

DARS Simulator DSG2000

Programming Manual

Version 1.6

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1 To make effective use of this manual

1.1 Contens of this manual

The following manual describes how to remotely control the DARS Simulator DSG2000. This includes the definition of the command set and the description of the status concept.

The instrument is SCPI-like which includes the implementation of the status concept and command definition in this manner. Additional documentation on SCPI may be found in the web (<http://www.scpiconsortium.org>).

1.2 How to use this manual

Chapter 2 gives an overview of how to configure the remote connections.

In chapter 3 the commands of the system are defined. The chapter includes a summary of all commands listed in command groups and then describes each command available in alphabetical order.

The status concept of the instrument is then detailed in chapter 0.

Some programming examples are listed in chapter 1.

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2 Overview of remote control

2.1 How to set up a remote control system

Overview

The instrument may be controlled via the graphical user interface, LAN, RS232 or GP-IB. Any command send from any of these sources will apply to the system.

LAN

By default, the instrument is configured as DHCP. Connect to the DARS Simulator by using telnet {ip address} 30000. The instrument will send a welcome message. Now the commands described in this document are valid.

RS232

The remote RS232 port is configure as 115200baud, 8N1. Use e.g. a hyper terminal to communicate with the unit.

GP-IB

Connect your GP-IB bus to the DSG2000 and configure the unit by using the CONFIG page. Here you may change the primary and secondary address of the device.

2.2 Sending command messages

SCPI defines two communication methods:

- Set commands are send to device and the device will never respond. Any event (e.g. invalid value) will result in an entry in the *Event Queue* and are reflected in the status of the system. The remote control unit has to poll the status to decide whether the command has succeeded (for example with *STB?)
- Query commands are ending with '?' and the instrument will return a string describing the result of the query. For example polling the *Event Queue* with a SYSTEM:ERROR? will result in a "0,No error" message.

The remote access unit may now send valid command strings and query the status of the system to identify success.

3 Command Reference

3.1 Command Syntax

You can control the instrument through GPIB, LAN or RS232 interface with a large group of commands and queries. This section describes the syntax, the commands and queries themselves are explained in a later chapter.

Communication with the instrument is established using the enhanced American Standard Code for Information Interchange (ASCII) character encoding.

The Backus-Naur Form (BNF) notation is used in this manual to describe commands and queries as shown in Table 1.

Symbol	Description
< >	Defined element
	Exclusive OR
{ }	Group; one element required
[]	Optional ; can be omitted
()	Comment

Table 1 – BNF notation

3.1.1 Command and query structure

Commands consist of set commands and query commands. Often commands provide both forms of communication to allow to change or read the settings.

A command message consists of the elements listed in Table 2:

Symbol	Description
<Header>	The basic command name, if the command ends with a question mark, the command is a query else a set.
<Mnemonic>	A header subfunction. Each command may consist of 1 to N mnemonics.
<Argument>	The argument describes how to change the settings. Arguments may be strings, values, enumerations.
<Comma>	Commas separate the arguments of a command for multi-argument commands.
<Space>	A white space character between command header and argument.

Table 2 – Elements of a command

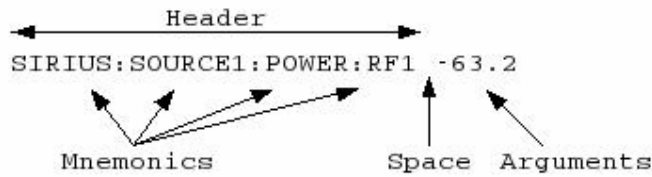


Figure 1 – Command message elements

Commands

Commands cause a change in settings or state of the unit. They have the following structure:

<Header>:[<Space><Argument>[<Comma><Argument>]...]

A command header is constructed out of one or more mnemonics arranged in a tree structure.

Queries

Queries are similar to the set commands but end with a question mark.

3.1.2 Argument types

The remote access language of the DARS Simulator DSG2000 uses the following argument types:

Symbol	Description
<string>	String value describing the setting
<numeric_value>	Value including precision
<Boolean>	0 to disable, any other value to enable setting
<enum>	Enumeration, only one item of list may be used

Table 3 – Argument types

3.2 Command Groups

3.2.1 Common Commands

Miscellaneous Commands

Mnemonic	Name	Page
*IDN?	Identification query	15
*RCL	Recalls a file	15
*SAV	Saves the current settings to file	15

Status and Error Commands

Mnemonic	Name	Page
*CLS	Clears the DSG2000 status data structure	14
*ESR?	Standard event status register query	14
*STB?	Read status byte query	16
CALibration:ALL	Calibrates the entire instrument	16
STATus:PRESet	Presets the instrument	16
SYSTem:ERRor[:NEXT]?	Event Queue query	17

3.2.2 Sirius Commands

Miscellaneous Commands

Mnemonic	Name	Page
SIRIus:SOURce:ROSCillator[:INTernal]	Configures the instrument to internal 10MHz	32
SIRIus:SOURce:ROSCillator:EXTernal	Configures the instrument to external 10MHz	32

Signal Generation Commands

Mnemonic	Name	Page
SIRIus:DATA:SOURce:BERMode	Sets or queries the bit error rate mode	18
SIRIus:DATA:SOURce:NAME	Sets or queries the file name used to generate the signal	19
SIRIus:DATA:SOURce:STATe	Enables or disables signal generation for Sirius	19
SIRIus:DATA:SOURce:TYPE	Selects the input of the signal generation	19

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Mnemonic	Name	Page
SIRlus:OUTPut	Configures the output to IQ or RF	22
SIRlus:PROFiles:DELAyfreq:NAME	File name for delay/frequency profiling	22
SIRlus:PROFiles:DELAyfreq:STATe	Enables or disables the delay/frequency profiling	23
SIRlus:PROFiles:POWEr:NAME	File name for power level profiling	23
SIRlus:PROFiles:POWEr:STATe	Enables or disables the power level profiling	23
SIRlus:SOURce:ATTenuation	Sets or queries the attenuation of the I/Q baseband output	28
SIRlus:SOURce:DELAy	Sets or queries the delay of the according source	28
SIRlus:SOURce:FREQUency[:CENTer]	Sets or queries the center frequency	29
SIRlus:SOURce:FREQUency:OFFSet	Sets or queries the frequency offset	29
SIRlus:SOURce:MODE	Sets or queries the mode of the source	30
SIRlus:SOURce:POWEr:OFFSet:RF	Sets or queries the power offset	31
SIRlus:SOURce:POWEr:RF	Sets or queries the output power level of the RF output (RF1 or RF2)	32

Impairments Commands

Mnemonic	Name	Page
SIRlus:AWG:FREQUency[:CENTer]	Sets or queries the frequency of AWG	17
SIRlus:AWG:NAME	Sets or queries the file name for the AWG	17
SIRlus:AWG:POWEr:RF	Sets the power of AWG for the according RF output	18
SIRlus:AWG:STATe	Sets or queries the AWG state	18
SIRlus:FILTer:STATe	Sets or queries the terrestrial filter	20
SIRlus:NOISe:BW	Configures the bandwidth of the noise generation.	20
SIRlus:NOISe:CN:RF	Configures the noise as C/N	20
SIRlus:NOISe:CN0:RF	Configures the noise as C/N0	21
SIRlus:NOISe:FREQUency[:CENTer]	Configures the center frequency of the noise	21
SIRlus:NOISe:N0:RF	Configures the noise density	21
SIRlus:NOISe:REFCarrier:RF	Configures reference carrier for noise	22
SIRlus:SOURce:NONLinearity:MULT	Configures the non linearity multiplier for this carrier	30
SIRlus:SOURce:NONLinearity:NAME	Configures the non linearity table for this carrier	30
SIRlus:SOURce:NONLinearity:STATe	State of the non linearity tables	31

Channel Simulator Commands

Mnemonic	Name	Page
SIRIus:SIMulator:SOURce:PATH:DELay	Delay of this source and path	24
SIRIus:SIMulator:SOURce:PATH:DOPPler	Doppler frequency of this source and path	24
SIRIus:SIMulator:SOURce:PATH:LOSS	Configures the loss of this source and path	25
SIRIus:SIMulator:SOURce:PATH:RICE:ANGLE	Configures the rice angle of this source and path	25
SIRIus:SIMulator:SOURce:PATH:RICE:K	Configures the rice K factor of this source and path	26
SIRIus:SIMulator:SOURce:PATH:SPEED	Configures the speed of this source and path	26
SIRIus:SIMulator:SOURce:PATH:STATe	Enables or disables this source and path	27
SIRIus:SIMulator:STATe	Enables or disables the complete channel simulator	27

3.2.3 XM Commands

Miscellaneous Commands

Mnemonic	Name	Page
XM:SOURce:ROSCillator[:INTernal]	Configures the instrument to internal 10MHz	48
XM:SOURce:ROSCillator:EXTernal	Configures the instrument to external 10MHz	48

Signal Generation Commands

Mnemonic	Name	Page
XM:DATA:SOURce:STATe	Enables or disables signal generation for XM	34
XM:DATA:SOURce:TDMA	Sets or queries the filename for TDM ensemble A	34
XM:DATA:SOURce:TDMB	Sets or queries the filename for TDM ensemble B	35
XM:OUTPut	Configures the output to IQ or RF	37
XM:PROFiles:POWEr:NAME	File name for power level profiling	38
XM:PROFiles:POWEr:STATe	Enables or disables the power level profiling	38
XM:SOURce:ATTenuation	Sets or queries the attenuation of the I/Q baseband output	43
XM:SOURce:DELay	Sets or queries the delay of the according source	44

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Mnemonic	Name	Page
XM:SOURce:FREQuency[:CENTer]	Sets or queries the center frequency	44
XM:SOURce:FREQuency:OFFSet	Sets or queries the frequency offset	45
XM:SOURce:MODE	Sets or queries the mode of the source.	45
XM:SOURce:POWer:OFFSet:RF	Sets or queries the power offset	47
XM:SOURce:POWer:RF	Sets or queries the output power level of the RF output (RF1 or RF2)	47

Impairments Commands

XM:AWG:FREQuency[:CENTer]	Sets or queries the frequency of AWG	33
XM:AWG:NAME	Sets or queries the file name for the AWG	33
XM:AWG:POWer:RF	Sets the power of AWG for the according RF output	33
XM:AWG:STATe	Sets or queries the AWG state	34
XM:FILTer:STATe	Sets or queries the terrestrial filter	35
XM:NOISe:BW	Configures the bandwidth of the noise generation	35
XM:NOISe:CN:RF	Configures the noise as C/N	36
XM:NOISe:CN0:RF	Configures the noise as C/N0	36
XM:NOISe:FREQuency[:CENTer]	Configures the center frequency of the noise	36
XM:NOISe:N0:RF	Configures the noise density	37
XM:NOISe:REFCarrier:RF	Configures reference carrier for noise	37
XM:SOURce:NONLinearity:MULT	Configures the non linearity multiplication for this carrier	46
XM:SOURce:NONLinearity:NAME	Configures the non linearity table for this carrier	46
XM:SOURce:NONLinearity:STATe	State of the non linearity tables	46

Channel Simulator Commands

Mnemonic	Name	Page
XM:SIMulator:CHAIn:PATH:DELay	Delay of this path	38
XM:SIMulator:CHAIn:PATH:LOSS	Loss of this path	39
XM:SIMulator:CHAIn:PATH:STATe	State of this source and path	39
XM:SIMulator:SOURce:PATH:DELay	Delay of this source and path	39
XM:SIMulator:SOURce:PATH:DOPPler	Doppler frequency of this source and path	40
XM:SIMulator:SOURce:PATH:LOSS	Configures the loss of this source and path	40
XM:SIMulator:SOURce:PATH:RICE:ANGLE	Configures the rice angle of this source and path	41

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XM:SIMulator:SOURce:PATH:RICE:K	Configures the rice K factor of this source and path	41
XM:SIMulator:SOURce:PATH:SPEEd	Configures the speed of this source and path	42
XM:SIMulator:SOURce:PATH:STATe	Enables or disables this source and path	42
XM:SIMulator:STATe	Enables or disables the complete channel simulator	43

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4 Command Descriptions

4.1 Common Commands

****CLS***

Group	Status and Error Commands
Syntax	*CLS
Name	Clears the DSG2000 status data structure
Description	The *CLS command clears the following: <ul style="list-style-type: none"> • the event queue • the standard event status register (SESR) • the status byte register
Arguments	None
Examples	None
Related	*ESE, *ESR?, *SRE, *STB?, SYST:ERR?

****ESR?***

Group	Status and Error Commands
Syntax	*ESR?
Name	Standard event status register query
Description	Returns the current status of the Standard Event Status Register (SESR) and automatically clears the register.
Returns	<numeric_value>
Examples	*ESR? might return the value 48 indicating a command and an execution error.
Related	*CLS, *ESE, *SRE, *STB?, SYST:ERR?

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****IDN?***

Group	Miscellaneous Commands
Syntax	*IDN?
Name	Identification query
Description	Returns the instruments identification code in IEEE 488.2 notation.
Returns	<string>
Examples	*IDN? IZT,DARS Simulator DSG2000,2356600101010001,MB 1.0.130
Related	None

****RCL***

Group	Miscellaneous Commands
Syntax	*RCL {filename}
Name	Recalls a file
Description	Loads the settings from the specified file, skips settings which cannot be configured (e.g. if an option is not available).
Arguments	<string>
Examples	*RCL /data/save_rcl/data.txt recalls the settings from data.txt
Related	*SAV, STATus:PRESet

****SAV***

Group	Miscellaneous Commands
Syntax	*SAV {filename}
Name	Saves the current settings to file
Description	Stores the current settings to the specified filename, stores default values for settings which are not configurable (e.g. if an option is not available).
Arguments	<string>
Examples	*SAV /data/save_rcl/data.txt stores the current settings to data.txt
Related	*RCL, STATus:PRESet

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****STB?***

Group	Status and Error Commands
Syntax	*STB?
Name	Read status byte query
Description	Returns the content of the status byte register.
Returns	<numeric_value>
Examples	*STB? might return the value of 36 indicating entries in the event queue and having an error condition in the SESR register.
Related	*CLS, *ESE, *ESR?, *SRE, SYST:ERR?

CALibration:ALL

Group	Miscellaneous Commands
Syntax	CALibration:ALL
Name	Calibrates the entire instrument
Description	Engages an auto-calibration of the instrument. Both the upper and lower modulator card are auto-calibrated.
Arguments	None
Examples	CALIBRATION:ALL
Related	None

STATus:PRESet

Group	Status and Error Commands
Syntax	STATus:PREset
Name	Presets the instrument
Description	Configures all parameters to the default values.
Arguments	None
Examples	STATUS:PRESET
Related	*RCL, *SAV

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SYSTem:ERRor[:NEXT]?

Group	Status and Error Commands
Syntax	SYSTem:ERRor[:NEXT]?
Name	Event Queue query
Description	Queries the next entry of the event queue, return "0,No Error" in case the event queue is empty.
Returns	<string>
Examples	SYST:ERR? might return "-113,Invalid header".
Related	*CLS, *ESE, *ESR?, *SRE

4.2 Sirius Commands

SIRIus:AWG:FREQuency[:CENTer]

Group	Impairments Commands
Syntax	SIRIus:AWG:FREQuency[:CENTer] <numeric_value> SIRIus:AWG:FREQuency[:CENTer]?
Name	Sets or queries the frequency of AWG
Description	While generating AWG the center frequency may be changed with this setting.
Arguments	<numeric_value>
Examples	SIRIUS:AWG:FREQUENCY 2322.293 places the AWG generation on the satellite 1.
Related	All SIRIus:AWG commands

SIRIus:AWG:NAME

Group	Impairments Commands
Syntax	SIRIus:AWG:NAME <filename> SIRIus:AWG:NAME?
Name	Sets or queries the file name for the AWG
Description	The filename of the AWG may be changed if the AWG is disabled. If a different file was chosen that currently loaded into memory, the download process for this file will start with the next AWG:ON command.
Arguments	<string>
Examples	SIRIUS:AWG:NAME /data/impairments/awg/demo.raw loads the demo.raw file into memory.
Related	All SIRIus:AWG commands

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SIRIus:AWG:POWer:RF

Group	Impairments Commands
Syntax	SIRIus:AWG:POWer:RF{1 2} {numeric_value} SIRIus:AWG:POWer:RF{1 2}?
Name	Sets the power of AWG for the according RF output
Description	Allows to change the power level of the arbitrary waveform generator for the according RF output. Note that the amplitude of the signal generated within the file will effect the total output level.
Arguments	<numeric_value>
Examples	SIRIUS:AWG:POWER:RF1 -40.0 configures the power level of the AWG to -40.0dBm.
Related	All SIRIus:AWG commands

SIRIus:AWG:STATe

Group	Impairments Commands
Syntax	SIRIus:AWG:STATe {OFF ON} SIRIus:AWG:STATe?
Name	Sets or queries the AWG state
Description	Enables or disabled the arbitrary waveform generator.
Arguments	<enum>
Examples	SIRIUS:AWG:STATE ON enables the AWG.
Related	All SIRIus:AWG commands

SIRIus:DATA:SOURce:BERMode

Group	Signal Generation Commands
Syntax	SIRIus:DATA:SOURce:BERMode <numeric_value> SIRIus:DATA:SOURce:BERMode?
Name	Sets or queries the bit error rate mode
Description	If this feature is available, the online BER mode may be disabled by choosing sequence 0 or enabled by choosing the desired BER mode sequence.
Arguments	<numeric_value>
Examples	SIRIUS:DATA:BERMODE 2 activates the online BER mode generation with sequence 2.
Related	None

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SIRIus:DATA:SOURce:NAME

Group	Signal Generation Commands
Syntax	SIRIus:DATA:SOURce:NAME <filename> SIRIus:DATA:SOURce:NAME?
Name	Sets or queries the file name used to generate the signal
Description	If the DATA:SOURce:STATe is OFF, this parameter may be changed to allow the generation of different signals. The file name specifies the file used to generate the signal.
Arguments	<string>
Examples	SIRIUS:DATA:SOURCE:NAME /data/bitstream/myfile.te1 configure the instrument to use myfile.te1 as input file of signal generation.
Related	SIRIus:DATA:SOURce:STATe, SIRIus:DATA:SOURce:TYPE

SIRIus:DATA:SOURce:STATe

Group	Signal Generation Commands
Syntax	SIRIus:DATA:SOURce:STATe {START STOP} SIRIus:DATA:SOURce:STATe?
Name	Enables or disables signal generation for Sirius
Description	Allow the signal generation to be started or stopped. With the query command the current state is returned.
Arguments	<enum>
Examples	SIRIUS:DATA:SOURCE:STATE START will start the signal generation.
Related	SIRIus:DATA:SOURce:NAME, SIRIus:DATA:SOURce:TYPE

SIRIus:DATA:SOURce:TYPE

Group	Signal Generation Commands
Syntax	SIRIus:DATA:SOURce:TYPE {FILE PORT} SIRIus:DATA:SOURce:TYPE?
Name	Selects the input of the signal generation
Description	Configures the input type to either FILE or PORT or allow the user to query the current type of the input.
Arguments	<enum>
Examples	SIRIUS:DATA:SOURCE:TYPE FILE will configure signal generation to use a file.
Related	SIRIus:DATA:SOURce:NAME, SIRIus:DATA:SOURce:STATe

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SIRIus:FILTer:STATe

Group	Impairments Commands
Syntax	SIRIus:FILTer:STATe {OFF ON} SIRIus:FILTer:STATe?
Name	Sets or queries the terrestrial filter
Description	Enables or disables the internal terrestrial filter simulation.
Arguments	<enum>
Examples	SIRIUS:FILTER:STATE ON enables the internal terrestrial filter simulation.
Related	None

SIRIus:NOISe:BW

Group	Impairments Commands
Syntax	SIRIus:NOISe:BW <25.0MHz 12.5MHz 6.25MHz 3.125MHz> SIRIus:NOISe:BW?
Name	Configures the bandwidth of the noise generation.
Description	The noise may be configure to 25, 12.5, 6.25 or 3.125MHz. With this settings the user may change the bandwidth of the noise. In case the noise is configured to 25MHz, the center frequency is automatically changed as then the frequency is fix.
Arguments	<enum>
Examples	SIRIUS:NOISE:BW 6.25MHz changes the bandwidth of the noise to 6.25MHz.
Related	All SIRIus:NOISe commands.

SIRIus:NOISe:CN:RF

Group	Impairments Commands
Syntax	SIRIus:NOISe:CN:RF{1 2} <numeric_value>
Name	Configures the noise as C/N
Description	Configures the noise regarding the selected reference carrier as C/N in dB.
Arguments	<numeric_value>
Examples	SIRIUS:NOISE:CN:RF1 6.0 creates noise with C/N of 6dB according to the configured reference carrier.
Related	All SIRIus:NOISe commands.

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SIRIus:NOISe:CN0:RF

Group	Impairments Commands
Syntax	SIRIus:NOISe:CN0:RF{1 2} <numeric_value>
Name	Configures the noise as C/N0
Description	Configures the noise as C/N0 dBHz for the according RF output.
Arguments	<numeric_value>
Examples	SIRIUS:NOISE:CN0:RF1 -64.0 activates the noise generation with a C/N0 of -64.0 dBHz.
Related	All SIRIus:NOISe commands.

SIRIus:NOISe:FREQUency[:CENTer]

Group	Impairments Commands
Syntax	SIRIus:NOISe:FREQUency[:CENTer] <numeric_value> SIRIus:NOISe:FREQUency[:CENTer]?
Name	Configures the center frequency of the noise
Description	If the noise bandwidth is limited, the user may configure the frequency of the noise generation allowing him to produce noise at any frequency within the band.
Arguments	<numeric_value>
Examples	SIRIUS:NOISE:FREQUENCY 2322.293 places the center frequency of the noise generation on the satellite 1.
Related	All SIRIus:NOISe commands.

SIRIus:NOISe:N0:RF

Group	Impairments Commands
Syntax	SIRIus:NOISe:N0:RF{1 2} <numeric_value> SIRIus:NOISe:N0:RF{1 2}?
Name	Configures the noise density
Description	Configures the noise as N0 in dBm/Hz for the according RF output.
Arguments	<numeric_value>
Examples	SIRIUS:NOISE:N0:RF1 -140.0 activates the noise generation with -140.0 dBm/Hz.
Related	All SIRIus:NOISe commands.

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SIRIus:NOISe:REFCarrier:RF

Group	Impairments Commands
Syntax	SIRIus:NOISe:REFCarrier:RF{1 2} <SAT1 TERR SAT2> SIRIus:NOISe: REFCarrier:RF{1 2}?
Name	Configures reference carrier for noise
Description	If noise is configured as C/N or C/N0 a reference carrier must be selected.
Arguments	<enum>
Examples	SIRIUS:NOISE:REFCARRIER:RF1 TERR chooses the terrestrial signal as reference carrier for C/N and C/N0 settings regarding the RF1 output..
Related	All SIRIus:NOISe commands.

SIRIus:OUTPut

Group	Signal Generation Commands
Syntax	SIRIus:OUTPut {RF IQ} SIRIus:OUTPut?
Name	Configures the output to IQ or RF
Description	Changes the output either to IQ or to the RF outputs.
Arguments	<enum>
Examples	SIRIUS:OUTPUT RF activates the RF outputs, if signal generation is started signal will be available at RF1 and RF2 according to the power levels.
Related	All SIRIUS:SOURce commands.

SIRIus:PROFiles:DELAyfreq:NAME

Group	Signal Generation Commands
Syntax	SIRIus:PROFiles:DELAyfreq:NAME {filename} SIRIus:PROFiles:DELAyfreq:NAME?
Name	File name for delay/frequency profiling
Description	Configures the filename used for combined delay and frequency profiling. This parameter may only be altered if the signal generation is stopped.
Arguments	<string>
Examples	SIRIUS:PROFILES:DELAYFREQ:NAME /data/profiles/del_freq/demo.dyp configure the instrument to use demo.dyp as input file for delay/frequency profiling.
Related	All SIRIus:PROFiles commands.

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SIRIus:PROFiles:DELAyfreq:STATe

Group	Signal Generation Commands
Syntax	SIRIus:PROFiles:DELAyfreq:STATe { START STOP } SIRIus:PROFiles:DELAyfreq:STATe?
Name	Enables or disables the delay/frequency profiling
Description	Delay/frequency profiling may not be changed during signal generation. With aid of the state the profiling may be activated or deactivated.
Arguments	<enum>
Examples	SIRIUS:PROFILES:DELAYFREQ:STATE START activates delay/frequency profiling.
Related	All SIRIus:PROFiles commands.

SIRIus:PROFiles:POWEr:NAME

Group	Signal Generation Commands
Syntax	SIRIus:PROFiles:POWEr:NAME {filename} SIRIus:PROFiles:POWEr:NAME?
Name	File name for power level profiling
Description	Configures the filename used for power level profiling. This parameter may only be altered if the profiling is stopped.
Arguments	<string>
Examples	SIRIUS:PROFILES:POWER:NAME /data/profiles/power/pow.plp configure the instrument to use pow.plp as input file for power profiling.
Related	All SIRIus:PROFiles commands.

SIRIus:PROFiles:POWEr:STATe

Group	Signal Generation Commands
Syntax	SIRIus:PROFiles:POWEr:STATe { START STOP } SIRIus:PROFiles:POWEr:STATe?
Name	Enables or disables the power level profiling
Description	Power level profiling may be changed during signal generation. With aid of the state the profiling may be activated or deactivated.
Arguments	<enum>
Examples	SIRIUS:PROFILES:POWER:STATE START activates power level profiling.
Related	All SIRIus:PROFiles commands.

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SIRIus:SIMulator:SOURce:PATH:DELay

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:DELay <numeric_value> SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:DELay?
Name	Delay of this source and path
Description	Configure the delay of the desired path of a chosen source. The delay is accepted in μ s and ranges from 0 to 80 μ s. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:DELAY 7 configures the delay of the simulator path0 of the terrestrial signal to 7 μ s.
Related	All SIRIus:SIMulator commands.

SIRIus:SIMulator:SOURce:PATH:DOPPler

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:DOPPler <numeric_value> SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:DOPPler?
Name	Doppler frequency of this source and path
Description	Configures the doppler frequency of this path. The doppler frequency and the speed setting are identical, the instrument will recalculate the doppler out of the speed setting if configured. The value is entered in Hz and can range from 0 to 3000Hz. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:DOPPLER 150 configures the doppler frequency of the terrestrial signal path0 to 150Hz.
Related	All SIRIus:SIMulator commands.

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SIRIus:SIMulator:SOURce:PATH:LOSS

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:LOSS <numeric_value> SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:LOSS?
Name	Configures the loss of this source and path
Description	Changes the loss of this path. The loss ranges from -1.000 to 1.000 and is entered linear. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:LOSS 0.5 configures the loss of the terrestrial signal path0 to 0.5.
Related	All SIRIus:SIMulator commands.

SIRIus:SIMulator:SOURce:PATH:RICE:ANGLE

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:RICE:ANGLE <numeric_value> SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:RICE:ANGLE?
Name	Configures the rice angle of this source and path
Description	In case a direct line of sight (LOS) is enabled with the rice K factor value this parameter allows to configure the direction from where the LOS is received. The values of the angle is entered in degree and ranges from -180 to 180°. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:RICE:ANGLE 90 configures the angle of the path0 of the terrestrial signal to 90°.
Related	All SIRIus:SIMulator commands.

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SIRIus:SIMulator:SOURce:PATH:RICE:K

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:RICE:K <numeric_value> SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:RICE:K?
Name	Configures the rice K factor of this source and path
Description	The rice K factor defines the ratio of the energy of the line of sight (LOS) versus the scattered components. The K factor can range from 0.0 to 10.0, a value of 0.0 disables the LOS. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:RICE:K 0.0 disables the LOS component for the terrestrial signal path0.
Related	All SIRIus:SIMulator commands.

SIRIus:SIMulator:SOURce:PATH:SPEED

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:SPEED <numeric_value> SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:SPEED?
Name	Configures the speed of this source and path
Description	Configures the doppler frequency of this path. The doppler frequency and the speed setting are identical, the instrument will recalculate the doppler out of the speed setting if configured. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:SPEED 19.5 configures the speed of the terrestrial signal path0 to 19.5m/s.
Related	All SIRIus:SIMulator commands.

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SIRIus:SIMulator:SOURce:PATH:STATe

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:STATe {OFF ON} SIRIus:SIMulator:SOURce{1...3}:PATH{0...7}:STATe?
Name	Enables or disables this source and path
Description	Allows to enable or disable a path of the channel simulator.
Arguments	<enum>
Examples	SIRIUS:SIMULATOR:SOURCE2:PATH0:STATE ON enables the path0 of the terrestrial signal. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Related	All SIRIus:SIMulator commands.

SIRIus:SIMulator:STATe

Group	Channel Simulator Commands
Syntax	SIRIus:SIMulator:STATe {OFF ON} SIRIus:SIMulator:STATe?
Name	Enables or disables the complete channel simulator
Description	Allows the user to enable or disable the complete channel simulator without the need of reconfiguration of all paths.
Arguments	<enum>
Examples	SIRIUS:SIMULATOR:STATE OFF disables the channel simulator.
Related	All SIRIus:SIMulator commands.

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SIRIus:SOURce:ATTenuation

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:ATTenuation <numeric_value> SIRIus:SOURce{1 2 3}:ATTenuation?
Name	Sets or queries the attenuation of the I/Q baseband output
Description	Sets the attenuation level of the I/Q baseband output. This setting will only apply if the SIRIus:OUTPut is set to I/Q mode. During power level profiles, used to simulate large scale fading, the attenuation will be changed by the file settings and therefore changing the attenuation manually will produce an error. At *RST, this value is set to minimum attenuation (-96.0dB attenuation).
Arguments	<numeric_value> value in the range of -96.0 to 0.0dB
Examples	SIRIUS:SOURCE3:ATTENUATION -15.1 attenuates the satellite2 about -15.1dB from full scale.
Related	SIRIus:OUTPut and all SIRIUS:SOURce commands.

SIRIus:SOURce:DELay

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:DELay <numeric_value> SIRIus:SOURce{1 2 3}:DELay?
Name	Sets or queries the delay of the according source
Description	Changes the delay of the according source.
Arguments	<numeric_value> value entered in ms with precision of μ s.
Examples	SIRIUS:SOURCE2:DELAY 4168.582375 changes the delay of source 2 (QPSK2) to 4168ms, 582 microseconds and 375 nanoseconds.
Related	All SIRIUS:SOURce commands.

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SIRIus:SOURce:FREQuency[:CENTer]

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:FREQuency[:CENTer] <numeric_value> SIRIus:SOURce{1 2 3}:FREQuency[:CENTer]?
Name	Sets or queries the center frequency
Description	Sets the center frequency of the according source. At *RST, these values are set to the network specific values (Source1 to 2322.255MHz, Source2 to 2330.245MHz, Source3 to 2326.250MHz).
Arguments	<numeric_value> is a frequency in MHz ranged from 2320.0 to 2332.5
Examples	SIRIUS:SOURCE2:FREQ:CENT 2330.245 moves the COFDM signal to 2330.245MHz.
Related	All SIRIUS:SOURce commands.

SIRIus:SOURce:FREQuency:OFFSet

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:FREQuency:OFFSet <numeric_value> SIRIus:SOURce{1 2 3}:FREQuency:OFFSet?
Name	Sets or queries the frequency offset
Description	Sets the center frequency offset of all sources, it does not matter which source was used. This allows the user to configure an offset in case there is no way to synchronize the DSG2000 to 10MHz and the receiver has a certain frequency offset.
Arguments	<numeric_value> is a frequency in MHz ranged from -0.1 to 0.1.
Examples	SIRIUS:SOURCE1:FREQUENCY:OFFSET 0.045 changes the frequency offset to 45kHz
Related	All SIRIUS:SOURce commands.

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SIRIus:SOURce:MODE

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:MODE {OFF CW INPUT} SIRIus:SOURce{1 2 3}:MODE?
Name	Sets or queries the mode of the source
Description	Allows the configuration of the source: Setting the source to OFF will mute this carrier, changing it to CW will generate a continuous wave (sine) signal and adapting it to INPUT will generate the normal signal.
Arguments	<enum> either OFF, CW or INPUT
Examples	SIRIUS:SOURCE3:MODE CW Starts the generation of a CW signal on source 3.
Related	All SIRIUS:SOURce commands.

SIRIus:SOURce:NONLinearity:MULT

Group	Impairments Commands
Syntax	SIRIus:SOURce{1 2 3}:NONLinearity:MULT <numeric_value> SIRIus:SOURce{1 2 3}:NONLinearity:MULT?
Name	Configures the non linearity multiplier for this carrier
Description	Changes the multiplier for the according carrier. The multiplier is used to drive the non linearity table at different operation points.
Arguments	<numeric_value>
Examples	SIRIUS:SOURCE2:NONLINEARITY:MULT -3.0 changes the multiplier for the terrestrial signal to -3.0dB.
Related	All SIRIUS:SOURce: NONLinearity commands.

SIRIus:SOURce:NONLinearity:NAME

Group	Impairments Commands
Syntax	SIRIus:SOURce{1 2 3}:NONLinearity:NAME <filename> SIRIus:SOURce{1 2 3}:NONLinearity:NAME?
Name	Configures the non linearity table for this carrier
Description	Each carrier may load a non linearity table describing the characteristics of the non linearity. With this setting a new table may be configured.
Arguments	<string>
Examples	SIRIUS:SOURCE2:NONLINEARITY:NAME /data/impairments/nonlin/demo.lin loads the demo.lin table into the terrestrial signal.
Related	All SIRIUS:SOURce: NONLinearity commands.

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SIRIus:SOURce:NONLinearity:STATe

Group	Impairments Commands
Syntax	SIRIus:SOURce{1 2 3}:NONLinearity:STATe <OFF ON> SIRIus:SOURce{1 2 3}:NONLinearity:STATe?
Name	State of the non linearity tables
Description	Enables or disables the non linearity table for the according carrier.
Arguments	<enum>
Examples	SIRIUS:SOURCE2:NONLINEARITY:STATE ON enables the non linearity for the terrestrial signal.
Related	All SIRIUS:SOURce: NONLinearity commands.

SIRIus:SOURce:POWER:OFFSet:RF

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:POWER:OFFSet:RF{1 2} <numeric_value> SIRIus:SOURce{1 2 3}:POWER:OFFSet:RF{1 2}?
Name	Sets or queries the power offset
Description	Sets the power level offset of all sources, it does not matter which source was used. This allows the user to address a power level offset. Commonly this is used to compensate cable losses from the DSG2000 to the device under test.
Arguments	<numeric_value> is a power level offset in dB ranged from 0.0 to 20.0dB.
Examples	SIRIUS:SOURCE1:POWER:OFFSET 5.7 changes the power level offset to 5.7dB
Related	All SIRIUS:SOURce commands.

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SIRIus:SOURce:POWer:RF

Group	Signal Generation Commands
Syntax	SIRIus:SOURce{1 2 3}:POWer:RF{1 2} <numeric_value> SIRIus:SOURce{1 2 3}:POWer:RF{1 2}?
Name	Sets or queries the output power level of the RF output (RF1 or RF2)
Description	Changes the output power level of the according source regarding the specified RF output. The value may be entered in dBm and are applied if the output is configured to RF output.
Arguments	<numeric_value> may be any power level in dBm in the range from -110.0 to +10.0dBm (or +20dBm with additional option)
Examples	SIRIUS:SOURCE2:POWER:RF2 -75.3 changes the source2 of the 2 nd RF output to a power level of -75.3dBm.
Related	All SIRIUS:SOURce commands.

SIRIus:SOURce:ROSCillator[:INTernal]

Group	Miscellaneous Commands
Syntax	SIRIus:SOURce:ROSCillator[:INTernal]
Name	Configures the instrument to internal 10MHz
Description	Uses the internally generated 10MHz as clock reference.
Arguments	None
Examples	SIRIUS:SOURCE:ROSCILLATOR switches to internal 10MHz reference.
Related	SIRIus:SOURce:ROSCillator:EXTernal

SIRIus:SOURce:ROSCillator:EXTernal

Group	Miscellaneous Commands
Syntax	SIRIus:SOURce:ROSCillator:EXTernal
Name	Configures the instrument to external 10MHz
Description	Synchronizes the unit to an external 10MHz reference.
Arguments	None
Examples	SIRIUS:SOURCE:ROSCILLATOR:EXTERNAL switches to external 10MHz reference.
Related	SIRIus:SOURce:ROSCillator

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4.3 XM Commands

XM:AWG:FREQuency[:CENTer]

Group	Impairments Commands
Syntax	XM:AWG:FREQuency[:CENTer] <numeric_value> XM:AWG:FREQuency[:CENTer]?
Name	Sets or queries the frequency of AWG
Description	While generating AWG the center frequency may be changed with this setting.
Arguments	<numeric_value>
Examples	XM:AWG:FREQUENCY 2333.465 places the AWG generation on the satellite 1 ensemble A.
Related	All XM:AWG commands

XM:AWG:NAME

Group	Impairments Commands
Syntax	XM:AWG:NAME <filename> XM:AWG:NAME?
Name	Sets or queries the file name for the AWG
Description	The filename of the AWG may be changed if the AWG is disabled. If a different file was chosen that currently loaded into memory, the download process for this file will start with the next AWG:ON command.
Arguments	<string>
Examples	XM:AWG:NAME /data/impairments/awg/demo.raw loads the demo.raw file into memory.
Related	All XM:AWG commands

XM:AWG:POWer:RF

Group	Impairments Commands
Syntax	XM:AWG:POWer:RF{1 2} {numeric_value} XM:AWG:POWer:RF{1 2}?
Name	Sets the power of AWG for the according RF output
Description	Allows to change the power level of the arbitrary waveform generator for the according RF output. Note that the amplitude of the signal generated within the file will effect the total output level.
Arguments	<numeric_value>
Examples	XM:AWG:POWER:RF1 -40.0 configures the power level of the AWG to -40.0dBm.
Related	All XM:AWG commands

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XM:AWG:STATe

Group	Impairments Commands
Syntax	XM:AWG:STATe {OFF ON} XM:AWG:STATe?
Name	Sets or queries the AWG state
Description	Enables or disabled the arbitrary waveform generator.
Arguments	<enum>
Examples	XM:AWG:STATE ON enables the AWG.
Related	All XM:AWG commands

XM:DATA:SOURce:STATe

Group	Signal Generation Commands
Syntax	XM:DATA:SOURce:STATe {START STOP} XM:DATA:SOURce:STATe?
Name	Enables or disables signal generation for XM
Description	Allow the signal generation to be started or stopped. With the query command the current state is returned.
Returns	<enum>
Examples	XM:DATA:SOURCE:STATE START will start the signal generation.
Related	XM:DATA:SOURce:STATe

XM:DATA:SOURce:TDMA

Group	Signal Generation Commands
Syntax	XM:DATA:SOURce:TDMA <filename> XM:DATA:SOURce:TDMA?
Name	Sets or queries the filename for TDM ensemble A
Description	If the DATA:SOURce:STATe of OFF this parameters allows the change of the input file used to generate the ensemble A.
Returns	<string>
Examples	XM:DATA:SOURCE:TDMA /data/bitstream/myfile_a.tdm configure the instrument to use myfile_a.tdm for signal generation
Related	XM:DATA:SOURce:STATe

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XM:DATA:SOURce:TDMB

Group	Signal Generation Commands
Syntax	XM:DATA:SOURce:TDMB <filename> XM:DATA:SOURce:TDMB?
Name	Sets or queries the filename for TDM ensemble B
Description	If the DATA:SOURce:STATe of OFF this parameters allows the change of the input file used to generate the ensemble B.
Returns	<string>
Examples	XM:DATA:SOURCE:TDMB /data/bitstream/myfile_b.tdm configure the instrument to use myfile_b.tdm for signal generation
Related	XM:DATA:SOURce:STATe

XM:FILTer:STATe

Group	Impairments Commands
Syntax	XM:FILTer:STATe {OFF ON} XM:FILTer:STATe?
Name	Sets or queries the terrestrial filter
Description	Enables or disables the internal terrestrial filter simulation.
Arguments	<enum>
Examples	XM:FILTER:STATE ON enables the internal terrestrial filter simulation.
Related	None

XM:NOISe:BW

Group	Impairments Commands
Syntax	XM:NOISe:BW <25.0MHz 12.5MHz 6.25MHz 3.125MHz> XM:NOISe:BW?
Name	Configures the bandwidth of the noise generation
Description	The noise may be configure to 25, 12.5, 6.25 or 3.125MHz. With this settings the user may change the bandwidth of the noise. In case the noise is configured to 25MHz, the center frequency is automatically changed as then the frequency is fix.
Arguments	<enum>
Examples	XM:NOISE:BW 6.25MHz changes the bandwidth of the noise to 6.25MHz.
Related	All XM:NOISe commands.

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XM:NOISe:CN:RF

Group	Impairments Commands
Syntax	XM:NOISe:CN:RF{1 2} <numeric_value>
Name	Configures the noise as C/N
Description	Configures the noise regarding the selected reference carrier as C/N in dB.
Arguments	<numeric_value>
Examples	XM:NOISe:CN:RF1 6.0 creates noise with C/N of 6dB according to the configured reference carrier.
Related	All XM:NOISe commands.

XM:NOISe:CN0:RF

Group	Impairments Commands
Syntax	XM:NOISe:CN0:RF{1 2} <numeric_value>
Name	Configures the noise as C/N0
Description	Configures the noise as C/N0 dBHz for the according RF output.
Arguments	<numeric_value>
Examples	XM:NOISe:CN0:RF1 -64.0 activates the noise generation with a C/N0 of -64.0 dBHz.
Related	All XM:NOISe commands.

XM:NOISe:FREQuency[:CENTer]

Group	Impairments Commands
Syntax	XM:NOISe:FREQuency[:CENTer] <numeric_value> XM:NOISe:FREQuency[:CENTer]?
Name	Configures the center frequency of the noise
Description	If the noise bandwidth is limited, the user may configure the frequency of the noise generation allowing him to produce noise at any frequency within the band.
Arguments	<numeric_value>
Examples	XM:NOISe:FREQUENCY 2333.465 places the center frequency of the noise generation on the satellite 1 ensemble A.
Related	All XM:NOISe commands.

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XM:NOISe:N0:RF

Group	Impairments Commands
Syntax	XM:NOISe:N0:RF{1 2} <numeric_value> XM:NOISe:N0:RF{1 2}?
Name	Configures the noise density
Description	Configures the noise as N0 in dBm/Hz for the according RF output.
Arguments	<numeric_value>
Examples	XM:NOISE:N0:RF1 -140.0 activates the noise generation with -140.0 dBm/Hz.
Related	All XM:NOISe commands.

XM:NOISe:REFCarrier:RF

Group	Impairments Commands
Syntax	XM:NOISe:REFCarrier:RF{1 2} <SAT1A SAT2A TERRA TERRB SAT2B SAT1B> XM:NOISe: REFCarrier:RF{1 2}?
Name	Configures reference carrier for noise
Description	If noise is configured as C/N or C/N0 a reference carrier must be selected.
Arguments	<enum>
Examples	XM:NOISE:REFCARRIER:RF1 SAT1A chooses the satellite1 ensemble A signal as reference carrier for C/N and C/N0 settings regarding the RF1 output.
Related	All XM:NOISe commands.

XM:OUTPut

Group	Signal Generation Commands
Syntax	XM:OUTPut {RF IQ} XM:OUTPut?
Name	Configures the output to IQ or RF
Description	Changes the output either to IQ or to the RF outputs.
Arguments	<enum>
Examples	XM:OUTPUT RF activates the RF outputs, if signal generation is started signal will be available at RF1 and RF2 according to the power levels.
Related	All XM:SOURce commands.

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XM:PROFiles:POWer:NAME

Group	Signal Generation Commands
Syntax	XM:PROFiles:POWer:NAME {filename} XM:PROFiles:POWer:NAME?
Name	File name for power level profiling
Description	Configures the filename used for power level profiling. This parameter may only be altered if the profiling is stopped.
Arguments	<string>
Examples	XM:PROFILES:POWER:NAME /data/profiles/power/pow.plp configure the instrument to use pow.plp as input file for power profiling.
Related	All XM:PROFiles commands.

XM:PROFiles:POWer:STATe

Group	Signal Generation Commands
Syntax	XM:PROFiles:POWer:STATe { START STOP } XM:PROFiles:POWer:STATe?
Name	Enables or disables the power level profiling
Description	Power level profiling may be changed during signal generation. With aid of the state the profiling may be activated or deactivated.
Arguments	<enum>
Examples	XM:PROFILES:POWER:STATE START activates power level profiling.
Related	All XM:PROFiles commands.

XM:SIMulator:CHAIIn:PATH:DELay

Group	Channel Simulator Commands
Syntax	XM:SIMulator:CHAIIn:PATH{0...3}:DELay <numeric_value> XM:SIMulator:CHAIIn:PATH{0...3}:DELay?
Name	Delay of this path
Description	Configure the delay of the delay chain for this path. The delay is accepted in μ s and ranges from 0 to 40 μ s.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:CHAIN:PATH0:DELAY 17 configures the delay of path0 of the delay chain to 17 μ s.
Related	All XM:SIMulator commands.

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XM:SIMulator:CHAIIn:PATH:LOSS

Group	Channel Simulator Commands
Syntax	XM:SIMulator:CHAIIn:PATH{0...3}:LOSS <numeric_value> XM:SIMulator:CHAIIn:PATH{0...3}:LOSS?
Name	Loss of this path
Description	Configure the loss of the delay chain for this path. The loss is accepted in dB and ranges from 0 to 50dB.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:CHAIN:PATH0:LOSS 3 configures the loss of path0 of the delay chain to 3dB.
Related	All XM:SIMulator commands.

XM:SIMulator:CHAIIn:PATH:STATE

Group	Channel Simulator Commands
Syntax	XM:SIMulator:CHAIIn:PATH{0...3}:STATe {OFF ON} XM:SIMulator:CHAIIn:PATH{0...3}:STATe?
Name	State of this source and path
Description	Enables or disables the delay chain for this path.
Arguments	<enum >
Examples	XM:SIMULATOR:CHAIN:PATH0:STATE OFF disables the path0 of the delay chain.
Related	All XM:SIMulator commands.

XM:SIMulator:SOURce:PATH:DELAy

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:DELAy <numeric_value> XM:SIMulator:SOURce{1...6}:PATH{0...7}:DELAy?
Name	Delay of this source and path
Description	Configure the delay of the desired path of a chosen source. The delay is accepted in μ s and ranges from 0 to 80 μ s. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:SOURCE3:PATH0:DELAY 7 configures the delay of the simulator path0 of the terrestrial signal to 7 μ s.
Related	All XM:SIMulator commands.

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XM:SIMulator:SOURce:PATH:DOPPler

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:DOPPler <numeric_value> XM:SIMulator:SOURce{1...6}:PATH{0...7}:DOPPler?
Name	Doppler frequency of this source and path
Description	Configures the doppler frequency of this path. The doppler frequency and the speed setting are identical, the instrument will recalculate the doppler out of the speed setting if configured. The value is entered in Hz and can range from 0 to 3000Hz. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:SOURCE3:PATH0:DOPPLER 150 configures the doppler frequency of the terrestrial signal path0 to 150Hz.
Related	All XM:SIMulator commands.

XM:SIMulator:SOURce:PATH:LOSS

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:LOSS <numeric_value> XM:SIMulator:SOURce{1...6}:PATH{0...7}:LOSS?
Name	Configures the loss of this source and path
Description	Changes the loss of this path. The loss ranges from -1.000 to 1.000 and is entered linear. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:SOURCE3:PATH0:LOSS 0.5 configures the loss of the terrestrial signal path0 to 0.5.
Related	All XM:SIMulator commands.

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XM:SIMulator:SOURce:PATH:RICE:ANGLE

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:RICE:ANGLE <numeric_value> XM:SIMulator:SOURce{1...6}:PATH{0...7}:RICE:ANGLE?
Name	Configures the rice angle of this source and path
Description	In case a direct line of sight (LOS) is enabled with the rice K factor value this parameter allows to configure the direction from where the LOS is received. The values of the angle is entered in degree and ranges from -180 to 180°. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:SOURCE3:PATH0:RICE:ANGLE 90 configures the angle of the path0 of the terrestrial signal to 90°.
Related	All XM:SIMulator commands.

XM:SIMulator:SOURce:PATH:RICE:K

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:RICE:K <numeric_value> XM:SIMulator:SOURce{1...6}:PATH{0...7}:RICE:K?
Name	Configures the rice K factor of this source and path
Description	The rice K factor defines the ratio of the energy of the line of sight (LOS) versus the scattered components. The K factor can range from 0.0 to 10.0, a value of 0.0 disables the LOS. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:SOURCE3:PATH0:RICE:K 0.0 disables the LOS component for the terrestrial signal path0.
Related	All XM:SIMulator commands.

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XM:SIMulator:SOURce:PATH:SPEED

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:SPEED <numeric_value> XM:SIMulator:SOURce{1...6}:PATH{0...7}:SPEED?
Name	Configures the speed of this source and path
Description	Configures the doppler frequency of this path. The doppler frequency and the speed setting are identical, the instrument will recalculate the doppler out of the speed setting if configured. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Arguments	<numeric_value>
Examples	XM:SIMULATOR:SOURCE3:PATH0:SPEED 19.5 configures the speed of the terrestrial signal path0 to 19.5m/s.
Related	All XM:SIMulator commands.

XM:SIMulator:SOURce:PATH:STATE

Group	Channel Simulator Commands
Syntax	XM:SIMulator:SOURce{1...6}:PATH{0...7}:STATE {OFF ON} XM:SIMulator:SOURce{1...6}:PATH{0...7}:STATE?
Name	Enables or disables this source and path
Description	Allows to enable or disable a path of the channel simulator.
Arguments	<enum>
Examples	XM:SIMULATOR:SOURCE3:PATH0:STATE ON enables the path0 of the terrestrial signal. Note: the satellites accept paths 0 and 1 while the terrestrial signal allow paths 0 to 7.
Related	All XM:SIMulator commands.

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XM:SIMulator:STATe

Group	Channel Simulator Commands
Syntax	XM:SIMulator:STATe {OFF ON} XM:SIMulator:STATe?
Name	Enables or disables the complete channel simulator
Description	Allows the user to enable or disable the complete channel simulator without the need of reconfiguration of all paths.
Arguments	<enum>
Examples	XM:SIMULATOR:STATE OFF disables the channel simulator.
Related	All XM:SIMulator commands.

XM:SOURce:ATTenuation

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:ATTenuation <numeric_value> XM:SOURce{1 2 3 4 5 6}:ATTenuation?
Name	Sets or queries the attenuation of the I/Q baseband output
Description	Sets the attenuation level of the I/Q baseband output. This setting will only apply if the XM:OUTPut is set to I/Q mode. During power level profiles, used to simulate large scale fading, the attenuation will be changed by the file settings and therefore changing the attenuation manually will produce an error. At *RST, this value is set to minimum attenuation (-96.0dB attenuation).
Arguments	<numeric_value> value in the range of -96.0 to 0.0dB
Examples	XM:SOURCE1:ATTENUATION -15.1 attenuates the satellite1 ensemble A about -15.1dB from full scale.
Related	XM:OUTPut and all XM:SOURce commands.

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XM:SOURce:DELay

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3}:DELay <numeric_value> XM:SOURce{1 2 3}:DELay?
Name	Sets or queries the delay of the according source
Description	Changes the delay of the according source. The delay may only be changed for the combined ensembles A and B, therefore the source 4, 5 and 6 are not configurable as they are linked to ensemble A.
Arguments	<numeric_value> value entered in ms with precision of μ s.
Examples	XM:SOURCE2:DELAY -5000 changes the delay of satellite2 to -5ms.
Related	All XM:SOURce commands.

XM:SOURce:FREQuency[:CENTer]

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:FREQuency[:CENTer] <numeric_value> XM:SOURce{1 2 3 4 5 6}:FREQuency[:CENTer]?
Name	Sets or queries the center frequency
Description	Sets the center frequency of the according source. At *RST, these values are set to the network specific values (Source1 to 2333.465MHz, Source2 to 2335.305MHz, Source3 to 2337.490MHz, Source4 to 2340.020MHz, Source5 to 2342.205MHz and Source6 to 2344.045MHz).
Arguments	<numeric_value> is a frequency in MHz ranged from 2332.5 to 2345.0
Examples	XM:SOURCE2:FREQ:CENT 2335.335 moves the satellite2 ensemble A signal to 2335.335MHz.
Related	All XM:SOURce commands.

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XM:SOURce:FREQuency:OFFSet

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:FREQuency:OFFSet <numeric_value> XM:SOURce{1 2 3 4 5 6}:FREQuency:OFFSet?
Name	Sets or queries the frequency offset
Description	Sets the center frequency offset of all sources, it does not matter which source was used. This allows the user to configure an offset in case there is no way to synchronize the DSG2000 to 10MHz and the receiver has a certain frequency offset.
Arguments	<numeric_value> is a frequency in MHz ranged from -0.1 to 0.1.
Examples	XM:SOURCE1:FREQUENCY:OFFSET 0.045 changes the frequency offset to 45kHz
Related	All SIRIUS:SOURce commands.

XM:SOURce:MODE

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:MODE {OFF CW INPUT} XM:SOURce{1 2 3 4 5 6}:MODE?
Name	Sets or queries the mode of the source.
Description	Allows the configuration of the source: Setting the source to OFF will mute this carrier, changing it to CW will generate a continuous wave (sine) signal and adapting it to INPUT will generate the normal signal.
Arguments	<enum> either OFF, CW or INPUT
Examples	XM:SOURCE3:MODE CW Starts the generation of a CW signal on terrestrial ensemble A.
Related	All XM:SOURce commands.

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XM:SOURce:NONLinearity:MULT

Group	Impairments Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:NONLinearity:MULT <numeric_value> XM:SOURce{1 2 3 4 5 6}:NONLinearity:MULT?
Name	Configures the non linearity multiplication for this carrier
Description	Changes the multiplier for the according carrier. The multiplier is used to drive the non linearity table at different operation points.
Arguments	<numeric_value>
Examples	XM:SOURCE2:NONLINEARITY:MULT -3.0 changes the multiplier for the satellite2 ensemble A signal to -3.0dB.
Related	All XM:SOURce: NONLinearity commands.

XM:SOURce:NONLinearity:NAME

Group	Impairments Commands
Syntax	XM:SOURce{1 2 3}:NONLinearity:NAME <filename> XM:SOURce{1 2 3}:NONLinearity:NAME?
Name	Configures the non linearity table for this carrier
Description	Each carrier may load a non linearity table describing the characteristics of the non linearity. With this setting a new table may be configured.
Arguments	<string>
Examples	XM:SOURCE1:NONLINEARITY:NAME /data/impairments/nonlin/demo.lin loads the demo.lin table into the satellite 1 ensemble A signal.
Related	All XM:SOURce: NONLinearity commands.

XM:SOURce:NONLinearity:STATe

Group	Impairments Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:NONLinearity:STATe <OFF ON> XM:SOURce{1 2 3 4 5 6}:NONLinearity:STATe?
Name	State of the non linearity tables
Description	Enables or disables the non linearity table for the according carrier.
Arguments	<enum>
Examples	XM:SOURCE3:NONLINEARITY:STATE ON enables the non linearity for the terrestrial signal ensemble A.
Related	All XM:SOURce: NONLinearity commands.

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XM:SOURce:POWer:OFFSet:RF

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3}:POWer:OFFSet:RF{1 2} <numeric_value> XM:SOURce{1 2 3}:POWer:OFFSet:RF{1 2}?
Name	Sets or queries the power offset
Description	Sets the power level offset of all sources, it does not matter which source was used. This allows the user to address a power level offset. Commonly this is used to compensate cable losses from the DSG2000 to the device under test.
Arguments	<numeric_value> is a power level offset in dB ranged from 0.0 to 20.0dB.
Examples	XM:SOURCE1:POWER:OFFSET 5.7 changes the power level offset to 5.7dB
Related	All XM:SOURce commands.

XM:SOURce:POWer:RF

Group	Signal Generation Commands
Syntax	XM:SOURce{1 2 3 4 5 6}:POWer:RF{1 2} <numeric_value> XM:SOURce{1 2 3 4 5 6}:POWer:RF{1 2}?
Name	Sets or queries the output power level of the RF output (RF1 or RF2)
Description	Changes the output power level of the according source regarding the specified RF output. The value may be entered in dBm and are applied if the output is configured to RF output.
Arguments	<numeric_value> may be any power level in dBm in the range from -110.0 to +10.0dBm (or +20dBm with additional option)
Examples	XM:SOURCE2:POWER:RF2 -75.3 changes the source2 of the 2 nd RF output to a power level of -75.3dBm.
Related	All XM:SOURce commands.

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XM:SOURce:ROSCillator[:INTernal]

Group	Miscellaneous Commands
Syntax	XM:SOURce:ROSCillator[:INTernal]
Name	Configures the instrument to internal 10MHz
Description	Uses the internally generated 10MHz as clock reference.
Arguments	None
Examples	XM:SOURCE:ROSCILLATOR switches to internal 10MHz reference.
Related	XM:SOURce:ROSCillator:EXTernal

XM:SOURce:ROSCillator:EXTernal

Group	Miscellaneous Commands
Syntax	XM:SOURce:ROSCillator:EXTernal
Name	Configures the instrument to external 10MHz
Description	Synchronizes the unit to an external 10MHz reference.
Arguments	None
Examples	XM:SOURCE:ROSCILLATOR:EXTERNAL switches to external 10MHz reference.
Related	XM:SOURce:ROSCillator

5 Error handling

5.1 Overview

The DARS Simulator DSG2000 includes the standard SCPI status concept as shown in Figure 2.

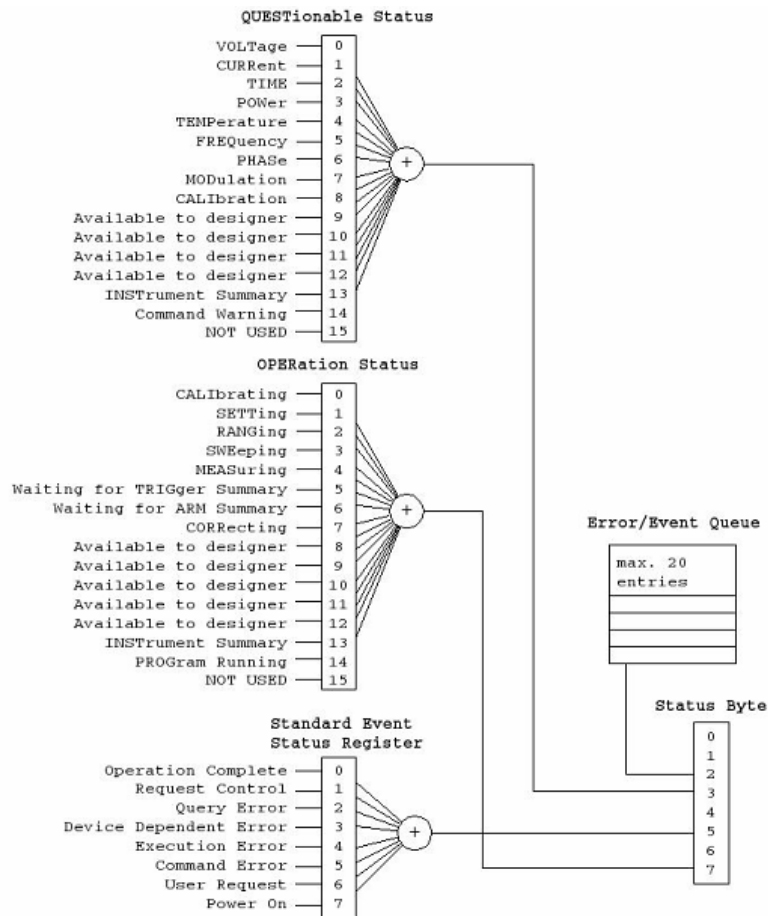


Figure 2 – Overview of the status concept

Any event which occurring, if not masked, will be placed into the *Event Queue* and will then be stored at the according position of the status tree. A voltage error for example will generate a *QUESTIONable:VOLTage* event. Simultaneously the *Status Byte* informs the remote application about the entire status: if the *Event Queue* contains entries, bit 2 is set; if any *QUESTIONable* or *OPERation Status* error has occurred, bit 3 or 7 are set. *Command* or *Execution Errors* are reported via the *Standard Event Status Register* reflected in bit 5 of the *Status Byte*.

5.2 Using the event queue

The following commands apply to the event queue:

Mnemonic	Name	Page
*CLS	Clears the DSG2000 status data structure	14
SYSTem:ERRor[:NEXT]?	Event Queue query	17

In case of entries within the event queue, the according bit in the status byte register is set. Any poll of the event queue with SYSTEM:ERROR? will return the next event and automatically removes this event from the queue. As soon as the queue is empty, the status byte register will be adapted.

5.3 Using the status reporting system

It is recommended to clear the status before starting to remotely control the system by calling *CLS. Next verify if any event is reported by calling *STB?. If the system return '0' it is ready to operate.

Now execute several commands to change the behaviour of the system. When finished query the status byte register. If still no event is reported, the commands have succeeded, else check the event queue for the reason of the failure.

The standard event status register is also reflected in the status byte register. This register is cleared as soon as it is queried with *ESR?.

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6 Sample program

6.1 HT Basic

```

REM Assuming the DSG2000 is configured as PAD 12
Gen=712
REM Send commands
OUTPUT Gen; "STATUS:PRESET"
OUTPUT Gen; "SIRIUS:DATA:SOURCE:NAME /data/bitstream/DFAT-01.tel"
OUTPUT Gen; "SIRI:SOUR1:POW:RF1 -75.0"
OUTPUT Gen; "SIRI:SOUR2:POW:RF1 -40.0"
OUTPUT Gen; "SIRI:SOUR3:POW:RF1 -75.0"
OUTPUT Gen; "SIRIUS:DATA:SOURCE:STATE START"
END

```

6.2 Visual C

main.cpp

```

/*****
main.cpp - implementation
-----
begin          : Tue Aug 25 2005
copyright      : (C) 2005 by Oliver Rommelfanger
email          : rom@izt.fraunhofer.de
compilers      : MSVC6.0

```

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```

*****/

#include <stdio.h>

// Include the WINDOWS.H and NI488.H files. The standard Windows
// header file, WINDOWS.H, contains definitions used by NI488.H and
// NI488.H contains prototypes for the GPIB routines and constants.
#include <windows.h>
#include <ni488.h>

#define GPIB0                0                // Board handle
#define TIMEOUT              T10s           // Timeout value = 10 seconds
#define EOTMODE              1                // Enable the END message
#define EOSMODE              0                // Disable the EOS mode

#define DSG2000_IDENTIFY_STRING    "DARS Simulator DSG2000"    // Identification for DSG2000
#define GPIB_COMMAND_IDN           "*IDN?\n"                    // GP-IB command

#define BUFFER_SIZE              256

// -----
void help(void)
{
    printf("Usage: GPIB {filename}\n");
    printf("e.g. GPIB sample.txt\n");
    printf("\n");
    printf("Opens the GPIB adapter and searches for the first\n");
    printf("DSG2000 on the bus. Then sends all commands of the\n");
    printf("file to the DSG2000 and prints responses received.\n");
    printf("\n");
}

```

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```

}

// -----
char ErrorMnemonic[21][5] = {"EDVR", "ECIC", "ENOL", "EADR", "EARG",
                             "ESAC", "EABO", "ENEB", "EDMA", "",
                             "EOIP", "ECAP", "EFSO", "", "EBUS",
                             "ESTB", "ESRQ", "", "", "", "ETAB"};

void error(char* cMessage)
{
    printf("Error : %s\n", cMessage);
    printf("ibsta = 0x%x iberr = %d (%s)\n", ibsta, iberr, ErrorMnemonic[iberr]);

    throw cMessage;
}

// -----
int main(int argc, char* argv[])
{
    int iNumInstruments = 0;           // Number of instruments on GPIB
    int iPAD = -1;                    // Primary address
    int iSAD = -1;                    // Secondary address
    int iLoop = 0;                    // Loop counter
    Addr4882_t adrInstruments[32];    // Array of primary addresses
    Addr4882_t adrResult[31];        // Array of listen addresses

    Addr4882_t adrDSG2000 = -1;
    char *cLine = NULL;
    int iBoard = -1;

```

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```
// Buffer used to send/receive data
char buffer[BUFFER_SIZE];
memset(buffer, 0, BUFFER_SIZE);
char message[BUFFER_SIZE];
memset(message, 0, BUFFER_SIZE);

try
{
    // Check command line parameters
    if (argc != 2)
    {
        help();
        throw "Program called with invalid arguments.";
    }

    // Your board needs to be the Controller-In-Charge in order to find
    // all instrument on the GPIB. To accomplish this, the function
    // SendIFC is called. If the error bit ERR is set in ibsta, call
    // GPIBCleanup with an error message.

    SendIFC(GPIB0);
    if (ibsta & ERR)
        throw "Unable to open GP-IB board.";

    // Create an array containing all valid GPIB primary addresses,
    // except for primary address 0. Your GPIB interface board is at
    // address 0 by default. This array (Instruments) will be given to
    // the function FindLstn to find all instruments. The constant
    // NOADDR, defined in NI488.H, signifies the end of the array.
```

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```

for (iLoop = 0; iLoop < 30; iLoop++)
    adrInstruments[iLoop] = (Addr4882_t)(iLoop + 1);
adrInstruments[30] = NOADDR;

// Print message to tell user that the program is searching for all
// active listeners. Find all of the instruments on the bus. Store
// the instrument addresses in the array Result. Note, the
// instruments must be powered on and connected with a GPIB cable in
// order for FindLstn to detect them. If the error bit ERR is set in
// ibsta, call GPIBCleanup with an error message.

printf("Finding all instruments on the bus...\n\n");

FindLstn(GPIB0, adrInstruments, adrResult, 31);
if (ibsta & ERR)
    throw "Unable to issue FindLstn call.";

// ibcntl contains the actual number of addresses stored in the
// Result array. Assign the value of ibcntl to the variable
// Num_Instruments. Print the number of instruments found.

iNumInstruments = ibcntl;
printf("Number of instruments found = %d\n\n", iNumInstruments);

// The Result array contains the addresses of all the instruments
// found by FindLstn. Use the constant NOADDR, as defined in
// NI488.H, to signify the end of the array.

adrResult[iNumInstruments] = NOADDR;

```

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```

// Print out each instrument's PAD and SAD, one at a time.
//
// Establish a FOR loop to print out the information. The variable
// LOOP will serve as a counter for the FOR loop and as the index
// to the array Result.

for (iLoop = 0; iLoop < iNumInstruments; iLoop++)
{
    // The low byte of the instrument address is the primary
    // address. Assign the variable PAD the primary address of the
    // instrument. The macro GetPAD, defined in NI488.H, returns
    // the low byte of the instrument address.

    iPAD = GetPAD(adrResult[iLoop]);

    // The high byte of the instrument address is the secondary
    // address. Assign the variable SAD the primary address of the
    // instrument. The macro GetSAD, defined in NI488.H, returns
    // the high byte of the instrument address.

    iSAD = GetSAD(adrResult[iLoop]);

    // Use the ibwrt and ibrd function to execute a *IDN?
    // command. Each GP-IB device must support a *IDN?
    // request.

    // Access the current device
    int iDev = ibdev(GPIB0, iPAD, iSAD, TIMEOUT, EOTMODE, EOSMODE);
    if (ibsta & ERR)
    {

```

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```

        sprintf(message, "Failed to %s on device %i",
                    GPIB_COMMAND_IDN, adrResult[iLoop]);
        throw message;
    }

    // Write *IDN?
    ibwrt(iDev, GPIB_COMMAND_IDN, strlen(GPIB_COMMAND_IDN));
    if (ibsta & ERR)
    {
        sprintf(message, "Failed to %s on device %i",
                    GPIB_COMMAND_IDN, adrResult[iLoop]);
        throw message;
    }

    // Read the response
    ibrd(iDev, buffer, BUFFER_SIZE);
    if (ibsta & ERR)
    {
        sprintf(message, "Failed to %s on device %i",
                    GPIB_COMMAND_IDN, adrResult[iLoop]);
        throw message;
    }
    buffer[ibcntl] = '\0';

    // check if this is the first DSG2000
    if ((adrDSG2000 == -1) && (0 != strstr(buffer, DSG2000_IDENTIFY_STRING)))
        adrDSG2000 = adrResult[iLoop];

    // print every device to user to inform him about all device on the bus
    if (iSAD == NO_SAD)

```

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```

        printf("[%2d] %s > PAD = %d SAD = NONE\n", iLoop, buffer, iPAD);
    else
        printf("[%2d] %s > PAD = %d SAD = %d\n", iLoop, buffer, iPAD, iSAD);
}

// Now communicate with first DSG2000
if (adrDSG2000 == -1)
    throw "Failed to find DSG2000 on GP-IB bus.";

// Access DSG2000 on GP-IB bus
iPAD = GetPAD(adrDSG2000);
iSAD = GetSAD(adrDSG2000);
int iDSG2000 = ibdev(GPIB0, iPAD, iSAD, TIMEOUT, EOTMODE, EOSMODE);

// Open the file
FILE *fid = fopen(argv[1], "r");
if (fid == NULL)
{
    sprintf(message, "File not found: %s", argv[1]);
    throw message;
}

// Send each line within the file to the DSG2000
while (NULL != (cLine = fgets(buffer, BUFFER_SIZE, fid))
{
    // Send command
    printf("SEND: %s", cLine);
    ibwrt(iDSG2000, cLine, strlen(cLine));
    if (ibsta & ERR)
    {

```

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```
        sprintf(message, "Failed to write command: %s", buffer);
        throw message;
    }

    // Poll response if command ends with '?'
    if (strchr(cLine, '?') != NULL)
    {
        ibrd(iDSG2000, buffer, BUFFER_SIZE);
        if (ibsta & ERR)
        {
            sprintf(message, "Failed to read command: %s", buffer);
            throw message;
        }

        if (ibcntl > 0)
        {
            buffer[ibcntl] = '\0';
            printf("READ: %s\n", buffer);
        }
    }
}

catch (...)
{
    // No error handling necessary
}

// Take device offline
if (iBoard != -1)
    ibonl(iBoard, 0);
```

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```
        return 0;  
    }
```

sample.txt

```
*IDN?  
SIRIUS:DATA:SOURCE:STATE STOP  
*CLS  
*STB?  
STAT:PRESET  
SIRIUS:DATA:SOURCE:NAME /data/bitstream/DFAT-01.tel  
SIRIUS:SOURCE1:POWER:RF1 -75.0  
SIRIUS:SOURCE2:POWER:RF1 -40.0  
SIRIUS:SOURCE3:POWER:RF1 -75.0  
SIRIUS:DATA:SOURCE:STATE START  
SYST:ERR?
```

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