RDS Signal Generator

For the servicing and testing of all currently used RDS functions, including sensitivity, traffic information carrier switching, as well as ARI and stereo functions

HG 813B-PC

GÖTTING

Contents

GÖTTING

GÖTTING

1   Introduction

1.1   Exclusion of Liability

Any information given printed needs to be confirmed in writing in order to be legally binding. Therefore, the given data is solely to be understood as product description and not as guaranteed features.

This instruction manual has been drawn up to the best of our knowledge. We guarantee, that the included parts left our factory in perfect condition. Operation of the device will be on the customer's own risk. Liability for consequential defects is excluded. We reserve the right for changes, that encourage technical improvements. We also reserve the right to change the contents of this manual without having to give notice to any third party.

1.2   Copyright

This manual is protected by copyright. We therefore reserve the rights for translation, copying, oral publication, taking out pictures and tables, radio transmission, microfilming, and any kind of copying and/or saving on data processing systems, even if only done partially.

Copying this manual or parts of this manual in its respectively current version, is restricted within the limits of the Legal Regulations for the Copyright in the Federal Republic of Germany of Sep.9, 1965. Its is always subject to compensation. Violations are subject to penal legislation of the Copyright.

1.3   Delivered Parts

- RDS signal generator HG 813B-PC

- PC software 'RDS control' on 3.5" disk

- 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

GÖTTING

1.4   Introduction

The RDS signal generator HG 813B-PC enables to check easily all functions normally provided by a modern radio. This includes:

- RF receiver's sensitivity

- Traffic information and carrier switching

- ARI functions

- Stereo function

- all currently important RDS functions (e.g. TP, TA, PTY, PS, AF, DI and M/S), please also refer to chapter 5 „Technical Specifications" on page 56

- The PC software 'RDS-Control' enables to generate any RDS signal. 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 conventional version without PC control distinguishes itself by means of a particularly simple servicing technique as described on the next few pages (chapter 2).

Furthermore, there is the even simpler and more comprehensive usage of the RDS signal generator HG 813B-PC through a PC with the help of supplied software 'RDS-Control', the operation of which is described in chapter 3 beginning on page 15. All that is required is to connect 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.

You are now free to select the working frequency out of a range from 87,6 MHz to 107,9 MHz (in steps of 0,1 MHz). In addition, it is possible to create any RDS program, work with the programs saved in the generator, delete or overwrite them.

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

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

2   Conventional Operation

2.1   Description of Operating Elements

To illustrate the operating elements, each one is explained in succession below.
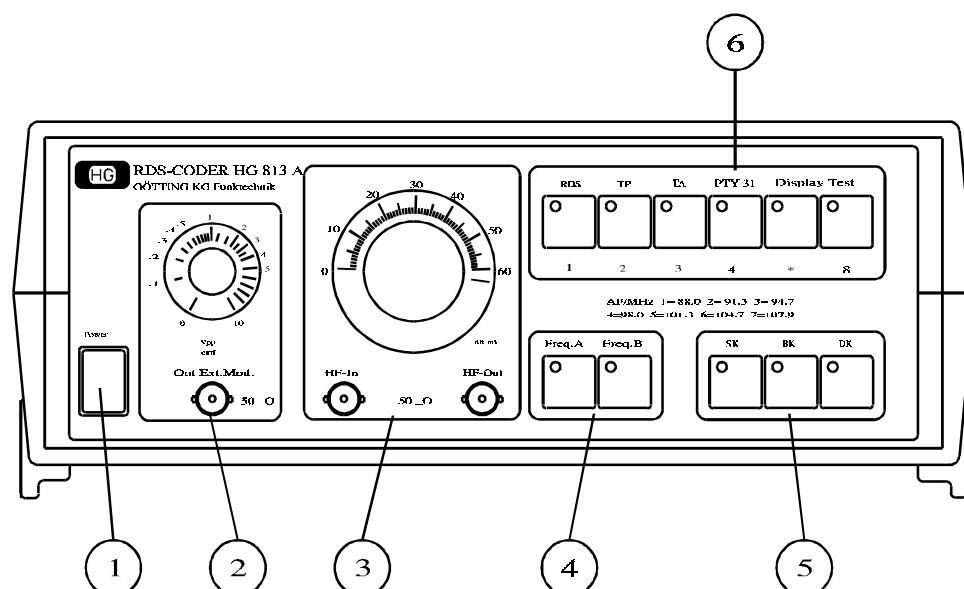
Drawing 1   Front panel blocks of functions

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 push-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 push-buttons serve to test ARI functions.
Block 6	These push-buttons serve to test RDS functions.

Table 1   Description of the front panel's blocks of functions
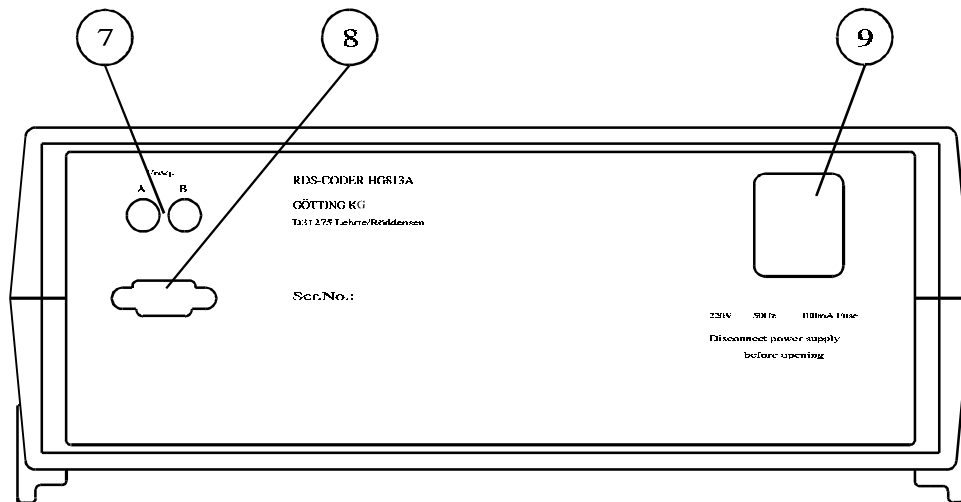
Drawing 2   Blocks of functions on the rear side

There are three additional blocks of functions on the rear side:

Block	Function
Block 7	Rotating switch designed to select both working frequencies out of seven available frequencies. This will allocate the two working frequencies to the front panel push-buttons described in Block 4.
Block 8	PC interface (serial)
Block 9	Mains connection with fuse holder

Table 2   Description of blocks of functions on the rear side

2.2   Functions of the RDS Signal Generator

2.2.1   Frequency Selection

For testing a radio's functions, 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

Selection of the two working frequencies should be done, when first setting the device into operation, in order to avoid interferences during the function tests through scattering of strong local transmitters. 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 the unwanted signal. Then program these frequencies for the function keys *<Freq.A>* and *<Freq.B>* using the code switches at the rear side of the device.

GÖTTING

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 recognise the used frequency, seven caps, referring to the seven available frequencies, are enclosed. These can be used for replacing the built-in caps. For doing so, insert a screw driver between the LED and the cap and take off the cap.

2.2.2   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 60 dBµV. In case an external HF signal is fed in, it will appear at the HF output attenuated by 10 dB.

2.2.3   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 2.1 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 Identification	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

2.2.4 Testing of RDS Functions

To control the RDS function test, the push buttons in Block 6 are utilised (refer to chapter 2.1 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, utilize the *<RDS>* push-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 what functions are assigned to each of the push-buttons and what readouts are generated on the test radio when an individual push-button or a combination is pressed.

Push-button(s)	Function	Display	Function level
8.	display test	88888888	**0**
*	display test	********	RDS LED off
	RDS activated	HGTEST 1	
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	**1**
* + TP	PTY4, TP bit set	PTY4TP	RDS LED lit
* + 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 Push-buttons of the signal generator and their functions (Part 1 of 2)

Push-button(s)	Function	Display	Function level
	EON level activated	EON 1	
TA	EON jump activated (will be automatically reset)	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.	**2** RDS LED blinks
With all push-button combinations in this level, the display is not updated.			

Table 5   Push-buttons of the signal generator and their functions (Part 2 of 2)

2.3 Checklist for a Complete Test Run

2.3.1   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 in packaging).

2. Connect a loudspeaker to the radio in order to be able to monitor the LF (or perhaps even 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 dependent on the radio type utilised).

2.3.2   ARI Functions

1. A single press of the *<SK>* push-button activates the transmitter identification. The radio should display the recognition of this signal.

2. The traffic area identification is activated by a single press of the *<BK>* push-button. The recognition of the signal should be displayed by the tested device.

3. Pressing the *<DK>* push-button activates the announcement identification.

4. Pressing the *<SK>* push-button a second time will deactivate the ARI functions.

GÖTTING

2.3.3 Display Test

The display of the radio may be tested by using push-buttons *<*>* and *<8>* in Block 6 (also refer to section 2.1 starting on page 7). This is only possible in operation level 0 where the RDS LED is neither lit nor blinking. Pressing the push-button *<*>* should result in filling the entire display of the radio with stars. Pressing the push-button *<8>* should fill the entire display of the radio with '8'. This enables to detect any defective strokes on the display easily.

2.3.4 RDS Functions

Transmitter Switching

1. To test the RDS functions, an FM modulatable HF generator is needed.

2. By pressing the *<RDS>* push-button once, the RDS functions of the RDS signal generator are activated.

3. Use the HF potentiometer to adjust the maximum transmission level (turned 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 2.2.1 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, press the push-button *<RDS>* once, this will generate the operation level 1 of this group of push-buttons. The *<RDS>* push-button's LED will light constantly. The display will show the text 'HGTEST 1'.

2. Pressing the push-button *<TP>* (traffic program) will generate the transmission of the corresponding RDS code to the radio. The display will show the text 'HGTEST 2'.

GÖTTING

3. Pressing the push-button *<TA>* (traffic announcement) will generate the transmission of the corresponding RDS code and the display will show the text 'HGTEST 23'. Please take 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

   - Press push-button *<PTY31>* (it is used for displaying the emergency message (Alarm)). The display will read 'HGTEST 4'.

   - Press push-button *<*>* (it is used for testing the RDS level PTY4 with a reference to sports transmissions). The display will read 'PTY4'.

   - Press push-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 HG 813B-PC can now 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 employed.

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 such 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>* push-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 NF frequencies through left and right channels) and will jump back from the link up because no radio traffic announcement is recognised 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 pressing the *<RDS>* push-button of generator 2, the RDS level will be activated (RDS LED lit constantly). Then activate radio traffic announcement with the push-buttons *<TA>* + *<TP>*.

4. On generator 1 EON level is activated by pressing the *<RDS>* push-button twice (RDS LED blinking). The radio will then display the text 'EON 1'.

5. If now the push-button *<TA>* is pressed 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.

3   PC Operation

PC operation distinguishes itself by a particularly simple yet many faceted operating technique of the RDS signal generator HG 813B.PC. 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'.

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

This third chapter is subdivided into four parts

1.   basic operating elements and functional groups (analogous to sections 2.1 starting on page 7 and 2.2 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

To answer any questions which arise during the course of the program, it is recommended to use the online-help which can be called upon at any time by pressing [F1]. Use of the help is explained in section 3.4.6 "Help Menu" on page 54.

3.1 Altered Operating Elements

In contrast to conventional operation (as described in section 2.1 starting on page 7) the following operating elements of the RDS signal generator have altered functions:
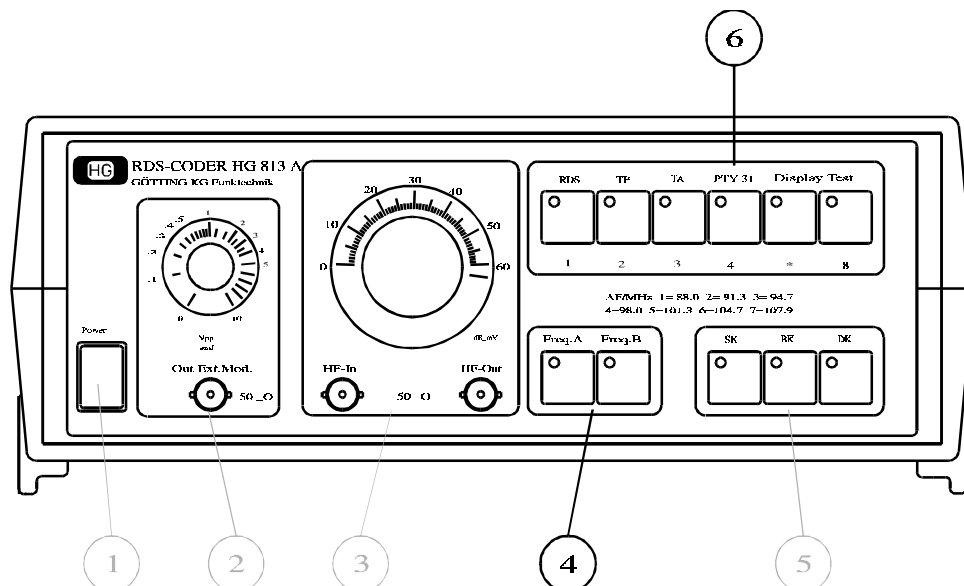
Drawing 3 Blocks of altered functions in PC operation

Block	Function
Block 4	Conventional mode of operation is retained by simultaneously pressing both push-buttons *<Freq. A>* and *<Freq. B>* while switching power on.
Block 6	Using these push-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: - push-button 8 -> 1 - push-button * -> 2 - push-button 4 (PTY 31) -> 4 - push-button 3 (TA) -> 8 - push-button 2 (TP) -> 16 - push-button 1 (RDS) -> 32 With the appropriate combination of buttons, any of the 63 program slots can be selected. For example: push-buttons 3 & 5 = 4 + 16 = program slot 20

Table 6 Meaning of altered function block in PC operation

     NOTE!   Before starting any adjustments you should read section 3.2 "Introduction to the PC Software RDS-Control" on page 17. This will give you 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 is described in sections 2.2.2 starting on page 9 and 2.2.3 starting on page 9.

The two working frequencies are no longer assigned by the rear set rotating switch to the push-buttons *<Freq. A>* and *<Freq. B>*, but directly controlled by the program RDS-Control from the menu RDS coder (also refer to section 3.4.2 starting on page 39).

3.2 Introduction to the PC Software RDS-Control

To be able to use the software requires a 286 PC with a 3.5" drive, MS-DOS (v 3.3 or higher) and a monochrome monitor. Admittedly for the program to offer full functionality a VGA monitor and a mouse are recommended. The program description refers to the program RDS-Control version 2.0.

3.2.1 Installing the Program

The program is installed from the supplied program disk. Place the disk in the 3.5" drive of the computer. Create a new sub directory on your hard disk to which the program will be installed.

DOS command: `MD C:\RDS_CTRL`

Copy all files and subdirectories from the program disk into the newly created directory.

DOS command: `XCOPY A:*.* C:\RDS_CTRL /S`

Should the drive have a different name than indicated above then exchange it with 'A' in the command above. Once all the files have been correctly copied, installation is complete and the program is ready to run.

3.2.2 Starting the Program

NOTE! The DOS character sets (Codepage) 437 or 850 should be active.

For correct displaying, it is essential, that the correct character set has been installed under DOS, either 437 or 850. If this is not the case, all characters larger than hex. 7F will be displayed as "\nn" (also compare section "Some further information about hexadecimal entrys" starting on page 25). For operation with RDS-Control, it is generally better to use code page 437. It is possible to check the used character set by entering the DOS command '`MODE CON`'. The following lines should be found in the file CONFIG.SYS:

- `COUNTRY = 049,437,C:\DOS\COUNTRY.SYS`

- `DEVICE  = C:\DOS\DISPLAY.SYS CON=(EGA,437,2)`

and in the file AUTOEXEC.BAT:

- `MODE CON CP PREP=((437 850) C:\DOS\EGA.CPI)`

- `NLSFUNC`

It is possible to switch between the two sets of characters via `MODE CON CP SEL=437` or `CHCP 437` and `MODE CON CP SEL=850` or `CHCP 850`.

If RDS-Control is operated under Microsoft® Windows®, it is important that the file SYSTEM.INI in the Windows directory in section `[boot.description]` includes the line `codepage=437`.

> **NOTE!** The program may also be operated under Windows 95®. Then, however, problems in the cooperation between PC and RDS coder may occur.

To start the program move into the directory of the hard disk in which the program files were installed:

DOS command: `CD C:\RDS_CTRL`

Once there, type in `RDS_CTRL` and confirm by pressing ⏎. When the program is run for the first time, a dialog box will appear asking for information on which interface the RDS signal generator is connected to. This input can be bypassed, if the program is started with the name of the interface. If the generator is connected to COM2 then the program could be started by entering:

DOS command: `RDS_CTRL /COM2`

This prevents the selection at the start.

It is also possible to start the program with the parameters `/8` or `/9`. The program stores the last used option. `/8` is the standard. This parameter provides a better presentation of the program structure in DOS. Only if you are encountered with problems while displaying the program structure (so far such a case is not known of for VGA display), you should start the program with the parameter `/9`.

You may also seek help while starting the program by entering `RDS_CTRL /?`.

3.2.3 General Program Concept

Before concerning oneself 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. It may be programmed to any of the 63 program slots of the RDS signal generator HG 813B-PC in coded form. Transference is done over a serial interface.

The data can be saved on disk and reloaded as well as printed. Conversion of the RDS data for use with special analysis software is also possible (refer to section 3.4.5 starting on page 53).

It is taken for granted, that at least the basic structure of the RDS data is understood. If no written documentation of the RDS norm has been available, the most important information of the data structure, in abbreviated form, can be found in the program's help index (press Alt F1 or F1, the most important appropriate topics being: *General*, *RDS General*, and *Group types*).

Most important: The RDS data is transmitted in the form of sequences of bit groups. Each group containing 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 bits + 10 bits) = 104 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 within the boundaries of DOS convention (maximum eight characters). The name can be used as file name when saving the group on disk. The extension used is that of the chosen group type, e.g. 'TEST_123.05A' for type 5A. Once a group is programmed into the RDS signal generator, its name will appear in the program slot list.

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 within the boundaries of DOS convention (maximum eight characters). The name can then be used as file name if the program is saved to disk. The extension would then be '.RDS'. Once a program has been programmed into the RDS signal generator its name will appear in the program slot list.

RDS-Control always holds one RDS group and one RDS program in memory. These are said to be the **topical group** and the **topical program**.

These may be edited, saved, reloaded or printed. Its components are coded and transmitted to the RDS signal generator, in which they are assigned to a program slot. From there the corresponding RDS program may be called upon at any time.
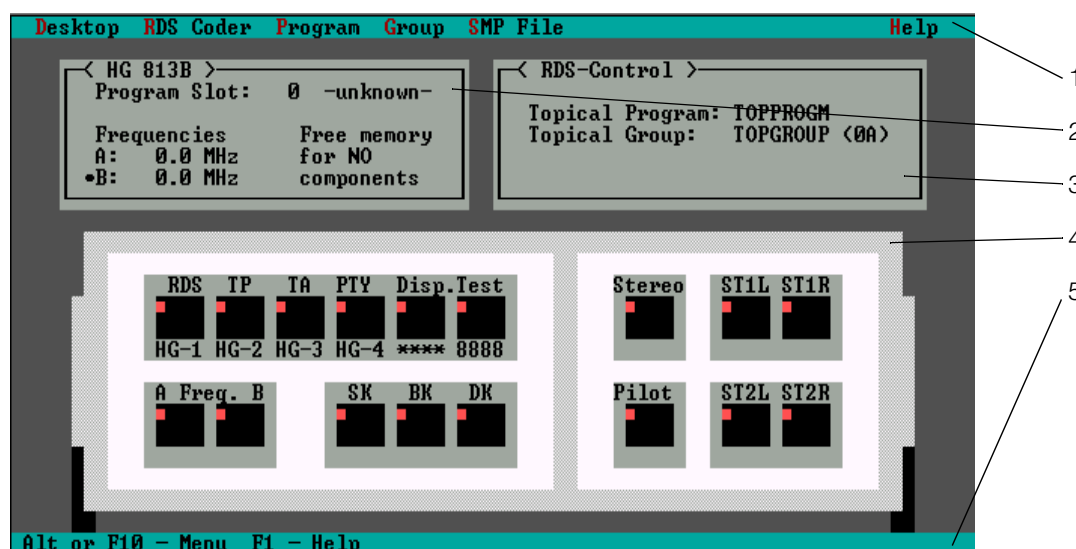
3.2.4 Program Interface Elements

The program runs in text mode.

NOTE! The DOS character sets (codepage) 437 or 850 should be active (also refer to 3.2.2 "Starting the Program" on page 17).

After the program has been started and a short display of the title, the structure of the main screen should be as follows:

Drawing 4 Main screen of the RDS PC program

1. *Menu bar:* In this line the menus are listed. Through the menu, the program functions are listed. To access a menu either click on it with the mouse or simultaneously press [Alt] together with the highlighted letter in the menu name. With the cursor keys or by clicking with the mouse, the desired topic may be selected and the corresponding pull down menu will be opened. A sub menu is then selected by clicking on it with the mouse or by choosing it with the cursor keys followed by [↵] or just by pressing the highlighted letter. Frequently used functions can also be reached by the function keys. [F9] gives a general view of all keys.

2. *Information window for HG 813B-PC:* This displays several settings of the device: both frequencies A and B, the currently selected program slot and the capacity available for further RDS components.

3. *Information window for the program:* This displays the names of the topical RDS group and the topical RDS program, which are stored in memory, as well as commands that are being transmitted to the HG 813B-PC.

4. *RDS coder:* This is a depiction of the front panel of the RDS signal generator. It shows all push-buttons that may be operated through the program.

-   ST1L (ST1R)   switches the internal LF modulation of the left (or right) channel.

-   ST2L (ST2R)   switches the external LF modulation of the left (or right) channel.

-   Pilot   switches the 19 kHz pilot tone on and off.

-   Stereo   switches the stereo coder on and off.

The buttons may be operated directly by clicking on them with the mouse. An activated function is reported by a red square in the left upper corner of the push-button (symbolizes the lit LED).

5. *Information bar:* For help, the keys which have currently special functions are displayed in this line.

3.2.5   General Operation of Dialog Boxes / Windows

Dialog boxes are used for data input. Here some general information on these windows. Dialog boxes contain the following elements:

Element	Description
Input fields	For numbers and strings (texts, names). Here input via keyboard (also refer to 3.2.7 ”Operation of Input Fields“ on page 24).
Action fields	These are used to generate actions. Perform a click on the field or click the button *OK* (see below), or press the space-bar or ⏎. Three periods following the inscription (e.g. *Action*...) indicate that a further dialog box appears if activated.
Lists	From them an entry has to be selected (also refer to 3.2.8 ”Operating the Lists“ on page 26).
Check boxes [X]	Select **from** several options. To switch the option on [X] or off [ ], carry out a double click on the field, or click on the button *OK*, or press the spacebar or ⏎.
Radio buttons (♦)	Select **between** several options. To select the option, carry out a double click on the field, or click in the button *OK*, or press the spacebar or ⏎. All other radio buttons are then automatically switched off. They 'click' out.

Table 7   Elements in dialog boxes

3.2.5.1   Selecting an Element with the Keyboard

Before an element can be operated upon, it must first be selected (marked). A selected element is being highlighted in a different colour.

To select an element:

Button	Function
Tab	Selects the next element
Shift Tab	Selects the previous element
←, ↓, ↑, and →	Selects the neighbouring element as far as possible
Home	Selects the first element
End	Selects the last element
Alt -Character (Hotkey)	Selects the element which has the same character highlighted in colour in its lettering.

Table 8   Selecting an element with the keyboard

Buttons are not directly selectable.

Hint!   With the mouse, the operation is much easier. You only need to click on the selected element without letting go of the left mouse push-button. To select an element without generating the program action at the same time, do not let go of the left mouse push-button before you have left the area of the selected element.

3.2.5.2   Buttons

On the bottom edge of the window there are buttons. Clicking them with the mouse is corresponding to the appropriate key press:

Button	Key	Function
OK	⏎	Accept input
Cancel	Esc	Cancel dialog
Exit	Esc	Leave dialog (without any consequences)
Help	F1	Call on-line help window This contains explanatory text corresponding to the dialog
Alt Help	Alt F1	Activate help index
Insert	Insert	Insert object
Delete	Delete	Delete object

Table 9   Buttons

To leave a dialog box, press *OK* or, in some windows, use extensive functions explicitly with the action field *Accept* in the lower right corner of the window. This makes the adjustments valid.

The dialog can be broken out of with *Cancel*. The window will be closed, however, new settings are not accepted. The settings that were valid when the dialog was called, remain the same. Cancelling is also possible, at any time, by clicking the right mouse button anywhere on the screen.

Special information on operating an individual dialog box can be taken from the appropriate help.

3.2.6   Using the Mouse

RDS-Control supports the operation of the program with a mouse. The mouse pointer can at any time be moved anywhere on the entire screen. To click on an object, move the mouse pointer over it and then press the left mouse button. When an incorrect click is made, for example outwith active display windows, a warning tone is sounded.

Mouse Button Functions

Clicking the *left* button to

- select a menu bar on the main screen

- select an element (field, list)

- activate an action of an action field

- mark/unmark a check field or radio button

- select an entry in a list

- position the text cursor in an input field

- press the according button of the RDS coder on the main screen

Carry out a *double click* with the left button or alternatively a single click with the *centre* button (if available) to

- accept values or list entries.

Click with the *right* button (at any point) to

- cancel (corresponds to the escape key ⌨).

> **Hint!**   As soon as the mouse pointer is moved into the lower left or right corner of the screen, the screen saver is activated.

The tracking speed of the mouse pointer is user adjustable. To set it, select the menu *Desktop/Mouse Tracking Speed* (also refer to Drawing 7 on page 27).

3.2.7   Operation of Input Fields

Input fields are elements in the dialog boxes, where numerical values and strings (texts, names) can be entered.

In the character input field for **strings** nearly every character is allowed as input. Stricter demands are only set for file names and file path names, since DOS convention must be met.

In the character input fields for **numerical values** only the number keys (⓪ to ⑨, for hexadecimal values additionally Ⓐ to Ⓕ) are accepted as input, as well as ⊞ and ⊟ as polarity sign and ⊡ or ⊡ as decimal point with non-integers.

In addition, the following keys have special meaning if the input field has been selected:

Key	Function
→	Cursor one character to the right
←	Cursor one character to the left
Home	Cursor to beginning of line
End	Cursor to end of line. The text cursor can also be placed with the mouse, by simply clicking on the selected point in the field.
Delete	Delete character at cursor position
← (Backspace)	Delete character before cursor position
Shift Delete	Delete all input
Insert	Toggle between overwrite and insert mode. The block cursor indicates insert mode.
↵	Accept input. This is only possible when the input in the field is valid, otherwise a warning tone will be emitted.
Esc	Cancel input. The original content of the field remains unchanged.

Table 10   Keys with special meaning while input field is selected

When the input field is selected and insert mode is active the field contents will appear in a different colour. This indicates that the entire field contents will be deleted as soon as an input is made which does not position the cursor. This is done on the assumption that a totally new entry will be made.

Some further information about hexadecimal entrys

Four bit each can be expressed by a hexadecimal figure:

0000 = 0	0100 = 4	1000 = 8	1100 = C
0001 = 1	0101 = 5	1001 = 9	1101 = D
0010 = 2	0110 = 6	1010 = A	1110 = E
0011 = 3	0111 = 7	1011 = B	1111 = F

Table 11   Allocation: four bit -> hexadecimal digit

GÖTTING

Dependant on the breadth of the data field, only a certain value area is possible.

Data field breadth	from hex.	to hex.
3 Bit	0	7
5 Bit	00	1F
10 Bit	000	3FF
16 Bit	0000	FFFF

Table 12   Value area dependant on data field breadth

Input of RDS specific alphanumerical characters (e.g. radio text), especially characters, that are not included in the keyboard, can be done using the hexadecimal code form ('\nn'). E.g. for '>' the string '\41' (means hex. 41 = '>'). In order to input and display the sign '\' itself, it has to be entered twice: '\\'.

3.2.8 Operating the Lists

Lists are recognized by the two vertical lines between which the list entries are placed. One of the entries in the list is always selected, recognizable by the characters '>' and '<', which frame the entry. When the list is selected the entry is highlighted in a different colour. Arrows at the ends of the vertical lines indicated that there are further entries above or below the section of the list shown.

3.2.8.1 Operation with the Keyboard

Key	Function
↑	Selects one entry above
↓	Selects one entry below
Page Up	Selects several entries further above (browsing upward)
Page Down	Selects several entries further below (browsing downward)
Home	Selects the first entry of the list
End	Selects the last entry of the list
Scroll Lock	Switches Scroll-Lock mode on and off. If it is active, the selected entry will always be displayed in the centre of the list, if possible, which simplifies keeping an overall view. This mode is indicated by the scroll lock LED on the keyboard.
↵	or the spacebar accept the selected entry.

Table 13   Operating the list with the keyboard

3.2.8.2 Operation with the Mouse

To select an entry in the list, simply click on it with the mouse. If only an excerpt of the list is displayed, it is possible, as long as the left mouse button remains pressed, to continuously scroll the list in the appropriate direction by moving the mouse pointer above or below the list.

Alternatively, it is possible to scroll the list one entry up or down by simply clicking on one of the arrows in the corners of the list. If the Shift or Ctrl keys are held down while clicking the arrows, the list will scroll in sections (corresponds to Page Up / Page Down). If the Alt key is held down while clicking the arrows, the first or the last entry in the list will be selected (corresponds to Home / End).

Double clicking the left mouse button or single clicking the central mouse button on an entry accepts it.

3.2.9 Program Configuration

When first starting the program, it is possibly necessary to carry out some adjustments in the program. The functions necessary for adjustments are in the menu *Desktop* (also briefly described in section 3.4.1 "Desktop Menu" on page 38).

Drawing 5   Dialog 'Select Serial Interface'

Switch on one of the four radio buttons to select the corresponding serial interface to control the RDS signal generator and then select *OK*. Make sure that the serial mouse interface is not selected, otherwise the mouse would not work correctly any more.

Drawing 6   Selection window 'Select Colour Scheme'

In this window, the colour scheme can be selected. By experimentation the user will be able to determine the colour best for him. If there is only a monochrome monitor available, it is recommended to use the monochrome palette.

Drawing 7   Dialog window 'Mouse Tracking Speed'

Use this dialog to adjust the speed at which the mouse pointer should move over the screen. As the value gets smaller, the movement of the mouse pointer gets slower and vice versa. The marker in the scroll bar can be moved by using the keys ← and → or clicking onto the scroll bar arrows with the mouse. It is also possible to click directly onto the desired position on the scroll bar. Select *OK* to accept the selected speed.

Furthermore there is the possibility of choosing whether the program will emit a warning beep and, if so, how it will sound. The beep will normally be sounded at wrong operation, or when a warning message appears on the screen. This would, for example, be the case, if the connected RDS signal generator has not been switched on. The sub menu *Warning Beep* allows the adjustment of its configuration.

Drawing 8 Dialog box 'Warning Beep'

In this dialog box it is possible to adjust the duration and the frequency or pitch of the beep. The current setting may be checked with F4. In case the warning beep is not needed, it can be deactivated by radio-button *Warning Beep off*. Select *OK* to accept the settings.

```
┌─────────────────────────────────────────────┐
│            Adjust Warning Beep               │
│ Duration:    ←▓░░░░░░░░░░░░░░→  110  ms       │
│ Frequency:   ←░▓░░░░░░░░░░░░░→  200  Hertz    │
│ Warning Beep:  ( ) Off  (•) On               │
│ OK    Cancel    Help            F4 - Test     │
└─────────────────────────────────────────────┘
```

3.2.10   Leaving the Program

The menu *Exit* will, following a security check, end the program RDS-Control. The keys Alt X or F3 cause the same effect. Ctrl Q will terminate the program without double-check.

All adjustments to the program configuration will automatically be saved within the program file and so remain even when the program is restarted.

3.3   A complete Test Run

It is the aim of this section to make the operation of the program RDS-Control clear by providing an example of the method of operation. This part of the program description is in its construction equal to an actual test run.

The aim should be the following:

The destination is to create a group of type 0A, which sets the text 'Radio ??' as program name. Then two RDS programs are to be created, in which the 0A group and, respectively, two RDS groups of type 2A (radio text) with two successive radio text lines each, are put together (this is much easier then it sounds). These programs should then be stored to program slots 5 and 6. Now these programs should be run alternatingly which will generate the program name and a total of four different radio text lines on the display of a radio, which can display radio text.

3.3.1   Creating a Type 0A Group and four Type 2A Groups

To be able to create a group, the sub menu `Edit Group` must be selected from the menu `Group`. As described in section 3.2 starting on page 17, this can be done either with the mouse or via the keyboard using the cursor keys and ↵ or by simultaneously pressing Alt and the respective highlighted character. In addition, it is possible to access this frequently used function directly by pressing F7 at the main screen.

Once this first step has been carried out, an input window will appear, a so-called dialog box, which presents all functions required to edit the data of a group.

Drawing 9 First dialog box of the test run

First, the name of the group to be created should be set in the input field, which the cursor is currently in, by overwriting it with the new name.

Since this name can also be selected as filename to save the file to disk, it may not consist of more than eight characters. Please note that DOS rules for characters and special characters in filenames apply.
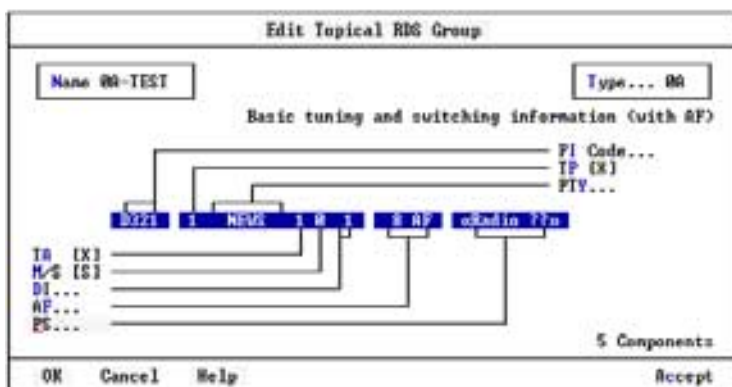
In this concrete case, the new group should be given the name „0A-TEST".

To define the type of the new group, click on the action field *Type* with the mouse.

Select the corresponding type from the selection menu which will then be opened, in this case '0A' (upper left). This selection menu will be closed and the selected type will be accepted.

Below the type field, all parameters are listed that can be changed with reference to the selected group type 0A. Parameters that have three dots after them lead to another output dialog box for their own peculiar input or rather output settings. The other parameters may be altered, between several conditions, by simply clicking on them with the mouse.

To determine the PI code, click on the action field *PI-Code*. Another window appears. Select within both lists: *Germany* and *Supra-regional*. The selected list entry will be encircled by the two characters '>' and '<'. Alternatively, the PI Code may be entered in the input field directly.

To confirm, click *OK* with the mouse. This will generate the code D321 in the first information block on the left, the PI field (D for *Germany*, 3 for *Supra-regional* and 21 for the program reference number, here optional).

Then activate traffic program identification bit by double-clicking with the mouse on the check box *TP* (a cross should appear between the square brackets).

Set the remaining parameters as follows:

- the program type PTY to NEWS (1),

- the traffic announcement TA to active (crossed, 1),

- the music/speech identification M/S to speech (S, 0),

- the decoder identification DI to stereophonic transmission (1).

- Produce a list of alternative frequencies AF with the following eight frequencies according to technique A (8 AF):
87.6 MHz, 88.8 MHz, 89.5 MHz, 91.2 MHz, 93.6 MHz, 95.9 MHz, 97.2 MHz and 107.9 MHz

NOTE!   If the dialog window for editing the list of alternative frequencies is active, select the transmission technique A with the two radio buttons in the left upper corner (no allocation of the frequencies in twos).

1. Adding frequencies
    Enter the desired frequency in the input field *Frequency* in MHz. Clicking with the mouse on button *[+]* or *Insert* places the new frequency in the frequency list just above the selection bar.

2. Removing frequencies
    Select the frequency to be deleted from the list with the selection bar. A mouse click on button *[-]* or *Delete* removes the selected frequency from the list and enters it into the frequency input field from where it can be deleted or re-inserted into another position in the list.
    Insert or *Delete* frequencies from the list until the desired sequence of frequencies in created.
    Accept the new frequency list by clicking with the mouse on the action field *Accept* (to the right below). Now the number of frequencies in the list is displayed in information block 3, here 8 AF.

•   the program segment PS to 'Radio ??' (max. eight characters).

Once all parameters have been set, the edit window on the screen should exactly look like the one in Drawing 9 on page 29.

If this is the case, click with the mouse on the button *Accept* (lower right). The window will close and all adjustments done before are accepted. The information window will now show under *Topical Group* the name '0A-TEST (0A)'.

To make sure, these settings are stored long-term, select from the menu *Group* the sub menu *Save*. The topical group is automatically saved in a file named '0A-TEST.00A'. If it is required that the new group is saved under a different name or in a different directory, select *Save as* from the sub menu *Group* and enter the new name in the file selection box.

The creation of the first group of type 0A is now complete.

To create the second group, again change over to the sub menu *Edit Group* from the *Group* menu.

Drawing 3   Second dialog box of the test run

Enter '2A-TEST1' as its name.

Then select type 2A (radio text) over the action field *Type* out of the group type list.

The remaining parameters are to be set as follows:

- *PI-Code* to D023 (Germany,local),

- *TP* to active (1),

- *PTY* to ROCK (11),

- *Text-Flag* (A, B, A&B) to A and

- *Radiotext*: Enter in the appearing window into the text line 'A:'
  (freely input via keyboard):   "Oldies and today's hits."
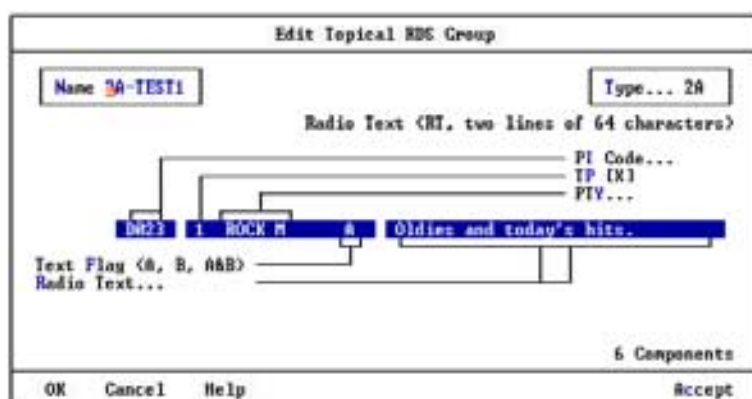
Once all parameters have been adjusted, the screen should be like shown in Drawing 3. *Accept* the input and save the settings of this group under the name '2A-TEST1.02A' using the sub menu *Save* from the *Group* menu. This finishes the construction of the first of the four 2A groups.

Now create, analogously to the proceeding group, three more 2A groups (names: '2A-TEST2' to '2A-TEST4'). The parameters should be set as follows in the corresponding dialog boxes:
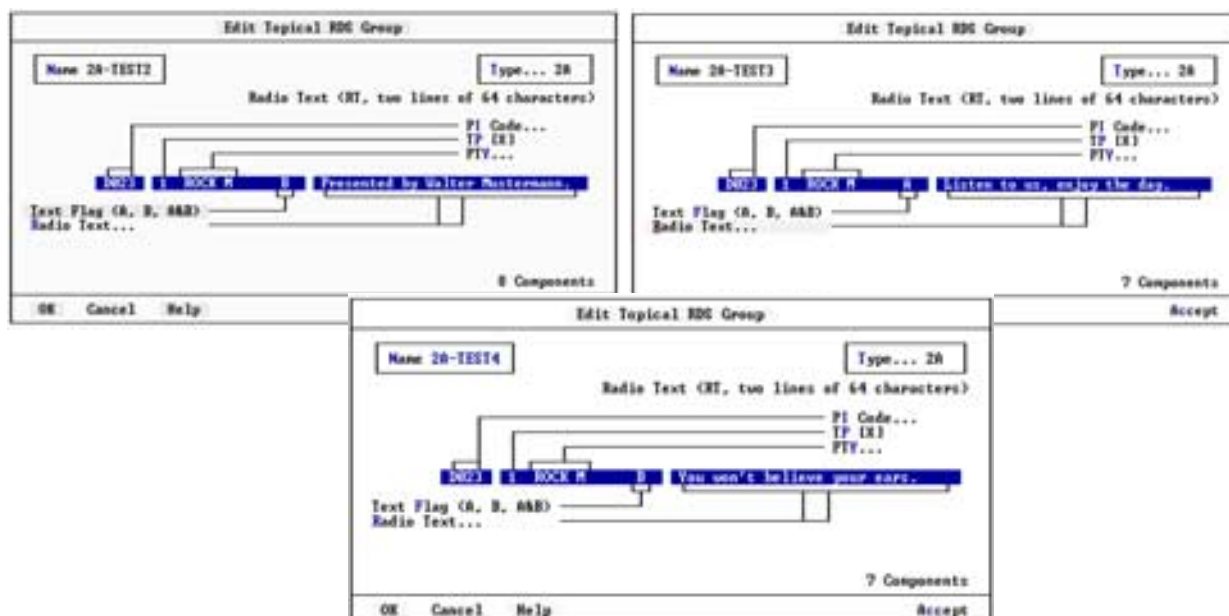
Drawing 4   Parameters for the remaining three test groups of type 2A

Group name	Text flag	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 your ears.

Table 14   Different parameters for four 2A test groups

Once having saved these groups, in the next step, they can be integrated into two RDS programs.

3.3.2   Editing an RDS Program

With the construction of a program it is important to know, that every group may be split up into several components. Groups of type 0A usually consist of four components (each containing two characters, this results in the eight characters of the name segment PS). Groups of type 1A (PIN) always consist of only one component. With other types, the number may vary. Groups of type 5A/5B (TDC) may, depending on the volume of data, even consist of hundreds of components. The value of 2A groups (RT) is such, that each four characters of radio text reserve one component. A remainder always represents a new component. Into each line may be entered up to 64 characters appropriately 16 components. Thus a 2A group may accordingly be comprised of a maximum of 32 components.

Within the program RDS-Control, it is possible to unite any groups into one program. It is only limited by the maximum number of permissible components, about 2300, which cannot be exceeded since the RDS signal generator may save no more than that.

Make sure, that one of the created 2A groups is specified as topical group in the information window. Should this not be the case, select the sub menu *Load* from the menu *Group* and call up the file '2A-TEST2.02A'. This will reload group '2A-TEST2' into memory. Then close the automatically opened window *Edit group* by double-clicking on *Accept*.

To unite the already created 2A groups into programs, use the function *New* from the menu *Program*. Do not yet use the function *Edit Program* (F6), since using *New* will make sure, that the content of the currently existing program will first be deleted. All further steps that are necessary for creating a program may now be carried out in the currently open working window.

Drawing 5 Working window 'Edit Topical RDS Program'

First set the program's name by overwriting the input field *Name*. For this example '2A-PROG'.

Then add the topical group '2A-TEST2' to the group list by double-clicking *Topical Group* with the mouse. Subsequently select the action field *Load Group(s)* and load first the group '2A-TEST1' and then the group '0A-TEST'.

Hint! Using so-called wild cards within the filename (e.g. '?1-*.00A') enables to load several groups at a time.

Now, the three lists are indicated in the group list with their name, their type, and their number of components.

Mark the group '0A-TEST' from the group list with the selection bar. To accept all components of group '0A-TEST' to the component list on the right, click button *[+]* between the lists.

A window will appear where it has to be specified which of the components are to be entered. Since all of them are to be accepted, switch on the radio button *All* by clicking on it with the mouse and then click on *OK*. Insert all the components of the groups '2A-TEST1' and '2A-TEST2' in this manner.

Hint! To abbreviate this procedure, it is possible to accept all components immediately by clicking *[+]* while [Alt] is held down.

The single components, which each group represents are now available in the component list for individual manipulation. For a precise description of manipulation possibilities, please refer to individual descriptions for editing an RDS program in section 3.4.3.3 "Edit Program" on page 43.

Drawing 6 Edit RDS program; resulting step

Beneath the lists, there is a field for entering a comment for your topical program.

Once all adjustments and manipulations have been made, double-click with the mouse on *Accept*. The working window will close, and as topical program the name '2A-PROG' is displayed in the information window.

Now select *Save* from the menu *Program* to save the program under the file named '2A-PROG.RDS'. Thus a program has been created out of two groups. In the same way, create a program '2A-PROG2' which comprises the groups '0A-TEST', '2A-TEST3', and '2A-TEST4' including all their components.

> **NOTE!** The order, in which the groups are listed in the *Group List* is irrelevant, however, the construction of the *Component List* is important.

Drawing 7 Construction of the second RDS program

Now the program slots of the RDS signal generator can be reserved.

### 3.3.3 Reserving a Program Slot in the Generator

Now that the 0A group and the four 2A groups have been built, as well as put together into the two programs they can now be assigned to the program slots of the RDS signal generator HG 813B-PC.

Before this is done, ensure that in the information window '2A-PROG.RDS' is the topical program. If this is not the case, select the sub menu *Load* from the menu *Program* to load the program.

When the program is up to date in memory, select the sub menu *Edit Program Slots* from the menu *RDS coder*. This sub menu can also be accessed without the mouse or a key combination by pressing the function key ⌨F4 directly.

Drawing 8 Working window 'Edit Program Slot'

Here the topical group and the topical program are listed as well. In addition, a list of all 63 program slots in the device, including their current placings, is displayed. For this example the program slots 4 and 5 are needed. If these slots are already reserved, either delete the two slots or overwrite them with the new components. If it is a matter of important data, which is to remain in these program slots, carry out the procedure with two other slots which are still free.
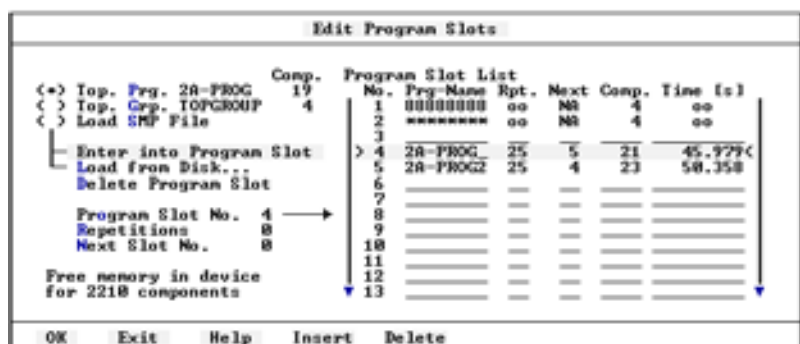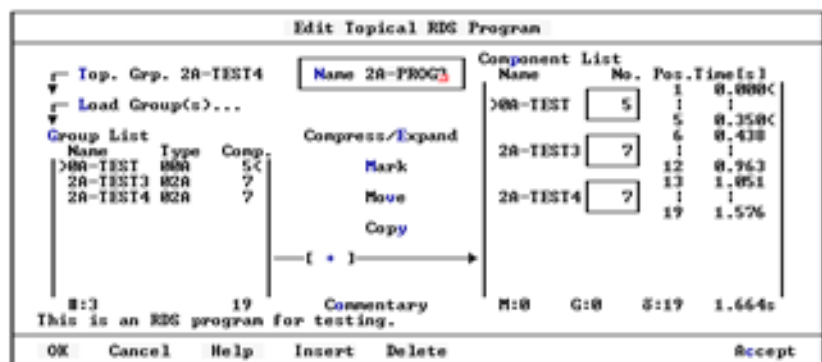
To delete a program slot, select it with the cursor keys or the mouse. By using the action field *Delete Program Slot*, the entry in this slot can be deleted. Now this program slot is free and may be reserved anew.

1. Select the topical program '2A-TEST' by switching on the radio button *Top.Grp*.

2. Mark the program slot 4 as destination (with the cursor keys, the mouse or by entering '4' in the field *Program Slot*).

3. Set the number of repetitions in the corresponding input field to 25. Here integer values from 0 to 99 are permitted, 0 signifying infinite repetition which may be aborted by a keypress on the device.

4. As the value of *Next Slot* enter 5 in the field. This results in the automatic switching to program slot 5 after 25 repetitions of the program '2A-PROG' and carrying out the input there.

5. To program the program slot 4 of the generator with the new settings, click on the action field *Enter into Program Slot* (topical program, in slot 4, 25 times, then to slot 5). The name of the program will then be listed on the fourth entry in the program list.

6. Click on *load from disk* and load the second created program (2A-PROG2.RDS) into the dialog box.

7. Mark program slot 5 as destination.

8. Set the number of repetitions in the corresponding input field to 25, just as before.

9. As value of *Next Slot* enter 4 in the corresponding field. This means, that after 25 repetitions of the program '2A-PROG2' the entry in program slot 4 will automatically be carried out.

10. To program slot 5 with the new settings of the generator, click on action field *Enter into Program Slot* (topical program, in slot 5, 25 times, then back to slot 4).

This results into two linked program slots to which two created programs are saved. It is possible to leave the working window using the button *Exit* or ⌈Esc⌋. The adjustments carried out remain valid. The repetitions required for the example are set. You may now carry out the test run.

3.3.4 Test Run

Now, groups of types 0A and 2A have been created, and, respectively, one 0A group and two 2A groups have been united into one program and the program slots 4 and 5 of the RDS signal generator HG 813B-PC have been reserved for these RDS signals.

Connect an RDS radio with the generator's output *<HF - Out>*, switch on the radio, and set it to the generator's frequency A. It will be displayed in the left information window, e.g. 87.5 MHz. Should this channel already be used by another transmitter, select the sub menu *Enter Frequencies* of the menu *RDS coder* and enter a different frequency for *frequency A* on which little or no interference exists. Adjust the radio to this frequency.

To start the test run, it is sufficient just to call upon program slot 4 of the generator. There are four possible ways of starting it: one from the push-button block of the generator, and three from the program:
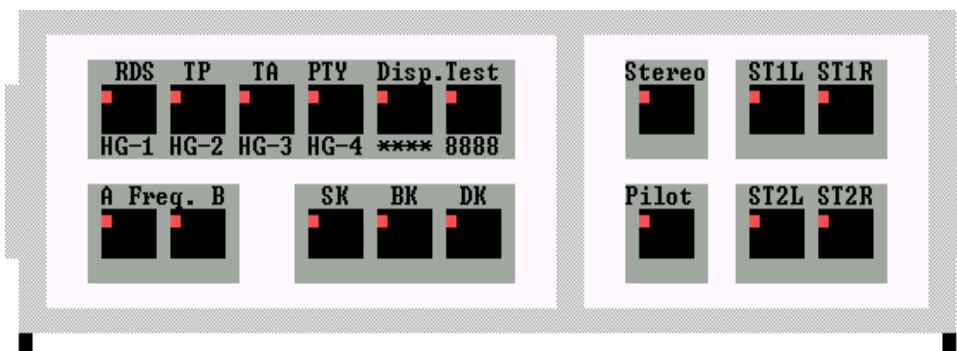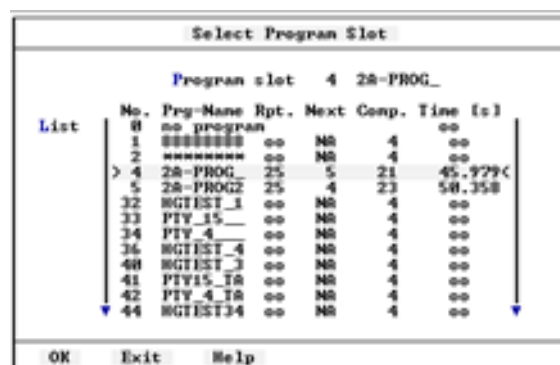

Drawing 9   Generator layout

1. *By Clicking with the Mouse on the Push-Buttons in the Layout of the Generator*
   The push-buttons which form the upper left block have the same values as the buttons in block 6 on the front panel of the generator (refer also to Table 6 on page 16). Therefore, only program slots with binary power numbers can be selected (refer to Drawing 9). If the program slots should also be directly selectable with the push-buttons at the device itself, it is anyway recommended to reserve only slots with binary power numbers in priority.
   To select the fourth program slot, simply click the third push-button from the right with the mouse.

2. *By Keyboard Access*
   The keys 1 to 6 on the keyboard have the same functions as the program slot selection buttons on the generator. Each key is valued as follows:
   $\boxed{1}$ = 32 $\boxed{2}$ = 16 $\boxed{3}$ = 8 $\boxed{4}$ = 4 $\boxed{5}$ = 2 $\boxed{6}$ = 1
   To select program slot 4 it is thus sufficient to just press key $\boxed{4}$.

Drawing 10   Dialog box 'Select Program Slot'

3. *By the Dialog Box 'Select Program Slot'*
   With the *Select Program Slot* function from the menu *RDS coder* all reserved program slots can be directly selected. The here shown option window will be opened.
   Enter '4' or select the program slot with the cursor keys or by double-clicking with the mouse directly from the list. Confirm with *OK*. This will call upon the program slot.
   The function *Select Program Slot* has the advantage over all other methods of being able to easily call extensive combinations as well. To select, for example program slot 15, the buttons with the binary values 8, 4, 2, and 1 would have to be depressed simultaneously with any of the other methods, which is impossible with the mouse. This dialog box allows direct selection or entry of slot 15.

4. *By the RDS Signal Generator's Push-Button Block*
   Press the push-button with the value 4 in the front element block 6 (also refer to Table 6 on page 16). This will call upon the appropriate program slot. This method is best suited for simple binary values in priority. For combinations, the buttons of the appropriate values have to be pressed simultaneously. So for more extensive combinations the third method is preferable in any case.

Once having called upon program slot 4 via any one of the four methods, the LED of the third push-button from the right in the front element block 6 of the RDS signal generator should light. The appropriate push-button of the graphical depiction in the program should now show a red patch. If this is not the case, press the space bar. This will update the program's display to the current state of the device.

On the display of the connected RDS radio the text 'Radio ??' will appear. Afterwards, the two radio text lines of the first RDS program will be displayed alternatingly on the display (of a radio capable to displaying radio text). Then the generator changes over to program slot 5. On the device the LED on the push-button to the very right and the one on the push-button third from the right should light up (4 + 1 = 5). The display will again show the text 'Radio ??', however, this time one of the text lines of the second RDS program will appear alternatingly. This terminates the first test run and the program will automatically jump back to program slot 4. This loop will continue until any key of the RDS signal generator is pressed (no matter whether it is pressed at the device itself, on the screen or on the computer keyboard).

Result

You are now able to create RDS groups, generate programs from the groups, reserve the RDS signal generator's program slots for them, and carry out test runs. This chapter should have shown just how straightforward it is to operate the program RDS-Control and that its functions are basically self explanatory.

Should any questions arise, refer to the reference section of these instructions below and use the extensive on-line help of the program (press ⌨F1). A survey of all contained help topics can be obtained by calling upon the help index by ⌨Alt ⌨F1.

3.4   Reference Section - The Menus and their Functions

This reference section is concerned with each individual menu, and briefly explains every function. Its structure closely obeys the order of the menus in the program. It is rather a reference book than an instruction. To help understanding the construction of the program and its operating procedure, section 3.3 "A complete Test Run" on page 28 is better suited. For any questions that arise while using the program which require quick answers, the on-line help is also recommended. It may be called upon at any time by pressing ⌨F1. A help index including a survey of all help topics will appear if keys ⌨Alt ⌨F1 or ⌨F11 are pressed. Further explanation of the help can be found in section 3.4.6 starting on page 54 at the end of this section.

3.4.1 Desktop Menu

Drawing 11 Menu 'Desktop'

The *Desktop* enables to set basic parameters of the program.

```
┌Desktop┐
│ RDS-Control...        │
│                       │
│ Serial Interface...   │
│ Colour Scheme...      │
│ Mouse Tracking Speed..│
│ Warning Beep...       │
│                       │
│ DOS Shell...    Alt-F3│
│ Exit               F3 │
└───────────────────────┘
```

3.4.1.1 RDS-Control

Opens a window which contains the program version number and the copyright notice of your copy of RDS-Control (refer also to section 3.4.6.3 "About" on page 54).
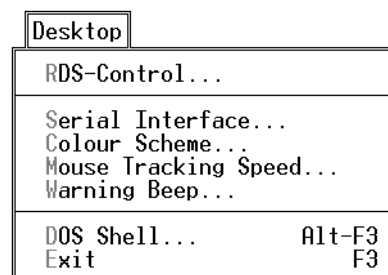
3.4.1.2 Serial Interface

The input in the opening selection window will indicate to the program with which interface of your computer the RDS signal generator HG 813B-PC is connected (COM1 to COM4). If a mouse is used, the appropriate interface is automatically recognised by several mouse drivers and closed off (refer also to section 3.2.9 "Program Configuration" on page 27).

3.4.1.3 Colour Scheme

Opens an option window which offers a total of five possible colour schemes for the monitor display out of which the best suiting one may be selected. If only a monochrome monitor is available, it is recommended, that the monochrome palette is used (refer also to section 3.2.9 "Program Configuration" on page 27).

3.4.1.4 Mouse Tracking Speed

This function allows the tracking of the mouse on screen to be made quicker or slower. By experimentation you will find the for you acceptable speed (refer also to section 3.2.9 "Program Configuration" on page 27).

3.4.1.5 Warning Beep

Whenever the program establishes that an error has occurred, e.g. the fact that the connection to the RDS signal generator cannot be established, a warning message will be issued. At the same time, a warning beep is sounded. The function *Warning Beep* enables to set whether the tone will sound or not, and, if so, for how long and at what pitch (refer also to section 3.2.9 "Program Configuration" on page 27).

3.4.1.6 DOS Shell

This menu function or [Alt][F3] switches to the DOS command mode. While RDS-Control is suspended and held in working memory with all current adjustments, the DOS command line interpreter is loaded through which it is possible to start other DOS programs depending on the memory demand. Avoid starting any program which becomes resident in memory (so-called TSR's).

To return to RDS-Control, enter the DOS command `exit` at the DOS prompt.

3.4.1.7 Quit

By selecting this sub menu or by pressing [F3] or [Alt][X] the program can be terminated. [Ctrl][Q] leaves directly without any extra confirmation. All adjustments concerning the program configuration (from 3.4.1.2 to 3.4.1.5 as well as the starting parameter of the program /8 or /9) are automatically saved in the program file and will therefore also be valid for further program start-ups.

3.4.2 RDS Coder Menu

Drawing 12 Menu 'RDS-Coder'

This menu unites all functions that allow remote control and programming of the RDS signal generator HG 813B-PC.

```
┌─────────┐
│RDS Coder│
├─────────┴───────────────────────┐
│ Select Program Slot...     F2    │
│ Edit Program Slots...      F4    │
│ Print...                         │
│                                  │
│√ Frequency A    88.0 MHz   Alt-A │
│ Frequency B   107.9 MHz   Alt-B │
│ Enter Frequencies...       F5    │
│                                  │
│ Device Reset...         Alt-Space│
└──────────────────────────────────┘
```

3.4.2.1 Select Program Slot

With this function a program slot of the RDS signal generator can be selected directly out of a list and the program (a sequence of RDS components) that resides there can be started. This window can also be activated from the main screen by pressing [F2].

Drawing 13 Window 'Select Program Slot'

All currently reserved program slots are listed. On the left the program slot number is shown then the name of the program followed by the particulars about how often it is to be repeated and which program slot will be jumped to next. This is followed by the number of components out of which the program consists and finally the dependent duration for a complete program run in seconds. The character of infinity is displayed for unlimited duration, or rather repetition.

3.4.2.2 Edit Program Slots

This sub menu or pressing [F4] displays the following dialog box:

Drawing 14 Dialog box 'Edit Program Slots'

This window shows the list of all 63 program slots of the RDS signal generator as well as whether they are currently reserved or not. The construction of the list is the same as in *Select Program Slot*. A program slot may be selected with the mouse or the cursor keys.

By using the three radio buttons in the upper right hand corner, the object is selected which is to be subjected to one of the actions displayed below: either the topical program or the topical group or an SMP file, which is still to be called before an action is performed. After the radio button of the topical program is shown its name and the number of its components, of which the program consists. This is also accordingly the same for the topical group. The free capacity of the RDS coder is displayed in the lower right corner.

A description of all functions of this dialog box follows:

GÖTTING

Elements	Function
Top. Prg. NAME	Switch this radio button on when the topical program should be the object for programming or loading action.
Top. Grp. NAME	This radio button selects the topical group for the programming and loading action.
Load SMP file	If this radio button is switched on, an SMP file then becomes selected as the object for a programming action. At the time for programming, a file selection box will appear. Select the SMP file to be loaded (refer also to section 3.4.5 starting on page 53). Then the number of components of which the file consists will be displayed and confirmations required as to whether the components from this file should really be programmed.
Enter into Program Slot	Selecting this action field programs the HG 813B-PC: The selected program slot is reserved for the object set by the radio buttons and the values adjusted in *Repetitions* and *Next Slot No.* This can also be done by using the button *Input*.
Load from Disk	By selecting this action field, a new program can be loaded from disk as the topical program or a new group as the topical group, without the need to leave the dialog and load from the corresponding menu. This opens a file selection box for selecting the chosen program or group. A program or group loaded in this way can be controlled and edited, completely analogously to the menu function, in the appearing dialog box. An SMP file cannot be permanently loaded, being the reason, why this action field does not appear when the radio button *Load SMP File* is activated.
Delete Program Slot	This action field releases the selected *program slot* in the device. This can also be done by using the button *Delete*. **Warning!** There does not appear any message for confirmation. The display of free capacity increases corresponding to the number of deleted components. Reserved program slots can also be overwritten without them needing to be empty first.

Table 15   Elements of dialog box 'Edit Program Slots' and their functions (Part 1 of 2)

Elements	Function
Program Slot	This input field displays which program slot is to be reserved or deleted. Here the chosen number can be directly input or selected simply by choosing it from the program slot list.
Repetition	Contains the specification of how often an object located within the program slot is to be transmitted. Here the appropriate number can be entered. The value 0 represents infinite repetition, which may be interrupted by the first keystroke on the RDS service generator on the selection of another slot. Permissible are integers from 1 to 99.
Next Slot	Shows which program slot will be jumped to after the current one has been completely executed. The number can be set in the same way as the *Program Slot No.* in the program slot list or directly entered into the field. Here the program slot 0 can also be selected if no more program shall follow, automatically ending the transmission.

Table 15   Elements of dialog box 'Edit Program Slots' and their functions (Part 2 of 2)

The button *Exit*, [Esc] or clicking with the right mouse button exits the dialog.

3.4.2.3   Print

When selecting this sub menu, all 63 program slots including their positions are listed on a text printer connected to LPT1. In addition, there is the possibility to write the list to disk as an ASCII file. For more detailed information on the print options refer to section 3.4.3.6 "Print" on page 50.

3.4.2.4   Frequency A

This switches the RDS signal generator onto the preselected frequency A. Switching is also possible by pressing [Alt][A] in the main screen.

3.4.2.5   Frequency B

This switches the RDS signal generator onto the preselected frequency B. Switching is also possible by pressing [Alt][B] in the main screen.

3.4.2.6   Enter Frequencies

By this function or [F5] an input window is opened that allows the adjustment of frequencies A and B. Both values may be selected from a range of 87,6 to 107,9 MHz in steps of 0,1 MHz. Accepting them with *OK* is only possible if both frequencies have valid values.

3.4.2.7   Device Reset

Following a safety question, a reset command is sent to the HG813B-PC. This erases any programming in the device. Then the RDS coder is deemed in original state. The reset command can also be activated from the main screen by [Alt][_] (Alt and space bar).

3.4.3　Program Menu

Drawing 15　The menu 'Program'

RDS-Control permanently stores an RDS program in memory. It is called the *topical RDS program*. This menu contains all functions necessary to create and edit this topical RDS program.

```
┌─Program─┐
│ New...          │
│ Load...    Ctrl-F6│
│                 │
│ Edit Program... F6│
│                 │
│ Save       Alt-F6│
│ Save as...      │
│ Print...        │
└─────────────────┘
```

3.4.3.1　New

The contents of the topical program in memory are deleted. The dialog box for editing the RDS program is opened and the name 'New' is suggested for the new program (for further information refer to section 3.4.3.3 "Edit Program" on page 43).

3.4.3.2　Load (Description of the File Selection Box)

With this sub menu or `Ctrl` `F6` an RDS program is loaded as new topical program from disk. This will open the file selection box, which enables to load a former created and saved program as topical program to the working memory using some facilitating search auxiliaries.

Drawing 16　The selection box 'Load RDS Program'

Select the desired file with the selection bar out of the *file* list or enter the entire filename in the input field *name*. Another drive or another path can be entered in the input field *Path* or be selected interactively using the list *Dir./Drives.* The field *Path* also enables entry of any search mask for files (e.g. *.* or *.RDS). A matching search mask may be set alternatively using the action fields displayed under *File Selection:* (refer also to Table 16).

```
┌──────────────── Load RDS Program ─────────────────┐
│                                                   │
│ Path: E:..\..\DOS\*.RDS                           │
│ Name: 2A-PROG.RDS ·                               │
│                                                   │
│ Files           Dir./Drives       File Selection: │
│ │>2A-PROG.RDS <│ │>..        <│                   │
│ │ 2A-PROG2.RDS │ │ RDS-CO~1   │    All *.*        │
│ │              │ │  - A: -    │    Group Type...  │
│ │              │ │  - B: -    │    All Groups     │
│ │              │ │  - C: -    │    RDS Programs   │
│ │              │ │  - D: -    │    *.TXT          │
│ │              │ │  - E: -    │    SMP Files      │
│ │              │ │  - F: -    │                   │
│ │              ▼ │  - G: -  ▼ │    Delete         │
│                           es                      │
│ OK    Cancel    Help                              │
└───────────────────────────────────────────────────┘
```

The name of the displayed file is transferred to the field *Name* by focussing it in the *File* List and then pressing ⏎. Once the name of the selected file is written in the field *Name*, it needs to be confirmed with *OK* (alternatively: double clicking on the field *Name* or double clicking in the filename in the *File* List). Or the procedure may be aborted by *Cancel*. It is also possible to delete a selected file after a security question, by selecting the action field *Delete*.

With OK the selected program will be loaded and the dialog box will be opened where the topical RDS program may be looked at and edited.

Type	Function
All *.*	All files in the currently set path are shown (mask *.*).
Group type	Prompts the selection box *Group Type*. Select the group type to be displayed and confirm the choice. All files in the currently set path, which are corresponding to this type, are displayed (only of use for loading an RDS group).
All Groups	All RDS groups existing in the set path are displayed (mask *.??A and *.??B, only of use for loading an RDS group).
RDS Programs	All RDS programs in the currently set path are shown (mask *.RDS). This mask is here preset for loading an RDS program.
*.TXT	All files with the extension '.TXT' are shown.
SMP Files	All SMP files are shown (mask *.SM?).

Table 16   Search help for file selection

3.4.3.3   Edit Program

This sub menu or pressing F6 branch directly into the dialog box for editing the topical RDS program.

Like in every dialog box the selection of an input or action field or of one of the two lists can be made either by using Tab, pressing a hotkey (highlighted by contrasting letter) together with Alt or by clicking directly on it with the mouse. The lists are controlled by the cursor keys or the mouse.

In two input fields at the very top and the bottom of the box may be entered the program's name (later its file name) as well as an informal comment (maximum 127 characters).

1.   Concept of Keyboard Operations

An operation always has an effect on the selected list entry, except if at the same time one of the following keys are pressed:

Ctrl   Its operation refers to all marked entries in the component list.

Alt   Its operation refers to all entries in the component list.

Shift   Generation of space is avoided.

2.   Group List

The list on the left part of the box shows all RDS groups of the program, sorted in alphabetical order by name. Each entry contains the name of that particular group, its group type and the number of components of which it consists. An asteric (*) indicates

the topical group, whose group type can still be changed (see below). Under the group list are displayed, for the user's information, the number of groups in the list and the sum of all group components.

3. Component List

On the right side of the box, the component list is displayed, in which the single components of the groups from the group list in their later order of transmission are listed. Each component entry contains the group name, from which the component originates, as well as the number which indicates the position of the component within the group. In addition, dependent on its position in the list, a position number and the transmission time in seconds corresponding to it are reported. It starts at 0 seconds for the first component and increases per component by approximately 87,6 ms. The transmission time indicates, at which point in time within the program a certain component is transmitted (important for time critical applications).

Drawing 17 The dialog box 'Edit Topical RDS Program'

So the order of the entries in this list corresponds to the later order of sending in the HG 813B-PC. Single components may also exist several times in the list. Just as well it is possible, that some are absent in the sequence. Thus the components of a group do not have to be inserted completely into the component list. Also their order does not matter. Thus the last group of the component may quite possibly be positioned before its first component in the component list, if this makes sense.
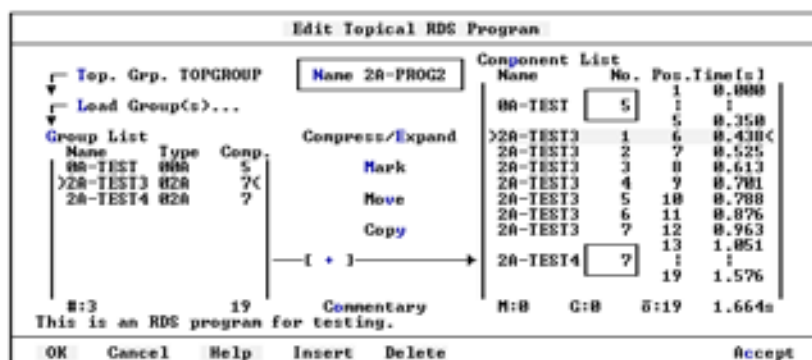
Under the component list, the number of components is displayed which are transmitted in the program, as well as the period of time the entire program needs, which enables you to estimate the volume of the program. In addition, the number of all entries that are marked ('M:n') and the number that are gaps ('G:n') is displayed.

Many consecutive components of one and the same group, make the list very long and complicated, and require long scrolling times until the desired entry is reached. Therefore, more than three consecutive entries of a group may be displayed as a single entry. It consists of three lines (the number of components contained is displayed in a small box). Whenever the dialog 'Edit Topical RDS Program' is called upon, the list is automatically compressed.

To use operations for more than one component in the list, the contained entries may be marked (refer to 9. "Marking Components in the Component List" on page 46). The list can only be accepted, if is not empty and contains not gaps.

4.   Add / Load Groups to Group List

Additional groups may be added to the group list; either by loading them using the action field *Load Group(s)* or by assigning the topical group (from memory) via the action field *Top.Group NAME* to the program. If the situation arises, that there is already a group with the same name in the list, an entry will not be possible unless the name of the group is altered in the following group edit dialog.

To load a group select the desired group file from the appearing file selection box. This is then loaded. It is possible to load several groups at a time by using wildcards within the file name ('*' or '?'). All files that conform to this mask are loaded. If necessary, the loading of several groups can be cancelled by pressing `Esc` or clicking the right mouse button. If the loading reports are not required loading may be accelerated by holding down `Ctrl` or `Alt`.

5.   View / Edit Group

Select a group out of the group list by pressing *OK* or by double clicking on it. The dialog box for editing a group will then appear (refer to section 3.4.4.2 "Edit Group" on page 52). Here belayed alteration of the data is still possible, like e.g. altering the group name (see above). The data within a group can only be permanently altered, if no components from it are in the component list, because this way the number of components in the component list could decrease (critical, since this would leave undefined entries in the list). If this is the case, a message will appear before editing. For the topical group only ('*') even the group type may be altered in this dialog.

6.   Entering a Group in the Component List

Pressing `Insert` or `+` or clicking on the button *Insert* or the symbol *[+]* on the right near the list causes, while the group list is focussed, one or more components from the selected group to be entered into the component list before the selected entry. If `Shift` is held down while doing this, first existing gaps in the component list are filled from the selected entry on with components of the group consecutively, before the possibly remaining components are added at the end of the list.

If the group consists of more than one component, a small dialog box will appear, in which has to be set, which components from the group are to be entered in the component list. If only a single component of the group is to be inserted, select radio button *One*, and enter the components number beside it. To enter several consecutive components of a group, select *Range* and enter the range in the fields *from* and *to*, being the numbers of the first and the last desired components. If all components should be accepted, switch on the radio button *All*. In this case, the dialog can also be bypassed by using the key `#` or by holding down `Alt` while clicking them with the mouse.

7.   Deleting Groups from the Group List

Select a group list and press `Delete`, `⌫` (Backspace) or `-` or click the button *Delete*. This will delete the selected group from the group list and thus from memory and also deletes all associated components from the component list without the closure of any resultant gaps by following components. To close the gaps, hold down `Shift` simultaneously while deleting the group.

This procedure of leaving the gaps normally unoccupied is advantageous, because it is now possible to insert e.g. the components of a replacement group into the resultant gaps (as described above) without changing the timing of the program.

8.   Compressing / Expanding Components in the Component List

Select the component list and press $\boxed{E}$ or click on the button *Compress/Expand*. It is also possible to click the button *OK* (or press $\boxed{\hookleftarrow}$) or double-click in the list. All consecutive components of the same group are either compressed to one entry or vice versa expanded again. Gaps in the list are not compressed, remaining visible and therefore always accessible. It is possible to simultaneously compress, or expand, every entry in the list by holding down $\boxed{Alt}$ at the same time.

9.   Marking Components in the Component List

In order to apply an operation to more than just one component in the list, it is possible to mark entries within it, by pressing $\boxed{M}$ or clicking on button *Mark* while the list is selected. In the same manner marked entries can have marking removed (toggle function). The number of marked entries is updated below the list accordingly.

If the spacebar is pressed while marking, automatic advancement to the next entry is caused, which will speed up the marking and unmarking of several consecutive entries. The advancement is also be done by clicking on button *Mark* with the mouse and holding down the mouse button. If all entries that correspond to the selected entry are to be marked or have marking removed, $\boxed{Shift}$ should be held down simultaneously. Thus when the selected entry is a component, all components of the list are marked or unmarked, which belong to the same group and have the same number as the selected one. If a gap is selected, then all gaps in the list are marked or unmarked. If a compressed entry is marked, all compressed entries with components from the same group in the list are marked / unmarked.

To mark or unmark all components in the list dependent on the selected entry, $\boxed{Alt}$ should be held down.

10.   Marking all Components of a Group

Select the group list and press either $\boxed{M}$ or spacebar. All components that belong to the selected group are marked or have marking removed in the component list.

11.   Deleting Components from the Component List

To delete an entry, select the component list and press $\boxed{Delete}$, $\boxed{-}$ or click on the button *Delete*. The selected entry is deleted whether it is just one component or several compressed components. Gaps will remain, which can be deleted in this same manner.

If an entry is to be deleted without any gaps remaining, click with the mouse on the button *Delete* simultaneously with $\boxed{Shift}$ or press $\boxed{Shift}\boxed{Delete}$. Furthermore, there is the possibility of deleting several entries that have been marked; regardless, whether they are single or compressed components or delete all that belong to one group. For this purpose $\boxed{Ctrl}$ should be pressed additionally, while each deleted component will again leave behind a gap (key $\boxed{Delete}$ here does not have any function, because $\boxed{Ctrl}\boxed{Delete}$ is not supported by DOS keyboard driver). If no gaps shall remain from the beginning, $\boxed{Shift}$ has to be held down additionally just as in the procedure of deleting single entries.

12. Generating Gaps in the Component List

It is also possible to explicitly produce gaps, e.g. in order to make space for inserting components of a further group into these gaps (see above). Select the component list and press ⌨Insert, ⌨+, ⌨L or click on button *Insert*. This also allows gaps to be put in the list as temporary barriers that can be used, e.g. to prevent consecutively placed components of a group from being compressed together, by placing the gaps, that are incompressible, inbetween them. Gaps at the end of the list are not deleted automatically.

### 13. Moving Components in the Component List

To move a selected entry, first select the component list and then press ⌨V, or click on the button *Move*. Now the moving mode is active (recognizable by the activated button *Move*).

Operating: With the cursor keys the selected entry can be moved to any position within the list. With the mouse, the selected entry can be moved upwards be simply clicking over it. Click under it and the entry will slide further down. If ⌨Shift or ⌨Ctrl are held pressed while doing this, then the entry is moved to a list section above or below. To send the entry to the beginning or the end of the list, keep the ⌨Alt key pressed. Clicking the arrows in the corners of the list is also possible. A double click or a click on *OK* (⌨↵) sets the position and the moving mode is left. With ⌨Esc, a click with the right mouse button or a click on the button *Cancel* this operation is aborted and the list is restored in its original state.

This moving function is particularly powerful in that various previously marked entries may be moved all together to another position. Marked entries are moved with ⌨Ctrl ⌨V or by clicking on the button *Move* while at the same time the ⌨Ctrl key is held down.

If several components are moved at once, they are all consecutively placed and are moved as a block. If there are more than three components they will be compressed. Only the first and the last component are then represented with names and component numbers. Similar to the representation of compressed entries, a double framed box is shown in the middle lines which indicate the number of components being moved.

14. Copying Components in the Component List

In the same way that entries are moved, they can be copied and then the copy be moved to another position. Select the component list and press ⌨K or click on the button *Copy*. If there is sufficient space, the selected entry is copied and may now be moved (see above). To copy all marked entries at once, do the above operation with ⌨Ctrl depressed. A concluding double click or a click on the button *OK* (⌨↵) sets the position and the moving mode is left. Again, ⌨Esc, a click with the right mouse button or a click on the button *Cancel* aborts this operation. The copies will automatically be removed from the list, and the original list is restored.

GÖTTING

15. Summary of Actions possible in both List

a) Group List

Function	Mouse	Key
Select group in list	click on entry, ▲ / ▼ ⌨Ctrl click on ▲ / ▼ ⌨Alt click on ▲ / ▼	⌨↑ / ⌨↓ ⌨Page Down / ⌨Page Up ⌨Home / ⌨End
Mark all components of the selected group in the component list	click on *Mark*	⌨M / 'spacebar'
Edit / view selected group	double-click on entry of click on *OK*	⌨↵
Insert components of the selected group in the component list (=> dialog box appears)	click on *[+]* or click on *Insert*	⌨Insert / ⌨+
Insert components of selected group in the component list, closing gaps (=> dialog box appears)	⌨Shift click on *[+]* or ⌨Shift click on *Insert*	⌨Shift ⌨Insert / ⌨Shift ⌨+
Insert all components of the selected group in the component list	⌨Alt click on *[+]* or ⌨Alt click on *Insert*	⌨#
Insert all components of the selected group in the component list, closing gaps	⌨Alt ⌨Shift click on *[+]* or ⌨Alt ⌨Shift click on *Insert*	⌨Shift ⌨#
Delete selected group, leaving gaps in the component list	click on *Delete*	⌨Delete / ⌨← (Backspace) / ⌨-
Delete selected group, leaving no gaps in the component list	⌨Shift click on *Delete*	⌨Shift ⌨Delete / ⌨Shift ⌨← (Backspace) / ⌨Shift ⌨-

Table 17   Possible actions within the group list

b)   Component List

Function	Mouse	Key

Select components in the list (simultaneously, corresponding group in group list)	click on entry, ▲ / ▼
	`Ctrl` click on ▲ / ▼
	`Alt` click on ▲ / ▼
		`↑` / `↓`
		`Page Down` / `Page Up`
		`Home` / `End`

Compress >3 entries / expand a compressed entry	double-click on entry or click on *OK* or click on *Compress/Expand*	`E` / `↵`
Compress / expand all entries	`Alt` double-click on entry, `Alt` click on *OK* or `Alt` click *Compress/Expand*	`Alt` `E`
(Un)mark entry	-	`M`
(Un)mark entry and select next one	click on *Mark*	'spacebar'
(Un)mark all entries corresponding to the selected entry	`Shift` click on *Mark*	`Shift` `M`
(Un)mark all entries	`Alt` click on *Mark*	`Alt` `M`
Insert gap	click on *Insert*	`Insert` / `+` / `L`
Delete entry leaving gaps (if no gap)	click on *Delete*	`Delete` / `←` (Backspace) / `-`
Delete entry without leaving gaps	`Shift` click on *Delete*	`Shift` `Delete` / `Shift` `←` (Backspace) / `Shift` `-`
Delete all marked entries, leaving gaps	`Ctrl` click on *Delete*	`Ctrl` `←` (Backspace) / `Ctrl` `-`
Delete all marked entries, without leaving gaps	`Ctrl` `Shift` click on *Delete*	`Ctrl` `Shift` `←` (Backspace) / `Ctrl` `Shift` `-`
Move entry	click on *Move*	`V`
Move all marked entries	`Ctrl` click on *Move.*	`Ctrl` `V`
Copy entry	click on *Copy*	`K`
Copy all marked entries	`Ctrl` click on *Copy*	`Ctrl` `K`
Conclude moving mode	click on *OK* or *Cancel*	`↵` or `Esc`

Table 18   Possible actions within the component list

> **NOTE!** The dialog for editing the topical program can only be left by using the action field *Accept*, if the component list is valid. A component list will only represent a valid RDS program, if it is no longer empty and contains no more gaps.

3.4.3.4 Save

Selecting this sub menu or pressing [Alt] [F6] causes the topical RDS program to be directly saved to disk. The filename results from the assigned name of the program. If a file of the same name already exists, this will be reported by the program.

3.4.3.5 Save as

This sub menu opens a file selection box, that allows to save the new topical RDS program under another name or in another path, which then will be used in the future. Either select the desired file from the list or enter the filename in the input field *Name*. Confirm the changes with *OK* or abort the procedure by selecting *Cancel* (the dialog box should be operated like the one described in section 3.4.3.2 "Load (Description of the File Selection Box)" on page 42).

3.4.3.6 Print

Drawing 18 Dialog box ' Print Topical RDS Program'

With this function the newly built topical RDS program can be printed in the form of two lists on a text printer connected to LPT1 or written to disk as an ASCII file. If the lists are saved, it is possible to either accept the proposed file name shown in a file selection box or enter a new one.

General Information concerning the Print Dialog:

```
            Print Topical RDS Program

Output to
 (•) Standard Printer Port
 ( ) ASCII File
        Name...   «2A-PROG.TXT»

[X] Permit character codes > 127

Output of
[X] Group List
[X] Component List
        [ ] autom. compressed
[X] Data of each group
        [X] PI Code in detail

  OK      Cancel      Help      Accept
```

The dialog box shown in Drawing 18 displays the maximum number of possibilities for controlling the printing procedure. This or a similar dialog box appears, whenever the topical RDS group, the topical RDS program, or the program slot list of the RDS coder is to be printed.

Within this dialog box, some adjustments are done before the printing procedure is started (also refer to Table 19). To accept the options, select the action field *Accept* and there press ⏎ or click on it with the mouse. Press [Esc] or click on the button *Cancel*, to cancel. This will not generate an output.

Option	Function
Standard Printer Port	Switching on this radio button generates output over the parallel printer interface.
ASCII file	Switching on this radio button generates output into ASCII file.
Name...	This action field displays a file selection box in which the name and the path of the output file can be entered. Its name is displayed next to the field.
Permit character codes > 127	If this field is not ticked, characters with codes larger than 127 are displayed in hexadecimal code numbers ('\nn'). Example: 'ä' will be '\91'
When printing an RDS program:	
Group list	The list of all contained RDS groups is output if this field is ticked.
Component list	A list of all contained components is output if this field is ticked.
Autom. compressed	Consecutive components of the same group are output automatically compressed. In any other case, output of the component list is effected in the way it has been set in the dialog for editing the RDS program.
Data of each group	If this field is ticked, the data of every contained group is output.
When printing RDS groups:	
PI code in detail	In addition to the PI code country, the kind of program, and the program reference number are output.

Table 19   Options within the print dialog

3.4.4   Group Menu

Drawing 19   Menu 'Group'

In RDS-Control one RDS group is always stored in memory. It is called the *topical RDS Group*. Its group type can quite be altered belated without losing data sets of the group types not selected. In this menu can be found functions to work with the topical RDS group.

```
┌─────┐
│Group│
├─────┴──────────────────┐
│ Load...        Ctrl-F7 │
├────────────────────────┤
│ Edit Group...       F7 │
│ View...                │
├────────────────────────┤
│ Save           Alt-F7  │
│ Save as...             │
│ Print...               │
└────────────────────────┘
```

3.4.4.1   Load

Selecting this sub menu or pressing [Ctrl][F7] loads an RDS group from disk into memory as topical group. The file selection box appears. There it is possible to load an already produced and saved to group as topical group into working memory
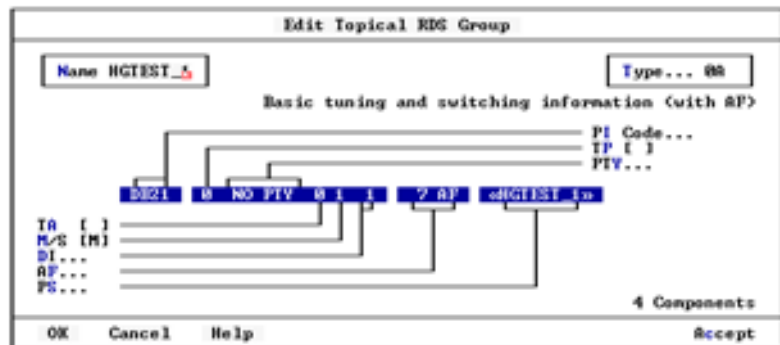
(for operation refer to section 3.4.3.2 "Load (Description of the File Selection Box)" on page 42). Once loading is complete, a dialog window for editing or viewing the topical RDS group is automatically opened.

3.4.4.2   Edit Group

Over this command or by pressing [F7] the dialog box for editing the topical RDS group can be reached.

Drawing 20 Dialog window 'Edit Topical RDS Group'

In the middle of the window, the four information blocks with the components in the group are displayed, and the data within, so far as there is space. On the right side above the block, the input elements are located, that are the same for all group types: PI, TP and PTY. The input elements for the specific group types are located in the left bottom corner. For transmission of all data from a group, it is possible that more than one component will be needed dependent upon group type and quantity of data. Therefore, information on the number of components is always displayed in the lower right.

By the action field *Type* the type of the group may be set (a further window will be opened on which a short description is also displayed). A faster adjustment is possible by pressing [/], [*], [-] and [+] on the number pad, if *Type* is selected. The group type is automatically coded by RDS-Control in block 2 of all components of the group

For each group type the program stores a type specific set of data, so that it is possible to change the group type while editing the *topical* group, without losing data.

How to operate this dialog has already been explained in section 3.3 "A complete Test Run" on page 28. For further information also refer to the on-line help (click on button *Help* or press [F1]).

Hint!   For assigning group names: For similar groups, that later on are to be loaded into an RDS program from disk as a block, choose similar names, if possible (perhaps with consecutive numbering), for then, it is possible to select and load them all by using a single search mask in the file name.

3.4.4.3   View Group

If the rare case occurs that the command *Edit Group* is blocked due to insufficient memory, the sub menu *View Group* offers the possibility of examining at least the contents of the topical group.

3.4.4.4 Save

Selecting this sub menu or pressing `Alt` `F7` causes the topical RDS group to be saved directly. The filename results from the group type and the name assigned to the group. If a file of the same name already exists, then it will be reported by the program.

3.4.4.5 Save as

This sub menu opens a file selection box that allows you to save the new topical RDS program under another name or in another path, which then will be used in the future.

Select the desired file from the list or enter the complete file name in the field *Name*. Confirm the changes by selecting *OK* or break the procedure by selecting *Cancel* (refer also to section 3.4.3.5 "Save as" on page 50 for more information on how to use this dialog box).

3.4.4.6 Print

With this function a newly built topical RDS group can be printed in the form of a list on a text printer connected to LPT1 or written to disk as an ASCII file.

Refer to section 3.4.3.6 "Print" on page 50 for more extensive information.

3.4.5 SMP File Menu

Files with the extension '.SMP', so called sampler files, contain sequences of RDS components in the same form as they are transmitted. This enables, e.g. to record real RDS radio programs and convert them into sampler files using the DOS program

Franken R•D•S - Software-Decoder

(may be ordered from Ing. Büro Dieter Nohse, Weiselleite 18, D-90587 Obermichelbach, Germany). The RDS software decoder allows easy and extensive analysis of this RDS data.

RDS-Control can produce such sampler files out of the components of the topical RDS program or also out of the components of the topical RDS group so that they can be imported and analysed by the RDS software decoder as well. The other way round, the recorded RDS data can be loaded out of an SMP file to reserve a program slot of the HG 813B-PC with it. This is done with the dialog *Edit Program Slots* by switching on the radio button *Load SMP File*.

Drawing 21 The menu 'SMP File'

```
SMP File
┌──────────────────────────┐
│ Topical Program...    F8 │
│ Topical Group...   Alt-F8│
└──────────────────────────┘
```

The menu *SMP file* is used for creating sampler files.
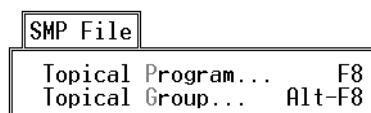
3.4.5.1 Topical Program

This function (`F8`) codes the complete topical RDS program in memory to an SMP file. The suggested file name can be accepted in the file selection box or another name can be assigned. If the selected file name already exists, this fact is pointed out by the program.

3.4.5.2 Topical Group

This function (`Alt` `F8`) codes the topical RDS group in memory to an SMP file. The suggested file name can be accepted in the file selection box or another name can be assigned. If the selected filename already exists, this fact will be pointed out here as well.

3.4.6 Help Menu

The help menu supplies often used information.

Drawing 22 The 'Help' menu

```
                                   Help
                         Command Keys...     F9
                         Help Index...    Alt-F1

                         About...
```

RDS-Control provides an extensive context sensitive on-line help, which can be called upon in all dialog windows, either by clicking with the mouse on the button *Help* or directly with `F1`. If also `Alt` is pressed, the help index is activated.

At reading the help text display, it is possible to leaf through the text by using the cursor keys or by moving the mouse cursor above or below the middle of he window holding down the left mouse button. The double line on the lower edge of the text window indicates the position of the current text section shown in relation to the entire text. Once the text has been read, press `Esc` or the right mouse button or click on the button *Exit*, to leave the text.

3.4.6.1 Command Keys

A help text appears including a general view of all keys, which are reserved with a function in the main screen. By pressing `F9` this help text can directly be reached.

3.4.6.2 Help Index

The help index is reached by this function or from most points in the program by pressing `Alt` `F1` or `F11`. It is a list of all topics a help text exists to. Select an entry with the cursor keys or by keeping the left mouse button pressed. It is also possible to enter the first letters of the desired topic, which causes an automatic selection of the appropriate list entry. The selected help text is displayed by clicking on *OK* or by pressing `↵`.

Once the text has been read, press `Esc` or the right mouse key, which will lead back to the index. The index can be left in the same way.

3.4.6.3 About

Corresponding to the menu *Desktop/RDS-Control* information to the program appears (refer to section 3.4.1.1 "RDS-Control" on page 38). Displayed in this window among the name and copyright additional information about free computer memory in KBytes and the firmware version of the RDS signal generator (if existent).

4   Block Diagram of the RDS Signal Generator
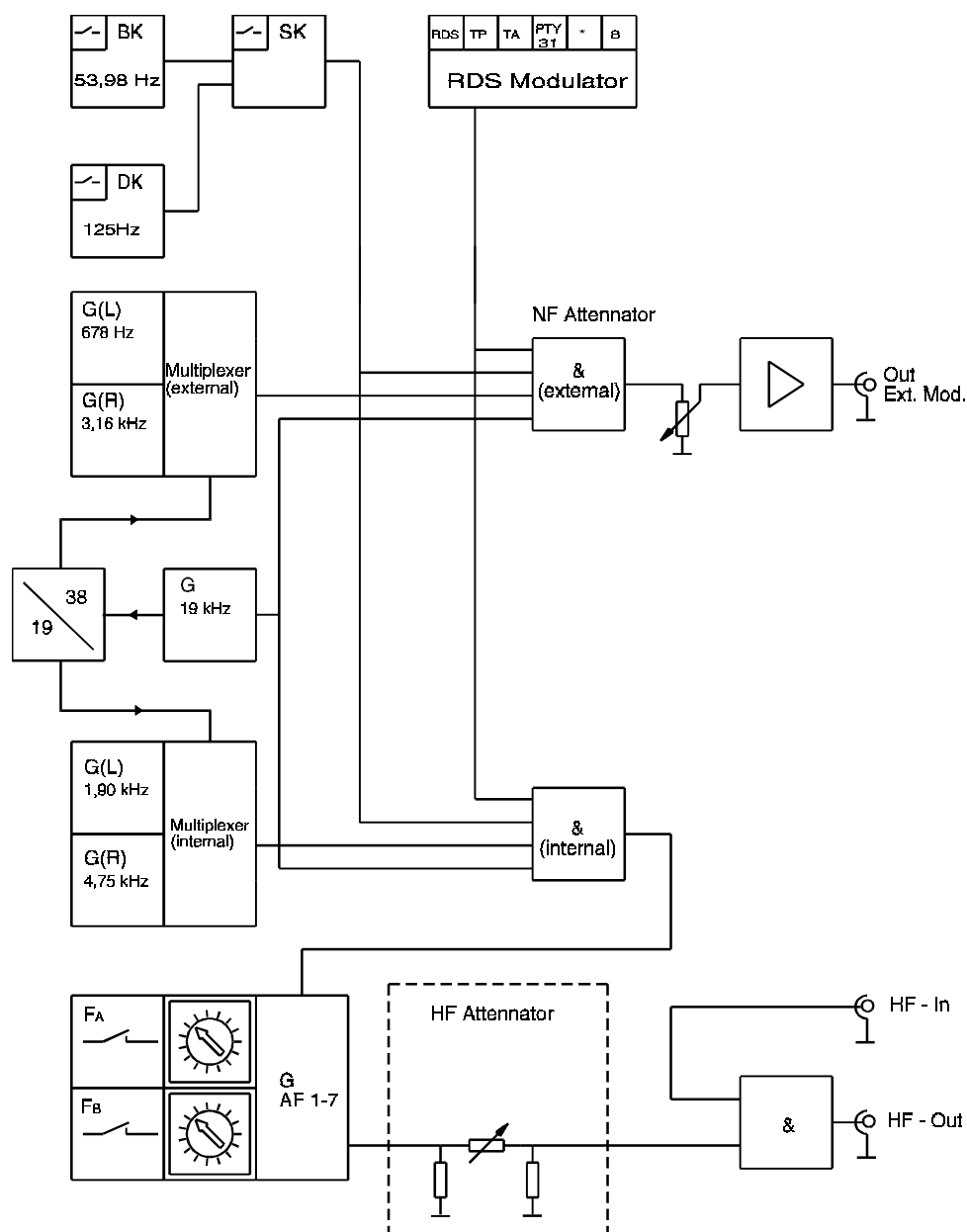
Drawing 23   Block diagram of the RDS generator

5   Technical Specifications

Value	Description
Operating voltage	230 V AC, 50/60 Hz, 15 W
Dimensions	270 mm x 300 mm x 120 mm (L x B x H)
Weight	approx. 3500 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)
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 1 mV or 0 dBµV to 60 dBµV or -107 dBm to -47 dBm
External generator	10 dB throughput damping
Internal resistance	50 Ohm
Internal Modulated Signal	
Multiplexer signal (left channel)	1,90 kHz
Multiplexer signal (right channel)	4,75 kHz
Pilot tone 19 kHz	6,75 kHz stroke
Information carrier (unmodulated)	3,20 kHz stroke
Traffic Announcement Identification	125 Hz, 30% AM
Traffic Area Identification	53,98 Hz, 60% AM (range F)
RDS signal	1,20 kHz stroke
External Modulated Signal (differing values)	
Multiplexer signal (left channel)	0,678 kHz

Table 20   Technical specifications of the RDS generator (Part 1 of 2)

GÖTTING

Value	Description
Multiplexer signal (right channel)	3,16 kHz
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. Here a second RDS signal generator is recommended.
DI	Decoder Information
M/S	Music/speech identification

Table 20   Technical specifications of the RDS generator (Part 2 of 2)

6   Ordering Information

6.1   Ordering Codes

Ordering code / Option	Device
HG 813B	RDS Signal Generator
HG 908	Option PC Interface
HG 813B-PC	RDS Signal Generator incl. PC Interface
HG 908/395	Converts HG 813A to HG 813B-PC
HG 395	Converts HG 813A to HG 813B
Option Cabling	• 1 m cable with BNC plug / BNC plug • 1 m cable with BNC plug / 2 x 4 bushel plugs • 1 m cable with BNC plug / HF 4/13 plug • 0,1 m cable with BNC plug / HF 4/13 plug • HF 4/13 coupler (socket / socket) • Plug combiner HF 4/13 to DIN 47283, cable RG58 (50 Ohm)

Table 21   Ordering codes for RDS generator

6.2   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

GÖTTING

7   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	
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	**1**
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 22   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 push-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	Se-quence
RDS'	EON 1	0A	0	1	1	1	0	8

Table 23   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-But-tons	PS(ON)	Type	TP(TN)	TP(ON)	PTY(TN)	PTY(ON)	Se-quence
RDS' + TP	HGTEST 2	14A	0	1	0	0	1

Table 24   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 push-buttons *<RDS´>* and *<TA>* switches the same EON traffic information announcement.

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

Table 25   Programs for generation of the EON jump

The following programs are transmitted until the appropriate push-button is pressed 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 26   Programs for repeated transmission with varying PTYs

GÖTTING

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
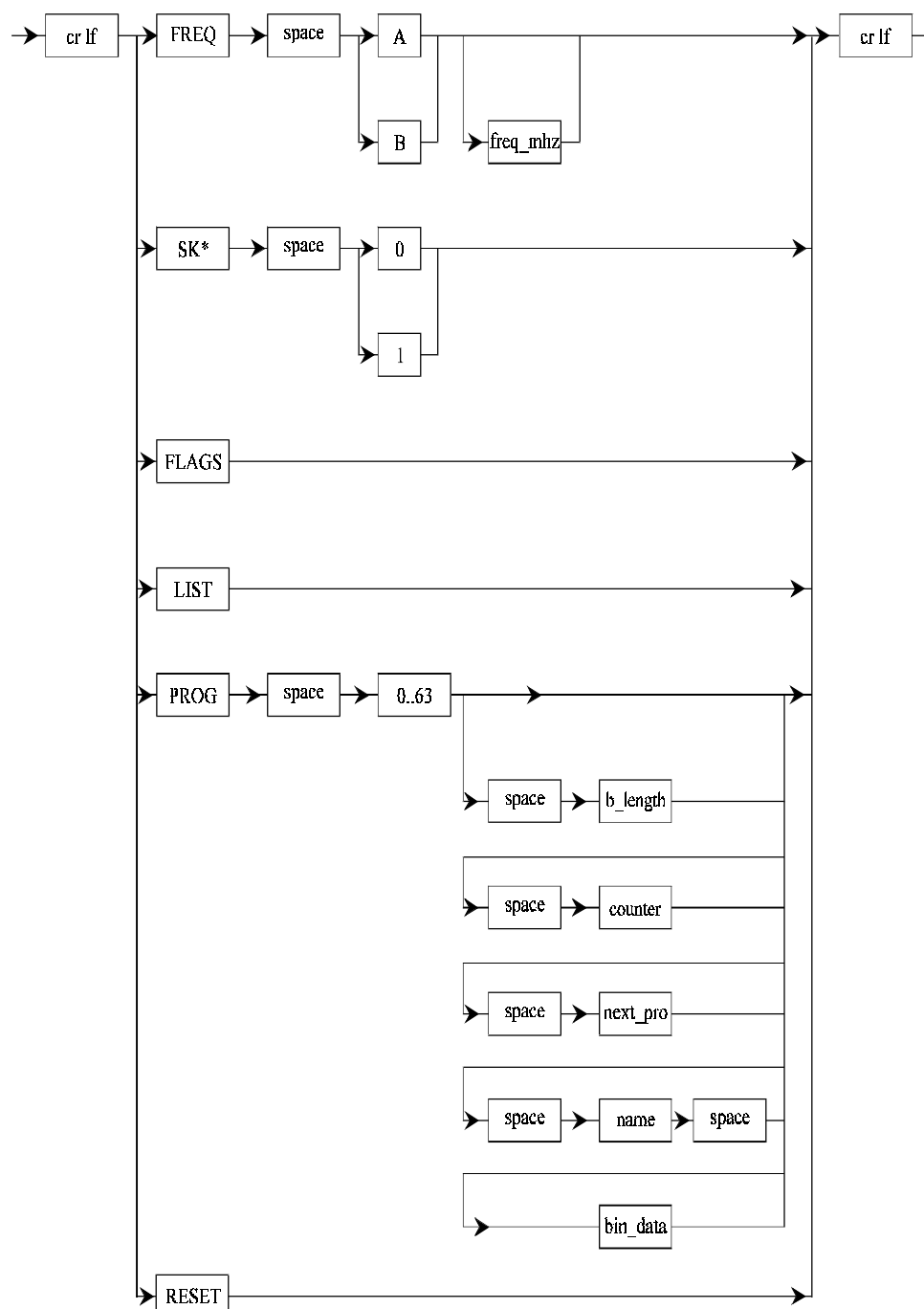
Drawing 24 Remote control syntax for RDS service generator HG 813B-PC

*)   not only SK possible, but also following switches:
BK, DK, ST1L, ST1R, ST2L, ST2R, STEREO, PILOT

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. *freq_mhz* has a format of nnn.n and a range of 87.5 to 108.0. *bin_data* is a sequence of hexadecimal digits ('0'...'9' and 'a'...'f' or 'A'...'F').

Keyword		Explanation
FREQ		Select frequency A or B or define another value for frequency A or B from a range of 87.5 to 108.0 MHz.
SK, BK, DK		ARI functions as with the RDS service generator HG 813B. In addition the diverse generators can be switched (ST1L, ST1R, ST2L, ST2R, PILOT and STEREO).
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 push-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, this holds the length of the program in bytes (e.g. one component consisting of 104 bits has the length of 104 / 8 = 13). If the length is zero then 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	Program data whose length was given by b_length. Every four bits are grouped to a hexadecimal digit.

Table 27   Explanation of the keywords (Part 1 of 2)

GÖTTING

Keyword	Explanation
FLAGS	The state of the diverse switches and the generators and the reserved frequencies, followed by the number of the firmware version.
LIST	A list of all reserved program slots is output, each line of the form: - number of the program slot, name, number of the next program slot, number of repetitions and program length in bytes. At the very end follows the free memory of the device in bytes.
RESET	All programming in the device is erased. The HG813B-PC is set back to original state.

Table 27   Explanation of the keywords (Part 2 of 2)

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.

8   List of Pictures

9   List of Tables

10 Index

GÖTTING