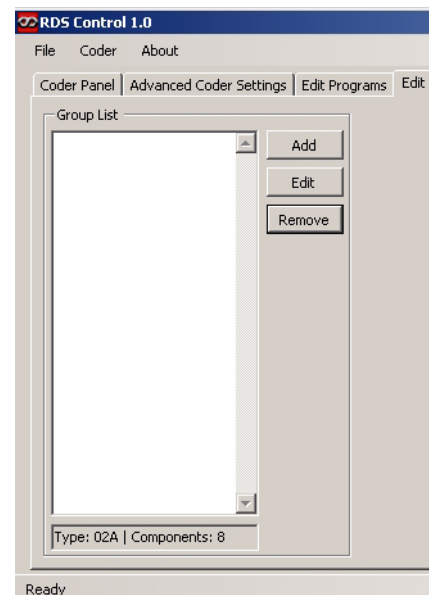


Figure 10 Screenshot: Create a group of Type 0A.

Once all parameters are set, the window on the screen should look like the illustration on the left.

If that is the case, click OK. The window will close and all previous settings will be saved. The group list now contains group 0A-TEST. Now this group is also included in the tab Edit Programs. It contains 5 components.

To save the previous adjustments permanently, choose the point Save Database as and enter a data name.

Creating the first group of type 0A is now terminated.

Now look at the second group: To generate this group change to tab Edit Groups. Create a new group applying push button Add and enter the name 2A-TEST1. Adjust the parameters as described below.

- Set the group type to 2A
- The PI-Code, PTY and TP- Flag still have the values already configured for group 0A
- Now activate the text Flag A
- Enter the example Oldies and Hits of today in the text field A.

Figure 11 Screenshot: Create a group of type 2A

Once all parameters are set the window should look like the illustration on the left.

If that is the case, click OK. The window will close and all previous settings will be saved. The group list now contains group 2A-Test1. Now this group is included in the tab Edit Programs as well.

Now you have completed the first of four 2A- groups.

Generate three more 2A -groups analog to the previous procedure (described before: 2A-TEST2 to 2A-TEST4). The parameters should be adjusted in the corresponding dialog boxes as follows:

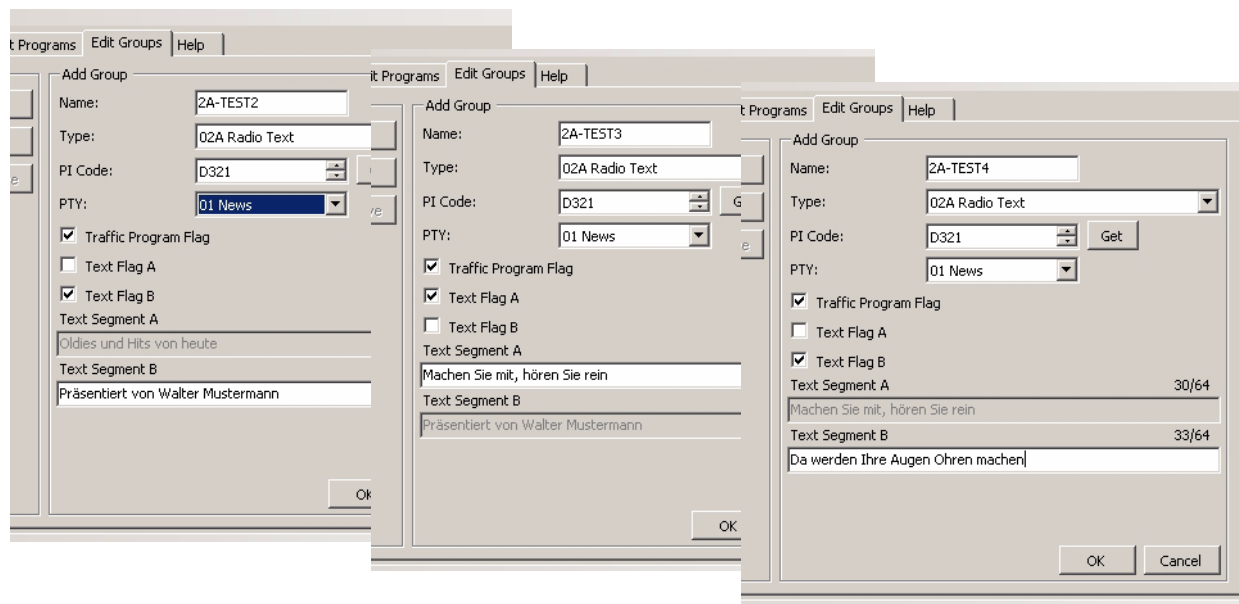


Figure 12 Screenshot: Edit Groups

Gruppenname	Textflag	Text
2A-TEST1	A	Oldies and today's hits
2A-TEST2	B	Presented by Walter Mustermann
2A-TEST3	A	Listen to us, enjoy the day
2A-TEST4	B	You won't believe you ears

Table 7 Different parameters for the four 2A- test groups.

Once you have saved the data bank the generated groups can be summarized in two RDS programs in the next step.

4.2.4.2 Editing an RDS program

For programming it is important to know that one group can be splitted into several components. Groups of type 0A mostly consist of four components (each has 2 characters resulting in the 8 characters of the name segment PS). Groups of type 1A (PIN) consist of one component only. For other types the number might vary. Groups of type 5A/5B (TDC) might include hundreds of components depending on the amount of data. In 2A groups (RT) 4 characters of the radio text are allocated to one component. The rest always stands for a new component. Up to 64 characters can be entered for each line, corresponding to the 16 components. Thus a 2A group can consist of a maximum of 32 components.

NOTE!

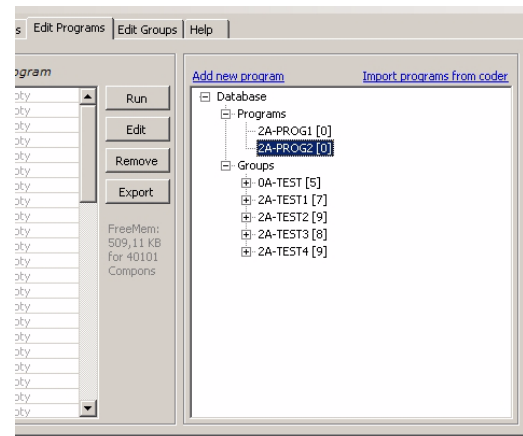
Within the program RDS Control it is possible to merge any groups to one program. Please make sure that the maximum permissible number of components of 40100 will not be exceeded as the RDS Coder G_81300-C is not capable of saving more.



Figure 13 Screenshot: Create a Program

For the creating of the two RDS programs choose tab **Edit Programs**. There you have to activate the link **Add new program** and enter the program name **2A-PROG1**. Only names with a maximum of 8 characters will be accepted. Generate a second (still empty) program in the same way and name it **2A-PROG2**.

To copy groups **0A-TEST**, **2A-TEST1** and **2A-TEST2** to the first program **2A-PROG1**, just drag the corresponding groups to the desired program (drag & drop).

**Tip!**

If you want to assign the group components individually to one program, click on the icon **[+]** to unfold the details in the tree structure. Then you can drag the components separately to the desired location of the RDS program. You can also change the order of the components in the RDS program by expanding the tree structure and by dragging the groups.



Operate in the same way with the groups **0A-TEST**, **2A-TEST3** and **2A-TEST4** and with the program **2A-PROG1** as well. Then the number of components of program **2A-PROG1** has to be 21, the number of components of program **2A-PROG2** has to be 22 components. You can save the data base at any time.

In the next step you can allocate the memory spaces of the RDS coder.

4.2.4.3 Allocation of the memory space in the Generator

Once you have created the **0A-** group and the four **2A-** groups and have formed two programs, you can allocate the program site of the RDS signal generator **G_81300_C** now. Therefore you have to use tab **Edit Programs** as well.

For this example you need program slots 4 and 5. Should these slots already be allocated, delete them or overwrite the data with the new programs. If the data is of great importance and has to remain exactly on these program slots, proceed analogously with two alternative, free slots. For this example you need program slot 4 and 5.

To delete a slot click the mouse. Then activate button **Remove**. Afterwards this slot will be free. It is also possible to program an allocated slot directly, then the deletion will be carried out automatically by the coder.

- Now drag the first program 2A-PROG1 from the window on the right to the left one on slot 1 and operate in the same way with the second program. The result should look like the illustration below:

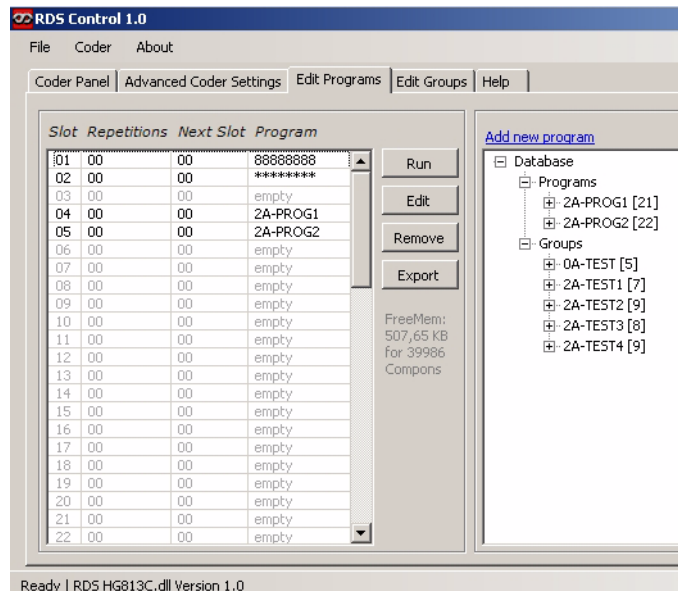
Figure 14 Screenshot: Edit program slots

The number of program repetitions is still 0 (infinite repetition).

- Mark slot 4 and activate button **EDIT**.
- Enter value 25 for Repetitions and for Next Slot value 5.
- Confirm with **OK**.

After 25 outputs of program 2A-PROG1 this input leads to an automatic change to slot 5.

- Now mark slot 5 and activate button **EDIT**.
- Enter value 25 for Repetitions and for Next Slot value 4.
- Now confirm the input with **OK**.



Now you have two linked program slots with two memorized programs.

Tip!

If you want to know the duration, e.g. of program 2A-PROG-1, move the mouse to the right window in this program. A so called tooltip with the specifications **Size: 21 Components, Time: 1,839 seconds** and "date created" and the time will be shown. If you multiply 1.839 seconds with the number of repetitions you will obtain the cycle duration of approx. 50 seconds of the saved program on slot 4.



4.2.4.4 Test Run

Now you have created groups of type 0A and 2A, one 0A and two 2A-groups each composed to one program and the program slots 4 and 5 of the RDS Signal Generator G_81300-C allocated with these RDS signals.

Now link one RDS radio to output **<HF - Out>** of the generator, turn on the radio and adjust frequency A of the generator. The frequency will be indicated on the display on the left side and is 87.5 MHz. Should this frequency already be allocated to one transmitter, change to the submenu **Enter Frequencies** of the menu **RDS Coder** and enter a frequency with low or no interferences on **frequency A**. Adjust the radio to this frequency.

To start the test run it is sufficient to call program slot 4 of the generator. Therefore three options are available: one applying the keypad of the generator and two using the program.

1. By clicking on the keys in the graphics of the generator (tab `Coder Panel`, see Figure 8 starting on page 21). The keys in the upper block on the left side have the same significance as the keys in block 6 on the front panel of the generator (see Table 6 starting on page 16). Thus only slots with powers of two can be selected. Should program slots be selected directly using the keys on the device it is recommended to allocate only slots with powers of two anyway. To choose the fourth program position you only have to click the third key from the right.
2. Using the selection menu in the left window of tab `Edit Programs`. Double clicking on the corresponding line in the window starts and stops the programs. In comparison to other options this one is advantageous as even complex combinations can be called easily. Example: To choose program position 15 you had to press keys with the signification 8,4,2 and 1 at the same time. If you use the mouse this is impossible.
3. Using the button on the RDS Service Generator directly. Press the key with signification 4 in block 6 of the front panel (see Table 6 starting on page 16). The corresponding program slot will be called. This option is primarily valid for numbers with the power of two. For combinations you have to press the keys with the corresponding significations simultaneously. For a more complex combination the second option is preferable anyway.

Once you have called program slot 4 using one of the three options, the LED on the third key from the right in block 6 of the front panel will shine. This will be indicated by a red field on the corresponding key of the graphics. If not, press function key `F5`. This adjusts the program display to the current status of the device.

On the display of the connected RDS Radio the text "Radio ?? " will be shown. Then one of the first radiotext lines of the first RDS programs will be displayed alternately. It will be changed to program slot 5. The LEDs on the very right key and on the third key from the right ($4 + 1 = 5$) are lit. On the display the text "Radio" will be shown again but now one of the two radio text lines of the second RDS program will be displayed alternately. The first test run is finished now and you will automatically return to program slot 4. This loop runs as long as one key of the RDS coder will be pressed (either at the device, on the monitor or on the keyboard of the controller).

Abstract

You are now able to generate RDS groups, to create programs from the groups, to allocate the program slots of your RDS signal generator and to carry out test runs. In this chapter you should have learned how simple it is to operate program RDS `Control` and that its functions are basically self explanatory.

Should there be any questions use the reference part of this documentation. A short explanation of the file functions will be shown by calling on the tab `Help`.

4.2.5 Reference Part

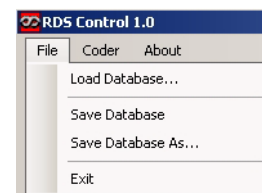
This reference part will address the single menus and files (see above) and explains each item shortly. In this section the structure corresponds to the classification of the items in the program. It is more a reference book than a manual. To understand the structure of the program and its operation better, we refer to section “ A complete Test run” (see 4.2.4 on page 21)

4.2.5.1 The Menues and their Functions

4.2.5.1.1 Menu “File“

Figure 15 Screenshot: The File Menu

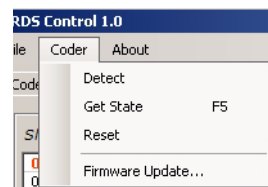
This menu saves and loads all RDS program data banks in an XML- format. RDS Control Program can be left with **Exit**.



4.2.5.1.2 Menu “Coder“

Figure 16 Screenshot: The Coder Menu

Under this item some operating instructions in connection with the RDS coder will be realized:



- “Detect“
If a coder was reconnected to the PC after the program start of RDS Control it has to be recognized by the user software. Activating Detect all COM ports available will be checked until a coder is detected. The detected COM port will be displayed in the status bar. If a coder was reconnected to the PC after the program start of RDS Control it has to be recognized by the user software. Activating Detect all COM ports available will be checked until a coder is detected. The detected COM port will be displayed in the status bar.
- “Get State“ (F5)
This function key F5 synchronizes the display of the operating program with the coder. If e.g. a key is operated at the coder the display of the coder and the user program are no longer consistent with one another, as the coder sends no status signal to the user program. Activating function key F5 the synchronization can be operated at any time.
- “Reset“
A Reset command will be send to the coder. The coder deletes all RDS programs saved up to now and is now in the initial state again. This is the same state like pressing the keys **FREQ A** and **FREQ B** simultaneously.
- “Firmware Update“
If a new firmware is available this menu item enables the update of the firmware in the RDS Coder. Having selected this item the corresponding file has to be indicated. After termination a progress bar will be displayed.

ATTENTION! It is important that the supply voltage will not be interrupted from now on as this could lead to a deletion of the firmware. If this happens the device has to be opened - only when deactivated before (**disconnect power plug!**) - and the program jumper has to be plugged. Then switch off the device for normal operation (**disconnect power plug!**) and remove the program jumper.




- Once the update is terminated a message will be displayed. Then the coder has to be switched off and switched on again and the message has to be confirmed. The new version number can be seen in the status bar down right.

4.2.5.2 The Tabs

4.2.5.2.1 “Coder Panel“

Here the front panel of the device is shown (see Figure 8 on page 21). All elements that can be adjusted directly on the device can be activated by mouse clicks. Additionally the range (A-F) of the ARI range identification can be changed. The knobs can either be operated by value input in the fields within the scale or by dragging the pitch line with the mouse.

If settings were made directly on the device, the display of the user software can be updated by activating  key.

4.2.5.2.2 “Advanced Coder Settings“

Here it is possible to change coder adjustments which are not directly accessible on the front panel. These are:

- The VH frequencies allocated to the keys FreqA and Freq B. They can be entered by using the two left sliding controllers or by clicking the corresponding numerical fields in the range from 87.5 to 108.0 MHz. The frequency currently generated can be seen from the numerical value displayed in yellow. The frequencies on this tab can be switched by clicking button *<Freq A>* or *<Freq B>*.
- The four audio frequencies of the internal tone generators ST1L, ST1R, ST2L and ST2R. They can be entered applying the four right sliding controllers or by clicking the corresponding numerical fields in the range from 30 to 15000 Hz. The currently generated frequencies can be taken from the numerical values in yellow. By clicking on the four buttons the generators can be switched on/off.
- Furthermore it is possible to switch on/off the 19 kHz pilot tone and the stereo coder (switch MPX).

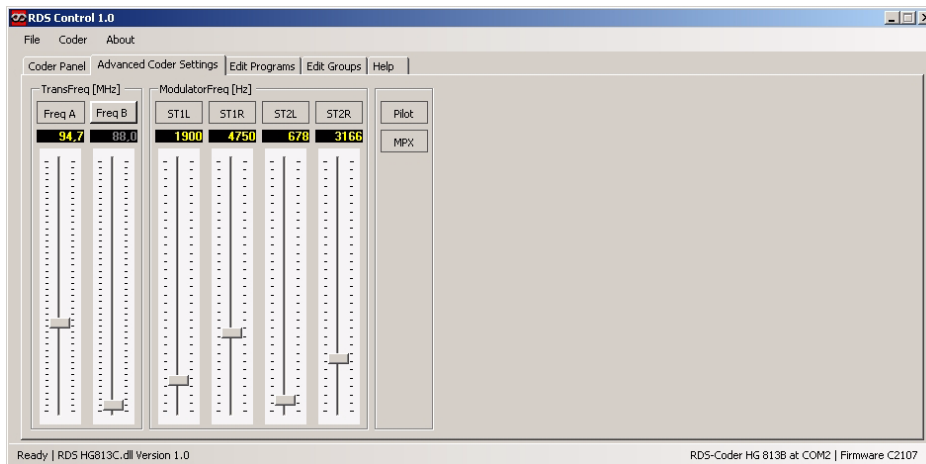


Figure 17 Screenshot: Advanced Codex Settings

4.2.5.2.3 “Edit Programs”

On this tab the RDS groups and their components will be combined to form RDS programs. These RDS programs can be programmed on the required program slot in the RDS coder.

Below this tab there are 2 tables: The left one shows the allocation of the program memories in the coder, the right one indicates the RDS programs and groups available in the loaded data base.

Specification of the (left) Codex allocation Table

One line in this table is assigned to each of the 63 possible program memories in the coder. Beyond each line of the table gives information on

- The memory location number
- The number of program repetitions located on this site, whereas the number 0 means infinite repetitions. The corresponding program will be running until another program will be started.
- The memory location number of a potential successor program, if the number of the repetitions is finite. 0 signifies for the termination of the output.
- The name of the program consisting of a maximum of 8 printable ASCII characters. The input empty means that the memory location is not allocated.

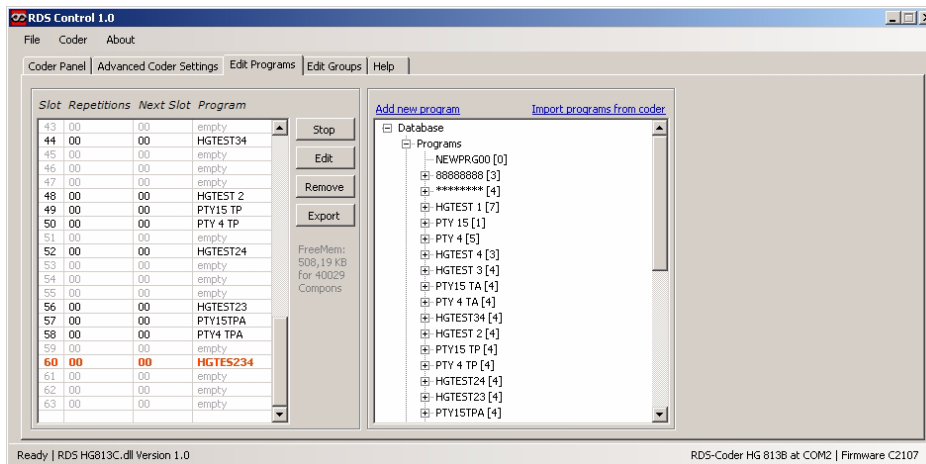


Figure 18 Screenshot: Edit Programs

Programs will be started either by double-clicking on the required not empty line or by activating the switch **Run**. The line of the program currently running will be displayed in red. The ongoing program will be stopped by either double-clicking on the red line, a double-click on another program (which will then be started immediately) or by activating the new switch **STOP**.

The following characteristic of a program stored in the coder can be changed by activating switch **EDIT**.

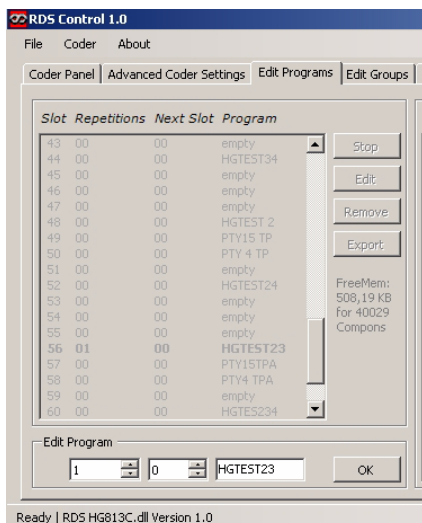


Figure 19 Screenshot: Edit Programs

- in the left field the number of repetitions described above
- in the middle field the next program activated after termination
- the name of the program

After affirmation with **OK** the altered program will be saved on the corresponding program slot. A program can be deleted by marking it with a single click and activating switch **REMOVE** afterwards.

Another function is the export of all programs available in the coder. For each program available a so called command file (*.KMD) named slot01.kmd up to slot 63.kmd will be generated. Having activated the switch `EXPORT` one will be asked for the directory where the files could be saved.

It is either possible to transmit the command files through a serial interface to another coder in order to program this coder with the corresponding programs or to save those files on a SD card. With inserting this SD card into the reader of another coder, all RDS programs on this card available will be copied to this coder. **If there are already any programs on these program slots, the programs will be overwritten.**

Specification of the (right) Program Data Base

The intention of this window is to compile RDS groups to a program in such a way that reasonable RDS test programs will be created.

All contents of the right window are part of the loaded XML-data base. . Here are the RDS programs and groups as described in section 4.2.2 "General Program Concept" on page 19.

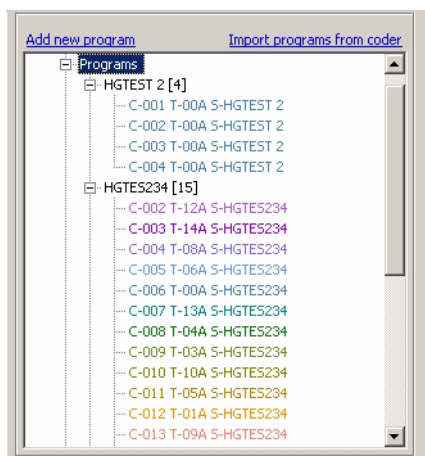




Figure 20 Screenshot: Program components

Under data entry `Programs` the components of a RDS program can be accessed. The number in brackets behind the program name indicates the number of components included. The components will be displayed by clicking on the  symbol. The components have a consecutive number (C-001, C-002...) a type (T-00A....T-15B) and thname of the primary group they were generated from (S- HGTEST 2).

Furthermore they will be color- marked according to their type. Within the program tree the components can be dragged in any order within the same program or to another one. Using the /DEL key deletes a selceted program or a selected component within a program.

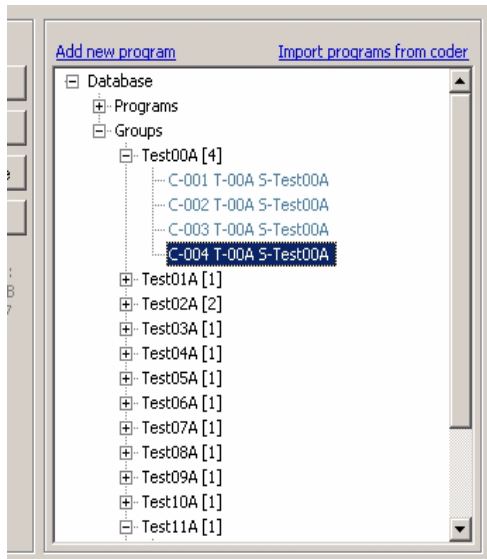



Figure 21 Screenshot: Group components

Under the databank entry `Groups` the different components of the defined group can be accessed. The number in square brackets behind the group name indicates the number of components included. Clicking the  symbol displays the components. The components have a consecutive number (C-001, C-002...), a type (T-00A...T15B) and the name of the group. Beyond they will be colour marked according to their type. Within the program tree the components can be dragged in any order within the same program or to another one. It is not possible to delete the groups and components of the data base entry `Groups` in this window.

As a further function an initially empty program with `Add new program` can be generated. First enter a name. Then it is possible to allocate any components already defined.

All programs available in the coder can also be loaded into the section `Program` of the data base by applying `Import programs from coder`. Here programs of the same name will be overwritten after confirming a warning message.

4.2.5.2.4 “Edit Groups“

On this tab RDS groups are generated, deleted and modified. The groups displayed in this window are the same displayed in tab `Edit Programs` under the data base section `Groups`.

After having activated switch `EDIT` one more window in this tab will be opened. Here group specific entries according to the RDS norm can be made. The picture below illustrates the most extensive group 14A as an example. For a better understanding of the entries please have a look at the corresponding sections of RDS standards. For each group as many components as necessary for a complete clustering of the group will be generated.

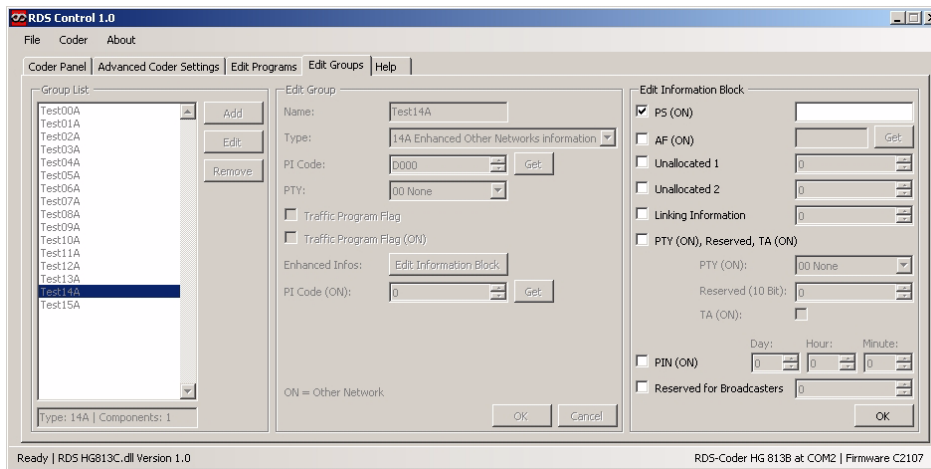


Figure 22 Screenshot: Edit Groups

5 Block Diagram of the RDS Signal Generator

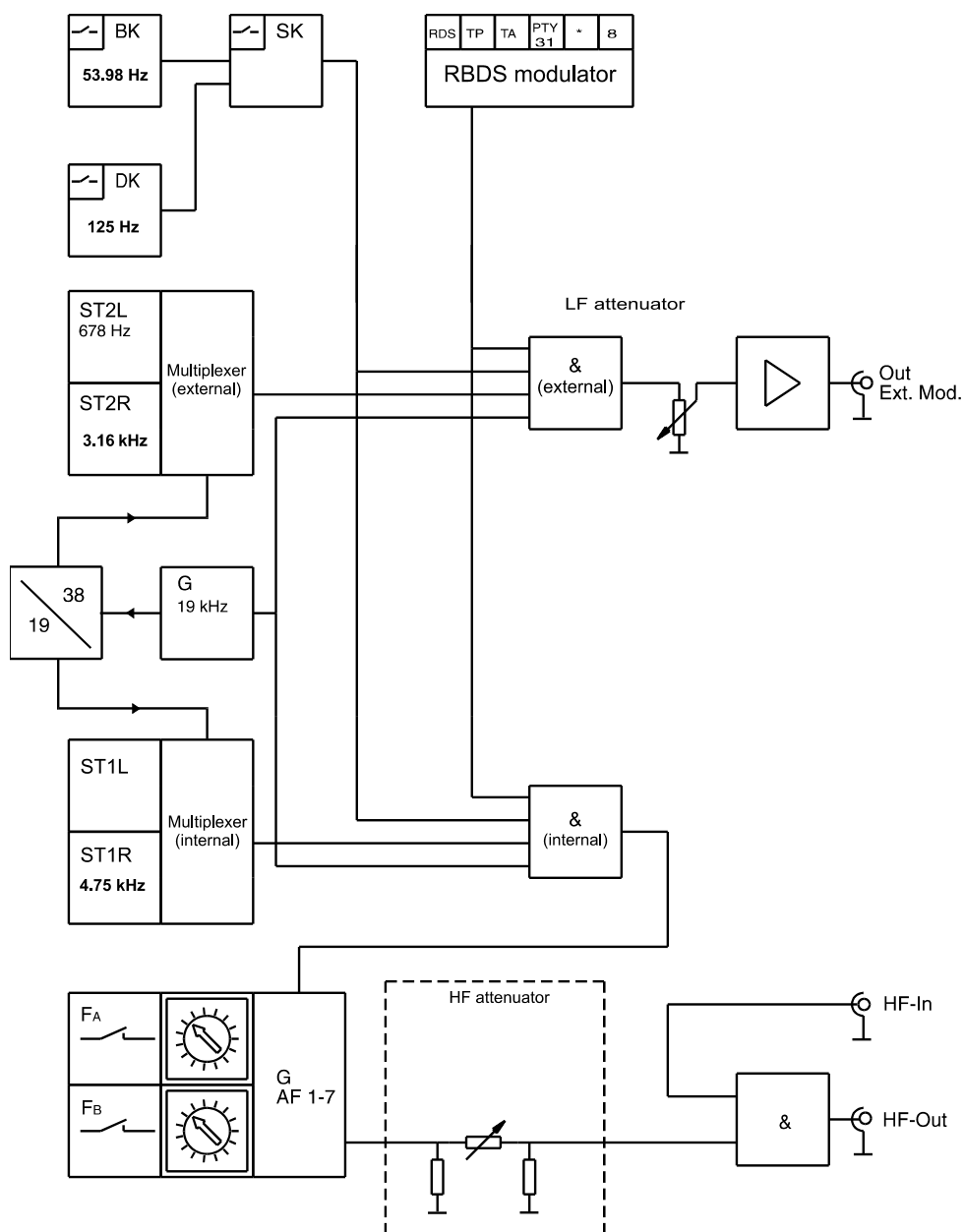


Figure 23 Block diagram of the RDS generator

6 Specifications / Waste Disposal

6.1 Technical Specifications

Value	Description
Operating voltage	100 - 240 V AC, 50/60 Hz, 10 W
Dimensions	270 mm x 300 mm x 120 mm (L x W x H)
Weight	approx. 2800 g
Protection classification	IP 41
Storage temperature	-20° C to 70° C
Operating temperature	0° C to 50° C
Air humidity	up to 80% (not condensing)
SD Card	
Format	FAT16 or FAT32
Capacity	Up to 2 GB have successfully been tested; standard cards with more capacity should work as well but cannot be guaranteed to be usable within the device
Back-up battery	
Type	Lithium Coin Battery CR2032
Transmission Carrier Frequencies	
Pre-sets	88.0 / 91.3 / 94.7 / 101.3 / 104.7 / 107.9 MHz
Programmable with PC	87.6 to 107.9 MHz in 0.1 MHz steps
HF Output Level	
Internal generator	1 µV to 3 mV or 0 dBµV to 70 dBµV or -107 dBm to -37 dBm
External generator	10 dB throughput damping
Internal resistance	50 ohm
Internal Modulated Signal	
Multiplexer signal (left channel)	1.90 kHz (adjustable)
Multiplexer signal (right channel)	4.75 kHz (adjustable)

Table 8 Technical specifications of the RDS generator (part 1 of 2)

Value	Description
Pilot tone 19 kHz	6.75 kHz frequency modulation
Information carrier	unmodulated, 3.20 kHz frequency modulation
Traffic Announcement Identification	125 Hz, 30% AM
Traffic Area Identification	60% AM (range A to F adjustable)
RDS signal	1.20; 2.00; 4.50 kHz frequency modulation
External Modulated Signal (differing values)	
Multiplexer signal (left channel)	0.678 kHz (adjustable)
Multiplexer signal (right channel)	3.16 kHz (adjustable)
RDS Functions	
TP	Traffic Program
TA	Traffic Announcement
PTY	4, 15 and 31 Program Types
PS	Program Service Name
AF	Alternative Frequency List
EON	Other Networks. A second RDS signal generator is recommended here
DI	Decoder Information
M/S	Music/voice identification

Table 8 Technical specifications of the RDS generator (part 2 of 2)

6.2 Notes for Disposal

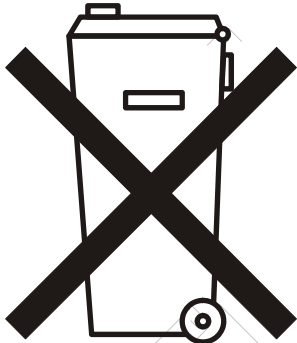
	<p>Electronic waste has to be disposed according to national directives</p>
---	--

Table 9 Notes for Disposal

7 Ordering Information

7.1 Ordering Codes

Ordering code / Option	Device
G_81300-C	RDS Signal Generator
Optional : Wire set	<ul style="list-style-type: none"> • 1 m cable with BNC connector / BNC connector • 1 m cable with BNC connector / 2 x 4 bunch pin plugs • 1 m cable with BNC connector / HF 4/13 plug • 0.1 m cable with BNC connector / HF 4/13 plug • HF 4/13 coupler (socket / socket) • patch plug HF 4/13 (DIN 47283), cable RG58 (50 ohm)

Table 10 Ordering codes for RDS generator

7.2 Information Source

All RDS functions mentioned in this documentation have been implemented on the basis of the following DIN standard:

DIN EN 50 067 Spezifikation des Radio-Daten-Systems (RDS)
Deutsche Fassung EN 50 067 : 1990
Oktober 1991

respective

IEC 62106 Specification of the Radio Data System (RDS)
First edition 2000-01

8 Tabulated Appendix

A Conventional Operation

The following tables give an insight into the construction of each individual level of operation. The PI code is D322h in the EON level and DB21h at all other times.

A.1 Table for Operating Levels 0 and 1

Push-Button(s)	PS	Type	TP	TA	M/S	DI	PTY	Level
8.	88888888.	0A	0	0	1	0	0	0
*	*****	0A	0	0	0	0	0	
RDS	HGTEST 1	0A	0	0	1	1	0	1
RDS + TP	HGTEST 2	0A	1	0	1	1	0	
RDS + TA	HGTEST 3	0A	0	1	1	1	0	
RDS + TP + TA	HGTEST23	0A	1	1	1	1	0	
RDS + PTY31	HGTEST 4	0A	0	0	1	1	31	
RDS + PTY31 + TP	HGTEST24	0A	1	0	1	1	31	
RDS + PTY31 + TA	HGTEST34	0A	0	1	1	1	31	
RDS + PTY31 + TP + TA	HGTES234	0A	1	1	1	1	31	
RDS + *	PTY 4	0A	0	0	0	1	4	
RDS + * + TP	PTY 4 TP	0A	1	0	0	1	4	
RDS + * + TA	PTY 4 TA	0A	0	1	0	1	4	
RDS + * + TP + TA	PTY4 TPA	0A	1	1	0	1	4	
RDS + 8	PTY 15	0A	0	0	1	1	15	
RDS + 8 + TP	PTY15 TP	0A	1	0	1	1	15	
RDS + 8 + TA	PTY15 TA	0A	0	1	1	1	15	
RDS + 8 + TP + TA	PTY15TPA	0A	1	1	1	1	15	

Table 11 Construction of the operating levels 0 and 1

A.2 Tables for Operating Level 2 (EON)

In this level, the RDS LED blinks. In this state the button <TP> is closed off, since the corresponding program slot is started automatically. The following two telegrams are transmitted alternately:

The first telegram consists of eight blocks, each with four bit groups of type 0A.

Push-button	PS	Type	TP	TA	M/S	DI	PTY	Sequence
RDS'	EON 1	0A	0	1	1	1	0	8

Table 12 Telegram 1 of the 2. level

The second telegram consists of nine bit groups of type 14A each with one variant 0 to 3 (PS(ON)), four variants 4 (AF(ON)) and one variant 13 (PTY(ON)).

Push-Buttons	PS(ON)	Type	TP(TN)	TP(ON)	PTY(TN)	PTY(ON)	Sequence
RDS' + TP	HGTEST 2	14A	0	1	0	0	1

Table 13 Telegram 2 of the 2. level

The following programs generate the EON jump. A bit group of type 14B is output eight times and then jumped back to the calling program. In this level, every combination with the buttons <RDS> and <TA> switches the same EON traffic information announcement.

Push-Buttons	Type	TP(TN)	TP(ON)	TA(ON)	PI(ON)	PTY	Sequence
RDS' + TA + xxx	14B	0	1	1	DB21	0	8

Table 14 Programs for generation of the EON jump

The following programs are transmitted until the appropriate button is pushed again. They deliver varying PTYs (ON).

Push-Buttons	Type	TP(TN)	TP(ON)	PI(ON)	PTY(TN)	PTY(ON)
RDS' + PTY31	14A	0	1	DB21	0	31
RDS' + PTY31 + TP	14A	0	1	DB21	0	31
RDS' + *	14A	0	1	DB21	0	4
RDS' + * + TP	14A	0	1	DB21	0	4
RDS' + 8	14A	0	1	DB21	0	15
RDS' + 8 + TP	14A	0	1	DB21	0	15

Table 15 Programs for repeated transmission with varying PTYs

As alternative frequencies in every group (except 14B) seven frequencies are coded: 88.0 MHz (05h), 91.3 MHz (26h), 94.7 MHz (48h), 98.0 MHz (69h), 101.3 MHz (8Ah), 104.7 MHz (ACh) and 107.9 MHz (CCh). Method A is used with the header E7h.

B PC Operation

The following diagrams illustrate the control syntax of the RDS Coder HG81300B-PC (precursor) and G_81300-C. Modifications and amendments for the current version G_81300-C are highlighted as follows: In the following section C on page 85 the keywords used in the diagrams will be explained .

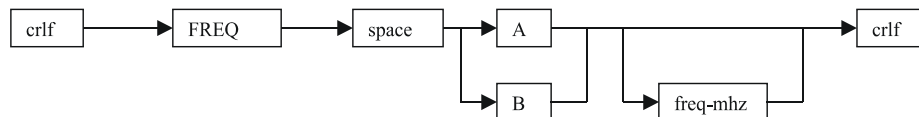


Figure 24 Controlsyntax diagram: Adjust Frequency

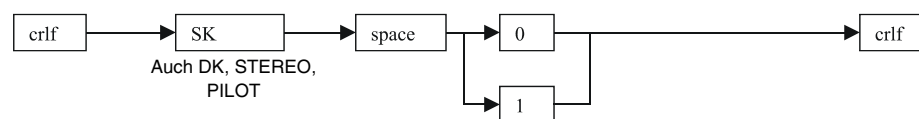


Figure 25 Controlsyntax diagram: Switch

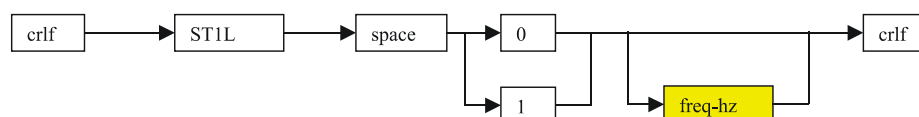


Figure 26 Controlsyntax diagram: Generators

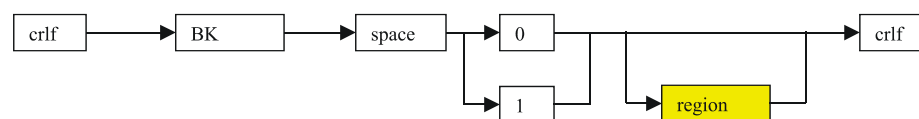


Figure 27 Controlsyntax diagram: Range identification



Figure 28 Controlsyntax diagram: LF level



Figure 29 Controlsyntax diagram: HF level

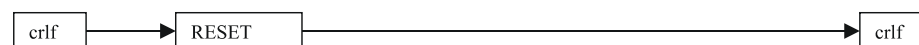


Figure 30 Controlsyntax diagram: Reset

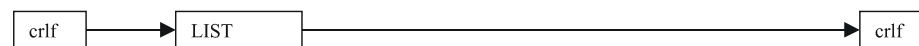


Figure 31 Controlsyntax diagram: Output program listing

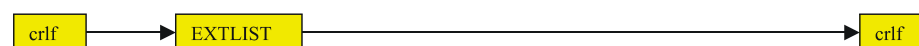


Figure 32 Controlsyntax diagram: Output extended program listing

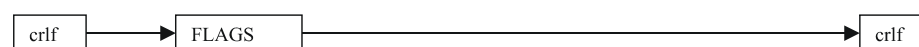


Figure 33 Controlsyntax diagram: Output status

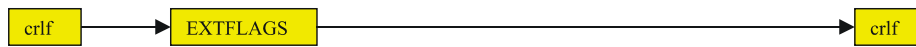


Figure 34 Controlsyntax diagram: Output extended status

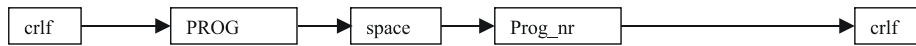


Figure 35 Controlsyntax diagram: Switch program

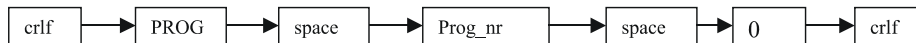


Figure 36 Controlsyntax diagram: Delete program

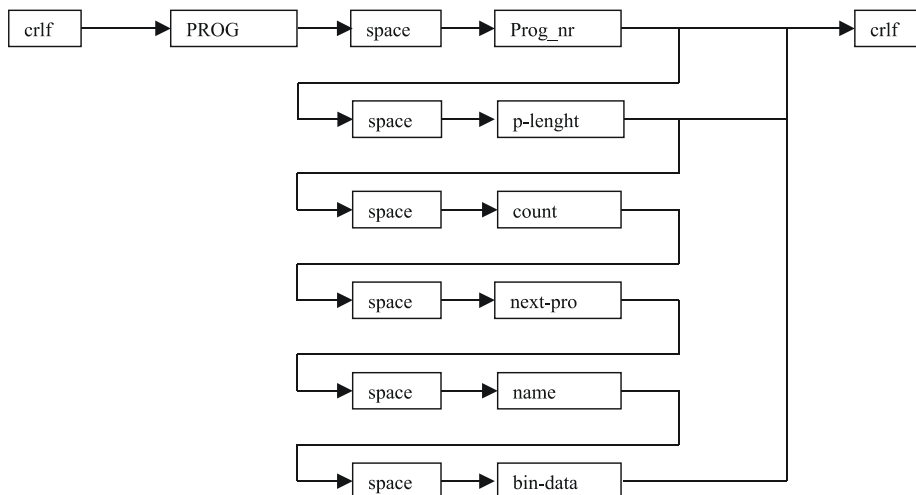


Figure 37 Controlsyntax diagram: Rewrite program

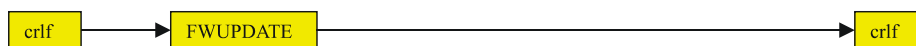


Figure 38 Controlsyntax diagram: Flash Firmware



Figure 39 Controlsyntax diagram: Output Program contact (binary data)

C Explanation of Keywords

Capitalized letters and digits are ASCII characters, *space* is the character 20h, and *cr_lf* are the ASCII characters 0Dh and 0Ah. Applying <crLf> will lead to a wordwrap.

NOTE!

Missing parameter input does not lead to a 'crash' of the RDS generator, since it has a time-out function and such input will be ignored following the time out period.



Keyword		Explanation
FREQ		Select frequency A or B or define another value for frequency A or B
	Parameters	freq_mhz has a format of nnn.n and a range of 87.5 to 108.0
SK, DK		ARI functions.
BK		ARI Range Identification
	Parameters	Input of ARI Range Identification. Identifications A, B, C, D, E or F are valid.
PILOT and STEREO		Stereo functions
ST1L, ST1R, ST2L, ST2R		Modulation signal generators
	Parameters	Frequencies of the tone generators in Hz. A range between 30 (Hz) up to 15000 (Hz) can be entered
LFLEVEL		Adjustment of LF level
	Parameters	% = Percentage of LF level relating to 10V. The range is 0...1000
RFLEVEL		Adjustment of the HF level
	Parameters	Level of the calibrated HF output in the range between 0.....70.
RESET		All programming in the device is erased. The G_81300-C is set back to original state

Table 16 Explanation of the keywords (part 1 of 4)

Keyword	Explanation
LIST	<p>A list of all reserved program slots is output, each line of the form:</p> <ul style="list-style-type: none"> - number of the program slot, name, number of the next program slot, number of repetitions and program length in bytes. <p>At the very end follows the free memory of the device in bytes.</p>
Output	<p>The answer to the command LIST will be indicated as follows:</p> <pre> 1 88888888 0 0 52 2 ***** 0 0 52 32 HGTEST_1 0 0 52 33 PTY_15__ 0 0 52 34 PTY_4___ 0 0 52 36 HGTEST_4 0 0 52 40 HGTEST_3 0 0 52 41 PTY15_TA 0 0 52 42 PTY_4_TA 0 0 52 44 HGTEST34 0 0 52 48 HGTEST_2 0 0 52 49 PTY15_TP 0 0 52 50 PTY_4_TP 0 0 52 52 HGTEST24 0 0 52 56 HGTEST23 0 0 52 57 PTY15TPA 0 0 52 58 PTY4_TPA 0 0 52 60 HGTES234 0 0 52 0 (aus) FREE=65535 </pre> <p>Here the number of free memory locations is limited to a 16 Bit int, i.e. as long as the number is higher than 65535, 65535 will be output.</p>
EXTLIST	<p>Extended output of the program allocation. As distinguished from LIST the number of free bytes will be output as a 32-Bit-long- variable.</p>
Output	<p>The answer to the command EXTLIST will be stated as follows:</p> <pre> 1 88888888 0 0 52 2 ***** 0 0 52 32 HGTEST_1 0 0 52 33 PTY_15__ 0 0 52 34 PTY_4___ 0 0 52 36 HGTEST_4 0 0 52 40 HGTEST_3 0 0 52 41 PTY15_TA 0 0 52 42 PTY_4_TA 0 0 52 44 HGTEST34 0 0 52 48 HGTEST_2 0 0 52 49 PTY15_TP 0 0 52 50 PTY_4_TP 0 0 52 52 HGTEST24 0 0 52 56 HGTEST23 0 0 52 57 PTY15TPA 0 0 52 58 PTY4_TPA 0 0 52 60 HGTES234 0 0 52 0 (aus) FREE=520385 </pre> <p>Here the free memory locations will be output as long.</p>

Table 16 Explanation of the keywords (part 2 of 4)

Keyword	Explanation
FLAGS	The state of the diverse switches and the generators and the reserved frequencies, followed by the number of the firmware version.
Output	This is the answer to command FLAGS: SK=0 DK=0 BK=0 ST1L=1 ST1R=1 ST2L=1 ST2R=1 STEREO=1 PILOT=1 FA=1 FB=0 PROG=0 VER=A1100 FA=1079 FB=1079
EXTFLAGS	Extended output of status. Additionally to the FLAGS the frequencies of the tone generators, the ranges of BK and the levels of the LF / HF potentiometer will be output.
Output	The answer to the command EXTFLAGS will be as follows: SK=0 DK=0 BK=0 A ST1L=1 1900 ST1R=1 4750 ST2L=1 678 ST2R=1 3116 STEREO=1 PILOT=1 FA=1 FB=0 PROG=0 VER=C2101 FA=1079 FB=1079 LFPOT=50 RFPOT=70 Additionally to the status of the BK switch the ARI- range (A) as well as the 4 tone frequencies of the LF generators in HZ will be output. Furthermore the level of the LF potentiometer (in %) and the adjusted HF level in dBµV will be shown.
PROG	Selection of one of 63 program slots if no further parameters follow. If further parameters do follow, reservation of a certain program slot with an RDS program. With the RDS coder, six program buttons are available, allowing up to 63 combinations (slots). Program slot 1 is selected by pressing the very right button, slot 2 the second from the right, slot 4 the third from the right, slot 8 the third from the left, slot 16 the second from the left and slot 32 the very left (binary coding). Program slot 0 (no button pressed) produces no RDS signal.
b_length	In case further parameters are entered it is the length of the program in bytes (e.g. one component consisting of 104 bits has a length of $104 / 8 = 13$). If the length is zero the selected program slot is deleted.
counter	Only useful in conjunction with next_pro. It instructs how many times the program should be run before continuing to the next program slot.
next_pro	Specifies the program slot to be executed after this one. If next_pro is not reserved with a program, RDS output will cease.
name	Up to eight characters can be allocated to the program as name. Upon command LIST is being called, this name is given out in conjunction with the program slot number.
bin_data	Is a sequence of hexadecimal digits ('0'...'9' and 'a'...'f' or 'A'...'F'). Program data whose length was given by b_length. Every four bits are grouped to a hexadecimal digit.

Table 16 Explanation of the keywords (part 3 of 4)

Keyword	Explanation
FWUPDATE	Flash Firmware: After input of this command a processor boot will be simulated. (The firmware is not deleted yet)
GETPROG	Output of program content: Extended output of programs and their data.
Output	<p>The answer to the command GETPROG1 will be indicated as follows (example with internal data record):</p> <pre>52<crLf> db2109000229be70529ce0e032db210900027222648cece0e032 (no space here) db210900029e9698aee8e0e032db21090002c50accca78e0e032<crLf></pre> <p>At first the amount of received bytes will be shown, afterwards the data itself follows.</p>

Table 16 Explanation of the keywords (part 4 of 4)

D Position of back-up battery and jumper on circuit board

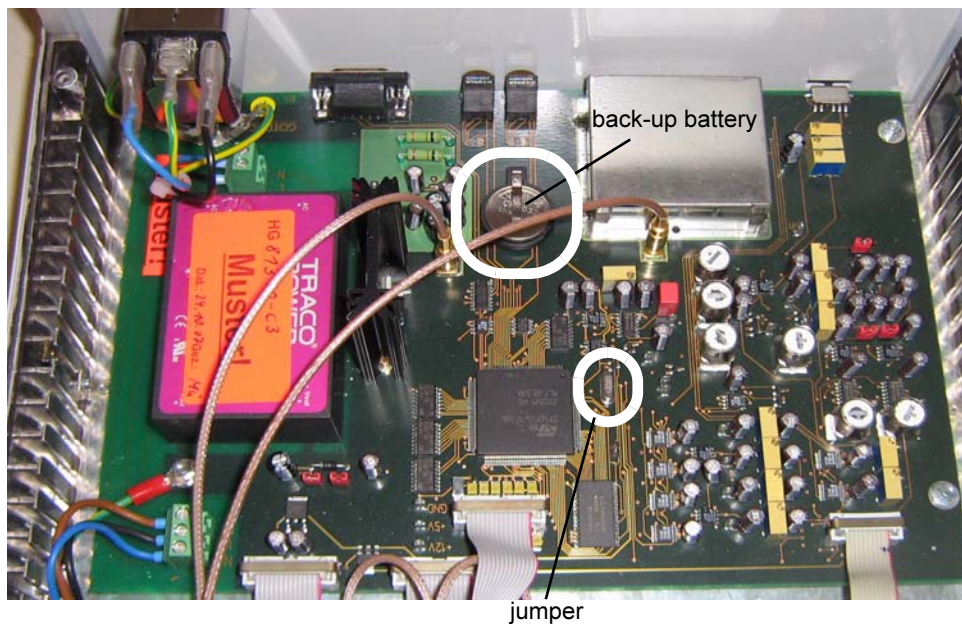


Figure 40 Circuit board with jumper and back-up battery

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