FM Stereo / RDS
Option for R&S®Signal Generators
Operating Manual

1171.6050.12 ─ 10

Test & Measurement

Operating Manual

ROHDE&SCHWARZ

This document describes the following software options:

- R&S®AMU-K57
  1403.4102.02
- R&S®SMATE-K57
  1400.6450.02
- R&S®SMBV-K57
  1415.8190.xx
- R&S®SMJ-K57
  1403.6350.02
- R&S®SMU-K57
  1403.6250.02

This manual version corresponds to firmware version:
FW 3.20.281.xx and later of the R&S®SMBV100A
FW 2.20.360.142 and later of the R&S®SMU200A, R&S®SMATE200A, R&S®SMJ100A and R&S®AMU200A

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The following abbreviations are used throughout this manual: R&S®AMU200A is abbreviated as R&S AMU, R&S®SMATE200A is abbreviated as R&S SMATE, R&S®SMBV100A is abbreviated as R&S SMBV, R&S®SMJ100A is abbreviated as R&S SMJ, R&S®SMU200A is abbreviated as R&S SMU, R&S®WinIQSIM2™ is abbreviated as R&S WinIQSIM2

Contents

1 Preface

1.1 Documentation Overview

The user documentation for the R&S Signal Generator consists of the following parts:

- Online Help system on the instrument,
- "Quick Start Guide" printed manual,
- Documentation CD-ROM with:
  - Online help system (*.chm) as a standalone help,
  - Operating Manuals for base unit and options,
  - Service Manual,
  - Data sheet and specifications,
  - Links to useful sites on the R&S internet.

Online Help

The Online Help is embedded in the instrument's firmware. It offers quick, context-sensitive access to the complete information needed for operation and programming. The online help contains help on operating the R&S Signal Generator and all available options.

Quick Start Guide

The Quick Start Guide is delivered with the instrument in printed form and in PDF format on the Documentation CD-ROM. It provides the information needed to set up and start working with the instrument. Basic operations and an example of setup are described. The manual includes also general information, e.g., Safety Instructions.

Operating Manuals

The Operating Manuals are a supplement to the Quick Start Guide. Operating Manuals are provided for the base unit and each additional (software) option.

These manuals are available in PDF format - in printable form - on the Documentation CD-ROM delivered with the instrument. In the Operating Manual for the base unit, all instrument functions are described in detail. Furthermore, it provides an introduction to remote control and a complete description of the remote control commands with programming examples. Information on maintenance, instrument interfaces and error messages is also given.

In the individual option manuals, the specific functions of the option are described in detail. For additional information on default settings and parameters, refer to the data sheets. Basic information on operating the R&S Signal Generator is not included in the option manuals.

Service Manual

The Service Manual is available in PDF format - in printable form - on the Documentation CD-ROM delivered with the instrument. It describes how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for repairing the instrument by the replacement of modules.

This manual can also be orderd in printed form (see ordering information in the data sheet).

Release Notes

The release notes describe new and modified functions, eliminated problems, and last minute changes to the documentation. The corresponding firmware version is indicated on the title page of the release notes. The current release notes are provided in the Internet.

Web Help

The web help provides online access to the complete information on operating the R&S Signal Generator and all available options, without downloading. The content of the web help corresponds to the user manuals for the latest product version.

The web help is available on the R&S Signal Generator product page at the Downloads > Web Help area.

Application Notes

Application notes, application cards, white papers and educational notes are further publications that provide more comprehensive descriptions and background information.

The latest versions are available for download from the Rohde & Schwarz website, at http://www.rohde-schwarz.com/appnotes.

1.2 Typographical Conventions

The following text markers are used throughout this documentation:

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialog boxes, menus, options, buttons, and softkeys are enclosed by quotation marks.
KEYS	Key names are written in capital letters.
`File names, commands, program code`	File names, commands, coding samples and screen output are distinguished by their font.
Input	Input to be entered by the user is displayed in italics.

Convention	Description
Links	Links that you can click are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by quotation marks.

1.3 Notes on Screenshots

When describing the functions of the product, we use sample screenshots. These screenshots are meant to illustrate as much as possible of the provided functions and possible interdependencies between parameters. The shown values may not represent realistic test situations.

The screenshots usually show a fully equipped product, that is: with all options installed. Thus, some functions shown in the screenshots may not be available in your particular product configuration.

2 Introduction

The R&S Signal Generator enables you to generate signals in accordance with the United States Radio Broadcast Data System (RBDS) standard and the european standard CENELEC EN50067 "Specification of the Radio Data System (RDS) for VHF/FM Sound Broadcasting in the frequency Range from 87.5 to 108.0 MHz".

The R&S Signal Generator simulates FM-STEREO signal at the physical layer. The following list gives an overview of the main options provided by the R&S Signal Generator for generating a FM-STEREO signal in accordance with the RDS/RBDS standard:

- Generation of standard compliant FM-Stereo signal with Stereo audio signal and RDS/RBDS signal
- Full configuration of all group types and versions
- Internal modulation sources from LF Generator and wave file for digital stereo signal
- External modulation sources from digital S/P DIF interface for digital stereo signal
- In case of two path instrument, simulation of two independent FM radio transmitters
- Configuration of other networks and alternative frequency list

2.1 Modulation System FM-Stereo

The figure below shows the stereophonic multiplex containing the data signal.

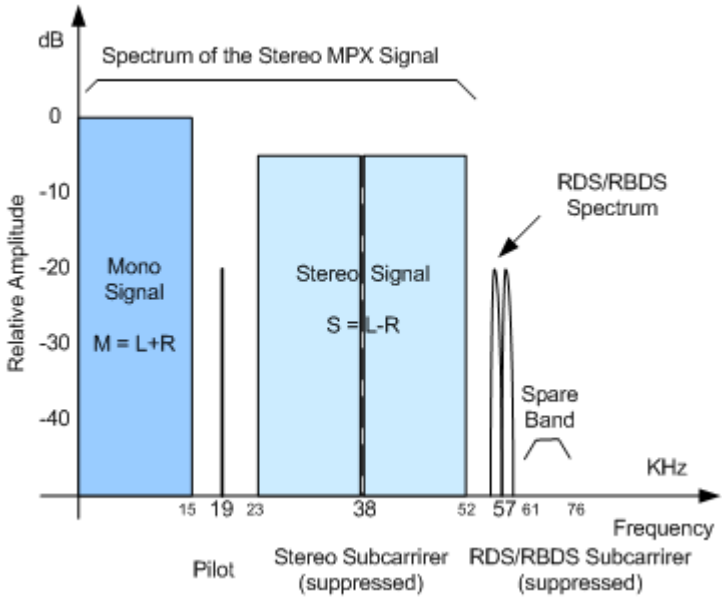


Fig. 2-1: FM baseband spectrum including RDS/RBDS subcarrier

The radio frequency signal consists of a frequency modulated carrier with frequency of 19 kHz and maximum frequency deviation of 80 kHz.

The stereophonic multiplex signal consists of a mono signal, the sidebands of the stereo signal with suppressed subcarrier at 38 kHz and a pilot signal with exactly one half of the subcarrier frequency.

The mono signal M is the sum of the left-hand signal L and the right-hand signal R. The stereo signal S is the difference between the signals L and R. A pre-emphasis can be applied to both L and R signal prior to stereo coding.

The RDS/RBDS subcarrier is locked to the third harmonic of the 19 kHz pilot tone and suppressed.

The R&S Signal Generator enables you to configure the pilot's phase and frequency deviation, the RDS/RBDS subcarrier's phase and frequency deviation and the preemphasis. The pilot's phase and the RDS/RBDS subcarrier phase are set with respect to the 38 kHz subcarrier.

The firgure below shows the FM-Stereo block diagram.

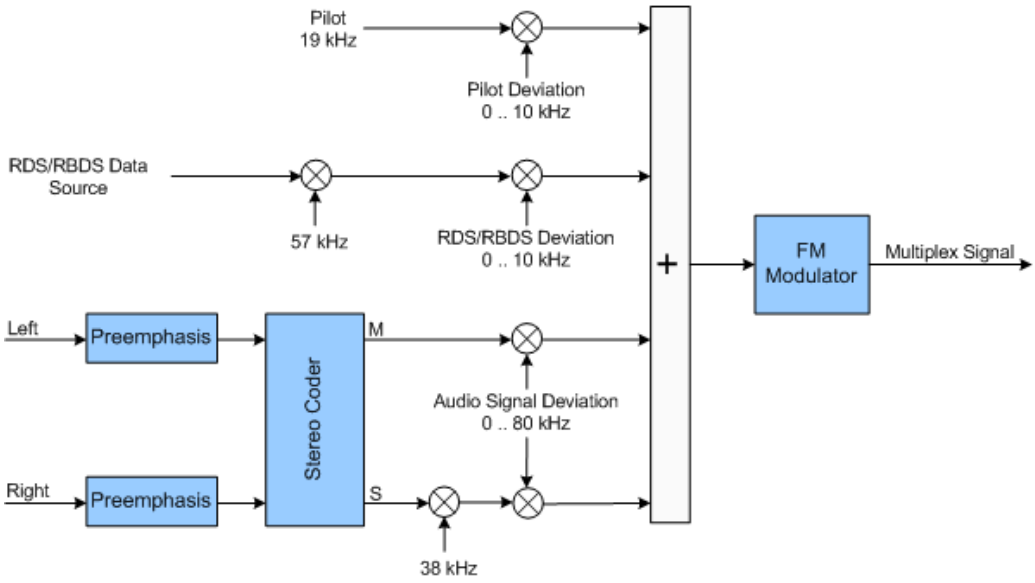


Fig. 2-2: FM-Stereo block diagram

2.2 Baseband Coding and Group Structure

The figure below shows the baseband coding principle.

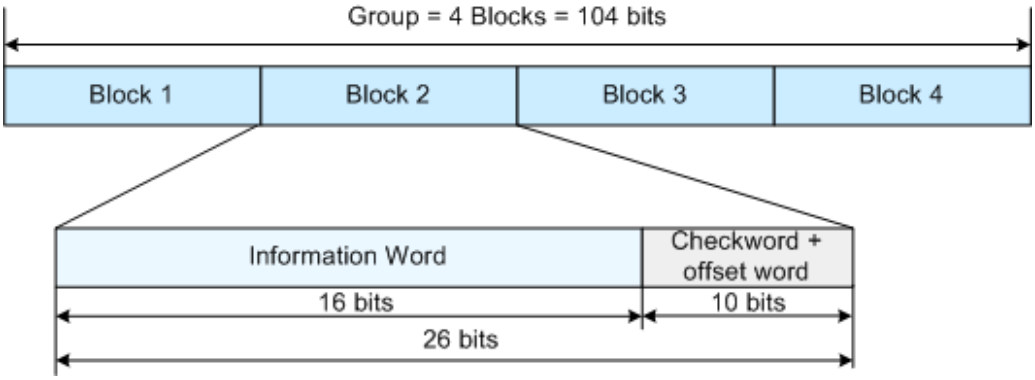


Fig. 2-3: Structure of the baseband coding

The basic element in the signal structure is the group. There are 16 groups (0 to 15) with 104 bits each. Each group consists of 4 blocks, 26 bits each. A block comprises an information word (16 bits) and a check word (10 bits).

Each group has two versions, version A and Version B. The figure below shows the group structure for both versions.

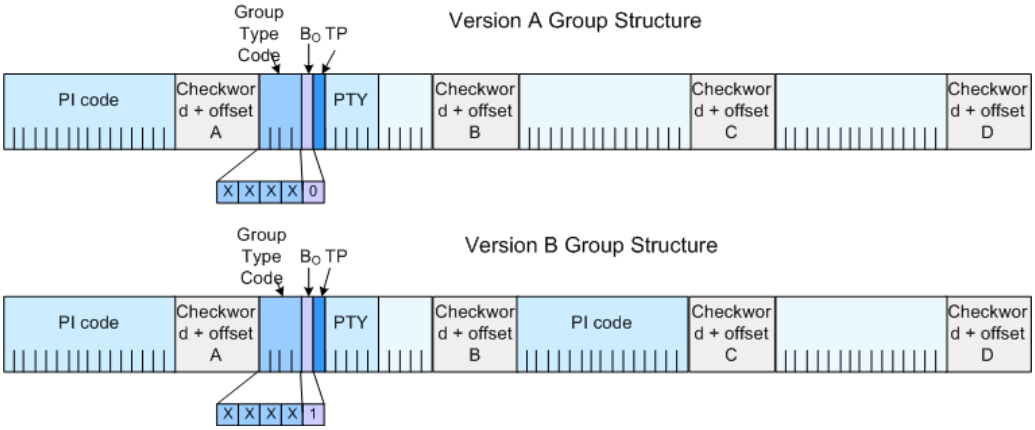
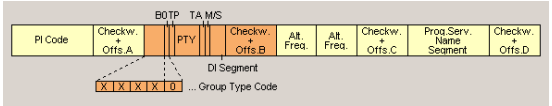
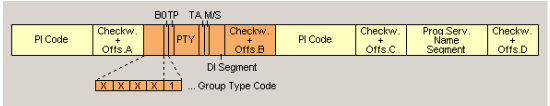
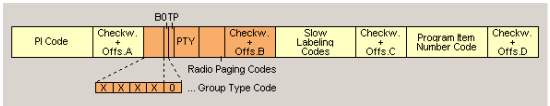
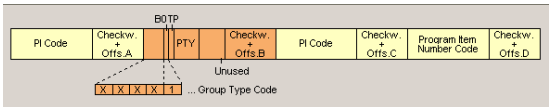
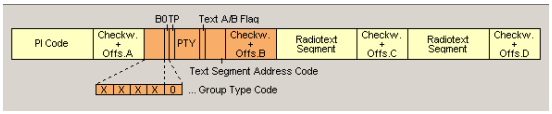
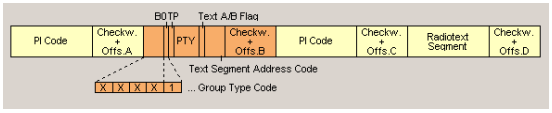
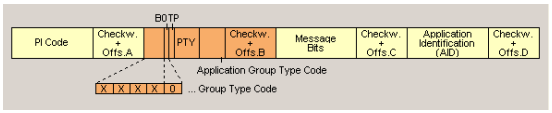
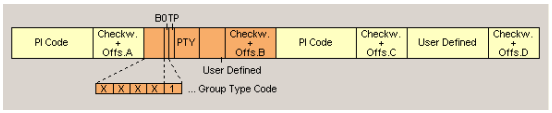
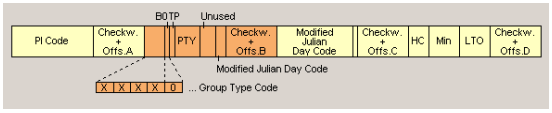
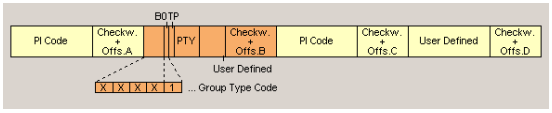
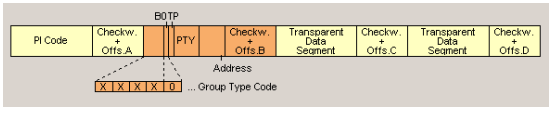
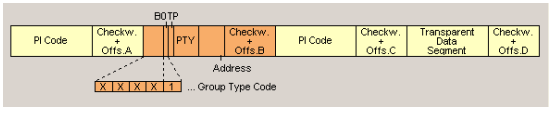
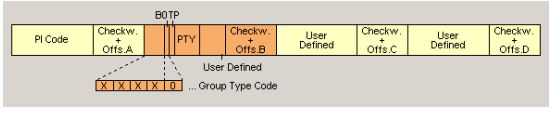
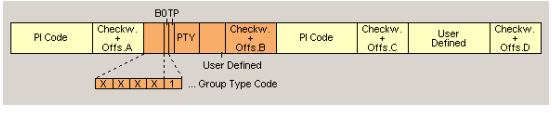
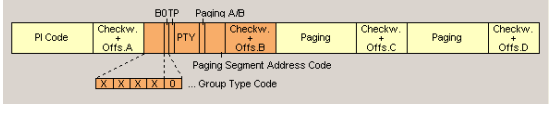
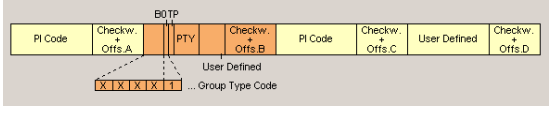
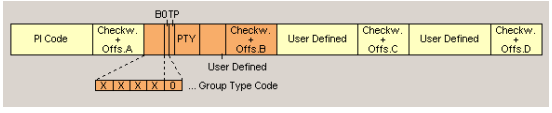
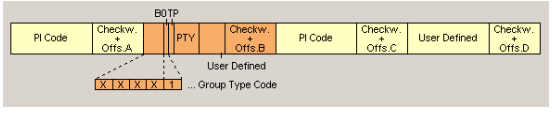
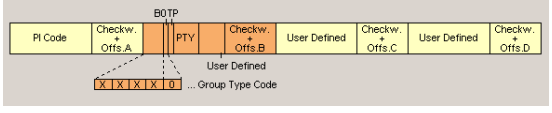
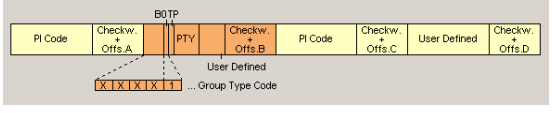
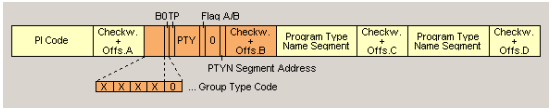
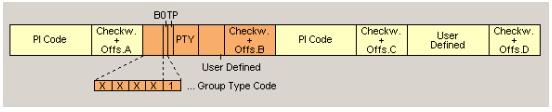
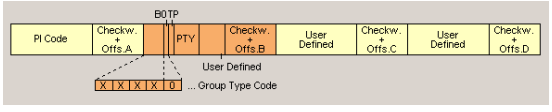
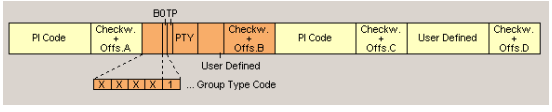
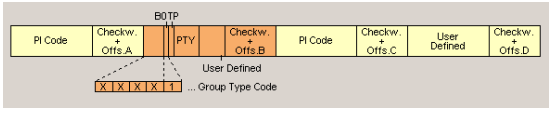
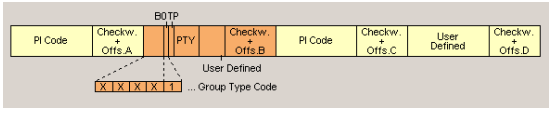


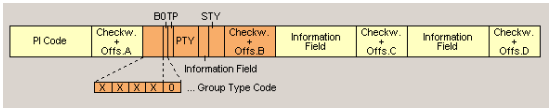
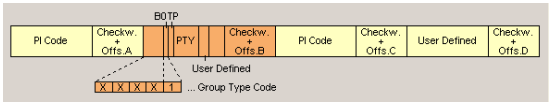
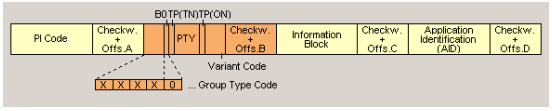
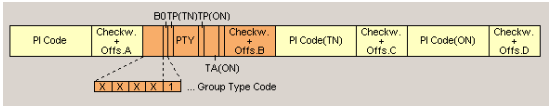
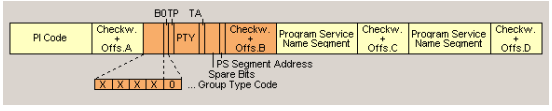
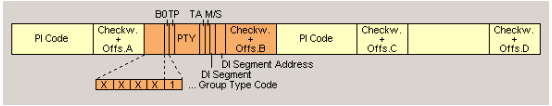
Fig. 2-4: Version A and B group format

The table below gives an overview of the available frame formats per Group Type and Group Type Version. The frame format is displayed in the "RDS/RBDS User Message Table" dialog of the corresponding group type and group type version

Table 2-1: Frame Formats per Group Type and Group Type Version

Group Type	Frame Format for Group Type Version A	Frame Format for Group Type Version B
0		
1		

Group Type	Frame Format for Group Type Version A	Frame Format for Group Type Version B
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Group Type	Frame Format for Group Type Version A	Frame Format for Group Type Version B
13		
14		
15		

3 FM-Stereo User Interface

The menu for setting the FM-Stereo digital standard is either called from the baseband block or from the menu tree under "Baseband."

The screenshots provided in this description show parameter values that have been selected to illustrate as much as possible of the provided functions and possible interdependencies between them.

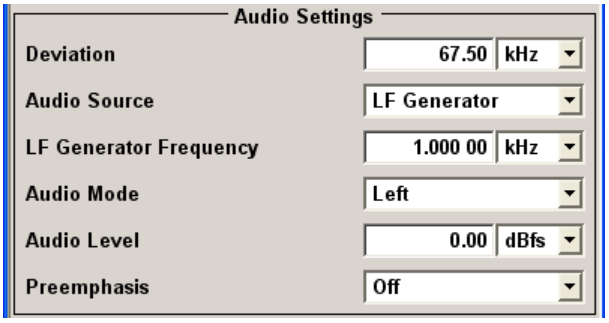
These values are not necessarily representative of realistic test situations.

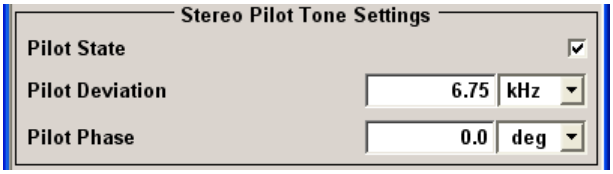
3.1 Main Settings

The menu is split into several sections for configuring the standard.

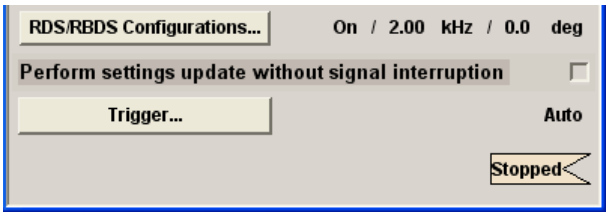
The upper menu section is where the FM-Stereo digital standard is activated and deactivated and the FM deviation is set. Configuration settings can be stored and already stored configuration settings can be loaded.

In the next two sections, the audio and stereo pilot tone settings are selected.





The buttons in the lower menu section lead to submenus for setting the trigger parameters and RDS/RBDS parameters.



3.1.1 General Settings

State
Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Remote command:
`[:SOURce<hw>]:BB:STEReo:STATe` on page 50

Set To Default
Calls the default settings. The values of the main parameters are listed in the following table.

Parameter	Value
State	Not affected by "Set To Default"
Deviation	67 500 Hz
Audio Source	Off
Audio Mode	Mono Left
Audio Level	0 dBfs
Preemphase	Off
Pilot State	On
Pilot Deviation	6750 Hz
Pilot Phase	0 deg
RDS/RBDS Configuration	On / 2.00 kHz / 0 deg
Trigger	Auto
Perform settings update without signal interruption	On

Remote command:
`[:SOURce<hw>]:BB:STEReo:PRESet` on page 51

Save/Recall..
Calls the "Save/Recall" menu.

From the "Save/Recall" menu, the "File Select" windows for saving and recalling FM-STEREO configurations and the "File Manager" is called.

FM-STEREO configurations are stored as files with the predefined file extension `*.fm`. The file name and the directory they are stored in are user-definable.

The complete settings in the "FM-STEREO" menu are saved and recalled.

"Recall FM-STEREO Setting"
Opens the "File Select" window for loading a saved FM-STEREO configuration.
The configuration of the selected (highlighted) file is loaded by pressing the "Select" button.

"Save FM-STEREO Setting"
Opens the "File Select" window for saving the current FM-STEREO signal configuration.
The name of the file is specified in the "File Name" entry field. The file is saved by pressing the Save button.

"File Manager"
Calls the "File Manager".
The "File Manager" is used to copy, delete, and rename files and to create new directories.

Remote command:
`[:SOURce<hw>]:BB:STEReo:SETTing:CATalog?` on page 51
`[:SOURce<hw>]:BB:STEReo:SETTing:LOAD` on page 51
`[:SOURce<hw>]:BB:STEReo:SETTing:STORe` on page 52

3.1.2 Audio Settings

In the "Audio Settings" section, the source for the audio signal and the preemphase are selected.

Deviation
Sets the frequency deviation of the audio signal, i.e. the deviation of the mono signal M and the stereo signal S (see figure 2-2).

Remote command:
`[:SOURce<hw>]:BB:STEReo:DEViation` on page 52

Audio Source
Selects the audio source for the FM-Stereo signal.

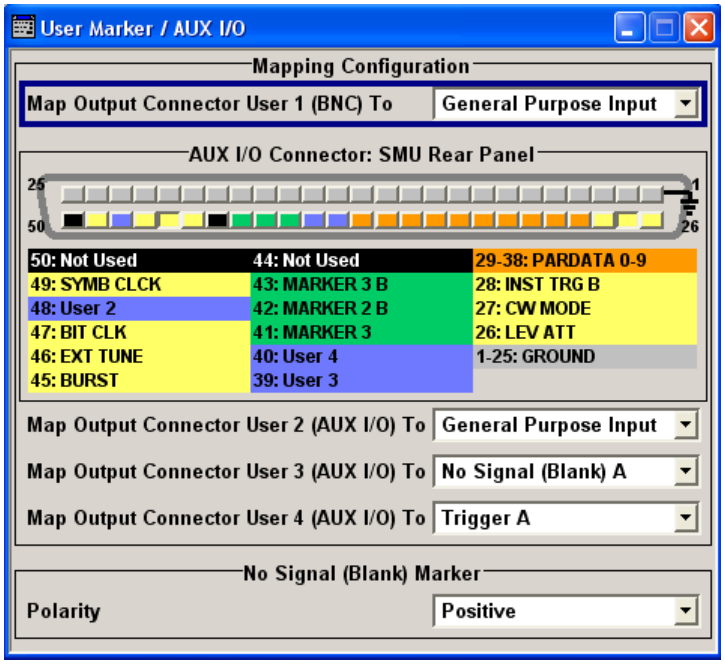
The sources cannot be used simultaneously.

"Off" The audio source is switched off.

"Extern S/P-DIF"

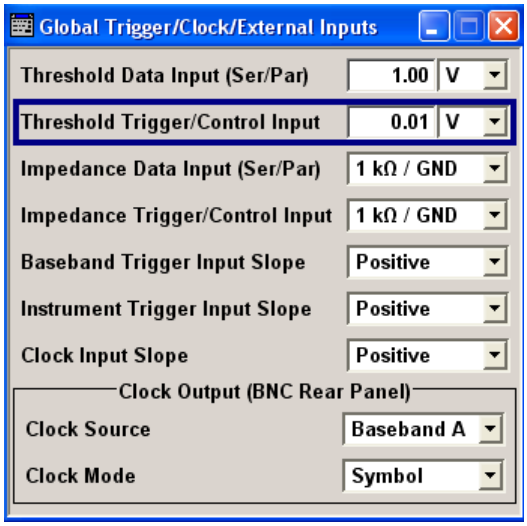
Activates the S/P-DIF input for the external digital modulation signals.
For R&S SMBV instruments:
The audio source for has to be connected to the CLK IN connector on the rear panel.
For R&S SMU, R&S SMJ, R&S SMATE and R&S AMU instruments:
The audio source for path A/B has to be connected respectively to the USER1/2 connector on the rear panel. The parameters "Map Out-

put Connector User 1 (BNC) / User 2 (AUX I/O) To" in the "User Marker/ AUS I/O" dialog have to be set to General Purpose Input.



Note: Appliying audio signal to the S/P-DIF interface.
For proper signal processing, the instrument requires an S/P-DIF source with input level of minimum 2.000 V and the following settings:

- "Extern Clock Source"
- "Global Trigger/Clock/External Inputs > Threshold Trigger/Control Input = 0.01V"
- "Global Trigger/Clock/External Inputs > Impedance Trigger/ Control Input = 50 Ohm"



"LF-Generator"
The audio source is generated by the internal LF generator. The frequency of the LF generator is set with the parameter LF Generator Frequency.

"Waveform Audio File"
A WAV-File can be selected. Audio files are selected in the Load Audio File menu.

Remote command:
[:SOURce<hw>]:BB:STEReo:SOURce on page 53

External Clock
Sets the external clock (44.1 or 48 kHz) in case an extern S/P-DIF audio source is selected.

Remote command:
[:SOURce<hw>]:BB:STEReo:AUDio:EXTClock on page 54

Load Audio File
Opens the "Load Audio File" menu to select the WAV-File.

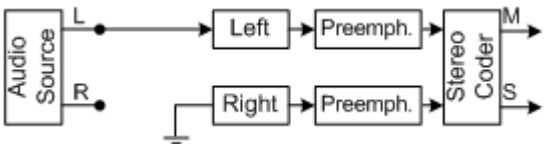
Remote command:
[:SOURce<hw>]:BB:STEReo:AUDio:DSELect on page 54

LF Generator Frequency
Sets the frequency of the LF-Generator in case a LF-Generator is selected as audio source.

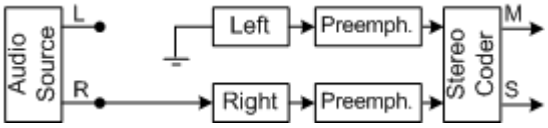
Remote command:
[:SOURce<hw>]:BB:STEReo:AUDio[:FREQuency] on page 56

Audio Mode
Sets the way the stereo audio source is mapped in case of mono or stereo operating mode.

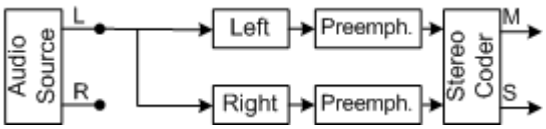
"Left" Audio signal only in the left-hand channel.



"Right" Audio signal only in the right-hand channel.

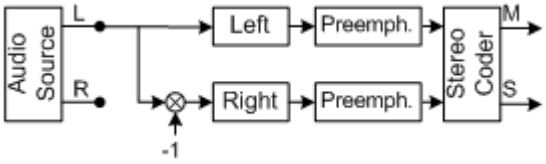


"Stereo Left=Right"
Audio signal of same frequency and phase in both channels.



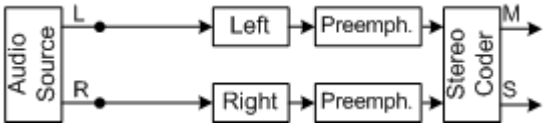
"Stereo Left=-Right"

Audio signal of same frequency but opposite phase in both channels.



"True Stereo"

Audio signal with true stereo quality, i.e. different and independent signals in both channels.
This audio mode is not possible for audio source LF Generator.



Remote command:
[:SOURce<hw>]:BB:STEReo:AUDio:MODE on page 55

Audio Level
Sets the level of the audio signal.

Remote command:
[:SOURce<hw>]:BB:STEReo:AUDio:LEVel on page 54

Preemphasis
Enables/disables and sets the preemphasis parameter value to 50 us or 75 us.

Remote command:
[:SOURce<hw>]:BB:STEReo:AUDio:PREemphasis on page 55

3.1.3 Stereo Pilot Tone Settings

Pilot State
Enables/disables the 19 kHz pilot tone.

Stereo operating mode is possible with enabled pilot tone only.

Remote command:
[:SOURce<hw>]:BB:STEReo:PILot:STATe on page 56

Pilot Deviation
Sets the frequency deviation of the pilot tone (see figure 2-2).

The parameter is enabled only for enabled pilot tone.

Remote command:
[:SOURce<hw>]:BB:STEReo:PILot[:DEViation] on page 56

Pilot Phase
Sets the phase of the pilot tone (with respect to the 38 kHz subcarrier).

The parameter is enabled only for enabled pilot tone.

Remote command:
[:SOURce<hw>]:BB:STEReo:PILot:PHASe on page 56

3.1.4 RDS/RBDS Parameters

RDS/RBDS Configurations
Calls the "RDS/RBDS Configurations" menu for configuring the RDS/RBDS. The currently selected RDS/RBDS parameters state, deviation and phase are displayed next to the button.

The menu is described in chapter 3.2, "RDS/RBDS Configuration", on page 22.

Remote command:
n.a.

Perform settings update without signal interruption
Sets the way the FM signal is calculated in case of parameter update. If this parameter is enabled and some parameters are changed, these parameters are updated but the FM signal will not be interrupted.

Disabling the parameter results in automatically re-calculation of the FM signal after each parameter update. This will disturb the pilot and the receiver has to be re-synchronized.

Remote command:
[:SOURce<hw>]:BB:STEReo:PUWSint on page 57

Trigger…
Calls the menu for selecting the trigger mode and trigger source, for configuring the marker signals, and for setting the time delay of an external trigger signal.

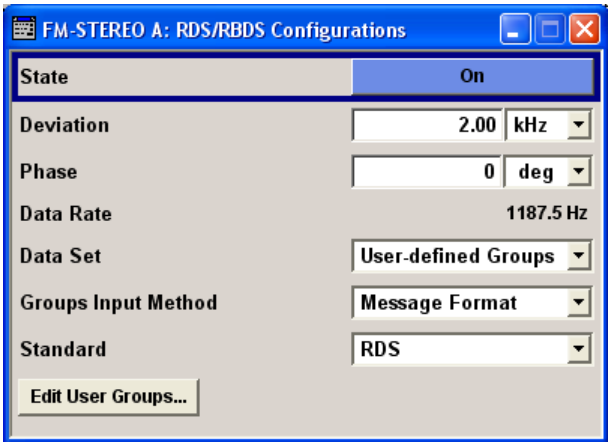
This menu is described in chapter 3.7, "Trigger", on page 45.

The currently selected trigger mode and trigger source are is displayed next to the button.

Remote command:
n.a.

3.2 RDS/RBDS Configuration

The "RDS/RBDS Configuration" menu allows you to configure the RDS/RBDS data.



State
Activates/deactivates RDS/RBDS function.

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:STATe` on page 61

Deviation
Sets the frequency deviation of the RDS/RBDS subcarrier (see figure 2-2).

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:DEViation` on page 58

Phase
Selects the phase of the RDS/RBDS subcarrier (with respect to the 38 kHz subcarrier).

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:PHASe` on page 60

Data Rate
Displays the RDS/RBDS data rate in Hz.

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:DRATe?` on page 59

Data Set
Selects and activates the RDS/RBDS data set.

"User-defined Groups"	The RDS/RBDS parameters in the"RDS/RBDS Groups Message Settings" or in the "RDS/RBDS Group Hex Table" menu can be configured by the user.

"Group List" The RDS/RBDS parameters can be loaded from a group list file. "Group List" can be generated internally in the data editor by means of the "Save Groups" button in "RDS/RBDS Groups Message Settings" menu.
The Group lists files have to have an extension `*.fm_gt`.
Group lists are selected in the "Load Group List" window, which is called by means of the "Select Group List" button.

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:DSET` on page 59
`[:SOURce<hw>]:BB:STEReo:DS:DSELect` on page 59

Groups Input Method
Selects the input format the RDS/RBDS parameters are represented for editing. There are two input formats: message format or hex table.

The parameter is enabled for data set "User-defined Groups" only.

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:GIM` on page 60

Standard
Selects the standard, RDS or RBDS, the signal is generated for.

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:MODE` on page 60

Edit User Group
Depending on the selection made for the parameter Groups Input Method, calls the "RDS/RBDS Groups Message Settings" menu or the "RDS/RBDS Group Hex Table" menu for configuring the RDS/RBDS parameters.

The parameter is enabled for data set "User-defined Groups" only.

The menus are described in sections chapter 3.3.1, "General Settings", on page 25 and chapter 3.6, "RDS/RBDS Group Hex Table", on page 44.

Remote command:
`n.a.`

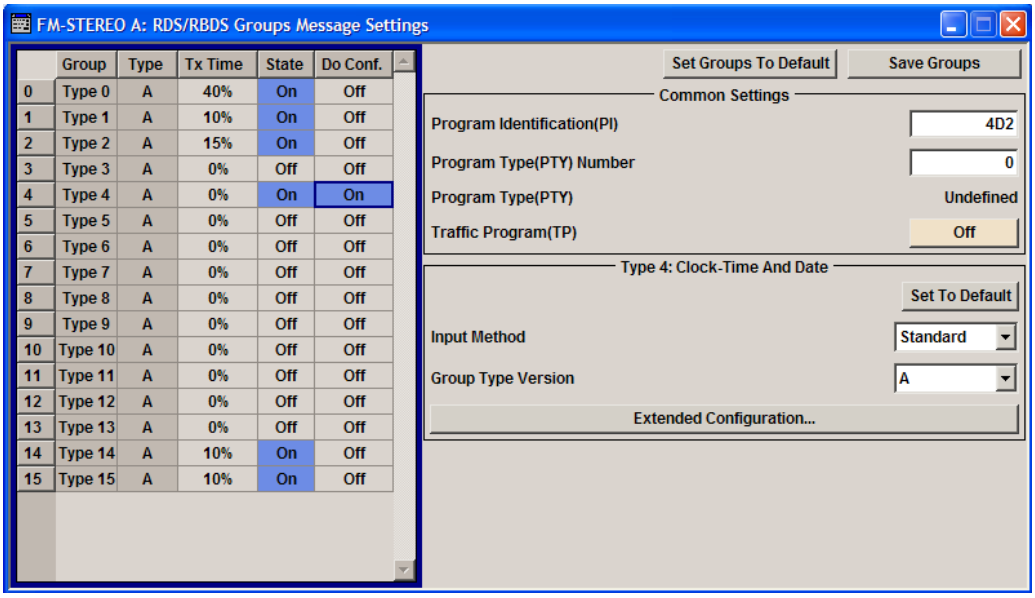
Select Group List
(enabled for data set Group List only)

Calls the "Load Group List" menu for group file selection.

Remote command:
`[:SOURce<hw>]:BB:STEReo:DS:DSET` on page 59
`[:SOURce<hw>]:BB:STEReo:DS:DSELect` on page 59

3.3 RDS/RBDS Groups Message Settings

The "RDS/RBDS Settings" menu allows you to configure the RDS/RBDS parameters. The RDS/RBDS parameters are divided into common RDS/RBDS settings and group type specific settings.



3.3.1 General Settings

Set Groups to Default
Sets all group parameter values to the default settings.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:PRESet` on page 83

Save Groups
Calls "Save Groups" menu for saving the settings to a file with extension `*.fm_gt`.

These files can be than loaded by means of the "Select Group List …" button in the "RDS/RBDS Configuration" menu.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:STORe` on page 83

3.3.2 Common Settings

Program Identification (PI)
Sets the parameter PI (Program Identification) in hex format.

The PI code is an international network identificator. PI identifies the nation, the coverage area of the service and the radio network. PI can be used for automatically tuning and is transmitted in all the groups.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:CMNS:PI` on page 64

Program Type (PTY) Number
Sets the program type number (see table 3-1).

The PTY number identifies the content of the program.

PTY can be used for automatically tuning and is transmitted in all the groups.

Table 3-1: RDS/RBDS Program Types

PTY Code	RDS Program Type	RBDS Program Type
0	No program type or undefined	No program type or undefined
1	News	News
2	Current Affairs	Information
3	Information	Sports
4	Sports	Talk
5	Education	Rock
6	Drama	Classic Rock
7	Culture	Adult Hits
8	Science	Soft Rock
9	Varied	Top 40
10	Pop Music	Country
11	Rock Music	Oldies
12	M.O.R. Music	Soft
13	Light classical	Nostalgia
14	Serious classical	Jazz
15	Other Music	Classical
16	Weather	Rhythm and Blues
17	Finance	Soft Rhythm and Blues
18	Children's programs	Foreign Language
19	Social Affairs	Religious Music
20	Religion	Religious Talk
21	Phone In	Personality
22	Travel	Public
23	Leisure	College
24	Jazz Music	Unassigned
25	Country Music	Unassigned
26	National Music	Unassigned
27	Oldies Music	Unassigned
28	Folk Music	Unassigned

PTY Code	RDS Program Type	RBDS Program Type
29	Documentary	Weather
30	Alarm Test	Emergency Test
31	Alarm	Emergency Test

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:CMNS:PTY on page 65

Program Type (PTY)
Displays the program type name of the selected PTY number (see table 3-1).

Remote command:
n.a.

Traffic Program (TP)
Enables/ disables the traffic program. TP code identifies radio programmes that continuously broadcasts traffic information.

TP can be used for automatically tuning and is transmitted in all the groups.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:CMNS:TP on page 65

3.3.3 Group Type 0A .. 15B Settings

The parameters in this section depend on the group type selected. To enable a group type for configuration, enable the corresponding parameter Do Conf. in the "Group Table". .

The table 3-2 gives an overview of the available RDS/RBDS Group Types.

Table 3-2: RDS/RBDS Group Type Codes

Group Type	Group Type Version	Description
0	A	Basic tuning and switching information only
	B	Basic tuning and switching information only
1	A	Program Item Number and slow labeling codes only
	B	Program Item Number
2	A	Radio text only
	B	Radio text only
3	A	Applications Identification for ODA only
	B	Open Data Applications
4	A	Clock-time and date only
	B	Open Data Applications
5	A	Transparent Data Channels (32 channels) or ODA

Group Type	Group Type Version	Description
	B	Transparent Data Channels (32 channels) or ODA
6	A	In House applications or ODA
	B	In House applications or ODA
7	A	Radio Paging or ODA
	B	Open Data Applications
8	A	Traffic Message Channel or ODA
	B	Open Data Applications
9	A	Emergency Warning System or ODA
	B	Open Data Applications
10	A	Program Type Name
	B	Open Data Applications
11	A	Open Data Applications
	B	Open Data Applications
12	A	Open Data Applications
	B	Open Data Applications
13	A	Enhanced Radio Paging or ODA
	B	Open Data Applications
14	A	Enhanced Other Networks information only
	B	Enhanced Other Networks information only
15	A	Defined in RBDS only
	B	Fast Basic Tuning and Switching Information

Table table 2-1 gives an overview of the available frame formats per Group Type and Group Type Version. The frame format is displayed in the RDS/RBDS User Message Table dialog of the corresponding group type and group type version

Set to Default
Resets the RDS/RBDS Group specific settings.

Input Method
Selects the format the corresponding group type 0 ..15 will be represented for editing.

"Standard" Configuration based on direct parameter input

"User-defined" Allows configuration of the group type using a user-defined message

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:INPMethod` on page 69

Group Type Version
Selects A or B as group type version for the corresponding group type.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:VERSion` on page 82

Text A/B Flag
(Enabled for "Group Type 2A/B" only)

Sets the Text A/B Flag to 0 (disabled parameter) or 1 (enabled parameter).

Each change of the state of the parameter Text A/B Flag (form 0 to 1 and from 1 to 0) triggers the receiver to clear the radio text and the program type name.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TABFlag` on page 79

Radio Text
(Enabled for "Group Type 2A" and "2B" only)

Sets the radio text.

The radio text is maximum 64 characters long for group type 2A and maximum 32 characters for group type 2B.

If less than 64 respectivelly 32 characters are used, the unused positions are filled in with zeros (0x00).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:RADText` on page 77

A/B Flag
(Enabled for "Group Type 10A/B" only)

Sets the A/B Flag to 0 (disabled parameter) or 1 (enabled parameter).

Each change of the state of the parameter A/B Flag (form 0 to 1 and from 1 to 0) triggers the receiver to clear the radio text and the program type name.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:ABFLag` on page 65

Program Type Name
(Enabled for "Group Type 10A" only)

Enters the program type name (max 8 characters).

If less than 8 characters are used, the unused positions are filled in with zeros (0x00).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTName` on page 76

Extended Configuration .. - RDS/RBDS
(Enabled for "Input Method" set to "Parameters" only)

Calls the "Group 0/4A/14/15B Extended Configuration" menu for configuring the RDS/RBDS parameters.

The menus are described in chapter 3.4, "Extended Configuration", on page 31.

Remote command:
n.a.

Edit User Message Table .. - RDS/RBDS
(Enabled for "Input Method" set to "User Message Table" only)

Calls the "RDS/RBDS User Message Table - Group 0A .. 15B" menu for configuring the RDS/RBDS user message parameters in hex format. The checkwords are calculated automatically.

The menus are described in chapter 3.5, "RDS/RBDS User Message Table - Group 0A .. 15B", on page 43 .

Remote command:
n.a.

3.3.4 Group Table

The "Group Table" is located in the lower part of the menu.

Group
Displays the group type number.

Remote command:
n.a.

Type
Displays the group type version.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:VERSion on page 82

Tx Time
Sets the transmit time of the selected group. The transmit time is the group repetition rate given as proportion.

The sum of the transmit times of all groups can not exceed 100%. If the total transmit time is less than 100%, during the rest of the transmit time zeros will be transmitted.

Only groups with "State" set to On are transmitted.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TTIMe on page 80

State
Enables/disables the transmission of the corresponding group type.

Only groups with "State" set to On are transmitted.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:STATe on page 78

Do Conf
Enables/disables the corresponding group type for configuration. All editable parameters are displayed in the menu section "Group Type 0A .. 15B" (see chapter 3.5, "RDS/ RBDS User Message Table - Group 0A .. 15B", on page 43).

To see the frame format of the selected group type, select "User-defined Input Method" and select "Edit User Message Table".

Remote command:
`n.a.`

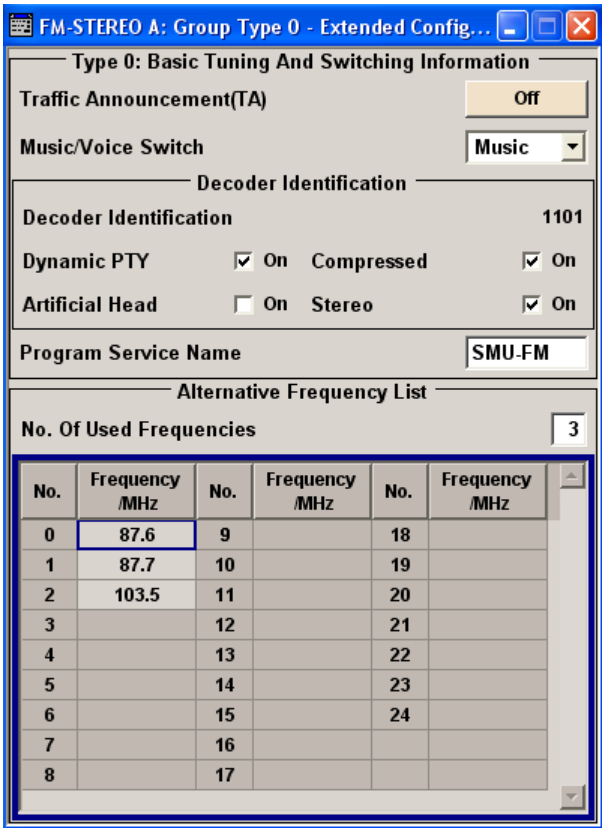
3.4 Extended Configuration

The menu "Extended Configuration" is enabled only for group types 0A, 0B, 4A, 14A, 14B and 15B.

3.4.1 Group Type 0 - Extended Configuration

The menu is separated into two sections, "Group Type" Parameters and "Alternative Frequency List".

The List of the Alternative Frequencies contains a group of maximum 25 frequencies. The list comprises the frequencies of the station of the same network that broadcast the same radio program within the geographical area concerned.



Traffic Announcement
Enables/disables broadcasting of traffic announcement. TA code indicates a traffic communication.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TA on page 79

Music/Voice Switch
Enables switching between speech and music transmission.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MVSWitch on page 73

Decoder Identification (DI)
Displays the decoder identification control code (DI) depending on the settings made for the parameter Dynamic PTY, Compressed, Artificial Head and Stereo

The DI is 4-bits long and identifies one of the 16 different operating modes of the decoder. The values of this 4 bits (d_0, d_1, d_2 and d_3) are set with the parameters "Stereo", "Artificial Head", "Compressed" and "Dynamic PTY" respectively.

Example:

```
SOUR:BB:STER:GRPS:GT0:DID:DPTY OFF
SOUR:BB:STER:GRPS:GT0:DID:COMP ON
SOUR:BB:STER:GRPS:GT0:DID:ARTH ON
SOUR:BB:STER:RDS:GT0:DID:STER OFF
SOUR:BB:STER:GRPS:GT0:DID:DATA?
Response: 0110
```

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:DATA on page 68

Dynamic PTY - DI
Enables/disables dynamically PTY switching.

Disabled parameter corresponds to a static PTY and sets the d_3 bit of DI to 0; Dynamic PTY is indicated with 1.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:DPTY on page 69

Compressed - DI
Enables/disables the compressed bit of DI.

Disabled parameter sets the d_2 bit of DI to 0; enabled - to 1.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:COMPressed on page 68

Artificial Head - DI
Enables/disables using of Artificial Head.

Disabled parameter sets the d_1 bit of DI to 0; enabled - to 1.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:ARTHead on page 68

Stereo - DI
Sets the mono/stereo switch in the DI.

Disabled parameter corresponds to Mono and sets the d_0 bit of DI to 0; Stereo is indicated with 1.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:STEReo on page 69

Program Service Name
Enters the program service (PS) name. The PS name is displayed on the receiver and supply the listener with the name of the radio station.

PS cannot be used for automatic search.

The default maximum length of PS is 8 characters.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PSName on page 75

No. Of Used Frequencies (Alternative Frequency List)
(Enabled for Group Type Version A only)

Sets the number of alternative frequency to be configured. A maximal number of 25 AFs can be configured.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:ALTF:NOENtries on page 67

Frequency/ MHz (Alternative Frequency List)
(Enabled for Group Type Version A only)

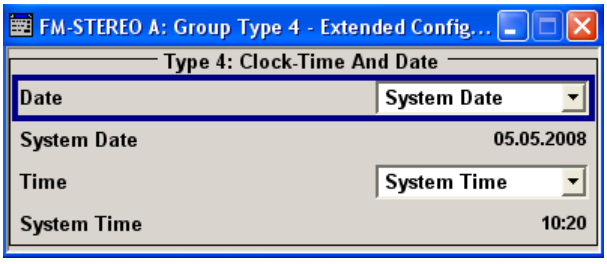
Sets the alternative frequency (AF) for the broadcast frequency.

The list(s) of alternative frequencies give information on the various transmitters broadcasting the same program in the same or adjacent reception areas, and enable receivers equipped with a memory to store the list(s), to reduce the time for switching to another transmitter.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:ALTF:DATA<ch0> on page 67

3.4.2 Group Type 4A - Extended Configuration

The Group Type 4 menu displays the clock time and date information.



Date
Sets the date type to user date or system date.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DATE` on page 67

System Date
Displays the system date.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:SYSDate` on page 78

User Date
Sets the user date in format DD.MM.YYYY.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:USRDate` on page 81

Time
Sets the time type to system time or user time.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TIME` on page 80

System Time
Displays the system time.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:SYSTime` on page 78

User Time
Sets the user time in format HH:MM.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:USRTime` on page 82

Local Offset Time
(available for "User Time" only)

Sets the local offset time expressed in multiples of half hours within the range -12h to +12h.

The time is the sum of the user time and the local time offset.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LOTime` on page 71

3.4.3 Group Type 14 - Extended Configuration

The menu is separated into two sections, one section that is always displayed, "Group Type" Parameters, and a dynamic one, where the parameters displayed depend on the selection made for the parameter Information Block.

The Group Type 14 has two versions: A and B. The A version is the normal form and shall be used for the background transmission of Enhanced Other Networks information. The B version of a type 14 group is used to indicate a change in the status of the TA flag of a cross-referenced program service.

The Group Type 14 Version A has 16 variants which can be used in any time mixture and order. Variant 4 (AF method A) and variants 5 to 9 (Mapped Frequency Method) are defined for the transmission of frequencies of cross-referenced program services.

The figure 3-1 shows the frame format of group type 14 version A, according to the RDS/RBDS standard.

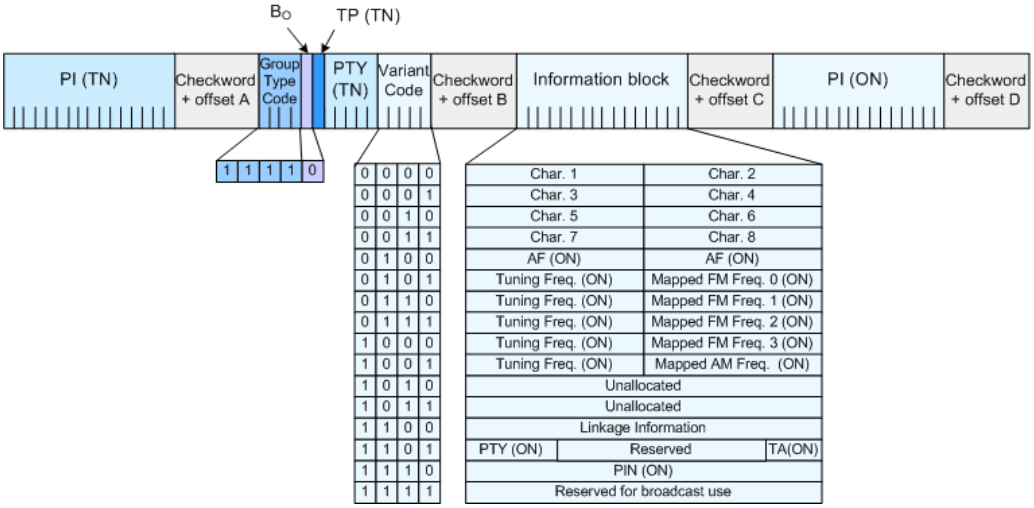


Fig. 3-1: Frame format of group type 14A

Switching between the different variants is performed with the parameter "Information Block".

The table 3-3 gives an overview of the cross-reference between the Group Type 14A variants and the content of the Information Block.

Table 3-3: Information Block Content (Group Type 14A)

Group Type 14A Variant	Information Block
0...3	PS (ON)
4	AF (ON)
5...8	Mapping between Tuning Freq. (TN) and Mapped FM Freq. 0 .. 3 (ON)
9	Mapping between Tuning Freq. (TN) and the Mapped AM Freq. (ON)
10...11	Unallocated

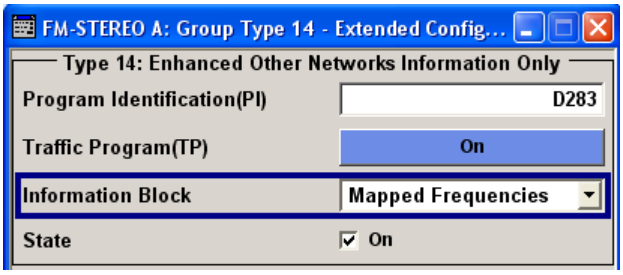
Group Type 14A Variant	Information Block
12	Linkage Information
13	PTY (ON), 10 Reserved Bits, TA (ON)
14	PIN (ON)
15	Reserved for Broadcast use

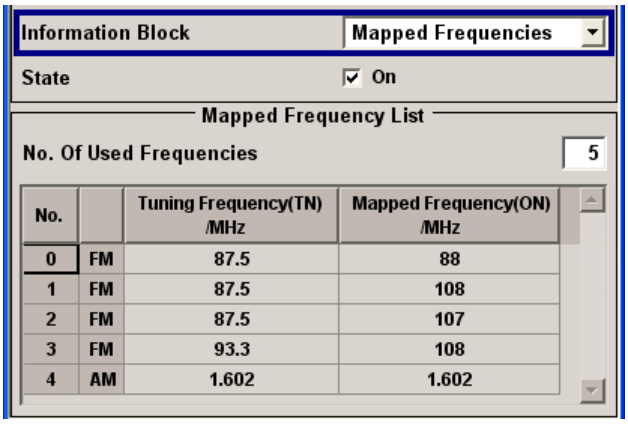
3.4.3.1 Alternative Frequencies

Alternative Frequencies are set in the Alternative Frequency List. Method AF method A is configured with the parameters "Frequency (ON)".The List of the Alternative Frequencies contains a group of maximum 25 frequencies. The list comprises the frequencies of the stations of the other networks that broadcast the same radio program.

3.4.3.2 Mapped Frequencies

Mapped Frequencies are set in the Mapped Frequency List. The "Mapped Frequency List" sets the cross-reference between the frequency in the tuned network (Tuning Frequency (TN)/ MHz) and the corresponding one or more frequencies in other network. The table allows a mapping to more than one VHF/FM frequency (Mapped Frequency (ON) 0 .. 3) and to one LF/MF frequency (Mapped Frequency (ON) 4).





Program Identification (PI) - Other Networks (ON)
Sets the parameter Program Identification of other networks in hex format.

The PI code is an international network identificator. PI identifies the nation, the coverage area of the service and the radio network. PI can be used for automatically tuning and is transmitted in all the groups.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PION on page 75

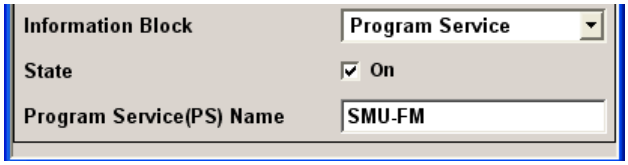
Traffic Program (TP) - Other Networks (ON)
Enables/ disables the traffic program of other networks. TP code identifies radio programmes that continuously broadcasts traffic information.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TPON on page 80

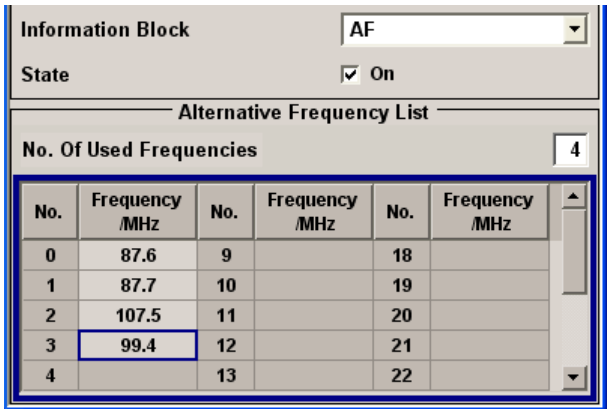
Information Block
(Enabled for group type version A only)

Sets the Group Type 14A variant codes. Depending on the selection made for this parameter; different additional parameters are displayed for configuration.

"Program Service"
Sets the content of Information Block Variant Codes 0..3 - PS (ON).

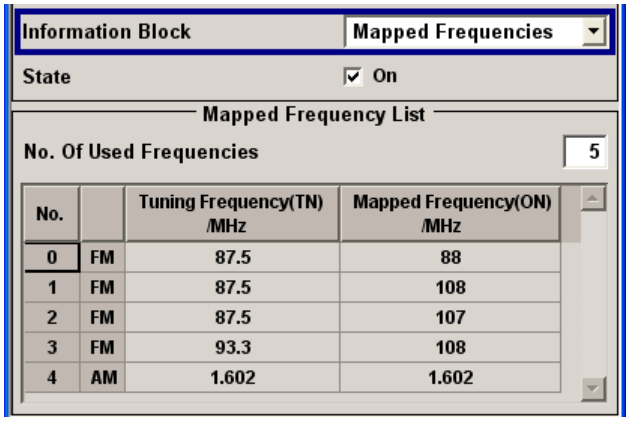


"AF" Sets the content of Information Block Variant Code 4 - Alternative Frequencies Method A.



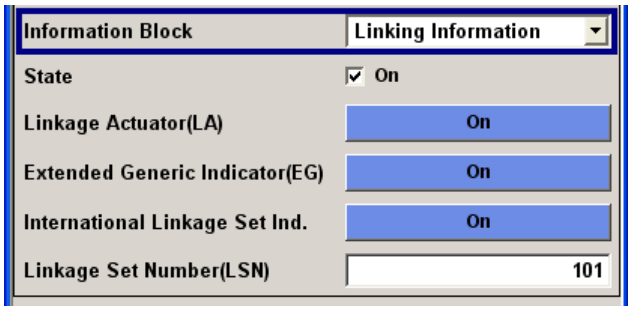
"Mapped Frequency"

Sets the content of Information Block Variant Codes 5..9 - Mapped Frequencies.

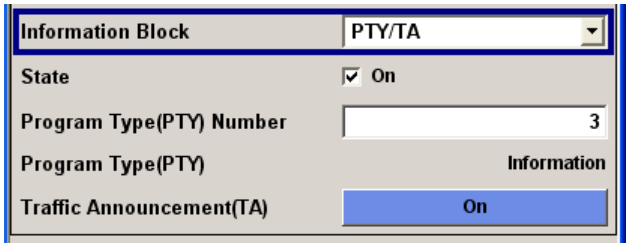


"Linkage Information"

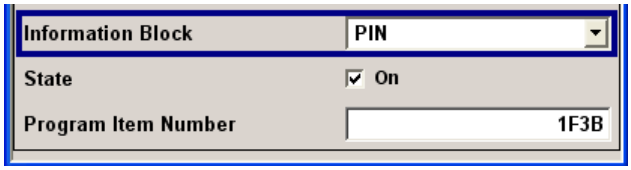
Sets the content of Information Block Variant Code 12 - Linkage Information.



"PTY/TA" Sets the content of Information Block Variant Code 13 - PTY (ON) and TA (ON).



"PIN" Sets the content of Information Block Variant Code 14 - PIN (ON).



Remote command:

`n.a.`

State (Program Service) - Other Networks (ON)
(Enabled for group type version A and Information Block set to Program Service only)

Enables/disables sending of program service name of other networks PS (ON).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PSON:STATe` on page 76

Program Service (PS) Name - Other Networks (ON)
(Enabled for group type version A and Information Block set to Program Service only)

Enters the program service name of other networks.

The PS name has a length of max 8 characters. If less than 8 characters are used, the unused positions are filled in with zeros (0x00).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PSON:PSName` on page 75

State (Alternative Frequency)
(Enabled for group type version A and Information Block set to AF only)

Enables/disables using AF method A.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:AFON:STATe` on page 66

No. Of Used Frequencies (Alternative Frequency List ON)
(Enabled for Group Type Version A only)

Sets the number of alternative frequency of other networks to be configured. A maximal number of 25 AFs can be configured.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:AFON:NOENtries` on page 66

Frequency/ MHz (Alternative Frequency List ON)
(Enabled for Group Type Version A only)

Sets the alternative frequency (AF) of other networks for the broadcast frequency.

The list(s) of alternative frequencies give information on the various transmitters of other networks broadcasting the same program in the same or adjacent reception areas, and enable receivers equipped with a memory to store the list(s), to reduce the time for switching to another transmitter.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:AFON:DATA<ch0>` on page 65

State (Mapped Frequencies)
(Enabled for group type version A and Information Block set to Mapped Frequencies only)

Enables/disables using of mapped frequencies.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:STATe` on page 73

No. Of Used Frequencies (Mapped Frequency List)
(Enabled for group type version A and Information Block set to Mapped Frequencies only)

Sets the number of mapped frequency to be configured. A maximal number of 5 frequencies can be configured.

The mapped frequencies are the frequencies of other network that are cross-referenced to the frequencies in the tuned network to allow a transmission of several different services from the same transmitter with the same coverage area.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:NOENtries` on page 73

Radio Band (Mapped Frequency List)
(Enabled for group type version A and Information Block set to Mapped Frequencies only)

Displays the radio band, AM or FM, used.

The first four frequencies (Frequency 0 .. 3) are VHF/FM frequencies (FM); the last one (Frequency 4) is a LF/MF frequency (AM).

Remote command:
`n.a.`

Tuning Frequency (TN)/ MHz
(Enabled for group type version A and Information Block set to Mapped Frequencies only)

Sets the tuning frequency.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:DATA<ch0>:TF` on page 72

Mapped Frequency (ON)/ MHz
(Enabled for group type version A and Information Block set to Mapped Frequencies only)

Sets the FM/AM frequency.

Selected FM/AM frequency is mapped to the tuned frequency.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:DATA<ch0>:MF` on page 72

State (Linkage Information)
(Enabled for group type version A and Information Block set to Linkage Information)

Enables/disables using of Linkage Information (ON).

Linkage Information enables the receiver to treat several program services as a single service.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:STATe` on page 71

Linkage Actuator (LA)
(Enabled for group type version A and Information Block set to Linkage Information)

Enables/disables the Linkage Actuator LA for other networks.

Enabled LA corresponds to active link (LA=1), i.e. the program service is linked to the set of services, set with the Linkage Set Number (LSN).

Disabled LA corresponds to passive link (LA=0), i.e. the link is currently not active but becomes active in the feature.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:LA` on page 70

Extended Generic Indicator (EG)
(Enabled for group type version A and Information Block set to Linkage Information)

Enables/disables the Extended Generic Indicator EG for other networks.

Enabled EG corresponds to EG=1, i.e. the program service is a member of an extended generic set.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:EG` on page 69

International Linkage Set Ind.
(Enabled for group type version A and Information Block set to Linkage Information)

Enables/disables the International Linkage Set indicator ILS for other networks.

Enabled ILS corresponds to international link (ILS=1).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:ILS` on page 70

Linkage Set Number (LSN)
(Enabled for group type version A and Information Block set to Linkage Information)

Sets the Linkage Set Number LSN for other networks.

The LSN is a 12 bit number.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:LSN` on page 70

State (PTY/TA) - Other Networks (ON)
(Enabled for group type version A and Information Block set to PTY/TA)

Enables/disables using of PTY (ON) and TA (ON).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTYTa:STATe` on page 77

Program Type (PTY) Number - Other Networks (ON)
(Enabled for group type version A and Information Block set to PTY/TA)

Sets the program type number of other networks (see table 3-1).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTYTa:PTY` on page 76

Traffic Announcement (TA) - Other Networks (ON)
Enables/disables the traffic announcement (TA) of other networks. TA code indicates a traffic communication.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TAON` on page 79

State (PIN) - Other Networks (ON)
(Enabled for group type version A and Information Block set to PIN)

Enables/disables using of PIN (ON).

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PINon:STATe` on page 74

Program Item Number (PIN) - Other Networks (ON)
(Enabled for group type version A and Information Block set to PIN)

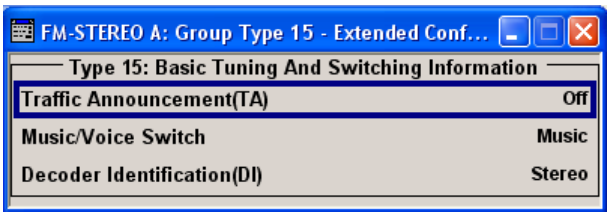
Enters the program item number (PIN) of other networks.

The transmitted Program Item Number code is the scheduled broadcast start time and day of month as published by the broadcaster.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PINon:PIN` on page 74

3.4.4 Group Type 15 - Extended Configuration

The Group Type 15 menu displays the basic tuninig and switching information, as selected for group type 0.



Traffic Announcement
Enables/disables broadcasting of traffic announcement. TA code indicates a traffic communication.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TA` on page 79

Music/Voice Switch
Enables switching between speech and music transmission.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MVSWitch` on page 73

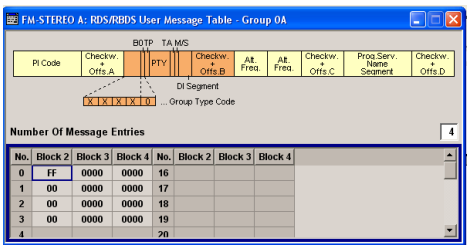
Decoder Identification (DI)
(enabled for group type version B only)

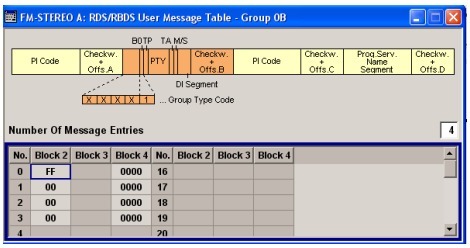
Displays the current decoder operating mode (mono, stereo, rtc.) as selected for group type 0.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:DATA` on page 68

3.5 RDS/RBDS User Message Table - Group 0A .. 15B

The "RDS/RBDS User Message" table allows direct configuration of the user message in hex format (see also chapter 2.2, "Baseband Coding and Group Structure", on page 10).





Depending on the selected "Group Type" and "Group Type Version", the frame format is displayed.

No. Of Message Entries (User Message Table)
Sets the number of transmitted groups per message. A maximal number of 32 groups can be configured.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:UMT:NOENtries` on page 81

Block 2 (User Message Table)
Sets the hex value for Block 2 of the corresponding user message hex table row.

Checkword and offset B are automatically calculated.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:UMT:DATA<ch0>:BLOCk<user>` on page 81

Block 3 (User Message Table)
(enabled for group type version A only)

Sets the hex value for Block 3 of the corresponding user message hex table row.

Checkword and offset C are automatically calculated.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:UMT:DATA<ch0>:BLOCk<user>` on page 81

Block 4 (User Message Table)
(enabled for group type version A only)

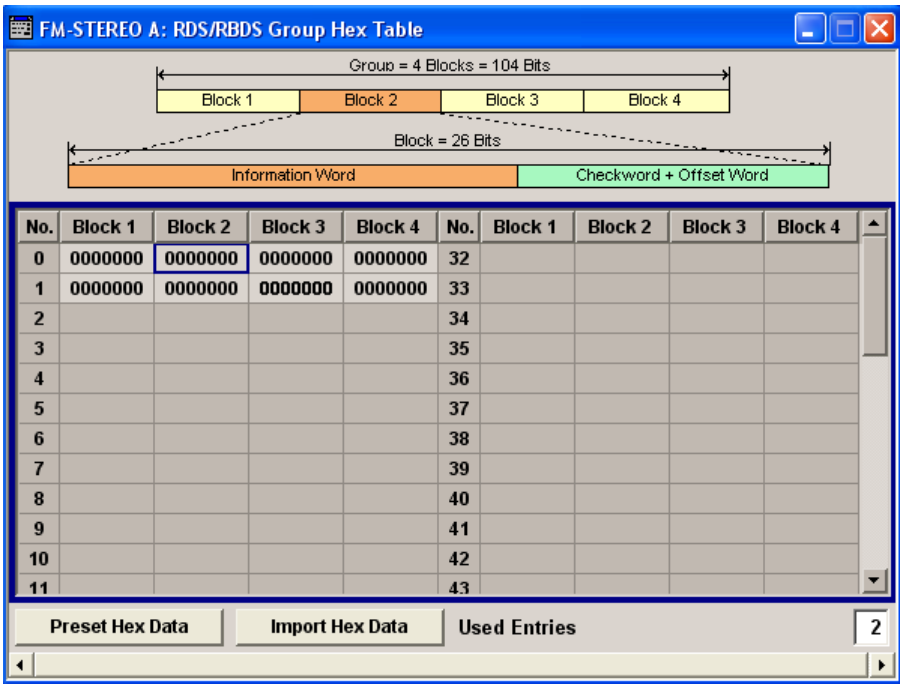
Sets the hex value for Block 4 of the corresponding user message hex table row.

Checkword and offset D are automatically calculated.

Remote command:
[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:UMT:DATA<ch0>:BLOCk<user>
on page 81

3.6 RDS/RBDS Group Hex Table

Alternatively to selecting RDS/RBDS Parameters, the RDS/RBDS Message Blocks can be directly configured in hex format.



No.
Displays the group hex table row number.

Block 1 .. 4 (Group Hex Table)
Sets the hex value for the Block 1 .. 4 of the corresponding group hex table row.

Remote command:
[:SOURce<hw>]:BB:STEReo:GHEX:DATA<ch0>:BLOCk<st> on page 62

Preset Hex Table
Presets the group hex table.

Remote command:
[:SOURce<hw>]:BB:STEReo:GHEX:PRESet on page 62

Load Hex Data
Opens the "Load Group Hex Data" dialog for loading of group lists files in hex formal. The hex file is generated externally and has to have an extension `*.fm_ghex`.

A group list file in hex format are file with extension `*.fm_ghex` and the following format:

Parameter	Description
GrouptypeXXX	Group Type and Group Type Version, where XXX=00A, 00B, .. 15A, 15B
:	Separator between the Group Type and the Data Blocks
0xNNNNNNN	where: 0x indicates the data format (hex format) and NNNNNNN is the 26-bit long data per Block, i.e. the Information Word and the Checkword + Offset Word.
,	Separator between the Data Blocks
//	Comment separator

The figure below gives an example of group list file in hex format.

```
// Type       Block 1    Block 2    Block 3    Block 4
// ------------------------------------------------------
Grouptype00A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype00B: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype00A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype00A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype00A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype10A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype11A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype12A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
Grouptype13A: 0x0123456, 0x1234567, 0x2345678, 0x3456789  // Comment
```

Remote command:
`[:SOURce<hw>]:BB:STEReo:GHEX:LOAD` on page 62

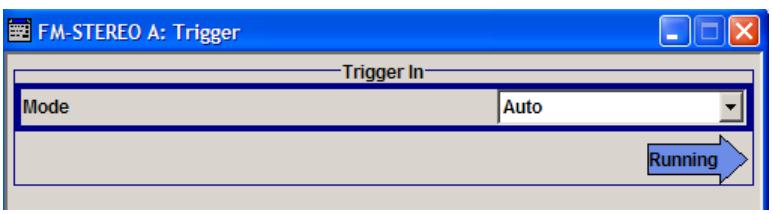
Used Entries
Sets the number of messages to be configured. A maximal number of 64 messages can be configured.

Remote command:
`[:SOURce<hw>]:BB:STEReo:GHEX:NOENtries` on page 62

3.7 Trigger

To access this dialog, select "Main Menu > Trigger/Marker".

The "Trigger In" section is where the trigger for the signal is set. The current status of signal generation ("Running" or "Stopped") is indicated.



The buttons in the last section lead to submenu for general trigger, clock and mapping settings.

3.7.1 Trigger In

The "Trigger In" section is where the trigger for the signal is set.

The current status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.

Trigger Mode
Selects trigger mode.

The trigger mode determines the effect of a trigger on the signal generation.

"Auto" The signal is generated continuously.

Remote command:
`[:SOURce<hw>]:BB:STEReo[:TRIGger]:SEQuence` on page 58

Running/Stopped
Displays the status of signal generation for all trigger modes. This display appears only when signal generation is enabled ("State" On).

"Running" The modulation signal is generated; a trigger was (internally or externally) initiated in triggered mode.

"Stopped" The signal is not generated, and the instrument waits for a trigger event (internal or external).

Remote command:
`[:SOURce<hw>]:BB:STEReo:TRIGger:RMODe` on page 57

3.7.2 Global Settings

The buttons in this section lead to dialogs for general trigger, clock and mapping settings.

Global Trigger/Clock Settings
Calls the "Global Trigger/Clock/Input Settings" dialog.

This dialog is used among other things for setting the trigger threshold, the input impedance and the polarity of the clock and trigger inputs.

The parameters in this dialog affect all digital modulations and standards, and are described in chapter "Global Trigger/Clock/Input Settings" in the Operating Manual.

User Marker / AUX I/O Settings
Calls the "User Marker AUX I/O Settings" dialog, used to map the connector on the rear of the instruments.

See also "User Marker / AUX I/O Settings" in the Operating Manual.

4 Remote-Control Commands

The following commands are required to perform signal generation with the FM-Stereo/RDS options in a remote environment. We assume that the R&S Signal Generator has already been set up for remote operation in a network as described in the R&S Signal Generator documentation. A knowledge about the remote control operation and the SCPI command syntax are assumed.

Conventions used in SCPI command descriptions

For a description of the conventions used in the remote command descriptions, see section "Remote Control Commands" in the R&S Signal Generator operating manual.

Common Suffixes

The following common suffixes are used in remote commands:

Suffix	Value range	Description
`SOURce<hw>`	[1]|2	available baseband signals
`OUTPut<ch>`	1 .. 4	available markers R&S SMBV supports two markers
`EXTernal<ch>`	1|2	external trigger connectors

Placeholder <root>

For commands that read out or save files in the default directory, the default directory is set using command `MMEM:CDIRectory`. The examples in this description use the place holder `<root>` in the syntax of the command.

- `D:\` - for selecting the internal hard disk of a Windows instrument
- `E:\` - for selecting the memory stick which is inserted at the USB interface of a Windows instrument
- `/var/user/` - for selecting the internal flash card of a Linux instrument
- `/usb/` - for selecting the memory stick which is inserted at the USB interface of a Linux instrument.

Tasks (in manual or remote operation) that are also performed in the base unit in the same way are not described here.

In particular, this includes:

- Managing settings and data lists, i.e. storing and loading settings, creating and accessing data lists, accessing files in a particular directory, etc.
- Information on regular trigger, marker and clock signals as well as filter settings, if appropriate.
- General instrument configuration, such as configuring networks and remote operation
- Using the common status registers

For a description of such tasks, see the R&S Signal Generator operating manual.

The following commands specific to the `SOURce:BB:STEReo` subsystem are described here:

4.1 Primary Commands

[:SOURce<hw>]:BB:STEReo:STATe <State>

Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 0

Example: `SOURce1:BB:STEReo:STATe ON`

Manual operation: See "State" on page 16

[:SOURce<hw>]:BB:STEReo:PRESet

Sets the parameters of the digital standard to their default values (`*RST` values specified for the commands).

Not affected is the state set with the command `SOURce<hw>:BB:STEReo:STATe`

Example: `SOURce1:BB:STEReo:PRESet`

Usage: Event

Manual operation: See "Set To Default" on page 16

[:SOURce<hw>]:BB:STEReo:SETTing:CATalog?

Reads out the files with FM-STEREO settings in the default directory.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.fm` will be listed.

Return values:
<Catalog> string

Example: `MMEM:CDIR '<root>FMSTereo'`
sets the default directory
`SOUR:BB:STER:SETT:CAT?`
reads out all the files with FM Stereo settings in the default directory
`Response: fm_stereo1, fm_stereo 2`

Usage: Query only

Manual operation: See "Save/Recall.." on page 16

[:SOURce<hw>]:BB:STEReo:SETTing:LOAD <Load>

Loads the selected file with FM Stereo settings.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.fm` will be loaded.

Setting parameters:
<Load> string

Example: `SOUR:BB:STER:SETT:LOAD 'fm_configuration1'`
loads the file `fm_configuration1.fm`

Usage: Setting only

Manual operation: See "Save/Recall.." on page 16

[:SOURce<hw>]:BB:STEReo:SETTing:STORe <Store>

Stores the selected file with FM-STEREO settings.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. FM-STEREO settings are stored as files with the specific file extension `*.fm`.

Setting parameters:
<Store> string

Example: `SOUR:BB:STER:SETT:STOR 'fm_configuration1'`
stores the current setting

Usage: Setting only

Manual operation: See "Save/Recall.." on page 16

[:SOURce<hw>]:BB:STEReo:SETTing:STORe:FAST <Fast>

Determines whether the instrument performs an absolute or a differential storing of the settings.

Enable this function to accelerate the saving process by saving only the settings with values different to the default ones.

Note: This function is not affected by the "Preset" function.

Parameters:
<Fast> 0 | 1 | OFF | ON
*RST: 0

[:SOURce<hw>]:BB:STEReo:DEViation <Deviation>

Sets the frequency deviation of the stereo signal.

Parameters:
<Deviation> integer
Range: 0 to 80000
Increment: 10
*RST: 67500

Example: `SOURce:BB:STER:DEV 70000`
sets the deviation value 70kHz

Manual operation: See "Deviation" on page 17

[:SOURce<hw>]:BB:STEReo:SOURce <Source>

Selects the audio source for the FM-Stereo signal.

The sources cannot be used simultaneously.

Parameters:

<Source> OFF | SPEXt | LFGen | FILE

OFF
The audio source is switched off.

SPEXt
Activates the S/P-DIF input for the external digital modulation signals.
for R&S SMU/SMJ/SMATE and R&S AMU instruments:
The audio source for path A/B has to be connected respectively to the USER1/2 connector on the rear panel.
for R&S SMBV instrument:
The audio source has to be connected to the MARKER connector on the rear panel.
Note: In case an audio signal is applied to the S/P-DIF interface, an "Extern Clock Source" has to be selected and the parameter "Threshold Trigger/Control Input" has to be set to 0,01 V.

LFGen
The audio source is generated by the internal LF generator.
The frequency of the LF generator is set with the command `[:SOURce<hw>]:BB:STEReo:AUDio[:FREQuency]`.

FILE
A WAV-File can be selected. Audio files are selected with the command `[:SOURce<hw>]:BB:STEReo:AUDio:DSELect`

*RST: 0

Example: `SOUR:BB:STER:SOUR LFG`
selects the audio source
`SOUR:BB:STER:AUD:FREQ 1000`
sets the LF Generator Frequency

Manual operation: See "Audio Source" on page 17

[:SOURce<hw>]:BB:STEReo:AUDio:CATalog?

Reads out the Waveform files in the default directory.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.wav` will be listed.

Return values:

<Catalog> string

Example: `MMEM:CDIR '<root>FMStereo'`
sets the default directory
`SOUR:BB:STER:AUD:CAT?`
reads out all the waveform files in the default directory
`Response: fm_stereo_waveform1, fm_stereo_waveform2`

Usage: Query only

[:SOURce<hw>]:BB:STEReo:AUDio:DSELect <DSelect>

Loads the selected file with audio data. The file extension may be omitted. Only files with the file extension `*.wav` will be loaded.

Setting parameters:
<DSelect> string

Example: `SOUR:BB:STER:SOUR FILE`
selects the audio source
`MMEM:CDIR '<root>waveforms'`
sets the default directory
`SOUR:BB:STER:AUD:DSEL 'fm_wave'`
loads the audio file `fm_wave.wav` from the default directory

Usage: Setting only

Manual operation: See "Load Audio File" on page 20

[:SOURce<hw>]:BB:STEReo:AUDio:EXTClock <ExtClock>

Sets the external clock (44.1 or 48 kHz) in case an extern S/P-DIF audio source is selected.

Parameters:
<ExtClock> 44100 | 48000
*RST: 44100

Example: `SOUR:BB:STER:SOUR SPEX`
selects the audio source
`SOUR:BB:STER:AUD:EXTC 48000`
sets the external clock to 48 kHz

Manual operation: See "External Clock" on page 20

[:SOURce<hw>]:BB:STEReo:AUDio:LEVel <Level>

Sets the level of the audio signal.

Parameters:

<Level> float

Range: -30 to 10
Increment: 0.01
*RST: 0
Default unit: dBfs

Example: `SOUR:BB:STER:AUD:LEV -10.00`
sets the audio level –10dBFs

Manual operation: See "Audio Level" on page 21

[:SOURce<hw>]:BB:STEReo:AUDio:MODE <Mode>

Selects the operating mode.

Parameters:

<Mode> LEFT | RIGHt | RELeft | REMLeft | RNELeft

LEFT
Audio signal only in the left-hand channel

RIGHt
Audio signal only in the left-hand channel

RELeft
Audio signals of the same frequency and phase in both channels

REMLeft
Audio signals of same frequency but opposite phase in both channels

RNELeft
Different and independent audio signals in both channels (not possible with source selection LF Generator)

*RST: RNELeft

Example: `SOUR:BB:STER:AUDio:MODE RNEL`
sets the audio mode to true stereo

Manual operation: See "Audio Mode" on page 20

[:SOURce<hw>]:BB:STEReo:AUDio:PREemphasis <PreEmphasis>

Enables/disables and sets the preemphasis parameter value to 50us or 75us.

Parameters:

<PreEmphasis> OFF | 50 | 75

*RST: OFF

Example: `SOUR:BB:STER:AUD:PRE 50`
sets the preemphasis to 50 us

Manual operation: See "Preemphasis" on page 21

[:SOURce<hw>]:BB:STEReo:AUDio[:FREQuency] <Frequency>

Sets the frequency of the LF-Generator in case a LF-Generator is selected as audio source.

Parameters:

<Frequency> float

Range: 20 to 15000
Increment: 0.01
*RST: 1000

Example: `SOUR:BB:STER:SOUR LFG`
selects the audio source
`SOUR:BB:STER:AUD:FREQ 1000`
sets the LF Generator Frequency to 1 kHz

Manual operation: See "LF Generator Frequency" on page 20

[:SOURce<hw>]:BB:STEReo:PILot:PHASe <Phase>

Sets the phase of the pilot tone (with respect to the 38 kHz subcarrier). The parameter is enabled only for enabled pilot tone.

Parameters:

<Phase> float

Range: -50 to 50
Increment: 0.1
*RST: 0

Example: `SOUR:BB:STER:PIL:PHAS -3`
sets the phase to 3 degrees

Manual operation: See "Pilot Phase" on page 21

[:SOURce<hw>]:BB:STEReo:PILot:STATe <State>

Enables/disables the pilot tone.

Stereo operating mode is possible with enabled pilot tone only.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: ON

Example: `SOUR:BB:STER:PIL:STAT ON`
enables pilot tone

Manual operation: See "Pilot State" on page 21

[:SOURce<hw>]:BB:STEReo:PILot[:DEViation] <Deviation>

Sets the frequency deviation of the pilot tone. The parameter is enabled only for enabled pilot tone.

Parameters:

<Deviation> integer

Range: 0 to 10000
Increment: 10
*RST: 6750

Example: `SOUR:BB:PIL:DEV 5000`
sets the deviation of the pilot tone to 5 kHz

Manual operation: See "Pilot Deviation" on page 21

[:SOURce<hw>]:BB:STEReo:PUWSint <PUWS>

Sets the way the FM signal is calculated in case of parameter update.

If this parameter is enabled and some parameters are changed, these parameters are updated but the FM signal will not be interrupted.

Disabling the parameter results in automatically re-calculation of the FM signal after each parameter update. This will disturb the pilot and the receiver has to be re-synchronized.

Parameters:

<PUWS> 0 | 1 | OFF | ON

*RST: 1

Example: `SOUR:BB:STER:PUWS 1`
enables FM Stereo signal generation without interruption

Manual operation: See "Perform settings update without signal interruption" on page 22

[:SOURce<hw>]:BB:STEReo:TRIGger:RMODe <RMode>

The command queries the current status of signal generation for all trigger modes with FM Stereo modulation on.

Parameters:

<RMode> STOP | RUN

RUN
the signal is generated. A trigger event occurred in the triggered mode.

STOP
the signal is not generated.

*RST: STOP

Example: `BB:STER:TRIG:RMOD?`
queries the current status of signal generation.
`Response: RUN`
the signal is generated

Manual operation: See "Running/Stopped" on page 46

[:SOURce<hw>]:BB:STEReo[:TRIGger]:SEQuence <Sequence>

Sets the trigger mode.

Parameters:

<Sequence> AUTO

AUTO
The modulation signal is generated continuously.

*RST: AUTO

Example: `BB:STER:SEQ AUTO`
sets the Auto trigger mode

Manual operation: See "Trigger Mode" on page 46

4.2 RDS/RBDS Configurations

[:SOURce<hw>]:BB:STEReo:DS:CATalog?

Reads out the files with the group list settings in the default directory.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.fm_gt` will be listed.

Return values:

<Catalog> string

Example: `MMEM:CDIR '<root>FMStereo'`
sets the default directory
`SOUR:BB:STER:DS:CAT?`
reads out all the files with group lists settings in the default directory
`Response: fm_stereo_GL1, fm_stereo_GL2`

Usage: Query only

[:SOURce<hw>]:BB:STEReo:DS:DEViation <Deviation>

Sets the frequency deviation of the RDS/RDBS subcarrier.

Parameters:

<Deviation> integer

Range: 0 to 10000
Increment: 50
*RST: 2000

Example: `SOUR:BB:STER:DS:DEV 5000`
sets the deviation to 5 kHz

Manual operation: See "Deviation" on page 23

[:SOURce<hw>]:BB:STEReo:DS:DRATe?

Queries the data rate.

Return values:

<DRate> float

Range: 1187.5 to 1187.5
Increment: 0.1
*RST: 1187.5

Example: `SOUR:BB:STER:DS:DRATe?`
queries the data rate
`Response: 1187.5`

Usage: Query only

Manual operation: See "Data Rate" on page 23

[:SOURce<hw>]:BB:STEReo:DS:DSELect <DSelect>

Selects the group list.

Setting parameters:

<DSelect> string

Example: `BB:STER:DS:DSET GRPL`
selects group lists
`BB:STER:DS:DSEL 'fm_group_list'`
selects the group list file

Usage: Setting only

Manual operation: See "Data Set" on page 23

[:SOURce<hw>]:BB:STEReo:DS:DSET <DSet>

Selects and activates the RDS/RBDS data set.

Parameters:

<DSet> UDGRoups | GRPList

UDGRoups
User-defined Groups

GRPList
the RDS/RBDS parameter are loaded from group lists files

*RST: UDGRoups

Example: `BB:STER:DS:DSET GRPL`
selects group list files

Manual operation: See "Data Set" on page 23

[:SOURce<hw>]:BB:STEReo:DS:GIM <Gim>

Sets the input method.

Parameters:

<Gim> MSGFormat | HEXFormat

MSGFormat
Message Format

HEXFormat
Hex Format

*RST: MSGFormat

Example: `BB:STEReo:DS:GIM HEXF`
selects the group input method Hex Format

Manual operation: See "Groups Input Method" on page 24

[:SOURce<hw>]:BB:STEReo:DS:MODE <Mode>

Selects the standard, RDS (Radio Data System) or RBDS (Radio Broadcast Data System), the signal is generated for.

Parameters:

<Mode> RDS | RBDS

*RST: RDS

Example: `SOUR:BB:STER:DS:MODE RBDS`
selects the Radio Broadcast Data System.

Manual operation: See "Standard" on page 24

[:SOURce<hw>]:BB:STEReo:DS:PHASe <Phase>

Selects the phase of the RDS/RBDS subcarrier (with respect to the 38 kHz subcarrier).

Parameters:

<Phase> float

Range: 0 to 359.9
Increment: 0.1
*RST: 0

Example: `SOUR:BB:STER:DS:PHAse 10.1`
sets a phase of 10.1 degrees.

Manual operation: See "Phase" on page 23

[:SOURce<hw>]:BB:STEReo:DS:STATe <State>

Activates/deactivates RDS/RBDS function.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: ON

Example: `SOUR:BB:STER:DS:STAT ON`
activates the RDS/RBDS function

Manual operation: See "State" on page 23

4.3 Group Hex Settings

[:SOURce<hw>]:BB:STEReo:GHEX:CATalog?

Reads out the files in hex format with the group list settings in the default directory.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.fm_ghex` will be listed.

Return values:

<Catalog> string

Example: `MMEM:CDIR '<root>FMStereo'`
sets the default directory
`SOUR:BB:STER:GHEX:CAT?`
reads out all the files in hex format with group lists settings in the default directory
`Response: fm_stereo_GL_hex1, fm_stereo_GL_hex2`

Usage: Query only

[:SOURce<hw>]:BB:STEReo:GHEX:DATA<ch0>:BLOCk<st> <Block>

Sets the block data.

Parameters:

<Block> integer

Range: 0 to #H3FFFFFF
*RST: 0

Example: `SOUR:BB:STER:GHEX:DATA2:BLOC3 #HA6BE`
sets the hex value #HA6BE for block 3 at group hex row index 2.

Manual operation: See "Block 1 .. 4 (Group Hex Table)" on page 44

[:SOURce<hw>]:BB:STEReo:GHEX:LOAD <Load>

Loads the selected file with group hex settings.

The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.fm_ghex` will be loaded.

Setting parameters:

<Load> string

Example: `SOUR:BB:STER:GHEX:LOAD 'fm_stereo_GL_hex1'`
loads the file `fm_stereo_GL_hex1.fm`

Usage: Setting only

Manual operation: See "Load Hex Data" on page 45

[:SOURce<hw>]:BB:STEReo:GHEX:NOENtries <NoEntries>

Sets the number of used group hex entries.

Parameters:

<NoEntries> integer

Range: 1 to 64
*RST: 1

Example: `SOUR:BB:STER:GHEX:NOEN 5`
selects 3 used group hex entries for signal generation

Manual operation: See "Used Entries" on page 45

[:SOURce<hw>]:BB:STEReo:GHEX:PRESet

Resets the group hex table.

Example: `SOURce1:BB:STEReo:GHEX:PRESet`

Usage: Event

Manual operation: See "Preset Hex Table" on page 44

[:SOURce<hw>]:BB:STEReo:GHEX:STORe <Store>

Stores the current RDS/RBDS Group Hex Settings into the selected file. The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. Only the file name has to be entered.

Setting parameters:

<Store> <file name>

Example: `SOUR:BB:STER:GHEX:STOR 'fm_groups'`
saves the RDS/RBDS Group Hex Settings into the file

Usage: Setting only

4.4 RDS/RBDS Group Settings

[:SOURce<hw>]:BB:STEReo:GRPS:AGPReset

Sets the parameter values of the active group to the default settings.

Example: `BB:STER:GRPS:AGPR`
sets the active group ro default

Usage: Event

[:SOURce<hw>]:BB:STEReo:GRPS:CMNS:PI <Pi>

Sets the parameter PI (Program Identification). The input format is hex format or decimal format with 4 symbols length.

Parameters:

<Pi> integer

Range: 0 to #HFFFF
*RST: #HD238

Example: `SOUR:BB:STER:GRPS:CMNS:PI #HAB18`
sets the PI to #HAB18

Manual operation: See "Program Identification (PI)" on page 25

[:SOURce<hw>]:BB:STEReo:GRPS:CMNS:PTY <Pty>

Sets the program type number. The PTY number identifies the content of the program.

Parameters:

<Pty> integer
Range: 1 to 31
*RST: 1

Example: `SOUR:BB:STER:GRPS:CMNS:PTY 4`
sets the PTY number

Manual operation: See "Program Type (PTY) Number" on page 26

[:SOURce<hw>]:BB:STEReo:GRPS:CMNS:TP <Tp>

Enables/disables the traffic program.

Parameters:

<Tp> 0 | 1 | OFF | ON
*RST: OFF

Example: `SOUR:BB:STER:GRPS:CMNS:TP ON`
enables sending of TP.

Manual operation: See "Traffic Program (TP)" on page 27

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:ABFLag <AbFlag>

Sets the A/B Flag to 0 (disabled parameter) or 1 (enabled parameter).

Parameters:

<AbFlag> 0 | 1 | OFF | ON
*RST: OFF

Example: `SOUR:BB:STER:GRPS:GT10:ABFL ON`
sets the A/B Flag for group type 10 to 1.

Manual operation: See "A/B Flag" on page 29

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:AFON:DATA<ch0> <Data>

Sets the alternative frequency (AF) for other networks.

This command is enabled only for group type 14A.

Suffix:

<st0> 14

<ch0> 0 .. 24

Parameters:

<Data> float

Range: 87.6 to 107.9
Increment: 0.1
*RST: 87.6

Example: `SOUR:BB:STER:GRPS:GT14:AFON:NOEN 10`
enables using of 10 AFs.
`SOUR:BB:STER:GRPS:GT14:AFON:DATA3 108.5`
sets the alternative frequency at index 3 to 108.5 MHz

Manual operation: See "Frequency/ MHz (Alternative Frequency List ON)" on page 39

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:AFON:NOENtries <NoEntries>

Sets the number of alternative frequency of other networks to be configured. A maximal number of 25 AFs can be configured.

This command is enabled only for group type 14A.

Suffix:

<st0> 14

Parameters:

<NoEntries> integer

Range: 0 to 25
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:AFON:NOEN 10`
enables using of 10 AFs.

Manual operation: See "No. Of Used Frequencies (Alternative Frequency List ON)" on page 39

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:AFON:STATe <State>

Enables/disables using AF method A for other networks.

This command is enabled only for group type 14A.

Suffix:

<st0> 14

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:AFON:STAT ON`
enables using of Alternative Frequency (ON)

Manual operation: See "State (Alternative Frequency)" on page 39

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:ALTF:DATA<ch0> <Data>

Sets the alternative frequency (AF) for the broadcast frequency.

This command is enabled only for group type 0A.

Suffix:
<st0> 0

<ch0> 0 .. 24

Parameters:
<Data> float

Range: 87.6 to 107.9
Increment: 0.1
*RST: 87.6

Example: `SOUR:BB:STER:GRPS:GT0:ALTF:NOEN 10`
enables using of 10 AFs.
`SOUR:BB:STER:GRPS:GT0:ALTF:DATA3 108.5`
sets the alternative frequency at index 3 to 108.5 MHz

Manual operation: See "Frequency/ MHz (Alternative Frequency List)" on page 33

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:ALTF:NOENtries <NoEntries>

Sets the number of alternative frequency to be configured. A maximal number of 25 AFs can be configured.

This command is enabled only for group type 0A.

Suffix:
<st0> 0

Parameters:
<NoEntries> integer

Range: 0 to 25
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT0:ALTF:NOEN 10`
enables using of 10 AFs.

Manual operation: See "No. Of Used Frequencies (Alternative Frequency List)" on page 33

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DATE <Date>

Sets the date type to user date (USRDate) or system date (SYSDate).

This command is enabled only for group type 4A.

Suffix:
<st0> 4

Parameters:
<Date> SYSDate | USRDate
*RST: SYSDate

Example: SOUR:BB:STER:GRPS:GT4:DATE USRD
selects user date

Manual operation: See "Date" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:ARTHead <ArtHead>

Enables/disables using of Artificial Head.

Parameters:
<ArtHead> 0 | 1 | OFF | ON
*RST: OFF

Example: SOUR:BB:STER:GRPS:GT0:DID:ARTH ON
enables artificial head

Manual operation: See "Artificial Head - DI" on page 32

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:COMPressed <Compressed>

Enables/disables the compressed bit of DI.

Parameters:
<Compressed> 0 | 1 | OFF | ON
*RST: OFF

Example: SOUR:BB:STER:GRPS:GT0:DID:COMP ON
enables the compressed bit

Manual operation: See "Compressed - DI" on page 32

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:DATA <Data>

Queries the current decoder operating mode (mono, stereo, rtc.) as selected for group type 0.

This command is enabled only for group type 0 and 15B.

Suffix:
<st0> 0 .. 15

Parameters:
<Data> integer
Range: 0 to #HF
*RST: 0

Example: SOUR:BB:STER:GRPS:GT15:DID:DATA?
queries the DI
Response: 0101

Manual operation: See "Decoder Identification (DI)" on page 32

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:DPTY <DPty>

Enables/disables dynamically PTY switching.

Parameters:
<DPty> 0 | 1 | OFF | ON
*RST: OFF

Example: `SOUR:BB:STER:GRPS:GT0:DID:DPTY OFF`
disables dynamic PTY

Manual operation: See "Dynamic PTY - DI" on page 32

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:DID:STEReo <Stereo>

Sets the mono/stereo switch in the DI.

Parameters:
<Stereo> 0 | 1 | OFF | ON
*RST: OFF

Example: `SOUR:BB:STER:GRPS:GT0:DID:STER OFF`
sets the DI bit to mono

Manual operation: See "Stereo - DI" on page 33

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:INPMethod <InpMethod>

Selects the input format of the RDS/RBDS parameters.

Suffix:
<st0> 0 .. 15

Parameters:
<InpMethod> PARameters | UDMessage

PARameters
Confirguration based on direct parameter input

UDMessage
User defined messages are used to configure the group types

*RST: PARameters

Example: `SOUR:BB:STER:GRPS:GT:INPM UDM`
user defined messages are used.

Manual operation: See "Input Method" on page 28

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:EG <Eg>

Enables/disables the Extended Generic Indicator EG.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<Eg> 0 | 1 | OFF | ON
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:LION:EG ON`
enables the Extended Generic Indicator EG

Manual operation: See "Extended Generic Indicator (EG)" on page 41

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:ILS <Ils>

Enables/disables the International Linkage Set indicator ILS.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<Ils> 0 | 1 | OFF | ON
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:LION:ILS ON`
enables ILS. i.e. sets ILS=1

Manual operation: See "International Linkage Set Ind." on page 41

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:LA <La>

Enables/disables the Linkage Actuator LA.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<La> 0 | 1 | OFF | ON
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:LION:LA ON`
enables LA, i.e. LA=1

Manual operation: See "Linkage Actuator (LA)" on page 40

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:LSN <Lsn>

Sets the Linkage Set Number LSN.

The LSN is a 12 bit number.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<Lsn> 12 bits

Example: `SOUR:BB:STER:GRPS:GT14:LION:LSN #H78`
sets the LSN to #H78

Manual operation: See "Linkage Set Number (LSN)" on page 41

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LION:STATe <State>

Enables/disables using of Linkage Information.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:LION:STAT ON`
enables using of Linking Information

Manual operation: See "State (Linkage Information)" on page 40

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LOTime <LoTime>

Sets the local offset time expressed in multiples of half hours within the range -12h to +12h.

The time is the sum of the user time and the local time offset.

This command is enabled only for group type 4A.

Suffix:
<st0> 4

Parameters:
<LoTime> string
Range: -12,00 to 12,00
*RST: 0:00

Example: `SOUR:BB:STER:GRPS:GT4:TIME USRT`
enables user time
`SOUR:BB:STER:GRPS:GT4:USRT 12,15`
sets the user time
`SOUR:BB:STER:GRPS:GT4:LOT 5,30`
sets the local offset time, i.e. the local time is 17:45

Manual operation: See "Local Offset Time" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:DATA<ch0>:MF <Mf>

Sets a mapped frequency entry.

Sets a mapped frequency entry. The following variant codes will be used to encode the frequency settings:

- Variant Code 5 (binary 0101) Mapped FM frequency 1 (ON)
- Variant Code 6 (binary 0110) Mapped FM frequency 2(ON)
- Variant Code 7 (binary 0111) Mapped FM frequency 3(ON)
- Variant Code 8 (binary 1000) Mapped FM frequency 4(ON)
- Variant Code 9 (binary 1001) Mapped AM frequency(ON)

This command is enabled only for group type 14A.

Suffix:

<st0> 14

<ch0> 0 .. 4

Parameters:

<Mf> float

Range: depends on channel: 87.6 .. 107.9 MHz (Data 0..3) or 153 .. 279 kHz/531 .. 1602 kHz (Data 4)
Increment: 0.001
*RST: depends on channel

Example: `BB:STER:GRPS:GT14:MFL:MF2 101.3`
sets the mapped frequency at index 2 to 101.3MHz.
`BB:STER:GRPS:GT14:MFL:MF4 532`
sets the mapped frequency at index 4 to 532 kHz.

Manual operation: See "Mapped Frequency (ON)/ MHz" on page 40

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:DATA<ch0>:TF <Tf>

Sets a tuning frequency entry.

The following variant codes will be used to encode the frequency settings:

- Variant Code 5 (binary 0101) Tuning FM frequency 1 (ON)
- Variant Code 6 (binary 0110) Tuning FM frequency 2 (ON)
- Variant Code 7 (binary 0111) Tuning FM frequency 3 (ON)
- Variant Code 8 (binary 1000) Tuning FM frequency 4 (ON)
- Variant Code 9 (binary 1001) Tuning AM frequency (ON)

This command is enabled only for group type 14A.

Suffix:

<st0> 14

<ch0> 0 .. 4

Parameters:

<Tf> float

Range: depends on channel: 87.6 .. 107.9 MHz (Data 0..3)
or 153 .. 279 kHz/531 .. 1602 kHz (Data 4)
Increment: 0.001
*RST: depends on channel

Example: `BB:STER:GRPS:GT14:MFL:TF2 87.7`
sets the tuning frequency at index 2 to 87.7 MHz.

Manual operation: See "Tuning Frequency (TN)/ MHz" on page 40

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:NOENtries <NoEntries>

Sets the number of mapped frequency to be configured. A maximal number of 5 frequencies can be configured.

This command is enabled only for group type 14A.

Suffix:

<st0> 14

Parameters:

<NoEntries> integer

Range: 0 to 5
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:MFL:NOEN 3`
sets 3 mapped frequencies

Manual operation: See "No. Of Used Frequencies (Mapped Frequency List)" on page 40

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MFL:STATe <State>

Enables/disables using of mapped frequencies.

This command is enabled only for group type 14A.

Suffix:

<st0> 14

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:MFL:STAT ON`
enables using of mapped sequences

Manual operation: See "State (Mapped Frequencies)" on page 39

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:MVSWitch <MvSwitch>

For GT0, enables switching between speech and music transmission.

For GT15B, this command is query only.

Suffix:
<st0> 0 | 15

Parameters:
<MvSwitch> MUSic | VOICe
*RST: MUSic

Example: `SOUR:BB:STER:GRPS:GT0:MVSW VOIC`
enables voice transmission
`SOUR:BB:STER:GRPS:GT15:MVSW?`
qieries the state of Music/Voice parameter
`Response: Voice`

Manual operation: See "Music/Voice Switch" on page 32

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PINon:PIN <Pin>

Enters the program item number (PIN) of other networks.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<Pin> 16 bits

Example: `SOUR:BB:STER:GRPS:GT14:PIN:STAT ON`
enables using of PIN (ON)
`SOUR:BB:STER:GRPS:GT14:PIN:PIN #H2AB3`
sets the PIN of other networks

Manual operation: See "Program Item Number (PIN) - Other Networks (ON)" on page 42

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PINon:STATe <State>

Enables/disables using of PIN (ON).

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:PIN:STAT ON`
enables using of PIN (ON)

Manual operation: See "State (PIN) - Other Networks (ON)" on page 42

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PION <PiOn>

Sets the parameter Program Identification of other networks in hex format.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<PiOn> 16 bits
Range: #H0000 to #HFFFF
*RST: #HD238

Example: `SOUR:BB:STER:GRPS:GT14:PION #H2D3A`
sets the PI (ON)

Manual operation: See "Program Identification (PI) - Other Networks (ON)" on page 36

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PSName <PsName>

Enters the program service (PS) name.

The default maximum length of PS is 8 characters.

Suffix:
<st0> 0

Parameters:
<PsName> string
*RST: SMU-FM

Example: `SOUR:BB:STER:GRPS:GT0:PSN 'Program 1'`
sets the PS name.

Manual operation: See "Program Service Name" on page 33

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PSON:PSName <PsName>

Enters the program service name (max 8 characters) of other networks.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<PsName> string
*RST: SMU-FM2

Example: `SOUR:BB:STER:GRPS:GT14:PSON:STAT ON`
enables using of program service name (ON).
`SOUR:BB:STER:GRPS:GT14:PSON:PSN 'PrServ1'`
sets the program service name (ON)

Manual operation: See "Program Service (PS) Name - Other Networks (ON)" on page 39

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PSON:STATe <State>

Enables/disables sending of program service name of other networks PS (ON).

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT14:PSON:STAT ON`
enables using of program service name (ON).

Manual operation: See "State (Program Service) - Other Networks (ON)" on page 39

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTName <PtName>

Enters the program type name (max 8 characters).

This command is enabled only for group type 10A.

Suffix:
<st0> 10

Parameters:
<PtName> <Program Type Name>
*RST: Music

Example: `SOUR:BB:STER:GRPS:GT10:PTN 'Music Only'`
enters the program type name

Manual operation: See "Program Type Name" on page 29

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTYTa:PTY <Pty>

Sets the program type number of other networks.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<Pty> integer
Range: 0 to 31
*RST: 0

Example: SOUR:BB:STER:GRPS:GT14:PTYT:STAT ON
enables PTY/TA of other networks
SOUR:BB:STER:GRPS:GT14:PTYT:PTY 15
sets the program type (ON)

Manual operation: See "Program Type (PTY) Number - Other Networks (ON)" on page 41

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTYTa:STATe <State>

Enables/disables using of PTY (ON) and TA (ON).

This command is enabled only for group type 14A.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: OFF

Example: SOUR:BB:STER:GRPS:GT14:PTYT:STAT ON
enables PTY/TA of other networks

Manual operation: See "State (PTY/TA) - Other Networks (ON)" on page 41

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:PTYTa:TA <Ta>

Enables/disables the traffic announcement (TA) of other networks.

This command is enabled only for group type 14A.

Suffix:
<st0> 14

Parameters:
<Ta> 0 | 1 | OFF | ON
*RST: 0

Example: SOUR:BB:STER:GRPS:GT14:PTYT:STAT ON
enables PTY/TA of other networks
SOUR:BB:STER:GRPS:GT14:PTYT:TAON ON
enables traffic communication (ON)

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:RADText <RadText>

Sets the radio text.

This command is enabled only for group type 2.

Suffix:
<st0> 2

Parameters:
<RadText> string
*RST: SMU-Radio

Example: `SOUR:BB:STER:GRPS:GT2:RADT 'RADIO MESSAGE'`
sets the radio text

Manual operation: See "Radio Text" on page 29

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:STATe <State>

Enables/disables the transmission of the corresponding group type.

Suffix:
<st0> 0 .. 15

Parameters:
<State> 0 | 1 | OFF | ON
*RST: 1

Example: `SOUR:BB:STER:GRPS:GT12:STAT ON`
group 12 will be transmitted

Manual operation: See "State" on page 30

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:SYSDate <SysDate>

Queries the system date.

This command is enabled only for group type 4A.

Suffix:
<st0> 14

Parameters:
<SysDate> string
Range: 01,01,2006 to 31,12,9999

Example: `SOUR:BB:STER:GRPS:GT4:DATE SYSD`
selects system date
`SOUR:BB:STER:GRPS:GT4:SYSD?`
queries the system date
`Response: 3,6,2008`

Manual operation: See "System Date" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:SYSTime <SysTime>

Queries the system time.

This command is enabled only for group type 4A.

Suffix:
<st0> 4

Parameters:
<SysTime> string
Range: 00,00 to 23,59

Example: SOUR:BB:STER:GRPS:GT4:TIME SYSD
selects system date
SOUR:BB:STER:GRPS:GT4:SYST?
queries the system time

Manual operation: See "System Time" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TA <Ta>

Enables/disables broadcasting of traffic announcement.

Parameters:
<Ta> 0 | 1 | OFF | ON
*RST: OFF

Example: SOUR:BB:STER:GRPS:GT0:TA ON
enables TA for group type 0

Manual operation: See "Traffic Announcement" on page 32

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TABFlag <TabFlag>

Sets the Text A/B Flag to 0 (disabled parameter) or 1 (enabled parameter).

Parameters:
<TabFlag> 0 | 1 | OFF | ON
*RST: OFF

Example: SOUR:BB:STER:GRPS:GT2:TABF ON
sets the Text A/B Flag for group type 2 to 1.

Manual operation: See "Text A/B Flag" on page 29

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TAON <TaOn>

Enables/disables the traffic announcement (TA) of other networks.

This command is enabled only for group type 14B.

Suffix:
<st0> 14

Parameters:
<TaOn> 0 | 1 | OFF | ON
*RST: 0

Example: SOUR:BB:STER:GRPS:GT14:TAON ON
enables TA (ON)

Manual operation: See "Traffic Announcement (TA) - Other Networks (ON)" on page 42

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TIME <Time>

Sets the time type to system time (SYSTime) or user time (USRTime).

This command is enabled only for group type 4A.

Suffix:
<st0> 4

Parameters:
<Time> SYSTime | USRTime
*RST: SYSTime

Example: `SOUR:BB:STER:GRPS:GT4:TIME USRT`
selects user time

Manual operation: See "Time" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TPON <TpOn>

Enables/ disables the traffic program of other networks.

Parameters:
<TpOn> 0 | 1 | OFF | ON
*RST: OFF

Example: `SOUR:BB:STER:GRPS:GT14:TPON ON`
enables traffic program (ON)

Manual operation: See "Traffic Program (TP) - Other Networks (ON)" on page 37

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:TTIMe <TTime>

Sets the group transmit time. The transmit time is the group repetition rate given as proportion. The sum of all transmit time is 100%.

Only groups with "State" set to On (`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:STATe`) are transmitted.

Suffix:
<st0> 0 .. 15

Parameters:
<TTime> integer
Range: 0 to 100
*RST: 40% (GT0), 10% (GT1), 15% (GT2), 4% (GT3), 2% (GT4..GT13), 10% (GT14), 1% (GT15)

Example: `SOUR:BB:STER:GRPS:GT12:STAT ON`
group 12 will be transmitted
`SOUR:BB:STER:GRPS:GT12:TTIM 6`
the transmission time of group 12 is 6%

Manual operation: See "Tx Time" on page 30

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:UMT:DATA<ch0>:BLOCk<user> <Block>

Sets the hex value for the corresponding block of the corresponding user message hex table row.

Checkword and offset are automatically calculated.

Suffix:
<st0> 0 .. 25

<ch0> 0 .. 31

<user> 2 .. 4

Parameters:
<Block> integer

Range: 0 to #H1F
*RST: 0

Example: `SOUR:BB:STER:GRPS:GT0:UMT:DATA0:BLOCK2 #H1F`
sets block 2 to 1F

Manual operation: See "Block 2 (User Message Table)" on page 43

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:UMT:NOENtries <NoEntries>

Sets the number of transmitted groups per message. A maximal number of 32 groups can be configured.

Suffix:
<st0> 0 .. 15

Parameters:
<NoEntries> integer

Range: 0 to 32
*RST: 1

Example: `SOUR:BB:STER:GRPS:GT0:UMT:NOEN 4`
4 user defined messages will be used

Manual operation: See "No. Of Message Entries (User Message Table)" on page 43

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:USRDate <UsrDate>

Sets the user date in format DD,MM,YYYY.

This command is enabled only for group type 4A.

Suffix:
<st0> 4

Parameters:

<UsrDate> DD,MM,YYYY

Range: 01,01,2006 to 31,12,9999
*RST: 01,01,2006

Example: `SOUR:BB:STER:GRPS:GT4:DATE USRD`
selects user date
`SOUR:BB:STER:GRPS:GT4:USRD '30,05,2008'`
sets the user date

Manual operation: See "User Date" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:USRTime <UsrTime>

Sets the user time in format HH,MM. The time is the sum of the user time and the local time offset (`[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:LOTime`).

This command is enabled only for group type 4A.

Suffix:

<st0> 4

Parameters:

<UsrTime> string

Range: 00,00 to 23,59
*RST: 00,00

Example: `SOUR:BB:STER:GRPS:GT4:TIME USRT`
selects user time
`SOUR:BB:STER:GRPS:GT4:USRT 12,15`
sets the user time

Manual operation: See "User Time" on page 34

[:SOURce<hw>]:BB:STEReo:GRPS:GT<st0>:VERSion <Version>

Sets the group type version of the corresponding group type.

Suffix:

<st0> 0 .. 15

Parameters:

<Version> A | B

A
Group Type Version A

B
Group Type Version B

*RST: A

Example: `SOUR:BB:STER:GRPS:GT2:VERS B`
sets group type 2 with version B

Manual operation: See "Group Type Version" on page 29

[:SOURce<hw>]:BB:STEReo:GRPS:PRESet

Sets all group parameter values to the default settings.

Example: `SOURce1:BB:STEReo:GRPS:PRESet`

Usage: Event

Manual operation: See "Set Groups to Default" on page 25

[:SOURce<hw>]:BB:STEReo:GRPS:STORe <Store>

Stores the current RDS/RBDS group settings into the selected file. The directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the files in the specified directory are read. Only the file name has to be entered. RDS/RBDS group settings are stored as files with the specific file extension `*.fm_gt`.

Setting parameters:

<Store> string

Example: `SOUR:BB:STER:GRPS:STOR 'fm_groups'`
saves the RDS/RBDS setting into the file `fm_groups.fm_gt`

Usage: Setting only

Manual operation: See "Save Groups" on page 25

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