



SMA100A

SMB100A



SMF100A

Products: R&S® SMA100A, R&S® SMB100A, R&S® SMF100A

## Remote emulation modes with R&S® signal generators

### Application Note

This application note describes in detail how the different remote emulation modes of the R&S® series SMA100A, SMB100A, SMF100A signal generators can be used.



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# 1 Overview

Signal generators are often used in automated test environment applications. The replacement of those instruments, e.g., due to malfunction or standard replacement procedures requires special care to be taken in consideration.

Replacement of those instruments requires compatibility between the replacement part and the replaced part in at least the

- electrical features
- remote-control features

Older instruments often use a proprietary remote-control language. Direct replacement therefore requires language emulation capability in the software of the replacement part.

To match these requirements, the R&S® signal generators are shipped with the feature of “language emulation”.

By selecting the desired “language emulation”, the signal generator acts as the original replaced instrument, e.g., the HP® 8340A from Agilent.

This Application Note describes in detail how to use this feature of the R&S® signal generators.

Section [Emulations](#) describes some global aspects common to all emulation modes.

Section [Limitations](#) describes general limitations common to all kinds of emulations.

Section [ActivationActivation](#) describes how to activate an emulation mode via the front panel or remote-control interface.

Section [AF2040 emulation mode](#) describes the AF2040 emulation mode in detail.

Section [AN680XX emulation mode](#) describes the AN680XX emulation mode in detail.

Section [HP8340 emulation mode](#) describes the HP8340 emulation mode in detail.

Section [HP8360 emulation mode](#) describes the HP8360 emulation mode in detail.

Section [HP8373 emulation mode](#) describes the HP8373 emulation mode in detail.

Section [HP8643 emulation mode](#) describes the HP8643 emulation mode in detail.

Section [HP8648 emulation mode](#) describes the HP8648 emulation mode in detail.

Section [HP8657 emulation mode](#) describes the HP8657 emulation mode in detail.

Section [HP8657 emulation mode](#) describes the HP8662 emulation mode in detail.

## Overview

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Section [RC3102 emulation mode](#) describes the RC3102 emulation mode in detail.

### Note:

The following abbreviations are used throughout this Application Note:

Shortcut	Comment
SM*	SMA100, SMB100, SMF100
SMA100	Signal Generator R&S® SMA100A
SMB100	Signal Generator R&S® SMB100A
SMF100	Signal Generator R&S® SMF100A
SWEEPER	Signal Generator
ANALYZER	Network Analyzer

Table 1: Abbreviations

## Emulation

## 2 Emulation

The instruments to be emulated by the SM\* signal generators implement different kind of remote-control languages.

Basically, those languages can be divided into the following groups:

Language Group	Language Description	Command Examples
1	Pre-/Non-SCPI	FR 125 MZ CW 125 MZ
2	SCPI-compatible/-similar	FREQ: CW 125 MHZ CFRQ: VALUE 125 MHZ

Table 2: Remote-control languages on emulated instruments

Some instruments (e.g., Agilent 8340, Racal 3102) only support language of group 1, some other instruments (e.g., Aeroflex 2030) only language of group 2 and finally, some instruments (e.g., Agilent 8643, Anritsu 68037) support both languages of groups 1 and 2.

The emulation software on the signal generators SM\* offers the primary language group, if the emulated instrument supports more than one language.

A list of actually emulated instruments and related emulation modes is shown in the following table.

Manufacturer Instrument	Language Group	Emulation mode		
		SMA100	SMB100	SMF100
Rohde & Schwarz				
SCPI		SCPI	SCPI	SCPI
Aeroflex / IFR / Marconi				
2030 2031 2032 2040 2041 2042	2	AF2040		
Agilent				
8340A / B 8341A / B 83620A / B 83630A / B	1			HP8340
83620A / B	2			HP8360



## Emulation

Manufacturer Instrument	Language Group	Emulation mode		
		SMA100	SMB100	SMF100
83630A / B				
83711A / B 83712A / B 83730A 83731A 83732A	2			HP8373
8643A 8644A / B	2	HP8643	HP8643	
8647A 8648A / B / C / D	1		HP8657	
8647A 8648A / B / C / D	2		HP8648	
8656A / B 8657A / B	1		HP8657	
8662A 8663A	1	HP8662		
Anritsu / Wiltron				
68037B 68045B 68047B	2			AN680XX
Racal-Dana				
3102 9087	1	RC3102		

Table 3: Emulated instruments mode on SM\*

### **3 Limitation**

#### **General**

The signal generators SM\* offers built in “language emulation”.

This “language emulation” capability assures, that the SM\*

- processes all documented commands without malfunction of the emulation software or the instruments software at all.
- processes all documented parameters of a command without malfunction of the emulation software or the instruments software.

This “language emulation” does **NOT** assure, that the SM\*

- processes all commands exactly as the emulated instrument does.
- processes all parameters of a command exactly as the emulated instrument does.
- processes emulation languages, implemented on the emulated instrument.
- operates with the same timing as with the emulated instrument.
- sets up additional supporting hardware, e.g., the auxiliary i/o interface in the same way as the emulated instrument does.

**In particular, please note that undocumented commands and parameters can lead to undesirable effects in the SM\*.**

#### **Command compability**

The “language emulation” processes all commands and all parameters of a command without malfunction of the emulation software or the instruments software.

Nevertheless, not all command and the parameters of a command are supported due to the technical limitations of the SM\*.

Therefore, each command is linked to a implementation and compatibility status.

The following table shows the different implementation and compatibility status.

## Limitation

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Status	Remark
	Command fully supported by emulation software. Implementation is identical in both systems. No special care has to be taken in consideration. Software, that uses that kind of command has not to be adapted.
	Command partly supported by emulation software. Implementation is different in both systems. Software has to be checked and validated. Differences in both implementations could be related to: <ul style="list-style-type: none"><li>Parameters that are not supported.</li><li>Functional behavior that is different.</li></ul>
	Command not supported by emulation software. Implementation acts as a "dummy" without any physical effect. <ul style="list-style-type: none"><li>The Setting command is ignored.</li><li>The Query command always returns "0".</li><li>Errors are <b>NOT</b> reported.</li><li>The operation mode and state of the instrument is <b>NOT</b> changed.</li></ul> Software has to be checked and adapted.

Table 4: Command compability

## Timing

The "language emulation" cannot provide exact timing compatibility with the emulated instrument.

Special care has to be taken with respects to commands that directly or indirectly affect the synchronisation signals, e.g., at the instruments rear or front panel.

## Synchronisation

The "language emulation" only covers activity at the remote-control interface of the SM\*.

Special care has to be taken on concurrent operating at the SM\*'s front panel. For more information please see the section of the concrete language emulation.

### 4 Activation

In order to use a specific language emulation mode of the SM\*, it must first be activated by the user.

Activation is done either

- locally using the front panel, or,
- remotely using SCPI commands

#### Local

In the Remote Channel Settings dialog from the Setup GPIB menu, select the appropriate Language in GPIB Settings, e.g., HP8340. When done, exit the dialog by pressing ESC or clicking the close icon.



Figure 1: Activating an emulation mode on, e.g., SMF100

## Activation

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Possible values for the emulation language depend on the signal generator family.

Emulation language	SMA100	SMB100	SMF100
AF2040	X		
AN680XX			X
HP8340			X
HP8360			X
HP8373			X
HP8643	X	X	
HP8648		X	
HP8657		X	
HP8662	X		
RC3102	X		

Table 5: Emulation modes on SM\*

“SCPI” returns to the instrument specific SCPI command set.

### Remote

Use the command notation

“*SYSTem:LANGuage <value>*” to select the appropriate language emulation mode.

Upper-case and lower-case notation serves to distinguish between the long and the short form. The instrument itself does not distinguish between upper-case and lower-case spelling.

Possible values are shown in table “Emulation modes on SM\*”.

### Power down / Power up

The selected language emulation mode is saved when the instrument is switched off.

The emulation parameters are **NOT** persistent and are therefore lost when the instrument is switched off.

When the instrument is switched on again, it starts up with the language emulation mode, which was active before switching it off.

Due to the loss of the emulation parameters, it is strongly recommended to preset the instrument by applying the corresponding preset command, e.g., the command IP in HP8340 emulation mode.

## 5 AF2040 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the SCPI compatible language implemented in Aeroflex's signal generators of type

- AF2030
- AF2031
- AF2032
- AF2040
- AF2041
- AF2042

The emulation software is supported on signal generators of type

- SMA100

The emulation software simulates the AF2040 data model in the execution unit and transforms the AF2040 parameters into the SM\* parameters.

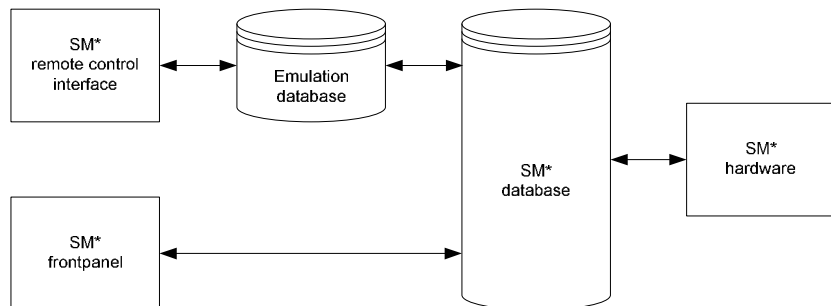


Figure 2: AF2040 emulation model

This mapping occurs only in one direction: Setting commands that arrive via the remote-control interface modify the AF2040 parameters. These parameters are converted into SM\* parameters and written to the database.

Modifying the SM\* parameters in any other manner, e.g., via manual operation at the frontpanel, causes no changes to the AF2040 parameters of the emulation software.

**While this is insignificant in pure remote-control operation, it can lead to inconsistencies and undesirable effects or malfunctions when you use both manual and remote control in this language emulation mode.**

## AF2040 emulation mode

### GPIB functions

The following table shows the GPIB functions, supported by the AF2040.










Status	Command	Function / Remark / Limitation
	DCL	Device clear.
	GET	Goup execute trigger.
	GTL	Goto local mode.
	LLO	Local lockout.
	REN	Goto remote mode.
	SDC	Selective device clear.
	SPD	Serial-Poll disable.
	SPE	Serial-Poll enable.
	SRQ	Request service.









Table 6: AF2040 GPIB functions

### GPIB functions

#### Commands

The following table shows the commands, supported by the AF2040.

- **Common**

Status	Command / Function / Remark / Limitation
	*CLS Clear all status registers and error queue.
	*ESE value Set / Query the bits of the event status enable register.
	*ESR? Query the bits of the event status register.
	*IDN? Query the ID string. Format: "IFR,2041,123456789,2.008"
	*OPC *OPC? Wait / Query for the completion of the command.
	*OPT? Query the instrument options.
	*PUD value
	*RST Reset the instrument to the factory default power up state.

## AF2040 emulation mode






Status	Command / Function / Remark / Limitation
	*SRE value Set / Query the bits of the service request enable register.
	*STB? Query the bits of the status byte.
	*TRG Executes a trigger function
	*TST? Perform a self test and return the test result. Format "0" = OK
	*WAI Wait for completion of pending operations.

Table 7: Common commands

- Additional**


Status	Command / Function / Remark / Limitation
	EX Return to SCPI mode. <b>Remark:</b> This command has been added to the AF2040 command set.

Table 8: Additional commands

- Instrument Mode**


Status	Command / Function / Remark / Limitation
	IMODE value Select instrument mode. <b>Value:</b> NORMAL   NOISE1   NOISE2   SWEEPER <b>Default:</b> NORMAL <b>Remark:</b> NOISE1, NOISE2 are not supported.

Table 9: Instrument mode

- Carrier Frequency**

Status	Command / Function / Remark / Limitation
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## AF2040 emulation mode














Status	Command / Function / Remark / Limitation
★	CFRQ[:VALUE] value Set carrier frequency. <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ] <b>Default:</b> 1.35 GHZ
★	CFRQ:INC value Set carrier frequency step. <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ] <b>Default:</b> 1.0 KHZ
★	CFRQ:UP Set carrier frequency one step up.
★	CFRQ:DN Set carrier frequency one step down.
★	CFRQ:RETN Return to original setting.
★	CFRQ:XFER Treat current setting to be the new original setting.
★	CFRQ:PHASE value Adjust phase of carrier. <b>Value:</b> -255 ... 255 <b>Default:</b> 0
★	CFRQ? Query informations on carrier frequency setting.

Table 10: Carrier frequency

- **RF Level**

Status	Command / Function / Remark / Limitation
★	RFLV[:VALUE] value Set RF output level. <b>Value:</b> <i>num</i> [DBM   DBV   DVMV   DBUV   V   MV   UV] <b>Default:</b> -144.0 DBM

## AF2040 emulation mode

Status	Command / Function / Remark / Limitation
	RFLV:INC value Set RF level step. <b>Value:</b> <i>num</i> [DB] <b>Default:</b> 1.0 DB
	RFLV:UP Set RF output level one step up.
	RFLV:DN Set RF output level one step down.
	RFLV:RETN Return to original setting.
	RFLV:XFER Treat current setting to be the new original setting.
	RFLV:ON Turn RF output on.
	RFLV:OFF Turn RF output off.
	RFLV:TYPE value Select voltage related unit. <b>Value:</b> EMF   PD <b>Default:</b> PD
	RFLV:UNITS value Select default RF output level unit. <b>Value:</b> DBM   DBV   DVMV   DBUV   V   MV   UV <b>Default:</b> DBM
	RFLV:OFFS:VALUE value Set offset of current band. <b>Value:</b> <i>num</i> [DB] <b>Default:</b> 0.0 DB
	RFLV:OFFS:ON Turn offset of current band on.
	RFLV:OFFS:OFF Turn offset of current band off.
	RFLV:OFFS:ENABLE Enable offset value.

## AF2040 emulation mode













Status	Command / Function / Remark / Limitation
	RFLV:OFFS:DISABLE Disable offset value.
	RFLV:OFFS:SAVE Store offset to memory.
	RFLV? Query informations on rf level settings.
	RFLV:OFFS? Query informations on rf offset settings.
	RFLV:HYST:ENABLE Enable extended hysteresis mode.
	RFLV:HYST:DISABLE Disable extended hysteresis mode.
	RFLV:HYST? Query informations on hysteresis settings.
	RFLV:LIMIT[:VALUE] value Set RF output level limit.
	RFLV:LIMIT:ENABLE Enable RF output level limit.
	RFLV:LIMIT:DISABLE Disable RF output level limit.
	RFLV:LIMIT:SAVE Store RF output level limit to memory.
	RFLV:LIMIT? Query informations on rf level limit settings.

Table 11: RF level

- **Modulation Mode**

Status	Command / Function / Remark / Limitation
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## AF2040 emulation mode



Status	Command / Function / Remark / Limitation
	<p>MODE value</p> <p>Set modulation mode.</p> <p><b>Value:</b></p> <p>Combinations of AM, AM1, AM2, FM, FM1, FM2, PM, PM1, PM2, WBFM, PULSE, SDM, DDM, VOR, ILS, DME</p> <p><b>Default:</b></p> <p>FM</p> <p><b>Remark:</b></p> <p>Only the following mode combinations are supported:</p> <p>AM1</p> <p>FM1</p> <p>PM1</p> <p>PULSE</p> <p>AM1, AM2</p> <p>FM1, FM2</p> <p>PM1, PM2</p> <p>AM1, FM1</p> <p>AM1, PM1</p> <p>PULSE,FM1</p> <p>PULSE,PM1</p> <p>PULSE, FM1, FM2</p> <p>PULSE, PM1, PM2</p>
	<p>MODE?</p> <p>Query informations on modulation mode settings.</p>

Table 12: Modulation mode

- Modulation Control**




Status	Command / Function / Remark / Limitation
	<p>MOD:ON</p> <p>Turn modulation globally on</p>
	<p>MOD:OFF</p> <p>Turn modulation globally off.</p>
	<p>MOD?</p> <p>Query informations modulation control settings.</p>

Table 13: Modulation control

- Frequency Modulation**

Status	Command / Function / Remark / Limitation
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## AF2040 emulation mode












Status	Command / Function / Remark / Limitation
	{FM   FM1   FM2}[:DEVN] value Set FM deviation. <b>Value:</b> <i>num</i> [Hz   KHZ   MHZ   GHZ] <b>Default:</b> 0.0 HZ <b>Remark:</b> Modulation deviation of FM1 and FM2 is coupled on SM*. Especially internal deviation cannot exceed external deviation.
	{FM   FM1   FM2}:INC value Set FM deviation step. <b>Value:</b> <i>num</i> [Hz   KHZ   MHZ   GHZ] <b>Default:</b> 1.0 KHZ
	{FM   FM1   FM2};{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6   EXT1DC   EXT1AC   EXT1ALC   ETX2DC   EXT2AC   EXT2ALC} Select modulation source. <b>Remark:</b> External path 1 is equal to external path 2
	{FM   FM1   FM2}:ON Turn FM modulation on.
	{FM   FM1   FM2}:OFF Turn FM modulation off.
	{FM   FM1   FM2}:UP Set FM deviation on step up.
	{FM   FM1   FM2}:DN Set FM deviation on step down.
	{FM   FM1   FM2}:RETN Return to original setting.
	{FM   FM1   FM2}:XFER Treat current setting to be the new original setting.
	DCFMNL
	{FM   FM1   FM2}? Query informations on FM modulation settings.

Table 14: Frequency Modulation

- Phase Modulation

Status	Command / Function / Remark / Limitation
--------	--

## AF2040 emulation mode











Status	Command / Function / Remark / Limitation
	<p>{PM   PM1   PM2}[:DEVN] value</p> <p>Set PM deviation.</p> <p><b>Value:</b> <i>num</i> [RAD   RADS]</p> <p><b>Default:</b> 0.0 RAD</p> <p><b>Remark:</b> Modulation deviation of PM1 and PM2 is coupled on SM*. Especially internal deviation cannot exceed external deviation.</p>
	<p>{PM   PM1   PM2}:INC value</p> <p>Set PM deviation step.</p> <p><b>Value:</b> <i>num</i> [RAD   RADS]</p> <p><b>Default:</b> 0.1 RAD</p>
	<p>{PM   PM1   PM2}:{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6   EXT1DC   EXT1AC   EXT1ALC   ETX2DC   EXT2AC   EXT2ALC}</p> <p>Select modulation source.</p> <p><b>Remark:</b> External path 1 is equal to external path 2</p>
	<p>{PM   PM1   PM2}:ON</p> <p>Turn PM modulation on.</p>
	<p>{PM   PM1   PM2}:OFF</p> <p>Turn PM modulation off.</p>
	<p>{PM   PM1   PM2}:UP</p> <p>Set PM deviation on step up.</p>
	<p>{PM   PM1   PM2}:DN</p> <p>Set PM deviation on step down.</p>
	<p>{PM   PM1   PM2}:RETN</p> <p>Return to original setting.</p>
	<p>{PM   PM1   PM2}:XFER</p> <p>Treat current setting to be the new original setting.</p>
	<p>{PM   PM1   PM2}?</p> <p>Query informations on PM modulation settings.</p>

Table 15: Phase Modulation

- **Amplitude Modulation**

Status	Command / Function / Remark / Limitation
--------	--

## AF2040 emulation mode














Status	Command / Function / Remark / Limitation
	{AM   AM1   AM2}[:DEPTH] value Set AM depth. <b>Value:</b> <i>num</i> [PCT] <b>Default:</b> 0.0 PCT <b>Remark:</b> Modulation depth of AM1 and AM2 is coupled on SM*. Especially internal deviation cannot exceed external deviation.
	{AM   AM1   AM2}:INC value Set AM depth step. <b>Value:</b> <i>num</i> [PCT] <b>Default:</b> 1.0 PCT
	{AM   AM1   AM2}:{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6   EXT1DC   EXT1AC   EXT1ALC   ETX2DC   EXT2AC   EXT2ALC} Select modulation source. <b>Remark:</b> External path 1 is equal to external path 2
	{AM   AM1   AM2}:ON Turn AM modulation on.
	{AM   AM1   AM2}:OFF Turn AM modulation off.
	{AM   AM1   AM2}:UP Set AM depth on step up.
	{AM   AM1   AM2}:DN Set AM depth on step down.
	{AM   AM1   AM2}:RETN Return to original setting.
	{AM   AM1   AM2}:XFER Treat current setting to be the new original setting.
	{AM   AM1   AM2}? Query informations on AM modulation settings.

Table 16: Amplitude Modulation

- **Wideband Frequency Modulation**

Status	Command / Function / Remark / Limitation
	WBFM[:DEVN] value
	WBFM:ON
	WBFM:OFF

## AF2040 emulation mode





Status	Command / Function / Remark / Limitation
	WBFM:AC
	WBFM:DC
	DCFMNL
	WBFM? Query informations on WBFM modulation settings. Remark: 'WBFM:DEVN 0.0;AC;OFF' is returned in any case.

Table 17: Wideband Frequency Modulation

- Pulse Modulation**








Status	Command / Function / Remark / Limitation
	PULSE:ON Turn pulse modulation on.
	PULSE:OFF Turn pulse modulation off.
	PULSE? Query informations on pulse modulation settings.
	PULSE:CAL
	PULSE:CAL:ENABLE
	PULSE:CAL:DISABLE
	PULSE:CAL? Query informations on PULSE modulation settings. Remark: 'PULSE:CAL;DISABLE' is returned in any case.









Table 18: Pulse Modulation

- Modulation Frequency**

Status	Command / Function / Remark / Limitation
--------	--



## AF2040 emulation mode

Status	Command / Function / Remark / Limitation
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:FREQ] value</p> <p>Set modulation oscillator frequency.</p> <p><b>Value:</b> num [Hz   KHZ   MHZ   GHZ]</p> <p><b>Default:</b> INF1 = 300.0 HZ, SINE INF2 = 400.0 HZ, SINE INF3 = 500.0 HZ, SINE INF4 = 1000.0 HZ, SINE INF5 = 3000.0 HZ, SINE INF6 = 6000.0 HZ, SINE</p> <p><b>Remark:</b> Only 2 of 6 modulation oscillator frequencies can be used at one time, because on SM* only 2 LF generators are available. Usage of the LF generators 1 and 2 depend on selected modulation mode, modulation source and modulation oscillator waveforms.</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:FREQ:INC value</p> <p>Set modulation oscillator frequency step.</p> <p><b>Value:</b> num [Hz   KHZ   MHZ   GHZ]</p> <p><b>Default:</b> 1.0 KHZ</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:SIN</p> <p>Set modulation oscillator waveform to sine.</p> <p><b>Remark:</b> Modulation oscillator waveform can only be selected for 1 of 2 modulations oscillators used.</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:TRI</p> <p>Set modulation oscillator waveform to triangle.</p> <p><b>Remark:</b> Modulation oscillator waveform can only be selected for 1 of 2 modulations oscillators used.</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:SQU</p> <p>Set modulation oscillator waveform to square.</p> <p><b>Remark:</b> Modulation oscillator waveform can only be selected for 1 of 2 modulations oscillators used.</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:UP</p> <p>Set modulation oscillator frequency one step up.</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:DN</p> <p>Set modulation oscillator frequency one step down.</p>
	<p>{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:RETN</p> <p>Return to original setting.</p>

## AF2040 emulation mode








Status	Command / Function / Remark / Limitation
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:XFER Treat current setting to be the new original setting.
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:PHASE value
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:CTC1 value
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:CTC2 value
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:USER value
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}:TEMP value
	{INTF1   INTF2   INTF3   INTF4   INTF5   INTF6}? Query informations on modulation oscillator settings.

Table 19: Modulation frequency

- **CTCSS Tones Edit**

















Status	Command / Function / Remark / Limitation
	CTONES:EDIT:TNUM value
	CTONES:EDIT:TFRQ value
	CTONES:EDIT:LOAD value
	CTONES:EDIT:SAVE
	CTONES?
	CTONES:EDIT?

Table 20: CTCSS Tones Edit

- **Sequential Tones**

Status	Command / Function / Remark / Limitation
	SEQT:SEQ value
	SEQT:DUR value
	SEQT:SEND value
	SEQT:STOP
	SEQT:MODE:STD value
	SEQT:MODE:MOD value
	SEQT:PARAM:EXTD value
	SEQT:PARAM:SDLY value
	SEQT:PARAM:SHFT value
	SEQT:PARAM:RPTT value

## AF2040 emulation mode













Status	Command / Function / Remark / Limitation
	SEQT:PARAM:TDUR value
	SEQT:PARAM:TGAP value
	SEQT:EDIT:TNUM value
	SEQT:EDIT:TFRQ value
	SEQT:EDIT:TDUR value
	SEQT:EDIT:TGAP value
	SEQT:EDIT:LOAD value
	SEQT:EDIT:SAVE value
	SEQT?
	SEQT:MODE?
	SEQT:PARAM?
	SEQT:EDIT?

Table 21: Sequential Tones

- **LF Control**







Status	Command / Function / Remark / Limitation
	LF:ON Turn LF output on.
	LF:OFF Turn LF output off.
	LF:GEN
	LF:MON value
	LF? Query informations on the LF operation.

Table 22: LF Control

- **LF Generator Frequency**

Status	Command / Function / Remark / Limitation
	LFGF[:VALUE] value Set LF generator frequency. <b>Value:</b> <i>num</i> [Hz   KHZ   MHZ  GHZ] <b>Default:</b> 1.0 KHZ

## AF2040 emulation mode













Status	Command / Function / Remark / Limitation
	LFGF:INC value Set LF generator frequency step. <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ] <b>Default:</b> 1.0 KHZ
	LFGF:UP Set LF generator frequency one step up.
	LFGF:DN Set LF generator frequency one step down.
	LFGF:RETN Return to original setting.
	LFGF:XFER Treat current setting to be the new original setting.
	LFGF:SIN Set LF generator waveform to sine.
	LFGF:TRI Set LF generator waveform to triangle.
	LFGF:SQU Set LF generator waveform to square.
	LFGF? Query informations on the LF generator frequency setting.

Table 23: LF Generator Frequency

- **LF Generator Level**

Status	Command / Function / Remark / Limitation
	LFGL[:VALUE] value Set LF generator level. <b>Value:</b> <i>num</i> [V   MV   UV   DBMV] <b>Default:</b> 100.0 UV
	LFGL:INC value Set LF generator level step. <b>Value:</b> <i>num</i> [DB] <b>Default:</b> 1.0 DB
	LFGL:UP Set LF generator level one step up.

## AF2040 emulation mode









Status	Command / Function / Remark / Limitation
	LFGL:DN Set LF generator level one step down.
	LFGL:RETN Return to original setting.
	LFGL:XFER Treat current setting to be the new original setting.
	LFGL:UNITS value Select default LF generator level unit. <b>Value:</b> [DMB   DBV   DBMV   V   MV   UV] <b>Default:</b> V <b>Remark:</b> DBM, DBV are not supported.
	LFGL? Query informations on the LF generator level setting.

Table 24: LF Generator Level

- **Memory Store**

Status	Command / Function / Remark / Limitation
	STO:FULL value Full store. <b>Value:</b> 0 ... 49 <b>Remark:</b> Storage registers are not persistent and lost on power down and reset operations.
	STO:PART value Partial store. <b>Value:</b> 0 ... 49 <b>Remark:</b> Storage registers are not persistent and lost on power down and reset operations.
	STO:CFRQ value Carrier frequency store. <b>Value:</b> 0 ... 99 <b>Remark:</b> Storage registers are not persistent and lost on power down and reset operations.

## AF2040 emulation mode







Status	Command / Function / Remark / Limitation
	STO:SEQT value Sequentital tones store. <b>Value:</b> 0 ... 19 <b>Remark:</b> Storage registers are not persisent and lost on power down and reset operations.
	STO:SWEEP value Sweep store. <b>Value:</b> 0 ... 19 <b>Remark:</b> Storage registers are not persisent and lost on power down and reset operations.

Table 25: Memory Store

- **Memory Recall**

Status	Command / Function / Remark / Limitation
	RCL:FULL value Full recall. <b>Value:</b> 0 ... 49 <b>Remark:</b> Storage registers are not persisent and lost on power down and reset operations.
	RCL:FXCF value Full recall without carrier frequency. <b>Value:</b> 0 ... 49 <b>Remark:</b> Storage registers are not persisent and lost on power down and reset operations.
	RCL:PART value Partial recall. <b>Value:</b> 0 ... 49 <b>Remark:</b> Storage registers are not persisent and lost on power down and reset operations.
	RCL:PXCF value Partial recall without carrier frequency. <b>Value:</b> 0 ... 49 <b>Remark:</b> Storage registers are not persisent and lost on power down and reset operations.

## AF2040 emulation mode




Status	Command / Function / Remark / Limitation
	RCL:CFRQ value Carrier frequency recall. <b>Value:</b> 0 ... 99 <b>Remark:</b> Storage registers are not persistent and lost on power down and reset operations.
	RCL:SEQT value Sequenital tones recall. <b>Value:</b> 0 ... 19 <b>Remark:</b> Storage registers are not persistent and lost on power down and reset operations.
	RCL:SWEEP value Sweep recall. <b>Value:</b> 0 ... 19 <b>Remark:</b> Storage registers are not persistent and lost on power down and reset operations.

Table 26: Memory Recall

- **Memory Erase**

























Status	Command / Function / Remark / Limitation
	ERASE:FULL Erase all full stores.
	ERASE:PART Erase all partial stores.
	ERASE:CFRQ Erase all carrier frequency stores.
	ERASE:SEQT Erase all sequenital tones stores.
	ERASE:SWEEP Erase all sweep stores.
	ERASE:ALL Erase all stores.

Table 27: Memory Erase

- **Sweep Operation**























Status	Command / Function / Remark / Limitation
	SWEEP:MKRON
	SWEEP:MKROFF

## AF2040 emulation mode

Status	Command / Function / Remark / Limitation
	SWEEP:CFRQ:STARTvalue
	SWEEP:CFRQ:STOP value
	SWEEP:CFRQ:STEP value
	SWEEP:CFRQ:TIME value
	SWEEP:CFRQ:MKRNUM value
	SWEEP:CFRQ:MKRON
	SWEEP:CFRQ:MKROFF
	SWEEP:CFRQ:VALUE value
	SWEEP:RFLV:STARTvalue
	SWEEP:RFLV:STOP value
	SWEEP:RFLV:STEP value
	SWEEP:RFLV:TIME value
	SWEEP:RFLV:MKRNUM value
	SWEEP:RFLV:MKRON
	SWEEP:RFLV:MKROFF
	SWEEP:RFLV:VALUE value
	SWEEP:LFGF:STARTvalue
	SWEEP:LFGF:STOP value
	SWEEP:LFGF:STEP value
	SWEEP:LFGF:TIME value
	SWEEP:LFGF:MKRNUM value
	SWEEP:LFGF:MKRON
	SWEEP:LFGF:MKROFF
	SWEEP:LFGF:VALUE value
	SWEEP:LFGL:STARTvalue
	SWEEP:LFGL:STOP value
	SWEEP:LFGL:STEP value
	SWEEP:LFGL:TIME value
	SWEEP:LFGL:MKRNUM value
	SWEEP:LFGL:MKRON
	SWEEP:LFGL:MKROFF



## AF2040 emulation mode

Status	Command / Function / Remark / Limitation
	SWEEP:LFGL:VALUE value
	SWEEP:INTF:STARTvalue
	SWEEP:INTF:STOP value
	SWEEP:INTF:STEP value
	SWEEP:INTF:TIME value
	SWEEP:INTF:MKRNUM value
	SWEEP:INTF:MKRON
	SWEEP:INTF:MKROFF
	SWEEP:INTF:VALUE value
	SWEEP:HOP:STARTvalue
	SWEEP:HOP:STOP value
	SWEEP:HOP:STEP value
	SWEEP:HOP:TIME value
	SWEEP:HOP:MKRNUM value
	SWEEP:HOP:MKRON
	SWEEP:HOP:MKROFF
	SWEEP:HOP:VALUE value
	SWEEP? Query informations on sweep type, mode, and marker status.
	SWEEP:CFRQ? Query informations on carrier frequency sweep settings.
	SWEEP:CFRQ:VALUE? Query informations on current carrier frequency marker settings.
	SWEEP:RFLV? Query informations on RF level sweep settings.
	SWEEP:RFLV:VALUE? Query informations on current RF level marker settings.
	SWEEP:LFGF? Query informations on LF generator frequency sweep settings.
	SWEEP:LFGF:VALUE? Query informations on current LF generator frequency marker settings.
	SWEEP:LFGL? Query informations on LF generator level sweep settings.
	SWEEP:LFGL:VALUE? Query informations on current LF generator level marker settings.

## AF2040 emulation mode




Status	Command / Function / Remark / Limitation
	SWEEP:INTF? Query informations on modulation oscillator frequency sweep settings.
	SWEEP:INTF:VALUE? Query informations on current modulation oscillator frequency marker settings.
	SWEEP:HOP? Query informations on frequency hopping sweep settings.

Table 28: Sweep Operation

- **Sweep Mode/Type**








Status	Command / Function / Remark / Limitation
	SWEEP:MODE value Select operation mode of sweep generator. <b>Value:</b> SNGL   CONT   EXT <b>Default:</b> SNGL
	SWEEP:TYPE value Select type of sweep. <b>Value:</b> OFF   CFRQ   RFLV   LFGF   LFGL   INTF1   INTF2   INTF3   INTF4   INTF5   INTF6   HOP <b>Default:</b> CRFQ <b>Remark:</b> HOP is not supported
	SWEEP? Query informations on sweep mode and type.

Table 29: Sweep Mode/Type

- **Sweep Control**

Status	Command / Function / Remark / Limitation
	SWEEP:GO Commence sweep.
	SWEEP:CALC Initiate pre calculations.
	SWEEP:HALT Pause sweep.
	SWEEP:CONT Continue sweep. <b>Remark:</b> Identical to SWEEP:GO

## AF2040 emulation mode





Status	Command / Function / Remark / Limitation
	SWEEP:RESET Reset sweep to start value.
	SWEEP:XFER Transfer paused value to main parameter.
	SWEEP:UP Go up one sweep step while paused.
	SWEEP:DN Go down one sweep step while paused.

Table 30: Sweep Control

- **Frequency hopping**











Status	Command / Function / Remark / Limitation
	HOPSEQ value.
	HOPSEQ?

Table 31: Frequency hopping

- **Miscellaneous**

Status	Command / Function / Remark / Limitation
	RPPR Reset reverse power protection trip.
	FSTD value Select internal or external frequency standard. <b>Value:</b> INT0   INT1   INT5   INT10   EXT1   EXT5   EXT10 <b>Default:</b> EXT10 <b>Remark:</b> Only INT10, EXT5 and EXT10 are supported.
	FSTD? Query informations on frequency standard.
	BLANK value
	BACKL:ON
	BACKL:OFF
	TIME? Query informations on current time.
	DATE? Query informations on current date.

## AF2040 emulation mode



















Status	Command / Function / Remark / Limitation
	<p>OPER?</p> <p>Query informations on total operation time.</p> <p><b>Remark:</b></p> <p>0.0 is returned in any case.</p>
	<p>ELAPSED?</p> <p>Query informations on operation time since last reset.</p> <p><b>Remark:</b></p> <p>0.0 is returned in any case.</p>
	<p>ERROR?</p> <p>Query informations on next error from error queue.</p> <p><b>Remarks:</b></p> <p>Returns the original error message from the SM*.</p> <p>No conversion is done to AF2040 error codes.</p>
	<p>DEVTRG value</p> <p>Select device trigger function.</p>
	<p>EXTTRG value</p> <p>Select External trigger function.</p>
	<p>KLOCK</p> <p>Disable keyboard entry.</p>
	<p>KUNLOCK</p> <p>Enable keyboard entry.</p>

Table 32: Miscellaneous

- **Status Reporting**

Status	Command / Function / Remark / Limitation
	<p>CCR?</p> <p>Query the coupling condition register.</p> <p><b>Remark:</b></p> <p>Implemented as dummy register.</p>
	<p>CSE value</p> <p>Write the coupling status enable register.</p> <p><b>Value:</b></p> <p>0 ... 255</p> <p><b>Default:</b></p> <p>0</p> <p><b>Remark:</b></p> <p>Implemented as dummy register.</p>
	<p>CSE?</p> <p>Read the coupling status enable register.</p> <p><b>Remark:</b></p> <p>Implemented as dummy register.</p>

## AF2040 emulation mode

Status	Command / Function / Remark / Limitation
	<p>CSR?</p> <p>Read the coupling status register.</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>HCR?</p> <p>Query the hardware condition register.</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>HSE value</p> <p>Write the hardware status enable register.</p> <p><b>Value:</b> 0 ... 255</p> <p><b>Default:</b> 0</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>HSE?</p> <p>Read the hardware status enable register.</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>HSR?</p> <p>Read the hardware status register.</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>SCR?</p> <p>Query the instrument condition register.</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>SSE value</p> <p>Write the instrument status enable register.</p> <p><b>Value:</b> 0 ... 255</p> <p><b>Default:</b> 0</p> <p><b>Remark:</b> Implemented as dummy register.</p>
	<p>SSE?</p> <p>Read the instrument status enable register.</p> <p><b>Remark:</b> Implemented as dummy register.</p>

## AF2040 emulation mode


Status	Command / Function / Remark / Limitation
	SSR? Read the instrument status register. <b>Remark:</b> Implemented as dummy register.

Table 33: Status reporting

### Instrument initialization

The (factory) default setting of the AF203x and AF204x is applied and activated when

- applying the DCL, SDC to the GPIB interface.
- transmitting the \*RST command
- transmitting the first command after activating this emulation mode.

During initialisation, the AF203x and AF204x applies and activates the setting, which was active just before power down.

The SM\* however applies and activates the (factory) default setting of the AF203x and AF204x.

This different behaviour has to be taken in consideration.

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
IMODE	NORMAL
CFRQ	VALUE = 1.35 GHz INC = 1.0 kHz PHASE = 0
RFLV	VALUE = -144.0 DBM INC = 1.0 DB ON TYPE = PD UNITS = DBM
MODE	FM1
MOD	ON
FM1	DEVIATION = 0.0 kHz INC = 1.0 kHz

## AF2040 emulation mode

---

	ON INTF4
FM2	DEVIATION = 0.0 kHz INC = 1.0 kHz ON EXT1ALC
PM1	DEVIATION = 0.0 rad INC = 0.1 rad ON INTF4
PM2	DEVIATION = 0.0 rad INC = 0.1 rad ON EXT1ALC
AM1	DEPTH = 0.0 % INC = 1.0 % ON INTF4
AM2	DEPTH = 0.0 % INC = 1.0 % ON EXT1ALC
PULSE	ON EXT1ALC
WBFM	DEVIATION = 0.0 kHz ON EXT1AC
INTF1	VALUE = 300.0 Hz INC = 1.0 kHz SIN
INTF2	VALUE = 400.0 Hz INC = 1.0 kHz SIN
INTF3	VALUE = 500.0 Hz INC = 1.0 kHz SIN
INTF4	VALUE = 1000.0 Hz INC = 1.0 kHz SIN
INTF5	VALUE = 3000.0 Hz INC = 1.0 kHz SIN
INTF6	VALUE = 6000.0 Hz

## **AF2040 emulation mode**

---

	INC = 1.0 kHz SIN
LF	MON ON
LFGF	VALUE = 1.0 kHz INC = 1.0 kHz SIN
LFGL	VALUE = 0.0 V INC = 1.0 DB ON
SWEEP	RESET TYPE =CFRQ MODE = SNGL START = 100.0 MHz STOP = 1.35 GHz TIME = 50 ms STEP = 250

Table 34: Factory default settings

### **Status reporting**

The SM\* does not provide status informations in the STATus-Subsystem.

Therefore the Status reporting is supported by dummy commands and queries.



## 6 AN680XX emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the SCPI-compatible language, implemented in Anritsu's signal generators of type

- AN68017
- AN68020
- AN68037
- AN68040

The emulation software is supported on signal generators of type

- SMF100

The emulation software simulates the AN680XX data model in the execution unit and transfers all of the AN680XX parameters into the SM\* database.

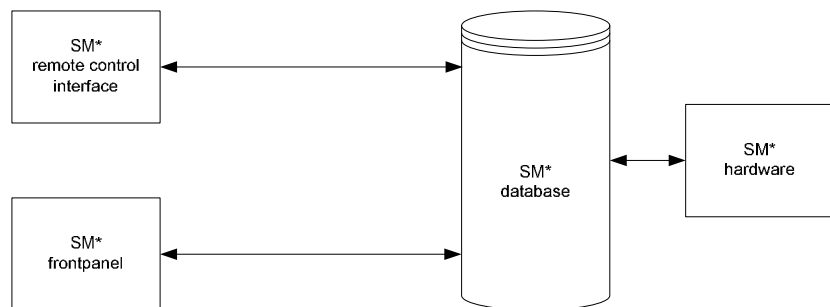


Figure 3: AN680XX emulation model

The following parameters

- Power Attenuation Step
- Unit Frequency
- Unit Time

are virtual parameters in the SM\* database and do not have a related item on the frontpanel.

### GPIB functions

The following table shows the GPIB functions, supported by the AN680XX.

Status	Function	Function / Remark / Limitation
--------	----------	--------------------------------

## AN680XX emulation mode



















Status	Function	Function / Remark / Limitation
	DCL	Device clear.
	GET	Goup execute trigger.
	GTL	Goto local mode.
	IFC	Interface clear.
	LLO	Local lockout.
	PPC	Parallel-Poll configure.
	PPU	Parallel-Poll unconfigure.
	REN	Goto remote mode.
	SDC	Selective device clear.
	SPD	Serial-Poll disable.
	SPE	Serial Poll enable.
	SRQ	Request service.

Table 35: GPIB functions

## Commands

The following table shows the commands, supported by the AN680XX.

- **Common**

Status	Command / Function / Remark / Limitation
	*CLS Clear the status register.
	*ESE value Set / Query the bits of the extended status enable register.
	*ESR? Query the bits of the extended status register.
	*IDN? Query the ID string. <b>Remark:</b> ID string has to be provided in frontpanel so far.
	*OPC *OPC? Wait / Query for completion of command.
	*OPT? Query the instrument options.

## AN680XX emulation mode









Status	Command / Function / Remark / Limitation
	*RCL value Recall an instrument setup. <b>Value:</b> 0 ... 9
	*RST Reset the instrument to a default state.
	*SAV value Save an instrument setup. <b>Value:</b> 0 ... 9
	*SRE value Set / Query the bits of the status enable register.
	*STB? Query the bits of the status register.
	*TRG Trigger an action.
	*TST? Execute the instruments self test
	*WAI Wait until al commands are completed.

Table 36: Common commands

- **ABORt Subsystem**


Status	Command / Function / Remark / Limitation
	ABORt

Table 37: ABORT subsystem

- **CONTRol Subsystem**






Status	Command / Function / Remark / Limitation
	CONTRol:BLANKing:POLarity value
	CONTRol:PENLift:POLarity value
	CONTRol:RAMP[:STATe] value
	CONTRol:RAMP:REST value
	CONTRol:RAMP:TIME value

Table 38: CONTROL subsystem

- **DIAGnostic Subsystem**

Status	Command / Function / Remark / Limitation
--------	--

## AN680XX emulation mode


Status	Command / Function / Remark / Limitation
	DIAGnostic:SNUM? Query the serial number of the instrument. <b>Remark:</b> SN1234567890 is returned so far.

Table 39: DIAGNOSTIC subsystem

- **DISPlay Subsystem**


Status	Command / Function / Remark / Limitation
	DISPlay[:WINDow]:TEXT:STATe value Set / Query the state of the parameter display at the front panel. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> ON <b>Remark:</b> ON activates screen saver. OFF deactivates screen saver.

Table 40: DISPLAY subsystem

- **INITiate Subsystem**



Status	Command / Function / Remark / Limitation
	INITiate[:IMMEDIATE]
	INITiate:CONTinuous value

Table 41: INITIATE subsystem

- **OUTPut Subsystem**










Status	Command / Function / Remark / Limitation
	OUTPut[:STATe] value Set / Query the state of the RF output. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	OUTPut:IMPedance? Query the impedance of the RF output.
	OUTPut:PROTection value
	OUTPut:PROTection:RETRace value



















Table 42: OUTPUT subsystem

## AN680XX emulation mode










- SOURce Subsystem**

Status	Command / Function / Remark / Limitation
	[[:SOURce:]CORRection[:STATe] value
	[[:SOURce:]CORRection:CSET:SELEct value
	[[:SOURce:]FREQuency[:CW   :FIXed] value Set / Query the RF output frequency. <b>Value:</b> freqmin...freqmax [HZ   KHZ   MHZ   GHZ]   MIN   MAX   UP   DOWN <b>Default:</b> 0.5 * (freqmin + freqmax)
	[[:SOURce:]FREQuency[:CW   :FIXed]:STEP[:INCRement] value Set / Query the frequency increment step size. <b>Value:</b> 1KHZ ... (freqmax - freqmin) [HZ   KHZ   MHZ   GHZ] <b>Default:</b> 0.1 GHz
	[[:SOURce:]FREQuency:CENTer value Set / Query the RF output center frequency. <b>Value:</b> freqmin ... freqmax [HZ   KHZ   MHZ   GHZ] <b>Default:</b> 0.5 * (freqmin + freqmax)
	[[:SOURce:]FREQuency:MODE value Set / Query the frequency operation mode. <b>Value:</b> CW   FIXed   SWEep[1]   SWCW   ALSW   LIST[1]   LIST2   LIST3   LIST4 <b>Default:</b> CW <b>Remark:</b> ALSW, LIST<n> are not supported. SWCE is identical to CW and FIXed. SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.
	[[:SOURce:]FREQuency:MULTiplier value Set / Query the factor for the frequency display. <b>Value:</b> 0.1 ... 14 <b>Default:</b> 1.0











## AN680XX emulation mode

Status	Command / Function / Remark / Limitation
	[:SOURce:]FREQuency:SPAN value Set / Query the frequency span for the sweep mode SWEep[1]. <b>Value:</b> 1KHZ ... (freqmax - freqmin) [HZ   KHZ   MHZ   GHZ] <b>Default:</b> freqmax – freqmin
	[:SOURce:]FREQuency:SPAN:FULL Set the frequency span for the sweep mode SWEep[1] to freqmax – freqmin.
	[:SOURce:]FREQuency:SPAN2 value
	[:SOURce:]FREQuency:SPAN2:FULL
	[:SOURce:]FREQuency:STARt value Set / Query the start frequency for the sweep mode SWEep[1]. <b>Value:</b> freqmin ... freqmax [HZ   KHZ   MHZ   GHZ]   MIN <b>Default:</b> Freqmin
	[:SOURce:]FREQuency:STARt2 value
	[:SOURce:]FREQuency:STOP value Set / Query the stop frequency for the sweep mode SWEep[1]. <b>Value:</b> freqmin ... freqmax [HZ   KHZ   MHZ   GHZ]   MAX <b>Default:</b> freqmax
	[:SOURce:]FREQuency:STOP2 value
	[:SOURce:]LIST<n>:CALCulate
	[:SOURce:]LIST<n>:DWELl value
	[:SOURce:]LIST<n>:FREQuency value
	[:SOURce:]LIST<n>:FREQuency:POINts value
	[:SOURce:]LIST<n>:INDex value
	[:SOURce:]LIST<n>:POWer value
	[:SOURce:]LIST<n>:POWer:POINts value
	[:SOURce:]LIST<n>:STARt value
	[:SOURce:]LIST<n>:STOP value
	[:SOURce:]MARKer<n>:AOFF Turn off all markers.

## AN680XX emulation mode







Status	Command / Function / Remark / Limitation
	<p>[[:SOURce:]]MARKer&lt;n&gt;:FREQuency value Set / Query frequency of the selected marker.</p> <p><b>Value:</b> freqmin ... freqmax [HZ   KHZ   MHZ   GHZ]   MAX</p> <p><b>Default:</b> M1 = 2.0 GHz, M2 = 8.4 GHz, M3 = 2.0 GHz, M4 = 5.0 GHz, M5 = 8.4 GHz M6 = 8.4 GHz, M7 = 8.4 GHz, M8 = 8.4 GHz, M9 = 8.4 GHz, M10 = 3.5 GHz</p>
	<p>[[:SOURce:]]MARKer&lt;n&gt;:POLarity value Set / Query pulse polarity of markers.</p> <p><b>Value:</b> NEGative   POSitive</p> <p><b>Default:</b> POSitive</p>
	<p>[[:SOURce:]]MARKer&lt;n&gt;:STATe value Set / Query the state of the specified marker.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> All OFF</p>
	<p>[[:SOURce:]]MARKer&lt;n&gt;:VIDeo value</p>
	<p>[[:SOURce:]]POWer[:LEVel][:IMMediate][:AMPLitude] value Set / Query the power level of the RF output.</p> <p><b>Value:</b> powermin ... powermax [DBM]   MIN   MAX   UP   DOWN</p> <p><b>Default:</b> 0.0 dBm</p>
	<p>[[:SOURce:]]POWer[:LEVel][:IMMediate][:AMPLitude]:STEP[:INCRement] value Set / Query the power level increment step size.</p> <p><b>Value:</b> powermin ... powermax [DB]</p> <p><b>Default:</b> 0.1 dB</p>
	<p>[[:SOURce:]]POWer[:LEVel]:ALTErnate value</p>
	<p>[[:SOURce:]]POWer:ALC:SOURce value</p>
	<p>[[:SOURce:]]POWer:ATTenuation value Set / Query the output attenuator</p> <p><b>Value:</b> 0 ... 110 [DB]</p> <p><b>Default:</b> 0.0 dB</p>

## AN680XX emulation mode







Status	Command / Function / Remark / Limitation
	<p>[:SOURce:]POWer:ATTenuation:AUTO value</p> <p>Set / Query the coupling of the attenuation to the amplitude level control circuit.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> ON</p>
	<p>[:SOURce:]POWer:ATTenuation:STEP[:INCRement] value</p> <p>Set / Query the output attenuator step size</p> <p><b>Value:</b> 0 ... 110 [DB]</p> <p><b>Default:</b> 10.0 dB</p>
	<p>[:SOURce:]POWer:CENTer value</p> <p>Set / Query the RF output center power level</p> <p><b>Value:</b> powermin ... powermax [DBM]</p> <p><b>Default:</b> <math>0.5 * (\text{powermin} + \text{powermax})</math></p>
	<p>[:SOURce:]POWer:DISPlay:OFFSet value</p> <p>Set / Query the offset for the power level display.</p> <p><b>Value:</b> -100 ... +100 [DB]</p> <p><b>Default:</b> 0.0 dB</p>
	<p>[:SOURce:]POWer:DISPlay:OFFSet:STATe value</p>
	<p>[:SOURce:]POWer:MODE value</p> <p>Set / Query the power level operation mode.</p> <p><b>Value:</b> CW   FIXed   SWEep[1]   SWEep2   ALSW   LIST[1]   LIST2   LIST3   LIST4</p> <p><b>Default:</b> CW</p> <p><b>Remark:</b> SWEep[1], ALSW, LIST&lt;n&gt; are not supported. SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>
	<p>[:SOURce:]POWer:SLOPe value</p>
	<p>[:SOURce:]POWer:SLOPe:PIVot value</p>
	<p>[:SOURce:]POWer:SLOPe:STATe value</p>
	<p>[:SOURce:]POWer:SLOPe:STEP[:INCRement] value</p>



## AN680XX emulation mode

Status	Command / Function / Remark / Limitation
	<p>[:SOURce:]POWer:SPAN value</p> <p>Set / Query the power level span for the sweep mode SWEep2.</p> <p><b>Value:</b> powermin ... powermax [DBM]</p> <p><b>Default:</b> powermax – powermin</p>
	<p>[:SOURce:]POWer:SPAN:FULL</p> <p>Set the power level span for the sweep mode SWEep2 to powermax – powermin.</p>
	<p>[:SOURce:]POWer:STARt value</p> <p>Set / Query the start power level for the sweep mode SWEep2.</p> <p><b>Value:</b> powermin ... powermax [DBM   MIN]</p> <p><b>Default:</b> powermin</p>
	<p>[:SOURce:]POWer:STOP value</p> <p>Set / Query the stop power level for the sweep mode SWEep2.</p> <p><b>Value:</b> powermin ... powermax [DBM   MAX]</p> <p><b>Default:</b> powermax</p>
	<p>SWEep&lt;n&gt;[:FREQuency]:STEP value</p> <p>Set / Query the step size for frequency sweep.</p> <p><b>Value:</b> stepmin ... stepmax [HZ   KHZ   MHZ   GHZ]   MIN   MAX</p> <p><b>Default:</b> 0.0001 * (freqmax - freqmin)</p> <p><b>Remark:</b> SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>
	<p>[:SOURce:]SWEep&lt;n&gt;:DIRection value</p> <p>Select / Query the sweep direction.</p> <p><b>Value:</b> UP   DOWN</p> <p><b>Default:</b> UP</p> <p><b>Remark:</b> STARt and STOP are exchanged if necessary. SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>

## AN680XX emulation mode

Status	Command / Function / Remark / Limitation
	<p>[:SOURce:]SWEep&lt;n&gt;:DWELl value</p> <p>Set / Query step time for frequency / power level sweep.</p> <p><b>Value:</b> timemin ... timemax [S   MS   US   NS]   MIN   MAX</p> <p><b>Default:</b> timemin</p> <p><b>Remark:</b> SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>
	[:SOURce:]SWEep<n>:DWELl:AUTO value
	[:SOURce:]SWEep<n>:GENeration value
	<p>[:SOURce:]SWEep&lt;n&gt;:POINts value</p> <p>Set / Query the number of steps in frequency / power level sweep.</p> <p><b>Value:</b> pointsmmin ... pointsmmax   MIN   MAX</p> <p><b>Default:</b> freqspan / freqstep powerspan / powerstep</p> <p><b>Remark:</b> SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>
	<p>[:SOURce:]SWEep&lt;n&gt;:POWer:STEP value</p> <p>Set / Query the step size for power level sweep.</p> <p><b>Value:</b> stepmin ... stepmax [DB]   MIN   MAX</p> <p><b>Default:</b> 0.02 dB</p> <p><b>Remark:</b> SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>
	<p>[:SOURce:]SWEep&lt;n&gt;:SPACing value</p> <p>Set / Query the type of sweep.</p> <p><b>Value:</b> LINear   LOGarithmic</p> <p><b>Default:</b> LINear for frequency sweep LOGarithmic for power sweep</p> <p><b>Remark:</b> SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.</p>

## AN680XX emulation mode










Status	Command / Function / Remark / Limitation
	[:SOURce:]SWEep<n>:TIME value Set / Query the sweep time. <b>Value:</b> timemin ... timemax [S   MS   US   NS]   MIN   MAX <b>Default:</b> TBD for frequency sweep. TBD for power sweep <b>Remark:</b> <i>value</i> is splitted into DWELI and POINTs, whereby DWELI is set to minimal possible value so that POINTs does not exceed upper limit. SWEep[1] is used for frequency sweep, SWEep2 is used for power sweep.
	[:SOURce:]SWEep<n>:TIME:AUTO value
	[:SOURce:]SWEep<n>:TIME:LLIMit value

Table 43: SOURCE subsystem

- **STATus Subsystem**

Status	Command / Function / Remark / Limitation
	STATus:OPERation[:EVENT]? Query the event bits of the operation status register.
	STATus:OPERation:CONDition? Query the condition bits of the operation status register.
	STATus:OPERation:ENABle value Set / Query the enable bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:OPERation:NTRansition value Set / Query the negative transition filter bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:OPERation:PTRansition value Set / Query the positive transition filter bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 32757
	STATus:PRESet Preset the operation and questionable register contents.

## AN680XX emulation mode








Status	Command / Function / Remark / Limitation
	STATus:QUESTionalbe[:EVENT]? Query the event bits of the questionable status register. <b>Value:</b> 0 ... 32757
	STATus: QUESTionalbe:CONDition? Query the condition bits of the questionable status register. <b>Value:</b> 0 ... 32757
	STATus: QUESTionalbe:ENABle value Set / Query the enable bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus: QUESTionalbe:NTRansition value Set / Query the negative transition filter bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus: QUESTionalbe:PTRansition value Set / Query the positive transition filter bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 32757
	STAT:QUEue[:NEXT]? Query and clear the oldest error. <b>Remark:</b> For more information, please see :SYSTem:ERRor?

Table 44: STATUS subsystem

- **SYSTem Subsystem**

Status	Command / Function / Remark / Limitation
	SYSTem:ERRor? Query and clear the oldest error. <b>Remark:</b> The original error codes and error descriptions of the SM* are returned. No translation to the AN680XX error codes and descriptions are done.

## AN680XX emulation mode




Status	Command / Function / Remark / Limitation
	SYSTem:LANGuage value Select / Query the remote-control language. <b>Value:</b> "SCPI"   "NATIVE"   "TMSL"   "EXIT" <b>Remark:</b> "SCPI", "NATIVE" and "TMSL" are not supported. "EXIT" has to be used to return to the instruments native SCPI-language.
	SYSTem:PRESet Preset instrument. <b>Remark:</b> For more information, please see *RST command.
	SYSTem:VERSion? Query the SCPI software version. <b>Remark:</b> YYYY.V is returned.

Table 45: SYSTEM subsystem

- **TRIGger Subsystem**



Status	Command / Function / Remark / Limitation
	TRIGger[:SEQuence   :START][:IMMediate] Trigger a sweep.
	TRIGger[:SEQuence   :START]:SOURce value Select / Query the trigger source. <b>Value:</b> BUS   EXTern   HOLD   IMMEDIATE <b>Default:</b> BUS <b>Remark:</b> HOLD is not supported.

Table 46: TRIGGER subsystem

- **TSWEEP Subsystem**


Status	Command / Function / Remark / Limitation
	TSWEEP Take a sweep.

Table 47: TSWEET subsystem

- **UNIT Subsystem**

Status	Command / Function / Remark / Limitation
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## AN680XX emulation mode

Status	Command / Function / Remark / Limitation
★	UNIT:FREQuency value Select / Query the global default frequency related parameter. <b>Value:</b> HZ, KHZ, MHZ, GHZ <b>Default:</b> HZ
★	UNIT:TIME value Select / Query the global default time related parameter. <b>Value:</b> S, MS, US, NS <b>Default:</b> S

Table 48: UNIT subsystem

### Instrument initialisation

The (factory) default setting of the AN680XX is applied when

- applying a DCL, SDC to the GPIB interface.
- ransmitting a \*RST command
- transmitting the first command after activating this emulation mode.

During initialisation, the AN680XX applies and activates the setting, that was active just before power down.

The SM\* however applies and activates the (factory) default setting of the AN680XX.

This different behaviour has to the be taken in consideration.

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
ABORT	-
CONTROL	-
DIAGNOSTIC	-
DISPLAY	TEXT STATE = ON
INITIATE	-
OUTPUT	STATE = ON

## AN680XX emulation mode

SOURCE (CORRECTION)	-
SOURCE (FREQUENCY)	<p>MODE = CW            CW = 0.5 * (Fmin + Fmax)            CW STEP = 100.0 MHZ            START = FMin            STOP = Fmax            CENTER = 0.5 * (Fmin + Fmax)            SPAN = Fmax – Fmin            MULTIPLIER = 1.0</p>
SOURCE (LIST)	-
SOURCE (MARKER)	<p>FREQUENCY(M1) = 2.0 GHz            FREQUENCY(M2) = 8.4 GHz            FREQUENCY(M3) = 2.0 GHz            FREQUENCY(M4) = 5.0 GHz            FREQUENCY(M5) = 8.4 GHz            FREQUENCY(M6) = 8.4 GHz            FREQUENCY(M7) = 8.4 GHz            FREQUENCY(M8) = 8.4 GHz            FREQUENCY(M9) = 8.4 GHz            FREQUENCY(M10) = 3.5 GHz            STATE = OFF            POLARITY = POSITIVE</p>
SOURCE (POWER)	<p>MODE = CW            LEVEL = 0.0 DBM            LEVEL STEP = 0.1 DB            ATTENUATION = AUTO            ATTENUATION AUTO = ON            ATTENUATION STEP = 10.0 DB            CENTER = 0.5 * (Pmin + Pmax)            DISPLAY OFFSET = 0.0 DB            START = Pmin            STOP = Pmax            SPAN = Pmax - Pmin</p>
SOURCE (SWEEP)	<p>FREQUENCY STEP = (Fmax – Fmin) / 10000            POWER STEP = 0.02 DB            DIRECTION = UP            DWELL = Tmin            POINTS = Fspan / Fstep and Pspan / Pstep            SPACING = LINEAR(F), LOGARITHMIC(P)            TIME = ???</p>
STATUS	-
SYSTEM	LANGUAGE = "SCPI"

## ***AN680XX emulation mode***

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TRIGGER	SOURCE = BUS
TSWEEP	-
UNIT	FREQUENCY = HZ TIME = S

Table 49: Factory default settings

### **Status reporting**

Status reporting is not supported so far.



## 7 HP8340 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the Pre-SCPI language, implemented in Agilent's signal generators of type

- HP8340A
- HP8340B
- HP8341B

The emulation software is supported on signal generators of type

- SMF100

The emulation software simulates the HP8340 data model in the execution unit and transforms the HP8340 parameters into the SM\* parameters.

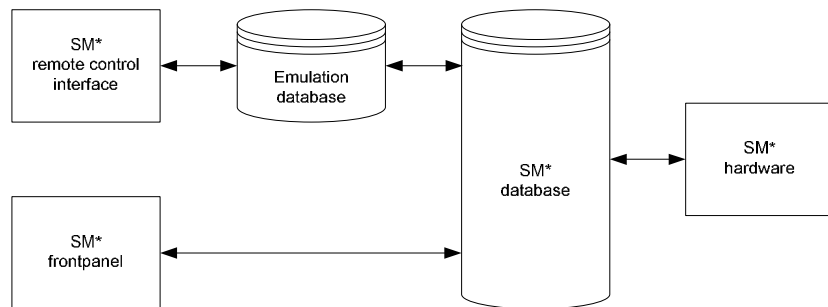


Figure 4: HP8340 emulation model

This mapping occurs only in one direction: Setting commands that arrive via the remote-control interface modify the HP8340 parameters. These parameters are converted into SM\* parameters and written to the database.

Modifying the SM\* parameters in any other manner, e.g., via manual operation at the frontpanel, causes no changes to the HP8340 parameters of the emulation software.

**While this is insignificant in pure remote-control operation, it can lead to inconsistencies and undesirable effects or malfunctions when you use both manual and remote control in this language emulation mode.**

### GPIB functions

The following table shows the GPIB functions, supported by the HP8340.

## HP8340 emulation mode










Status	Command	Function / Remark / Limitation
	DCL	Device clear.
	GET	Goup execute trigger.
	GTL	Goto local mode.
	LLO	Local lockout.
	REN	Goto remote mode.
	SDC	Selective device clear.
	SPD	Serial-Poll disable.
	SPE	Serial-Poll enable.
	SRQ	<p>Request service.</p> <p><b>Remarks:</b></p> <p>The status system of the HP8340 is not compatible with the status system implemented in the SMF100 in accordance with IEEE 488.2.</p> <p>The bits in the status byte supported by the emulation software in the SMF100 are.</p> <ul style="list-style-type: none"> <li>○ Bit 7 – New frequencies or sweep time in effect</li> <li>○ Bit 6 – Request service</li> <li>○ Bit 4 – End of sweep</li> </ul> <p>The emulations software in the SMF100 sets all othe bits in status byte to "0".</p>

Table 50: HP8340 GPIB functions

## Commands

The following table shows the commands, supported by the HP8340.

- **Additional**









Status	Command / Function / Remark / Limitation
	<p>EX</p> <p>Return to SCPI mode.</p> <p><b>Remark:</b></p> <p>This command has been added to the HP8340 command set.</p> <p>Emulation parameters (current register, backup registers) are <b>NOT</b> persistent and get lost when leaving the emulation mode.</p>

Table 51: Additional commands

- **Swept / CW Frequency Selection**

Status	Command / Function / Remark / Limitation
	FA[value]

## HP8340 emulation mode





	<p>Select start/stop frequency sweep mode, optionally set start frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> freqmin</p>
	<p>FB[value]</p> <p>Select start/stop frequency sweep mode, optionally set stop frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> freqmax</p>
	<p>CF[value]</p> <p>Select center/delta frequency sweep mode, optionally set center frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> <math>0.5 * (\text{freqmin} + \text{freqmax})</math></p>
	<p>DF[value]</p> <p>Select center/delta frequency sweep mode, optionally set delta frequency.</p> <p><b>Value:</b> 0 ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> freqmax - freqmin</p>
	<p>SHST[value]</p> <p>Zoom in/out in center/deltay frequency sweep mode.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> <math>0.5 * (\text{freqmin} + \text{freqmax})</math></p> <p><b>Remark:</b> Acts like CF[value] Frontpanel knob and step keys are not linked to center frequency and delta frequency. Commands RB[value] and UP/DN are not linked to center frequency and delta frequency.</p>
	<p>CW[value]</p> <p>Select fixed frequency mode, optionally set fixed frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> <math>0.5 * (\text{freqmin} + \text{freqmax})</math></p>
	<p>SHCW[value]</p> <p>Select fixed frequency mode, optionally set fixed frequency.</p> <p><b>Value:</b></p>

## HP8340 emulation mode















	<p>freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 0.5 * (freqmin + freqmax)</p> <p><b>Remark:</b> Acts like CW[value] Frontpanel knob and step keys are not linked to cw frequency and cw frequency resolution. Commands RB[value] and UP/DN are not linked to cw frequency and cw frequency resolution.</p>
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Table 52: Swept / CW Frequency Selection commands

- **Frequency Markers**

Status	Command / Function / Remark / Limitation
	<p>M1[value]</p> <p>Turn on marker 1, optionally set marker frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 0.5 * (freqmin + freqmax)</p> <p><b>Remark:</b> There is no signal output on auxiliary i/o.</p>
	<p>M2[value]</p> <p>Turn on marker 2, optionally set marker frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 0.5 * (freqmin + freqmax)</p> <p><b>Remark:</b> There is no signal output on auxiliary i/o.</p>
	<p>M3[value]</p> <p>Turn on marker 3, optionally set marker frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 0.5 * (freqmin + freqmax)</p> <p><b>Remark:</b> There is no signal output on auxiliary i/o.</p>
	<p>M4[value]</p> <p>Turn on marker 4, optionally set marker frequency.</p> <p><b>Value:</b> freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 0.5 * (freqmin + freqmax)</p>

## HP8340 emulation mode

	<p><b>Remark:</b></p> <p>There is no signal output on auxiliary i/o.</p>
	<p>M5[value]</p> <p>Turn on marker 5, optionally set marker frequency.</p> <p><b>Value:</b></p> <p>freqmin ... freqmax HZ   KZ   MZ   GZ</p> <p><b>Default:</b></p> <p>0.5 * (freqmin + freqmax)</p> <p><b>Remark:</b></p> <p>There is no signal output on auxiliary i/o.</p>
	<p>M1M0</p> <p>Turn off marker 1.</p>
	<p>M1MO</p> <p>Turn off marker 1.</p>
	<p>M2M0</p> <p>Turn off marker 2.</p>
	<p>M2MO</p> <p>Turn off marker 2.</p>
	<p>M3M0</p> <p>Turn off marker 3.</p>
	<p>M3MO</p> <p>Turn off marker 3.</p>
	<p>M4M0</p> <p>Turn off marker 4.</p>
	<p>M4MO</p> <p>Turn off marker 4.</p>
	<p>M5M0</p> <p>Turn off marker 5.</p>
	<p>M5MO</p> <p>Turn off marker 5.</p>
	<p>SHM0</p> <p>Turn off all markers.</p>
	<p>SHMO</p> <p>Turn off all markers.</p>
	<p>MD1&lt;value&gt;</p> <p>Turn on delta marker.</p> <p><b>Value:</b></p> <p>M1M2   M1M3   M1M4   M1M5   M2M3   M2M4   M2M5   M3M4   M3M5   M4M5</p> <p><b>Default:</b></p> <p>-</p> <p><b>Remark:</b></p> <p>There is no signal output on auxiliary i/o.</p>

## HP8340 emulation mode










	MD0 Turn off delta marker.
	MC Transfer frequency value of active marker to center frequency. <b>Remarks:</b> Affect on center/delta frequency sweep mode depends on firmware release of HP8340. SM* always selects center/delta frequency sweep mode.
	MP1 Turn on marker 1 → marker 2 frequency sweep mode.
	MP0 Turn off marker 1 → marker 2 frequency sweep mode.
	SHMP Transfer marker 1 frequency to start frequency and marker 2 frequency to stop frequency. <b>Remarks:</b> Affect on start/stop frequency sweep mode depends on firmware release of HP8340. SM* always selects start/stop frequency sweep mode.
	AK1 Turn on amplitude frequency markers.
	AK0 Turn off amplitude frequency markers.

Table 53: Frequency Marker commands

- **Sweep Mode, Trigger and Time**

Status	Command / Function / Remark / Limitation
	S1 Select continuous sweep mode. <b>Remarks:</b> Default on PON
	S2 Select single sweep mode.
	SG Select single sweep mode.
	S3 Select stepped (manual sweep) mode. <b>Remarks:</b> SM* output signal at connector X AXIS is always in the range from 0V (start frequency) to 10V (stop frequency).
	SM Select stepped (manual sweep) mode. <b>Remarks:</b> SM* output signal at connector X AXIS is always in the range from 0V (start

## HP8340 emulation mode











	frequency) to 10V (stop frequency).
	T1 Select freerun sweep trigger. <b>Remarks:</b> Default on PON
	T2 Select line sweep trigger. <b>Remarks:</b> SM* does not support 50/60Hz synchronisation. Implementation is therefore identical as T1, freerun sweep trigger.
	T3 Select external sweep trigger.
	ST[value] Set sweep time. <b>Value:</b> timemin ... timemax SC   MS <b>Default:</b> 44MS <b>Remarks:</b> SM* does not provide setting of sweep time. Sweep time is computed as $tsweep = dwell * count$ <i>dwell</i> is set to 10ms, <i>count</i> is computed.

Table 54: Sweep Mode, Trigger and Time commands

- **Modulation**

Status	Command / Function / Remark / Limitation
	AM1 Turn amplitude modulation on. <b>Remark:</b> Modulation source is external signal at connector EXT1.
	AM0 Turn amplitude modulation off.
	PM1 Turn pulse modulation on. <b>Remark:</b> Modulation source is external signal at connector PULSE.
	PM0 Turn pulse modulation off.
	SHAM Increase ALC bandwidth in pulse mode.
	FM1 Turn frequency modulation on. <b>Remark:</b>

## HP8340 emulation mode


	Modulation source is external signal at connector EXT2.
	FM0 Turn frequency modulation off.

Table 55: Modulation commands

- **Step Size, Display and Entry Control**

















Status	Command / Function / Remark / Limitation
	SF value Select and optionally set frequency step size.
	SHCF value Select and optionally set frequency step size.
	SP value Select and optionally set power step size.
	SHPL value Select and optionally set power step size.
	UP Increment active parameter.
	DN Decrement active parameter.
	DU1 Reenable numeric display update.
	SHS11 Reenable numeric display update.
	DU0 Disable numeric display update.
	SHS10 Disable numeric display update.
	SHT21 Enable penlift at bandcrossing.
	SHT20 Disable penlift at bandcrossing.
	AU Switch from fixed function to coupled mode.
	EF Disable active function and switch (numeric) entry off.
	SHFA<value> Select and optionally set frequency multiplications factor.
	SHFB<value> Select and optionally set frequency offset.

Table 56: Step Size, Display and Entry Control commands



## HP8340 emulation mode

- **Instrument State / Registers**









Status	Command / Function / Remark / Limitation
	<p>IP</p> <p>Preset instrument.</p> <p><b>Remarks:</b></p> <p>HP8340 presets to the last saved backup register set 0.</p> <p>SM* always presets to the HP8340 factory defaults and <b>NOT</b> to the last saved backup register set 0.</p>
	<p>SV&lt;value&gt;</p> <p>Save the actual instrument state to the backup register.</p> <p><b>Value:</b></p> <p>1 ... 9</p> <p><b>Default:</b></p> <p>1</p> <p><b>Remarks:</b></p> <p>The instrument state is <b>NOT</b> persistent and is lost when the instrument is switched off or emulation mode is left.</p>
	<p>RC value</p> <p>Recall an instrument state from the backup register.</p> <p><b>Value:</b></p> <p>1 ... 9</p> <p><b>Default:</b></p> <p>1</p> <p><b>Remarks:</b></p> <p>The instrument state is <b>NOT</b> persistent and is lost when the instrument is switched off or emulation mode is left.</p>
	<p>SHSV</p> <p>Lock access to backup registers.</p>
	<p>SHRC</p> <p>Unlock access to backup registers.</p>
	<p>AL1[value]</p> <p>Turn alternate sweep mode on, optionally selects background (backup) register &lt;value&gt;.</p>
	<p>ALO</p> <p>Turn alternate sweep mode off.</p>

Table 57: Instrument State / Registers commands

- **Power Level and Control**

Status	Command / Function / Remark / Limitation
	<p>PL [value]</p> <p>Select and optionally set output power level.</p> <p><b>Value:</b></p> <p>powermin ... powermax [DB]</p> <p><b>Default:</b></p>

## HP8340 emulation mode








	0 DB
	PS1 value Turn on power sweep mode, optionally sets power span.
	PS0 Turn off power sweep mode.
	SL1 Turn on power slope mode
	SL0 Turn off power slope mode
	RF1 Set output power on.
	RF0 Set output power off.
	RP1 Turn on peak output power.
	RP0 Turn off peak output power.
	SHAK Peak instantaneous.
	SHRP Select calibration tracking mode.
	A1 Select internal leveling mode.
	A2 Select external (crystal) leveling mode.
	A3 Select external (power meter) leveling mode.
	SHA3 Disable ALC to control modulator drive directly.
	SHPS Decouple ALC and attenuator, control each independently.
	SHSL Control step attenuator independently.
	AT Control step attenuator independently.

Table 58: Power Level and Control commands

- **Diagnostic**

Status	Command / Function / Remark / Limitation
	SHM1 Display M/N and 20/30 loop frequencies.

## HP8340 emulation mode
























	SHM2 Display band number and Y.O. loop frequency.
	SHM3 Display VCO1 and VCO2 frequencies.
	SHT1 Display test front panel.
	SHT3 Display unlock.
	SHS3 Display fault indicators.
	SHA21 Disable band cross.
	SHA20 Reenable band cross.
	SHA1 Advance manual band cross.
	BC Advance manual band cross.  <b>Remarks:</b> Command is sent by the HP8757 Analyzer during initialisation phase and measurement phase.
	SHM5 Turn off display diagnostics.
	SHGZ value Select channel for read/write to internal circuits.  <b>Remarks:</b> Command is sent by the HP8757 Analyzer during initialisation phase.
	SHMZ value Select subchannel for read/write to internal circuits.  <b>Remarks:</b> Command is sent by the HP8757 Analyzer during initialisation phase.
	SHKZ value Write data to internal circuits.  <b>Remarks:</b> Command is sent by the HP8757 Analyzer during initialisation phase.
	SHHZ Read data from internal circuits.  <b>Remarks:</b> Command is sent by the HP8757 Analyzer during initialisation phase.

Table 59: Diagnostic functions commands














- **GPIB**

Status	Command / Function / Remark / Limitation
--------	--

## HP8340 emulation mode

	<p>CS</p> <p>Clear both status bytes.</p> <p><b>Remark:</b></p> <p>The status registers of the GPIB-controller are not affected.</p> <p>The status system of the HP8340 is not compatible with the status system implemented in the SMF100 in accordance with IEEE 488.2.</p>
	<p>OS</p> <p>Output status bytes.</p> <p><b>Remarks:</b></p> <p>The number of status bytes (1 or 2) in the response depends on firmware release of HP8340.</p> <p>SM* responds 2 status bytes.</p> <p>The status system of the HP8340 is not compatible with the status system implemented in the SM* in accordance with IEEE 488.2.</p>
	<p>RM value</p> <p>Set Mask Status Byte 1.</p> <p><b>Value:</b></p> <p>0x00 ... 0xFF</p> <p><b>Default:</b></p> <p>0</p> <p><b>Remarks:</b></p> <p>The status registers of the GPIB-controller are not affected.</p> <p>The status system of the HP8340 is not compatible with the status system implemented in the SMF100 in accordance with IEEE 488.2.</p>
	<p>RE value</p> <p>Set Mask Status Byte 2.</p> <p><b>Value:</b></p> <p>0x00 ... 0xFF</p> <p><b>Default:</b></p> <p>0</p> <p><b>Remarks:</b></p> <p>The status registers of the GPIB-controller are not affected.</p> <p>The status system of the HP8340 is not compatible with the status system implemented in the SM* in accordance with IEEE 488.2.</p>
	<p>OL&lt;block&gt;</p> <p>Output learn string.</p>
	<p>IL&lt;block&gt;</p> <p>Input learn string.</p>
	<p>OM</p> <p>Output mode string.</p> <p><b>Remarks:</b></p> <p>Bits in mode string, resulting from front panel activity are always set to "0".</p>
	<p>OA</p> <p>Output active value.</p>
	<p>OB</p>

## HP8340 emulation mode

	<p>Output next bandcross frequency.</p> <p><b>Remarks:</b></p> <p>In frequency sweep mode, next bandcross frequency is always set to stop frequency.</p>
	<p>OC</p> <p>Output coupled parameters.</p>
	<p>OD</p> <p>Output diagnostics.</p>
	<p>OF</p> <p>Output faults.</p> <p><b>Remarks:</b></p> <p>HP8340 responds with actual state of the instruments hardware.</p> <p>SM* always responds "0000" due to the difference in hardware implementation.</p>
	<p>OI</p> <p>Output firmware id.</p> <p><b>Remarks:</b></p> <p>SM* responds "08340BREV 01 Aug 86".</p>
	<p>OK</p> <p>Output last lock frequency.</p>
	<p>OP</p> <p>Output interrogated parameter.</p>
	<p>OR</p> <p>Output power level.</p>
	<p>NA value</p> <p>Configure network analyzer.</p> <p><b>Value:</b></p> <p>0x00 ... 0xFF</p> <p><b>Default:</b></p> <p>0</p> <p><b>Remarks:</b></p> <p>Command is sent by the HP8757 Analyzer during initialisation phase.</p>
	<p>BC</p> <p>Advance manual band cross.</p> <p><b>Remarks:</b></p> <p>Command is sent by the HP8757 Analyzer during initialisation phase and measurement phase.</p>
	<p>KR</p> <p>Release keyboard.</p>
	<p>SW0</p> <p>Swap channels.</p>
	<p>SW1</p> <p>Swap channels.</p>
	<p>EK</p> <p>Enable KNOB at frontpanel</p>

## HP8340 emulation mode













	RB[value] Enable KNOB in remote-control interface, optionally modify active parameter by <value>.
	SN value Select stepped / manual sweep mode, optionally sets number of sweep steps from start to stop to <value>.
	IF Increment frequency.
	RS Reset sweep.
	TS Take sweep.
	TL value Set time limit to <value> <b>Remarks:</b> SM* allows only time limit values, that are multiples of 10ms. Sweep time is computed as $tsweep = dwell * count$ <i>dwell</i> is set to 10ms, <i>count</i> is computed. As time limit is the minimal sweep time, time limit is computed as $tlimit = dwell * count(min)$
	AS0 Select foreground (backup) register.
	AS1 Select background (backup) register.
	FP Select fast phaselock.
	AT Control step attenuator independently.
	TI value Test GPIB interface. <b>Value:</b> 0x00 ... 0xFF <b>Default:</b> 0 <b>Remark:</b> Response depends on firmware release of HP8340. SM* always responds <value>.

Table 60: GPIB commands

- Others / Unknown

Status	Command / Function / Remark / Limitation
	SHPM

## HP8340 emulation mode












	<p><b>Remark:</b> Command is sent by the HP8757 Analyzer during initialisation phase. Functionality unknown ...</p>
	<p>SH Select shift function.</p> <p><b>Remark:</b> See SHxy commands for additional informations on functions with shift prefix. Prefix not allowed without function.</p>
	<p>GZ Frequency unit</p>
	<p>MZ Frequency unit</p>
	<p>KZ Frequency unit</p>
	<p>HZ Frequency unit</p>
	<p>MS Time unit</p>
	<p>SC Time unit</p>
	<p>DB Level unit</p>
	<p>AU Automatic unit</p>

Table 61: Others / Unknown commands

## Instrument initialisation

	<p>EX Return to SCPI mode.</p> <p><b>Remark:</b> This command has been added to the HP8657 command set.</p>
	<p>IP Preset instrument.</p> <p><b>Remark:</b> SM* always presets to the HP8657 factory defaults.</p> <ul style="list-style-type: none"> <li>○ 100 MHz frequency</li> <li>○ 10 MHz frequency increment / decrement</li> <li>○ 0 ° frequency phase</li> <li>○ – 143.5 dBm amplitude</li> <li>○ 10 dB amplitude increment / decrement</li> <li>○ 0 dB amplitude offset</li> <li>○ Active mode</li> </ul>

## HP8340 emulation mode

	<ul style="list-style-type: none"> <li>○ RF output on</li> <li>○ AM off</li> <li>○ AM depth 0 %</li> <li>○ FM off</li> <li>○ FM deviation 1 kHz</li> <li>○ PM off</li> <li>○ LF generator frequency 1 kHz</li> </ul> <p>All registers 0 ... 99 are also preset to the factory defaults.</p>
--	---

Table 62: Additional commands

### • Frequency


Status	Command / Function / Remark / Limitation
	<p>CW value</p> <p>Select fixed frequency function, optionally set fixed frequency.</p> <p><b>Value:</b> value in HZ   KZ   MZ</p> <p><b>Default:</b> 100.0 MZ</p>

Table 63: Frequency commands

### • Amplitude



Status	Command / Function / Remark / Limitation
	<p>AP value</p> <p>Select amplitude function, optionally set amplitude.</p> <p><b>Value:</b> value in DM   DF   DM VL   DM MV   DM UV   DM EM VL   DM EM UV   EM VL   EM MV   EM UV   VL   MV   UV</p> <p><b>Default:</b> -143.5 DM</p> <p><b>Remark:</b> DF (dBf) is not supported.</p>
	<p>AO value</p> <p>Set amplitude offset.</p> <p><b>Value:</b> value in DB</p> <p><b>Default:</b> 0.0 DB</p>









Table 64: Amplitude commands

### • Modulation

Status	Command / Function / Remark / Limitation
--------	--



## HP8340 emulation mode

	<p>AM value</p> <p>Select amplitude modulation function, optionally set modulation depth.</p> <p><b>Value:</b> value in PCT   %</p> <p><b>Default:</b> 0.0 PCT</p> <p><b>Remark:</b> % is not supported. AM must be preceeded by either S1, S2 or S3.</p>
	<p>FM value</p> <p>Select frequency modulation function. Optionally set modulation deviation.</p> <p><b>Value:</b> value in HZ   KZ   MZ</p> <p><b>Default:</b> 0.0 HZ</p> <p><b>Remark:</b> FM must be preceeded by either S1, S2 or S3.</p>
	<p>S1</p> <p>Select external modulation source.</p> <p><b>Remark:</b> Coupling is AC in any case.</p>
	<p>S2</p> <p>Select internal 400 Hz sine wave as modulations source.</p> <p><b>Remark:</b> Selection S2 sets LF frequency to 400 Hz for both, AM and FM. Any preceeding selection of S3 is overridden.</p>
	<p>S3</p> <p>Select internal 1000 Hz sine wave as modulations source.</p> <p><b>Remark:</b> Selection S3 sets LF frequency to 1000 Hz for both, AM and FM. Any preceeding selection of S3 is overridden.</p>
	<p>S4</p> <p>Turn modulation completely or selectively off.</p>
	<p>S5 value</p> <p>Select DC frequency modulation function. Optionally set modulation deviation.</p> <p><b>Value:</b> Value in HZ   KZ   MZ</p> <p><b>Default:</b> 0.0 HZ</p> <p><b>Remark:</b> External modulation source is selected as well as DC coupling.</p>
	<p>PM</p> <p>Turn pulse modulation on.</p>

## HP8340 emulation mode




















	<p>PF</p> <p>Turn pulse modulation (fast mode) on.</p> <p><b>Remark:</b> Implementation on SM* is identical to PM.</p>
---	--

Table 65: Modulation commands

- **Other**

Status	Command / Function / Remark / Limitation
	<p>HI</p> <p>Unknown function ...</p>
	<p>LO</p> <p>Unknown function ...</p>
	<p>UP</p> <p>Increment the value of the active function (frequency, amplitude, modulation depth, modulation deviation) by the value specified at command IS.</p>
	<p>DN</p> <p>Decrement the value of the active function (frequency, amplitude, modulation depth, modulation deviation) by the value specified at command IS.</p>
	<p>IS value</p> <p>Set increment/decrement value of the active function (frequency, amplitude, modulation depth, modulation deviation).</p> <p><b>Value (frequency function):</b> value in HZ   KZ   MZ</p> <p><b>Value (amplitude function):</b> value in DB</p> <p><b>Value (AM):</b> value in PCT   %</p> <p><b>Value (FM):</b> value in HZ   KZ   MZ</p> <p><b>Remark:</b> % is not supported</p>
	<p>PI</p> <p>Increment RF frequency phase by 1.0 °.</p> <p><b>Remark:</b> No wrap around occurs at the phase limits in opposition to the HP8657.</p>
	<p>PD</p> <p>Decrement RF frequency phase by 1.0 °.</p> <p><b>Remark:</b> No wrap around occurs at the phase limits in opposition to the HP8657.</p>
	<p>R0</p> <p>Select Standby mode.</p> <p><b>Remark:</b> The implementation on SM* is identical to R2.</p>

## HP8340 emulation mode

	<p>R1</p> <p>Select Active mode.</p> <p><b>Remark:</b></p> <p>The implementation on SM* is identical to R3.</p>
	<p>R2</p> <p>Set Rf output off.</p>
	<p>R3</p> <p>Set Rf output on.</p>
	<p>R5</p> <p>Set Rf output dead.</p> <p><b>Remark:</b></p> <p>The implementation on SM* is identical to R2.</p>
	<p>ST value</p> <p>Save actual setup to backup register.</p> <p><b>Value:</b></p> <p>0 ... 9</p> <p><b>Remark:</b></p> <p>The contents of the registers 0 ... 9 are NOT persistent and are lost when power off or leaving the emulation mode.</p>
	<p>RC value</p> <p>Recall setup from backup register.</p> <p><b>Value:</b></p> <p>0 ... 9</p> <p><b>Remark:</b></p> <p>The contents of the registers 0 ... 9 are NOT persistent and are lost when power off or leaving the emulation mode.</p>
	<p>SV value</p> <p>Save actual setup to backup register.</p> <p><b>Value:</b></p> <p>0 ... 99</p> <p><b>Remark:</b></p> <p>The contents of the registers 0 ... 99 are NOT persistent and are lost when power off or leaving the emulation mode.</p>
	<p>RL value</p> <p>Recall actual setup from register <i>value</i>.</p> <p><b>Value:</b></p> <p>0 ... 99</p> <p><b>Remark:</b></p> <p>The contents of the registers 0 ... 99 are NOT persistent and are lost when power off or leaving the emulation mode.</p>
	<p>SQ</p> <p>Step forward to next register and recall setup.</p>
	<p>GT</p> <p>Setup a flexible sequence.</p>

## HP8340 emulation mode



	QS Step backward to previous register and recall setup.
	RP Reset reverse power protection.

Table 66: Other commands

### Instrument initialisation

The (factory) default setting of the HP8340 is applied when

- applying the DCL, SDC to the GPIB interface.
- transmitting the first command after activating this emulation mode.

During initialisation, the HP8340 applies and activates the backup register set 0.

The SM\* however applies and activates the (factory) default setting of the HP8340.

This different behaviour has to be taken in consideration:

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
frequency mode	start / stop frequency sweep mode
start frequency	lowest possible value of SMF100 (depends on installed options)
stop frequency	highest possible value of SMF100 (depends on installed options)
center frequency	= 0.5 * (start frequency + stop frequency)
delta frequency	= stop frequency – start frequency
cw frequency	= center frequency
sweep mode	continuous sweep mode
trigger mode	freerun trigger mode
sweep time	44ms
marker states	off
marker frequency	= center frequency
amplitude modulation	off
pulse modulation	off
frequency modulation	off

## **HP8340 emulation mode**

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frequency step size	1 kHz
status bytes	cleared, set to "0"
levelling mode	internal levelling mode
rf output	on
power level	-110 dB(m) without option XYZ -30 dB(m) with option XYZ
power level step size	10 dB

Table 67: Factory default setting

### **Status reporting**

Status reporting is not supported so far.

## 8 HP8360 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the SCPI-compatible language, implemented in Agilent's signal generators of type

- HP83620A / B
- HP83630A / B

The emulation software is supported on signal generators of type

- SMF100

**The signal generator HP83620 / HP83630 also supports a HP8340 compatible Pre-SCPI-language. For more information on that language, please refer to the *HP8340 emulation*.**

The emulation software simulates the HP8360 data model in the execution unit and transfers most of the HP8360 parameters into the SM\* database.

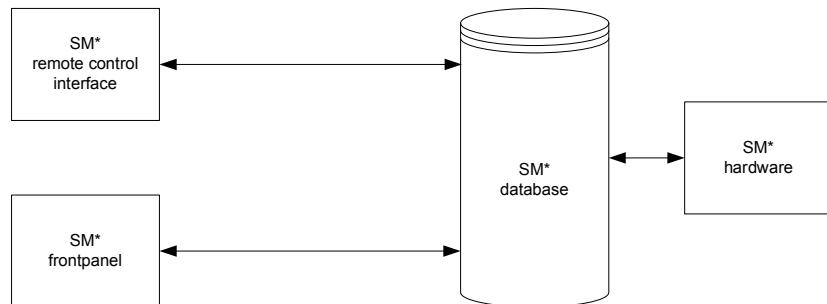


Figure 5: HP8360 emulation model

Those HP8360 functions and parameters, having no direct equivalent SM\* function and parameter, are not supported by this emulation so far.













### GPIB functions

### Commands

The following table shows the commands, supported by the HP8360.

## HP8360 emulation mode

- **Common**

Status	Command / Function / Remark / Limitation
	*CLS Clear the status byte, the data questionable event register, the standard event status register, the operation status register ...
	*ESE value Set / Query the bits of the event status enable register. <b>Value:</b> 0 ... 255
	*ESR? Query the bits of the event status register.
	*IDN? Query the ID string.
	*LRN? Query the long string device specific character set.
	*OPC *OPC? Wait / Query for the complete execution of all programming commands.
	*OPT? Query the device options. <b>Value:</b> --- <b>Remark:</b> HP8360 options are not returned. SM* options returned.
	*RCL value Recall an instrument setup. <b>Value:</b> 0 ... 9
	*RST Reset the instrument to the default state. <b>Remark:</b> SM*'s default state is applied and activated.
	*SAV value Save an instrument setup. <b>Value:</b> 0 ... 9
	*SRE value Set / Query the bits of the service request enable register. <b>Value:</b> 0 ... 191
	*STB? Query the bits of the status byte.

## HP8360 emulation mode



Status	Command / Function / Remark / Limitation
	*TRG Execute a trigger function.
	*TST? Performs a self test and returns result. Remark: 0 is return in any case, indicating no error.
	*WAI Wait until pending operations have taken place.

Table 68: Common commands

- **ABORt Subsystem**






Status	Command / Function / Remark / Limitation
	ABORt Abort and reset sweep in process.

Table 69: Common commands

- **AM Subsystem**

Status	Command / Function / Remark / Limitation
	AM[:DEPTh] value Set / Query the modulation depth. <b>Value:</b> <i>num</i> [PCT]   MAXimum   MINimum   <i>num</i> [DB] $0.0 \% \leq num \leq 100.0 \%$ <b>Default:</b> 50.0 % <b>Remark:</b> MAXimum, MINimum is not supported. <i>num</i> DB is not supported.
	AM:INTernal:FREQuency value Set / Query the modulation rate. <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum $Fmin \leq num \leq Fmax$ <b>Default:</b> 1.0 KHz <b>Remark:</b> MAXimum, MINimum is not supported.
	AM:INTernal:FUNCTion value
	AM:MODE value



## HP8360 emulation mode



















Status	Command / Function / Remark / Limitation
	<p>AM:SOURce value</p> <p>Select / Query the signal source of the modulation.</p> <p><b>Value:</b> INTernal   EXTernal</p> <p><b>Default:</b> EXTernal</p> <p><b>Remark:</b> INTernal, EXTernal are not supported LF1 corresponds to INTernal EXT1 corresponds to EXTernal</p>
	<p>AM:STATe value</p> <p>Set / Query the (activation) state of the modulation.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> OFF</p>
	<p>AM:TYPE value</p>

Table 70: AM subsystem

- CALibration Subsystem**

Status	Command / Function / Remark / Limitation
	CALibration:AM:AUTO value
	CALibration:AM[:EXECute]
	CALibration:PEAKing:AUTO value
	CALibration:PEAKing[:EXECute]
	CALibration:PMETer:DETEctor:INITiate? value
	CALibration:PMETer:DETEctor:NEXT? value
	CALibration:PMETer:FLATness:INITiate? value
	CALibration:PMETer:FLATness:NEXT? value
	CALibration:SPAN:AUTO value
	CALibration:SPAN[:EXECute]
	CALibration:TRACK
	CALibration:CORRection:ARRay{0   1} value
	CALibration:CORRection:FLATness value
	CALibration:CORRection:FLATness:POINts? value
	CALibration:CORRection:SOURce{0   1} value

## HP8360 emulation mode


Status	Command / Function / Remark / Limitation
	CALibration:CORRection[:STATe] value

Table 71: Calibration subsystem

- **DIAGnostics Subsystem**

Status	Command / Function / Remark / Limitation
	DIAGnostics:ABUS? value
	DIAGnostics:ABUS:AVERAge value
	DIAGnostics:ABUS:STATus?
	DIAGnostics:INSTrument:PMETer:ADDRess value
	[DIAGnostics:INSTrument:PRINter:ADDRess value
	DIAGnostics:IORW value, value
	DIAGnostics:OUTPut:FAULts?
	DIAGnostics:RESult?
	DIAGnostics:TEST:CONTInue
	DIAGnostics:TEST:DATA:DESC?
	DIAGnostics:TEST:DATA:MAXimum?
	DIAGnostics:TEST:DATA:MINimum?
	DIAGnostics:TEST:DATA:VALue?
	DIAGnostics:TEST:DISAbLe value
	DIAGnostics:TEST:ENABLe value
	DIAGnostics:TEST[:EXECute]
	DIAGnostics:TEST:LOG:SOURce
	DIAGnostics:TEST:LOG[:STATe] value
	DIAGnostics:TEST:LOOP value
	DIAGnostics:TEST:NAME? value
	DIAGnostics:POINTs?
	DIAGnostics:RESult? value
	DIAGnostics:TINT? value

Table 72: Diagnostics subsystem

- **DISPlay Subsystem**

Status	Command / Function / Remark / Limitation
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## HP8360 emulation mode









Status	Command / Function / Remark / Limitation
	DISPlay[:STATE] value

Table 73: Display subsystem

- **FM Subsystem**

Status	Command / Function / Remark / Limitation
	FM:COUPling value
	<p>FM[:DEVIation] value Set / Query the modulation deviation.</p> <p><b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum 0.0 Hz ≤ <i>num</i> ≤ ??? Hz</p> <p><b>Default:</b> 1.0 MHz</p> <p><b>Remark:</b> MAXimum, MINimum is not supported..</p>
	FM:FILTer:HPASs value
	<p>FM:INTernal:FREQuency value Set / Query the modulation rate.</p> <p><b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum <math>F_{min} \leq num \leq F_{max}</math></p> <p><b>Default:</b> 1.0 MHz</p> <p><b>Remark:</b> MAXimum, MINimum is not supported.</p>
	FM:INTernal:FUNcTion value
	FM:SENSitivity value
	<p>FM:SOURce value Select / Query the signal source of the modulation.</p> <p><b>Value:</b> INTernal   EXTernal</p> <p><b>Default:</b> EXTernal</p> <p><b>Remark:</b> INTernal, EXTernal are not supported LF1 corresponds to INTernal EXT1 corresponds to EXTernal</p>

## HP8360 emulation mode












Status	Command / Function / Remark / Limitation
	FM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

Table 74: FM subsystem

- FREquency Subsystem**

Status	Command / Function / Remark / Limitation
	FREquency:CENTer value Set / Query the rf center frequency (in sweep mode). <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum $F_{min} \leq num \leq F_{max}$ <b>Default:</b> $0.5 * (F_{max} + F_{min})$ <b>Remark:</b> MAXimum, MINimum is not supported.
	FREquency[:CW   :FIXed] value Set / Query the rf fixed frequency. <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum $F_{min} \leq num \leq F_{max}$ <b>Default:</b> $0.5 * (F_{max} + F_{min})$ <b>Remark:</b> MAXimum, MINimum is not supported.
	FREquency:CW:AUTO value
	FREquency:MANual value Set / Query the manual (current) rf frequency (in sweep mode). <b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum $F_{min} \leq num \leq F_{max}$ <b>Default:</b> $0.5 * (F_{max} + F_{min})$ <b>Remark:</b> MAXimum, MINimum is not supported.

## HP8360 emulation mode

Status	Command / Function / Remark / Limitation
	<p>FREQUENCY:MODE value</p> <p>Set / Query the frequency operation mode.</p> <p><b>Value:</b> FIXed   CW   SWEep   LIST</p> <p><b>Default:</b> CW</p> <p><b>Remark:</b> LIST is not supported</p>
	<p>FREQUENCY:MULTIPLIER value</p> <p>Set / Query the rf frequency multiplier (for the frontpanel display).</p> <p><b>Value:</b> <i>num</i>   MAXimum   MINimum</p> <p><math>0.001 \leq num \leq 10000</math></p> <p><b>Default:</b> 1.0</p> <p><b>Remark:</b> MAXimum, MINimum is not supported.</p>
	<p>FREQUENCY:MULTIPLIER:STATE value</p>
	<p>FREQUENCY:OFFSET value</p> <p>Set / Query the rf frequency offset (for the frontpanel display).</p> <p><b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum</p> <p><math>-50 \text{ GHz} \leq num \leq +50\text{GHz}</math></p> <p><b>Default:</b> 0.0 Hz</p> <p><b>Remark:</b> MAXimum, MINimum is not supported.</p>
	<p>FREQUENCY:OFFSET:STATE value</p>
	<p>FREQUENCY:SPAN value</p> <p>Set / Query the rf frequency span (in sweep mode).</p> <p><b>Value:</b> <i>num</i> [HZ   KHZ   MHZ   GHZ]   UP   DOWN   MAXimum   MINimum</p> <p><math>0.0 \text{ Hz} \leq num \leq F_{\text{max}}</math></p> <p><b>Default:</b> 0.0 Hz</p> <p><b>Remark:</b> UP, DOWN, MAXimum, MINimum are not supported.</p>

## HP8360 emulation mode





Status	Command / Function / Remark / Limitation
	<p>FREQUENCY:START value</p> <p>Set / Query the rf start frequency (in sweep mode).</p> <p><b>Value:</b></p> <p><i>num</i> [HZ   KHZ   MHZ   GHZ]   UP   DOWN   MAXimum   MINimum</p> <p><math>F_{min} \leq num \leq F_{max}</math></p> <p><b>Default:</b></p> <p>Fmin</p> <p><b>Remark:</b></p> <p>UP, DOWN, MAXimum, MINimum are not supported.</p>
	<p>FREQUENCY:STEP:AUTO value</p>
	<p>FREQUENCY:STEP[:INCRement] value</p> <p>Set / Query the rf frequency step size.</p> <p><b>Value:</b></p> <p><i>num</i> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum</p> <p><math>0.0 \text{ Hz} \leq num \leq F_{max}</math></p> <p><b>Default:</b></p> <p>---</p> <p><b>Remark:</b></p> <p>MAXimum, MINimum are not supported.</p>
	<p>FREQUENCY:STOP value</p> <p>Set / Query the rf stop frequency (in sweep mode).</p> <p><b>Value:</b></p> <p><i>num</i> [HZ   KHZ   MHZ   GHZ]   UP   DOWN   MAXimum   MINimum</p> <p><math>F_{min} \leq num \leq F_{max}</math></p> <p><b>Default:</b></p> <p>Fmax</p> <p><b>Remark:</b></p> <p>UP, DOWN, MAXimum, MINimum are not supported.</p>

Table 75: Frequency subsystem

- INITiate Subsystem**




Status	Command / Function / Remark / Limitation
	INITiate:CONTinuous value
	INITiate[:IMMediate]

Table 76: Initiate subsystem

- LIST Subsystem**

Status	Command / Function / Remark / Limitation
	LIST:DWELI value

## HP8360 emulation mode









Status	Command / Function / Remark / Limitation
	LIST:DWELI:POINts? value
	LIST:FREQuency value
	LIST:FREQuency:POINts? value
	LIST:MANual value
	LIST:MODE value
	LIST[:POWer]:CORRection value
	LIST[:POWer]:CORRection:POINts? value
	LIST:TRIGger:SOURce value

Table 77: List subsystem

- MARKer Subsystem**









Status	Command / Function / Remark / Limitation
	MARker[1 ... 5]:AMPLitude[:STATe] value
	MARker[1 ... 5]:AMPLitude:VALue value
	MARker[1 ... 5]:AOFF
	MARker[1 ... 5]:DELTA?
	MARker[1 ... 5]:FREQuency value
	MARker[1 ... 5]:MODE value
	MARker[1 ... 5]:REFerence value
	MARker[1 ... 5][:STATe] value

Table 78: Marker subsystem

- MEASure Subsystem**





Status	Command / Function / Remark / Limitation
	MEASure:AM?
	MEASure:FM?

Table 79: Measure subsystem

- MODulation Subsystem**

Status	Command / Function / Remark / Limitation
	MODulation:OUTPut:SOURce value
	MODulation:OUTPut:STATe value

## HP8360 emulation mode












Status	Command / Function / Remark / Limitation
	MODulation:STATe? Query the general (activation) state of the modulation.













Table 80: Modulation subsystem

- **POWER Subsystem**

Status	Command / Function / Remark / Limitation
	POWer{:ALC:Bandwidth:BWIDTh} value
	POWer{:ALC:Bandwidth:BWIDTh}:AUTO value
	POWer:ALC:CFACTOR value
	POWer:ALC:SOURce value Set / Query the type of leveling for output power automatic leveling <b>Value:</b> INTernal   DIODE   PMETER   MMHead <b>Default:</b> INTernal <b>Remark:</b> MMHead is not supported.
	POWer:ALC[:STATe] value Set / Query the (activation) state of leveling for output power automatic leveling <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	POWer:AMPLifier:STATe
	POWer:AMPLifier:STATe:AUTO
	POWer:ATTenuation value Set / Query the output attenuation level. <b>Value:</b> <i>num</i> [DB]   UP   DOWN   MAXimum   MINimum $0.0 \text{ dB} \leq \textit{num} \leq 110.0 \text{ dB}$ <b>Default:</b> --- <b>Remark:</b> UP, DOWN, MAXimum, MINimum are not supported.
	POWer:ATTenuation:AUTO value
	POWer:CENTer value



## HP8360 emulation mode

Status	Command / Function / Remark / Limitation
	<p>POWer[:LEVel] value</p> <p>Set / Query the rf output level.</p> <p><b>Value:</b>  <i>num</i> [tbd]   UP   DOWN   MAXimum   MINimum</p> <p><math>P_{min} \text{ dBm} \leq num \leq P_{max} \text{ dBm}</math></p> <p><b>Default:</b>            0.0 dBm</p> <p><b>Remark:</b>            UP, DOWN, MAXimum, MINimum are not supported.</p>
	<p>POWer:MODE value</p> <p>Set / Query the rf power operation mode.</p> <p><b>Value:</b>            FIXed   SWEEp</p> <p><b>Default:</b>            CW</p>
	POWer:OFFSet value
	POWer:OFFSet:STATe value
	POWer:RANGe value
	POWer:SEARCh value
	POWer:SLOPe value
	POWer:SLOPe:STATe value
	POWer:SPAN value
	<p>POWer:STARt value</p> <p>Set / Query the rf start output level (in sweep mode).</p> <p><b>Value:</b>  <i>num</i> [tbd]   UP   DOWN   MAXimum   MINimum</p> <p><math>P_{min} \text{ dBm} \leq num \leq P_{max} \text{ dBm}</math></p> <p><b>Default:</b>            0.0 dBm</p> <p><b>Remark:</b>            UP, DOWN, MAXimum, MINimum are not supported.</p>
	<p>POWer:STATe value</p> <p>Set / Query the (activation) state of the rf output</p> <p><b>Value:</b>            ON   OFF   1   0</p> <p><b>Default:</b>            OFF</p>
	POWer:STEP:AUTO value

## HP8360 emulation mode














Status	Command / Function / Remark / Limitation
	<p>POWER:STEP[:INCRement] value</p> <p>Set / Query the rf output level step size.</p> <p><b>Value:</b>  <math>num</math> [DB]     MAXimum   MINimum</p> <p><math>0.0 \text{ dB} \leq num \leq P_{max}</math></p> <p><b>Default:</b>            10.0 dB</p> <p><b>Remark:</b>            MAXimum, MINimum are not supported.</p>
	<p>POWER:STOP value</p> <p>Set / Query the rf stop output level (in sweep mode).</p> <p><b>Value:</b>  <math>num</math> [td]   UP   DOWN   MAXimum   MINimum</p> <p><math>P_{min} \text{ dBm} \leq num \leq P_{max} \text{ dBm}</math></p> <p><b>Default:</b>            0.0 dBm</p> <p><b>Remark:</b>            UP, DOWN, MAXimum, MINimum are not supported.</p>

Table 81: Power subsystem

- **PULM Subsystem**

Status	Command / Function / Remark / Limitation
	PULM:EXTernal:DELay value
	PULM:EXTernal:POLarity value
	PULM:INTernal:FREQuency value
	PULM:INTernal:GATE value
	PULM:INTernal:PERiod value
	PULM:INTernal:TRIGger:SOURce value
	PULM:INTernal:WIDTh value
	PULM:SLEW value
	PULM:SLEW:AUTO value
	PULM:SOURce value
	<p>PULM:STATe value</p> <p>Set / Query the (activation) state of the pulse modulation.</p> <p><b>Value:</b>            ON   OFF   1   0</p> <p><b>Default:</b>            OFF</p>

## HP8360 emulation mode

Table 82: Pulm subsystem

- PULSe Subsystem**




Status	Command / Function / Remark / Limitation
	PULSe:FREQuency value
	PULSe:PERiod value
	PULSe:WIDTh value

Table 83: Pulse subsystem

- ROSCillator Subsystem**







Status	Command / Function / Remark / Limitation
	ROSCillator:SOURce value Set / Query the source of the reference oscillator <b>Value:</b> INTernal   EXTernal   NONE <b>Default:</b> -- <b>Remark:</b> EXTernal, NONE are not supported.
	ROSCillator:SOURce:AUTO value

Table 84: ROscillator subsystem

- STATus Subsystem**

Status	Command / Function / Remark / Limitation
	STATus:OPERation:CONDition? Query the condition bits of the operation status register.
	STATus:OPERation:ENABLE value Set / Query the enable bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:OPERation[:EVENT]? Query the event bits of the operation status register.
	STATus:OPERation:NTRansition value Set / Query the negative transition filter bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0

## HP8360 emulation mode



















Status	Command / Function / Remark / Limitation
	STATus:OPERation:PTRansition value Set / Query the positive transition filter bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 32757
	STATus:PRESet Preset the operation and questionable register contents.
	STATus: QUESTionalbe:CONDition? Query the condition bits of the questionable status register. <b>Value:</b> 0 ... 32757
	STATus: QUESTionalbe:ENABLe value Set / Query the enable bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:QUESTionalbe[:EVENT]? Query the event bits of the questionable status register. <b>Value:</b> 0 ... 32757
	STATus: QUESTionalbe:NTRansition value Set / Query the negative transition filter bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus: QUESTionalbe:PTRansition value Set / Query the positive transition filter bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 32757

Table 85: STATUS subsystem

- **SWEep Subsystem**

Status	Command / Function / Remark / Limitation
	SWEep:CONTRol:STATe value
	SWEep:CONTRol:TYPE value

## HP8360 emulation mode

Status	Command / Function / Remark / Limitation
	<p>SWEep:DWELI value</p> <p>Set / Query the fdwell time (in sweep mode).</p> <p><b>Value:</b></p> <p><i>num</i> [S   MS   US]   MAXimum   MINimum</p> <p><math>P_{min} \text{ dBm} \leq num \leq P_{max} \text{ dBm}</math></p> <p><b>Default:</b></p> <p>100.0 US</p> <p><b>Remark:</b></p> <p>MAXimum, MINimum are not supported.</p> <p>Only frequency sweep is supported.</p>
	SWEep:DWELI:AUTO value
	SWEep:GENeration value
	SWEep:MANual:POINT value
	SWEep:MANual[:RELative] value
	SWEep:MARKer:STATe value
	SWEep:MARKer:XFER
	<p>SWEep:MODE value</p> <p>Set / Query the sweep operation mode.</p> <p><b>Value:</b></p> <p>AUTO   MANual</p> <p><b>Default:</b></p> <p>AUTO</p>
	<p>SWEep:POINTs value</p> <p>Set / Query the number of points in a stepped sweep.</p> <p><b>Value:</b></p> <p><i>num</i>   MAXimum   MINimum</p> <p><math>1 \leq num \leq tbd</math></p> <p><b>Default:</b></p> <p>11</p> <p><b>Remark:</b></p> <p>MAXimum, MINimum are not supported.</p> <p>Only frequency sweep is supported.</p>

## HP8360 emulation mode















Status	Command / Function / Remark / Limitation
	<p>SWEep:STEP value</p> <p>Set / Query the size of each frequency step</p> <p><b>Value:</b>  <math>num</math> [HZ   KHZ   MHZ   GHZ]   MAXimum   MINimum</p> <p><math>0.0 \text{ Hz} \leq num \leq F_{max}</math></p> <p><b>Default:</b>  <math>(F_{max} - F_{min}) / 10</math></p> <p><b>Remark:</b>            MAXimum, MINimum are not supported.</p>
	SWEep:TIME value
	SWEep:TIME:AUTO value
	SWEep:TIME:LLIMit value
	SWEep:TRIGger:SOURce value

Table 86: Sweep subsystem

- **SYSTEM Subsystem**

Status	Command / Function / Remark / Limitation
	SYSTEM:ALTErnate value
	SYSTEM:ALTErnate:STATe value
	<p>SYSTEM:COMMunicate:GPIB:ADDRes value</p> <p>Set / Query the GPIB address of the instrument.</p> <p><b>Value:</b>            00 ... 30   MINimum   MAXimum</p> <p><b>Remark:</b>            MINimum, MAXimum are not supported.</p>
	SYSTEM:DUMP:PRINter?
	<p>SYSTEM:ERRor?</p> <p>Query and clear the oldest error number and error description</p> <p><b>Remark:</b>            Returns in error in the SM* naming convention</p>
	SYSTEM:KEY:ASSign value
	SYSTEM:KEY:CLEar value
	SYSTEM:KEY:DISable value
	SYSTEM:KEY:ENABle value

## HP8360 emulation mode










Status	Command / Function / Remark / Limitation
	SYSTem:LANGUage value Set / Query the programming language. <b>Value:</b> "SCPI"   "CIIL"   "COMPAtilbe" <b>Remark:</b> "SCPI" returns to the native SM* SCPI language "CIIL", "COMPAtible" are not supported
	SYSTem:MMHead:SElect value
	SYSTem:MMHead:SElect:AUTO value
	SYSTem:PRESet[:EXEC]
	SYSTem:PRESet::SAVE
	SYSTem:PRESet::TYPE value
	SYSTem:SECurity:COUNT value
	SYSTem:SECurity[:STATe] value
	SYSTem:VERSion? Query the SCPI version number that the instruments supports.

Table 87: System subsystem

- **TRIGger Subsystem**




Status	Command / Function / Remark / Limitation
	TRIGger[:IMMEDIATE]
	TRIGger:ODELay value
	TRIGger:SOURce value

Table 88: Trigger subsystem

- **TSweep Subsystem**


Status	Command / Function / Remark / Limitation
	TSweep

Table 89: TSweep subsystem

- **UNIT Subsystem**


Status	Command / Function / Remark / Limitation
	UNIT:AM value
	UNIT:POWer value

Table 90: Unit subsystem

### **Instrument initialization**

The (factory) default setting of the HP8360 is applied and activated when

- applying the DCL, SDC to the GPIB interface.
- transmitting the \*RST command

The (factory) default settings are listed under keyword "Default" in the corresponding command.

### **Status reporting**

Status reporting is not supported so far.



## 9 HP8373 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the SCPI-compatible language, implemented in Agilent's signal generators of type

- HP83711A / B
- HP83712A / B
- HP83730A
- HP83731A / B
- HP83732A

The emulation software is supported on signal generators of type

- SMF100

**The signal generator HP8373x also supports a HP8673 compatible Pre-SCPI-language. This emulation is not available so far.**

The emulation software simulates the HP8373 data model in the execution unit and transfers most of the HP8373 parameters into the SM\* database.

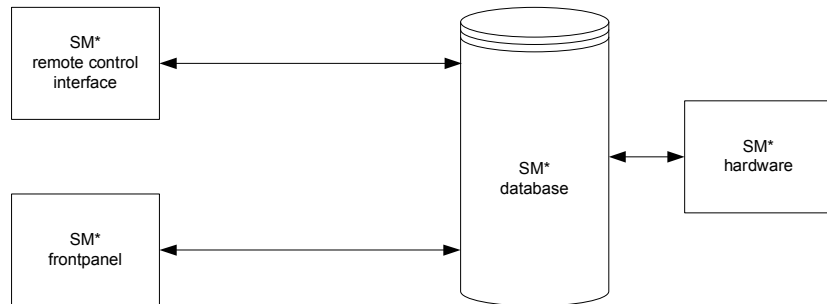


Figure 6: HP8373 emulation model

Those HP8373 functions and parameters, having no direct equivalent SM\* function and parameter, are not supported by this emulation so far.

















### GPIB functions

#### Commands

The following table shows the commands, supported by the HP8373.

## HP8373 emulation mode

- **Common**

Status	Command / Function / Remark / Limitation
	*CLS Clear the operation event register, the questionable event register and the standard status register.
	*DMC value, value
	*EMC value
	*ESE value Set / Query the bits of the extended status enable register. <b>Value:</b> 0 ... 255
	*ESR? Query the bits of the extended status register.
	*GMC? value
	*IDN? Query the ID string.
	*LMC?
	*LRN? Query the current state of the instrument.
	*OPC *OPC? Wait / Query for the complete execution of all programming commands.
	*OPT? Query the device options. <b>Value:</b> 1E1, 1E2, 1E5, :1E8, 1E9, 800 <b>Remark:</b> HP8373 options are not returned. SM* options returned.
	*PMC
	*RMC value
	*PSC value
	*RCL value Recall an instrument setup. <b>Value:</b> 0 ... 9
	*RST Reset the instrument to the default state. <b>Remark:</b> SM*'s default state is applied and activated.

## HP8373 emulation mode






Status	Command / Function / Remark / Limitation
	*SAV value Save an instrument setup. <b>Value:</b> 0 ... 9
	*SRE value Set / Query the bits of the service request enable register. <b>Value:</b> 0 ... 191
	*STB? Query the bits of the status byte.
	*TST? Performs a self test and returns result. Remark: 0 is return in any case, indicating no error.
	*WAI Wait until pending operations have taken place.

Table 91: Common commands

- **Automatic Level Control**





Status	Command / Function / Remark / Limitation
	[SOURce[1]:]POWer:ALC:PMETer[:LEVel][:AMPLitude] value
	[SOURce[1]:]POWer:ALC:PMETer[:LEVel]:STEP[:INCRement] value
	[SOURce[1]:]POWer:ALC:SOURce value Set / Query type of leveling for output power automatic leveling <b>Value:</b> INTernal   DIODE   PMETer <b>Default:</b> INTernal

Table 92: Automatic level control commands

- **Carrier**

Status	Command / Function / Remark / Limitation
	[SOURce[1]:]FREQuency[:CW   :FIXed] value Set / Query the rf carrier frequency. <b>Value:</b> Fmin ... FMax [HZ   KHZ   MHZ   MHZ   GHZ]   UP   DOWN   MINimum   MAXimum   DEFault <b>Default:</b> 3.0 GHZ <b>Remark:</b> UP, DOWN, MINimum, MAXimum, DEFault are not supported.

## HP8373 emulation mode




Status	Command / Function / Remark / Limitation
	[SOURce[1]:]FREQuency[:CW   :FIXed]:STEP[:INCRement] value Set / Query the rf carrier frequency step size. <b>Value:</b> Fmin ... FMax [HZ   KHZ   MHZ   MHz   GHZ]   MINimum   MAXimum   DEFault <b>Default:</b> - <b>Remark:</b> MINimum, MAXimum, DEFault are not supported.
	[SOURce[1]:]FREQuency:MULTiplier value <b>Value:</b> 1.0 ... 100.0   UP   DOWN   MINimum   MAXimum   DEFault <b>Default:</b> 1.0 <b>Remark:</b> UP, DOWN, MINimum, MAXimum, DEFault are not supported.
	[SOURce[1]:]FREQuency:MULTiplier:STEP[:INCRement] value

Table 93: Carrier commands

- **Instrument information**





Status	Command / Function / Remark / Limitation
	OUTPut:IMPedance? value
	[SOURce[1]:]ROSCillator:SOURce? Query the source of the synthesizer toimebase reference
	SYSTem:ERRor? Query and clear the oldest error number and error description <b>Remark:</b> Returns in error in the SM* naming convention
	SYSTem:VERSion? Query the SCPI version number that the instruments supports.

Table 94: Instrument information commands

- **Instrument state**



Status	Command / Function / Remark / Limitation
	MEMory:RAM:INITialize[:ALL]
	SYSTem:PRESet

Table 95: Instrument information commands

- **Level correction**

Status	Command / Function / Remark / Limitation
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## HP8373 emulation mode














Status	Command / Function / Remark / Limitation
	MEMory:CATalog[:ALL]?
	MEMory:CATalog:TABLE?
	MEMory:TABLE:FREQuency value
	MEMory:TABLE:FREQuency:POINts? value
	MEMory:TABLE:LOSS[:MAGNitude] value
	MEMory:TABLE:LOSS[:MAGNitude]:POINts? value
	MEMory:TABLE:SELEct value
	[SOURce[1]:]CORRection:CSET[:SELEct] value
	[SOURce[1]:]CORRection:CSET:STATe value
	[SOURce[1]:]CORRection:FLATness[:DATA] value
	[SOURce[1]:]CORRection:FLATness:POINts value
	[SOURce[1]:]CORRection:STATe value
	SYSTem:COMMunicate:PMETER:ADDRess value

Table 96: Level correction commands

- **Macro**


Status	Command / Function / Remark / Limitation
	MEMory:FREE:MACRo?

Table 97: Macro commands

- **Miscellaneous**













Status	Command / Function / Remark / Limitation
	DISPlas[:WINDow][:STATe] value
	SYSTem:KEY value

Table 98: Miscellaneous commands











- **Modulation**

Status	Command / Function / Remark / Limitation
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## HP8373 emulation mode

Status	Command / Function / Remark / Limitation
	<p>[SOURce[1]:]AM[:DEPTh] value</p> <p>Set / Query the modulation depth.</p> <p><b>Value:</b> 0.0 ... 100.0 [PCT   %]   UP   DOWN   MINimum   MAXimum   DEFault</p> <p><b>Default:</b> 6 PCT</p> <p><b>Remark:</b> % is not supported UP, DOWN, MINimum, MAXimum, DEFault are not supported.</p>
	[SOURce[1]:]AM[:DEPTh]:STEP[:INCRement] value
	<p>[SOURce[1]:]AM:INTernal:FREQuency value</p> <p>Set / Query the modulation rate.</p> <p><b>Value:</b> 0.5 Hz ... 100.0 KHz in [HZ   KHZ]   UP   DOWN   MINimum   MAXimum   DEFault</p> <p><b>Default:</b> 5.0 KHz</p> <p><b>Remark:</b> LF Generator 1 is used UP, DOWN, MINimum, MAXimum, DEFault are not supported.</p>
	[SOURce[1]:]AM:INTernal:FREQuency:STEP[:INCRement] value
	[SOURce[1]:]AM:INTernal:FUNCTion value
	[SOURce[1]:]AM:SENSitivity value
	<p>[SOURce[1]:]AM:SOURce value</p> <p>Select / Query the signal source of the modulation.</p> <p><b>Value:</b> INTernal   FEED   EXTernal</p> <p><b>Default:</b> EXTernal</p> <p><b>Remark:</b> INTernal, FEED, EXTernal are not supported LF1 corresponds to INTernal EXT1 corresponds to EXTernal</p>
	<p>[SOURce[1]:]AM:STATe value</p> <p>Set / Query the (activation) state of the modulation.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> OFF</p>
	[SOURce[1]:]AM:TYPE value
	[SOURce[1]:]FM:COUPling value

## HP8373 emulation mode

Status	Command / Function / Remark / Limitation
	<p>[SOURce[1]:]FM[:]DEVIation] value</p> <p>Set / Query the modulation deviation.</p> <p><b>Value:</b> 0.0 ... 10MHz in [HZ   KHZ   MHZ]   UP   DOWN   MINimum   MAXimum   DEFault</p> <p><b>Default:</b> 1.0 MHZ</p> <p><b>Remark:</b> UP, DOWN, MINimum, MAXimum, DEFault are not supported.</p>
	[SOURce[1]:]FM[:]DEVIation]:STEP[:]INCRement] value
	<p>[SOURce[1]:]FM:INTernal:FREQuency value</p> <p>Set / Query the modulation rate.</p> <p><b>Value:</b> 1.0 KHz ... 1.0 MHz in [HZ   KHZ]   UP   DOWN   MINimum   MAXimum   DEFault</p> <p><b>Default:</b> 100.0 KHz</p> <p><b>Remark:</b> LF Generator 1 is used UP, DOWN, MINimum, MAXimum, DEFault are not supported.</p>
	[SOURce[1]:]FM:INTernal:FREQuency:STEP[:]INCRement] value
	[SOURce[1]:]FM:INTernal:FUNCTion value
	[SOURce[1]:]FM:SENSitivity value
	<p>[SOURce[1]:]FM:SOURce value</p> <p>Select / Query the signal source of the modulation.</p> <p><b>Value:</b> INTernal   FEED   EXTernal</p> <p><b>Default:</b> EXTernal</p> <p><b>Remark:</b> INTernal, FEED, EXTernal are not supported LF1 corresponds to INTernal EXT1 corresponds to EXTernal</p>
	<p>[SOURce[1]:]FM:STATe value</p> <p>Set / Query the (activation) state of the modulation.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> OFF</p>
	[SOURce[1]:]MODulation:AOFF
	[SOURce[1]:]MODulation:OVDR

## HP8373 emulation mode

Status	Command / Function / Remark / Limitation
	[SOURce[1]:]PM:COUPling value
	[SOURce[1]:]PM[:DEVIation] value Set / Query the modulation deviation. <b>Value:</b> 0.0 ... 200.0 [RAD]   UP   DOWN   MINimum   MAXimum   DEFault <b>Default:</b> 3.0 RAD <b>Remark:</b> UP, DOWN, MINimum, MAXimum, DEFault are not supported.
	[SOURce[1]:]PM[:DEVIation]:STEP[:INCRement] value
	[SOURce[1]:]PM:INTernal:FREQuency value Set / Query the modulation rate. <b>Value:</b> 0.5 Hz ... 1.0 MHz in [HZ   KHZ]   UP   DOWN   MINimum   MAXimum   DEFault <b>Default:</b> 10.0 KHz <b>Remark:</b> LF Generator 1 is used UP, DOWN, MINimum, MAXimum, DEFault are not supported.
	[SOURce[1]:]PM:INTernal:FREQuency:STEP[:INCRement] value
	[SOURce[1]:]PM:INTernal:FUNCTion value
	[SOURce[1]:]PM:RANGe value
	[SOURce[1]:]PM:SENSitivity value
	[SOURce[1]:]PM:SOURce value Select / Query the signal source of the modulation. <b>Value:</b> INTernal   FEED   EXTernal <b>Default:</b> EXTernal <b>Remark:</b> INTernal, FEED, EXTernal are not supported LF1 corresponds to INTernal EXT1 corresponds to EXTernal
	[SOURce[1]:]PM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF



## HP8373 emulation mode



















Status	Command / Function / Remark / Limitation
	[SOURce[1]:]PULM:EXTernal:POLarity value
	[SOURce[1]:]PULM:SOURce value Select / Query the signal source of the modulation. <b>Value:</b> INTernal   EXTernal <b>Default:</b> EXTernal
	[SOURce[1]:]PULM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	[SOURce[1]:]PULSe:DELay value
	[SOURce[1]:]PULSe:DELay:STEP[:INCRement] value
	[SOURce[1]:]PULSe:DOUBle[:STATe] value
	[SOURce[1]:]PULSe:FREQUency value
	[SOURce[1]:]PULSe:FREQUency:STEP[:INCRement] value
	[SOURce[1]:]PULSe:PERiod value
	[SOURce[1]:]PULSe:PERiod:STEP[:INCRement] value
	[SOURce[1]:]PULSe:TRANSition[:LEADing] value
	[SOURce[1]:]PULSe:TRANSition:STATe value
	[SOURce[1]:]PULSe:TRANSition:TRAIling value
	[SOURce[1]:]PULSe:WIDTh value
	[SOURce[1]:]PULSe:WIDTh:STEP[:INCRement] value
	TRIGger[:SEQUence[1]:] START[:SOURce] value
	TRIGger:SEQUence2:SLOPe value
	TRIGger:SEQUence2:STOP[:SOURce] value

Table 99: Modulation commands

- **Power Level**

Status	Command / Function / Remark / Limitation
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## HP8373 emulation mode



Status	Command / Function / Remark / Limitation
	<p>[SOURce[1]:]POWer[:LEVel][:IMMEDIATE][:AMPLitude] value</p> <p>Set / Query the output power level.</p> <p><b>Value:</b> Pmin ... Pmax in []   UP   DOWN   MINimum   MAXimum   DEFault</p> <p><b>Default:</b> -110.0 DBM</p> <p><b>Remark:</b> UP, DOWN, MINimum, MAXimum, DEFault are not supported.</p>
	<p>[SOURce[1]:]POWer[:LEVel][:IMMEDIATE][:AMPLitude]:STEP[:INCREMENT] value</p> <p>Set / Query the output power level step size.</p> <p><b>Value:</b> 0.01 ... 150.0 [DB]     MINimum   MAXimum   DEFault</p> <p><b>Default:</b> 1.0 DB</p> <p><b>Remark:</b> MINimum, MAXimum, DEFault are not supported.</p>

Table 100: Power level commands

- **Programmable Interface**






Status	Command / Function / Remark / Limitation
	<p>SYSTem:COMMunicate:GPIB:ADDRESS value</p> <p>Set / Query the GPIB address of the instrument.</p> <p><b>Value:</b> 00 ... 30   MINimum   MAXimum</p> <p><b>Remark:</b> MINimum, MAXimum are not supported.</p>
	<p>SYSTem:LANGuage value</p> <p>Set / Query the programming language.</p> <p><b>Value:</b> "SCPI"   "COMP=8673"   "COMPATIBILITY=8673"</p> <p><b>Remark:</b> "SCPI" returns to the native SM* SCPI language "COMP=8673", "COMPATIBILITY=8673" are not supported</p>
	UNIT:FREQuency value
	UNIT{:POWer[:VOLTAGE]} value
	UNIT:TIME value

Table 101: Programmable Interface commands

- **RF output control**

Status	Command / Function / Remark / Limitation
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## HP8373 emulation mode










Status	Command / Function / Remark / Limitation
	OUTPut:PROTection[:STATe] value
	OUTPut[:STATe] value Set / Query the (activation) state of the rf output. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> ON
	[SOURce[1]:]POWer:ATTenuation:AUTO value
	[SOURce[1]:]POWer:PROTection:STATe value

Table 102: RF output control commands

- **Status register control**

Status	Command / Function / Remark / Limitation
	STATus:OPERation:CONDition? Query the condition bits of the operation status register. <b>Value:</b> 0 ... 32757
	STATus:OPERation:ENABle value Set / Query the enable bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:OPERation[:EVENT]? Query the event bits of the operation status register. <b>Value:</b> 0 ... 32757
	STATus:OPERation:NTRansition value Set / Query the negative transition filter bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:OPERation:PTRansition value Set / Query the positive transition filter bits of the operation status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 32757

## HP8373 emulation mode


Status	Command / Function / Remark / Limitation
	STATus:PRESet Preset the operation and questionable register contents.
	STATus:QUEStionable:CONDition? Query the condition bits of the questionable status register. <b>Value:</b> 0 ... 32757
	STATus:QUEStionable:ENABle value Set / Query the enable bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:QUEStionable[:EVENT]? Query the event bits of the questionable status register. <b>Value:</b> 0 ... 32757
	STATus:QUEStionable:NTRansition value Set / Query the negative transition filter bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 0
	STATus:QUEStionable:PTRansition value Set / Query the positive transition filter bits of the questionable status register. <b>Value:</b> 0 ... 32757 <b>Default:</b> 32757

Table 103: Status register commands

### Instrument initialization

The (factory) default setting of the HP8373 is applied and activated when

- applying the DCL, SDC to the GPIB interface.
- transmitting the \*RST command

The (factory) default settings are listed under keyword "Default" in the corresponding command.

## ***HP8373 emulation mode***

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### **Status reporting**

Status reporting is not supported so far.

## 10 HP8643 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the SCPI-compatible language, implemented in Agilent's signal generators of type

- HP8643A
- HP8644A / B
- HP8645A

The emulation software is supported on signal generators of type

- SMA100
- SMB100

**The signal generator HP8643 / HP8644 / HP8645 also supports a HP8642 compatible Pre-SCPI-language. For more information on that language, please refer to the *HP8642 emulation*.**

The emulation software simulates the HP8643 data model in the execution unit and transfers most of the HP8643 parameters into the SM\* database.

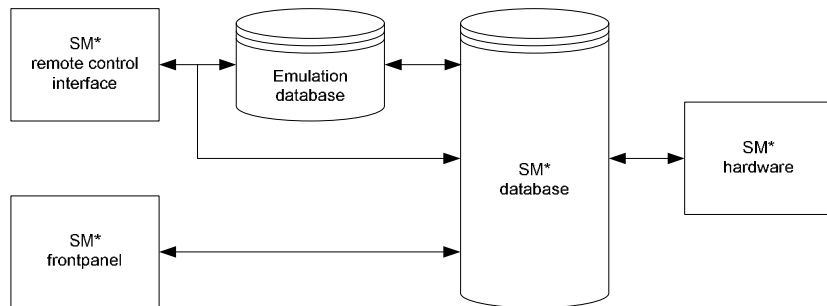


Figure 7: HP8643 emulation model

This mapping occurs only in one direction: Setting commands that arrive via the remote-control interface modify the HP8643 parameters. These parameters are converted into SM\* parameters and written to the database.

Modifying the SM\* parameters in any other manner, e.g., via manual operation at the frontpanel, causes no changes to the HP8643 parameters of the emulation software.

## HP8643 emulation mode

While this is insignificant in pure remote-control operation, it can lead to inconsistencies and undesirable effects or malfunctions when you use both manual and remote control in this language emulation mode.

### GPIB functions

The following table shows the GPIB functions, supported by the HP8643.


















Status	Function	Function / Remark / Limitation
	DCL	Device clear.
	GTL	Goto local mode.
	IFC	Interface clear.
	LLO	Local lockout.
	PPC	Parallel-Poll configure.
	PPU	Parallel-Poll unconfigure.
	REN	Goto remote mode.
	SDC	Selective device clear.
	SPD	Serial-Poll disable.
	SPE	Serial Poll enable.
	SRQ	Request service.

Table 104: GPIB functions

### Commands

The following table shows the commands, supported by the HP8643.

- **Common**

Status	Command / Function / Remark / Limitation
	*CAL? Query the instruments calibration state.
	*CLS Clear the status register.
	*ESE value Set / Query the bits of the extended status enable register.
	*ESR? Query the bits of the extended status register.
	*IDN? Query the ID string.
	*OPC *OPC? Wait / Query for completion of command.

## HP8643 emulation mode











Status	Command / Function / Remark / Limitation
	*OPT? Query the installed options.
	*RCL value Recall an instrument setup. <b>Value:</b> 0 ... 9
	*RST Reset the instrument to a default state.
	*SAV value Save an instrument setup. <b>Value:</b> 0 ... 9
	*SRE value Set / Query the bits of the status enable register.
	*STB? Query the bits of the status register.
	*TST? Execute the instruments self test
	*WAI Wait until al commands are completed.

Table 105: Common commands

- **AM Subsystem**

Status	Command / Function / Remark / Limitation
	[SOURce:]AM[:DEPTH] value Set / Query the rf carrier modulation depth. <b>Value:</b> value [PCT   %]   UP   DOWN   MINimum   MAXimum <b>Default:</b> 0.0 PCT <b>Remark:</b> % is not supported.
	[SOURce:]AM[:DEPTH]:STEP[:INCRement] value Set / Query the rf carrier modulation depth step size. <b>Value:</b> value [PCT   %]   MINimum   MAXimum <b>Default:</b> 1.0 PCT <b>Remark:</b> % is not supported.



## HP8643 emulation mode


















Status	Command / Function / Remark / Limitation
	[SOURce:]AM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	[SOURce:]AM:SOURce value Set / Query the source of the modulation signal. <b>Value:</b> INTernal, EXTernal   EXTernal, INTernal <b>Default:</b> INTernal
	[SOURce:]AM: COUPling value Set / Query the coupling type, when modulation signal source is set to external. <b>Value:</b> AC   DC   GROund <b>Default:</b> DC <b>Remark:</b> GROund is not supported
	[SOURce:]AM:FREQuency value Alias to LFSOURCE:FREQuency value.
	[SOURce:]AM:FREQuency:STEP[:INCRement] value Alias to LFSOURCE:FREQuency:STEP[:INCRement] value.

Table 106: AM subsystem commands










- **AMPLitude Subsystem**

Status	Command / Function / Remark / Limitation
	{AMPLitude   POWER}[:OUT][:LEVEl] value Set / Query the rf carrier's power level. <b>Value:</b> Value [DBM   DBMW   DBUV  V   MV   UV]   UP   DOWN   MINimum   MAXimum <b>Default:</b> -140 DBM
	{AMPLitude   POWER}[:OUT][:LEVEl]:STEP[:INCRement] value Set / Query the rf carrier's power level step size. <b>Value:</b> Value [DB   V   MV   UV]   MINimum   MAXimum <b>Default:</b> 10.0 DB

## HP8643 emulation mode

Status	Command / Function / Remark / Limitation
	{AMPLitude   POWER}{:OUT}{:LEVel}:STEP:UNIT value Set / Query the rf carrier's power level step unit. <b>Value:</b> DB   V <b>Default:</b> DB
	{AMPLitude   POWER}{:OUT}:ALC:BA NDwidth:AUTO value
	{AMPLitude   POWER}{:OUT}:ATTenuation value Set / Query the output attenuator. <b>Value:</b> value DB <b>Default:</b> 0.0 DB / AUTO ON
	{AMPLitude   POWER}{:OUT}:ATTenuation:AUTO value Set / Query the (activation) state of the automatic output. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> ON
	{AMPLitude   POWER}{:OUT}:ATTenuation:STEP[:INCRement]?
	{AMPLitude   POWER}{:OUT}:GAIN value Set / Query the rf carrier's gain (offset). <b>Value:</b> value [DB]   MINimum   MAXimum <b>Default:</b> 0.0 DB
	{AMPLitude   POWER}{:OUT}:MUTing value
	{AMPLitude   POWER}{:OUT}:STATe value Set / Query the (activation) state of automatic attenuation mode. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	{AMPLitude   POWER}{:OUT}:ULIMit value
	{AMPLitude   POWER}{:OUT}:UNIT value Set / Query the rf carrier's power level unit. <b>Value:</b> DBM   DBMW   DBUV   V <b>Default:</b> DBM

## HP8643 emulation mode

Status	Command / Function / Remark / Limitation
	<p>{AMPLitude   POWER}:SOURce[:LEVel] value</p> <p>Set / Query the rf carrier's power level in EMF.</p> <p><b>Value:</b> Value [DBM   DBMW   DBUV  V   MV   UV]   UP   DOWN   MINimum   MAXimum</p> <p><b>Default:</b> -140 DBM</p>
	<p>{AMPLitude   POWER}:SOURce[:LEVel]:STEP[:INCRement] value</p> <p>Set / Query the rf carrier's power level step size in EMF.</p> <p><b>Value:</b> Value [DB   V   MV   UV]   MINimum   MAXimum</p> <p><b>Default:</b> 10.0 DB</p>
	<p>{AMPLitude   POWER}:SOURce[:LEVel]:STEP:UNIT value</p> <p>Set / Query the rf carrier's power level step unit.</p> <p><b>Value:</b> DB   V</p> <p><b>Default:</b> DB</p>
	<p>{AMPLitude   POWER}:SOURce:ALC:BANDwidth:AUTO value</p>
	<p>{AMPLitude   POWER}:SOURce:ATTenuation value</p> <p>Set / Query the output attenuator.</p> <p><b>Value:</b> value DB</p> <p><b>Default:</b> 0.0 DB / AUTO ON</p>
	<p>{AMPLitude   POWER}:SOURce:ATTenuation:AUTO value</p> <p>Set / Query the (activation) state of automatic attenuation mode.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> OFF</p>
	<p>{AMPLitude   POWER}:SOURce:ATTenuation:STEP[:INCRement]?</p>
	<p>{AMPLitude   POWER}:SOURce:GAIN value</p> <p>Set / Query the rf carrier's gain (offset).</p> <p><b>Value:</b> value [DB]   MINimum   MAXimum</p> <p><b>Default:</b> 0.0 DB</p>
	<p>{AMPLitude   POWER}:SOURce:MUTing value</p>

## HP8643 emulation mode




Status	Command / Function / Remark / Limitation
	{AMPLitude   POWER}:SOURce:STATe value Set / Query the (activation) state of the rf output. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	{AMPLitude   POWER}:SOURce:ULIMit value
	{AMPLitude   POWER}:SOURce:UNIT value Set / Query the rf carrier's power level unit. <b>Value:</b> DBM   DBMW   DBUV   V <b>Default:</b> DBM

Table 107: AMPLitude subsystem commands

- CALibration Subsystem**



Status	Command / Function / Remark / Limitation
	CALibration:ALL?
	CALibration:AMPLitude:STATe value

Table 108: CALibration subsystem commands

- DISPlay Subsystem**

















Status	Command / Function / Remark / Limitation
	DISPlay:STATe value Set / Query the activation state of the front panel <b>Value:</b> ON   OFF   1   0 <b>Default:</b> ON <b>Remark:</b> OFF enables the screen saver, ON disables the screen saver.
	DISPlay:ANNotation[:ALL] value
	DISPlay:ANNotation:AMPLitude value
	DISPlay:ANNotation:FREQUency value
	DISPlay:ANNotation:LFSOURCE value
	DISPlay:ANNotation:MODulation value
	DISPlay:RADix value

Table 109: DISPlay subsystem commands

## HP8643 emulation mode

- FM Subsystem

Status	Command / Function / Remark / Limitation
	[SOURce:]FM[:DEViation] value Set / Query the rf carrier modulation deviation. <b>Value:</b> value [HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum <b>Default:</b> 1 KHZ
	[SOURce:]FM[:DEViation]:STEP[:INCRement] value Set / Query the rf carrier modulation deviation step size. <b>Value:</b> value [HZ   KHZ   MHZ   MAHZ   GHZ]   MINimum   MAXimum <b>Default:</b> 1 KHZ
	[SOURce:]FM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	[SOURce:]FM:SOURce value Set / Query the source of the modulation signal. <b>Value:</b> INTernal, EXTernal   EXTernal, INTernal <b>Default:</b> INTernal
	[SOURce:]FM:COUPling value Select / Query the coupling type, when modulation signal source is set to external. <b>Value:</b> AC   DC   GROund <b>Default:</b> DC <b>Remark:</b> GROund is not supported.
	[SOURce:]FM:MODE value
	[SOURce:]FM:FREQuency value Alias to LFSOURCE:FREQuency value.
	[SOURce:]FM:FREQuency:STEP[:INCRement] value Alias to LFSOURCE:FREQuency:STEP[:INCRement] value.
	[SOURce:]FM:DELay value

## HP8643 emulation mode










Status	Command / Function / Remark / Limitation
	[SOURce:]FM:IMPedance?

Table 110: FM subsystem commands

- FREQUENCY Subsystem**

Status	Command / Function / Remark / Limitation
	[:SOURce:]FREQUENCY[:CW] value Set / Query the rf carrier frequency. <b>Value:</b> value HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum <b>Default:</b> 1500.0 MHZ
	[SOURce:]FREQUENCY[:CW]:STEP[:INCRement] value Set / Query the rf carrier frequency step size. <b>Value:</b> Value [HZ   KHZ   MHZ   MAHZ   GHZ]   MINimum   MAXimum <b>Default:</b> 10.0 MHZ
	[:SOURce:]FREQUENCY:START value Set / Query the rf carrier sweep start frequency. <b>Value:</b> value HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum <b>Default:</b> freqmin
	[SOURce:]FREQUENCY:START:STEP[:INCRement] value Alias to FREQUENCY[:CW]:STEP[:INCRement] value
	[:SOURce:]FREQUENCY:STOP value Set / Query the rf carrier sweep stop frequency. <b>Value:</b> value HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum <b>Default:</b> freqmax
	[SOURce:]FREQUENCY:STOP:STEP[:INCRement] value Alias to FREQUENCY[:CW]:STEP[:INCRement] value
	[:SOURce:]FREQUENCY:CENTER value Set / Query the rf carrier sweep center frequency. <b>Value:</b> value HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum <b>Default:</b> 0.5 * (freqmin + freqmax)
	[SOURce:]FREQUENCY:CENTER:STEP[:INCRement] value Alias to FREQUENCY[:CW]:STEP[:INCRement] value

## HP8643 emulation mode

Status	Command / Function / Remark / Limitation
★	[:SOURce:]FREQUency:SPAN value Set / Query the rf carrier sweep frequency span. <b>Value:</b> value HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum <b>Default:</b> freqmax - freqmin
★	[SOURce:]FREQUency:SPAN:STEP[:INCRement] value Alias to FREQUency[:CW]:STEP[:INCRement] value
★	[:SOURce:]FREQUency:MANual value Set / Query the actual rf carrier frequency in stepped sweep. <b>Value:</b> value [HZ   KHZ   MHZ   MAHZ   GHZ]   MINimum   MAXimum <b>Default:</b> freqmin
★	[:SOURce:]FREQUency:OFFSet value Set / Query the rf carrier frequency offset. <b>Value:</b> value [HZ   KHZ   MHZ   MAHZ   GHZ]   MINimum   MAXimum <b>Default:</b> 0.0 HZ
✘	[:SOURce:]FREQUency:MULTiplier value
✘	[:SOURce:]FREQUency:SYNThesis value
✘	[:SOURce:]FREQUency:SYNThesis:AUTO value
★	[:SOURce:]FREQUency:MODE value Set / Query the rf carrier frequency operation mode. <b>Value:</b> CW   SWEep <b>Default:</b> CW
✘	[:SOURce:]FREQUency:INSTantaneous?

Table 111: FREQUency subsystem commands

- **INITialize Subsystem**

Status	Command / Function / Remark / Limitation
★	INITialize[:IMMediate] Starts a single or continuous sweep.
★	INITialize:ABORt Terminates a sweep.

## HP8643 emulation mode


















Status	Command / Function / Remark / Limitation
	INITialize:MODE value Set / Query the sweep mode. <b>Value:</b> CONTinuous   SINGle <b>Default:</b> CONTinuous
	INITialize:STATe




















Table 112: INITIALize subsystem commands

- **LFSource Subsystem**

Status	Command / Function / Remark / Limitation
	LFSource[:FREQuency] value Set / Query the lf generator frequency. <b>Value:</b> value [HZ   KHZ   MHZ   MAHZ   GHZ]   MINimum   MAXimum <b>Default:</b> 1.0 KHZ
	LFSource[:FREQuency]:STEP[:INCRement] value Set / Query the lf generator frequency step size. <b>Value:</b> value [HZ   KHZ   MHZ   MAHZ   GHZ]   MINimum   MAXimum <b>Default:</b> 100.0 HZ
	LFSource:AM[:DEPT]h] value
	LFSource:AM[:DEPT]h]:STEP[:INCRement] value
	LFSource:AM:FREQuency value
	LFSource:AM:FREQuency:STEP[:INCRement] value
	LFSource:AM:PHASe[:ADJust] value
	LFSource:AM:PHASe[:ADJust]:STEP[:INCRement] value
	LFSource:AM:STATe value
	LFSource:AM:WAVEform value
	LFSource:FM[:DEViation] value
	LFSource:FM[:DEViation]:STEP[:INCRement] value
	LFSource:FM:FREQuency value
	LFSource:FM:FREQuency:STEP[:INCRement] value
	LFSource:FM:PHASe[:ADJust] value



## HP8643 emulation mode

Status	Command / Function / Remark / Limitation
	LFSOURCE:FM:PHASe[:ADJust]:STEP[:INCRement] value
	LFSOURCE:FM:STATe value
	LFSOURCE:FM:WAVEform value
	LFSOURCE:LEVEl value Set / Query the If generator level. <b>Value:</b> value [V   MV   UV]   MINimum   MAXimum <b>Default:</b> 1.0 V
	LFSOURCE:LEVEl:STEP[:INCRement] value Set / Query the If generator level step size. <b>Value:</b> value [V   MV   UV]   MINimum   MAXimum <b>Default:</b> 0.1V
	LFSOURCE:PM[:DEVIation] value
	LFSOURCE:PM[:DEVIation]:STEP[:INCRement] value
	LFSOURCE:PM:FREQUency value
	LFSOURCE:PM:FREQUency:STEP[:INCRement] value
	LFSOURCE:PM:PHASe[:ADJust] value
	LFSOURCE:PM:PHASe[:ADJust]:STEP[:INCRement] value
	LFSOURCE:PM:STATe value
	LFSOURCE:PM:WAVEform value
	LFSOURCE:PULSe:FREQUency value
	LFSOURCE:PULSe:FREQUency:STEP[:INCRement] value
	LFSOURCE:PULSe:PHASe[:ADJust] value
	LFSOURCE:PULSe:PHASe[:ADJust]:STEP[:INCRement] value
	LFSOURCE:PULSe:STATe value
	LFSOURCE:STATe value Set / Query the (activation) state of the If generator. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

## HP8643 emulation mode




Status	Command / Function / Remark / Limitation
	<p>LFSOURCE:WAVEform value</p> <p>Set / Query to lf generator waveform.</p> <p><b>Value:</b></p> <p>SAWtooth   SINE   SQUARE   WGNoise   TRIangle</p> <p><b>Default:</b></p> <p>SINE</p> <p><b>Remark:</b></p> <p>SAWtooth, WGNoise is not supported.</p>
	LFSOURCE:TRIGGER[:IMMEDIATE]
	LFSOURCE:TRIGGER:SOURCE value

Table 113: LFSOURCE subsystem commands

- **MARKER Subsystem**





Status	Command / Function / Remark / Limitation
	<p>MARKER[1   2][:FREQUENCY] value</p> <p>Set / Query the marker frequency.</p> <p><b>Value:</b></p> <p>value [HZ   KHZ   MHZ   MAHZ   GHZ]   UP   DOWN   MINimum   MAXimum</p> <p><b>Default:</b></p> <p>freqmin</p> <p><b>Remark:</b></p> <p>Marker signals at auxiliary i/o ports are not supported so far.</p>
	<p>MARKER[1   2][:FREQUENCY]:STEP[:INCREMENT] value</p> <p>Alias to FREQUENCY[:CW]:STEP[:INCREMENT] value</p> <p><b>Remark:</b></p> <p>Marker signals at auxiliary i/o ports are not supported so far.</p>
	<p>MARKER[1   2]:STATE value</p> <p>Set / Query the marker (activation) state.</p> <p><b>Value:</b></p> <p>ON   OFF   1   0</p> <p><b>Default:</b></p> <p>OFF</p> <p><b>Remark:</b></p> <p>Marker signals at auxiliary i/o ports are not supported so far.</p>
	<p>MARKER[1   2]:AOFF</p> <p>Set all markers off.</p> <p><b>Remark:</b></p> <p>Marker signals at auxiliary i/o ports are not supported so far.</p>

Table 114: MARKER subsystem commands

## HP8643 emulation mode

- **MODulation Subsystem**


Status	Command / Function / Remark / Limitation
	MODulation[:STATe] value Set / Query the general (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

Table 115: MODulation subsystem commands

- **PHASe Subsystem**






Status	Command / Function / Remark / Limitation
	PHASe[:ADJust] value Set / Query the rf carrier's phase (relative to reference). <b>Value:</b> Value [DEG   RAD]   UP   DOWN   MINimum   MAXimum <b>Default:</b> 0.0 DEG
	PHASe[:ADJust]:STEP[:INCRement] value Set / Query the rf carrier's phase step size. <b>Value:</b> Value [DEG   RAD]   MINimum   MAXimum <b>Default:</b> 1.0 DEG
	PHASe:REFerence Resets the phase value to 0.0 DEG without changing the phase of rf carrier.

Table 116: PHASe subsystem commands

- **PM Subsystem**

Status	Command / Function / Remark / Limitation
	[SOURce:]PM[:DEViation] value Set / Query the rf carrier modulation deviation. <b>Value:</b> value [DEG   RAD] MINimum   MAXimum <b>Default:</b> 0.0 RAD
	[SOURce:]PM[:DEViation]:STEP[:INCRement] value Set / Query the rf carrier modulation deviation step size. <b>Value:</b> value [DEG   RAD]   MINimum   MAXimum <b>Default:</b> 0.0 RAD

## HP8643 emulation mode






Status	Command / Function / Remark / Limitation
	[SOURce:]PM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	[SOURce:]PM:SOURce value Set / Query the source of the modulation signal. <b>Value:</b> INTernal, EXTernal   EXTernal, INTernal <b>Default:</b> INTernal
	[SOURce:]PM:COUPling value Select / Query the coupling type, when modulation signal source is set to external. <b>Value:</b> AC   DC   GROund <b>Default:</b> DC <b>Remark:</b> GROund is not supported
	[SOURce:]PM:FREQuency value Alias to LFSOURCE:FREQuency value.
	[SOURce:]PM:FREQuency:STEP[:INCRement] value Alias to LFSOURCE:FREQuency:STEP[:INCRement] value.

Table 117: PM subsystem commands

- **PMETer Subsystem**












Status	Command / Function / Remark / Limitation
	PMETer[:POWer]?

Table 118: PMETer subsystem commands

- **PULSe Subsystem**

Status	Command / Function / Remark / Limitation
	PULSe[:STATe] value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

## HP8643 emulation mode

Status	Command / Function / Remark / Limitation
	PULSe:CONDitioning value
	<p>PULSe:DELAy value Set / Query the pulse delay.</p> <p><b>Value:</b> value [S   MS   US   NS]   UP   DOWN   MINimum   MAXimum</p> <p><b>Default:</b> 1.0 US</p>
	<p>PULSe:DELAy:STEP[:INCRement] value Set / Query the pulse delay step size.</p> <p><b>Value:</b> value [S   MS   US   NS]   MINimum   MAXimum</p> <p><b>Default:</b> 1.0 US</p>
	<p>PULSe:FREQuency value Alias to LFSOURCE:FREQuency value.</p>
	<p>PULSe:FREQuency:STEP[:INCRement] value Alias to LFSOURCE:FREQuency:STEP[:INCRement] value.</p>
	PULSe:IMPedance value
	<p>PULSe:SLOPe value Set / Query the trigger edge.</p> <p><b>Value:</b> POSitive   NEGative   BOTH</p> <p><b>Default:</b> POSitive</p> <p>Remark: BOTH is not supported.</p>
	<p>PULSe:SOURce value Set / Query the source of the modulation signal.</p> <p><b>Value:</b> INTernal, EXTernal   EXTernal, INTernal</p> <p><b>Default:</b> INTernal</p>
	<p>PULSe:WIDTh value Set / Query the pulse width.</p> <p><b>Value:</b> value [S   MS   US   NS]   UP   DOWN   MINimum   MAXimum</p> <p><b>Default:</b> 1.0 US</p>

## HP8643 emulation mode


Status	Command / Function / Remark / Limitation
	PULSe:WIDTh:STEP[:INCRement] value Set / Query the pulse width step size. <b>Value:</b> value [S   MS   US   NS]   MINimum   MAXimum <b>Default:</b> 1.0 US

Table 119: PULSe subsystem commands

- **ROSCillator Subsystem**





Status	Command / Function / Remark / Limitation
	ROSCillator:CALibration value
	ROSCillator:CALibration:STEP[:INCRement] value
	ROSCillator:SOURce?
	ROSCillator:SOURce:AUTO value

Table 120: ROSCillator subsystem commands

- **SEQuence Subsystem**












































Status	Command / Function / Remark / Limitation
	SEQuence[:IMMEDIATE]
	SEQuence:REGister value, ..., value
	SEQuence:STATe value

Table 121: SEQuence subsystem commands

- **STATus Subsystem**

Status	Command / Function / Remark / Limitation
	STATus[:DEVice][:EVENT]?
	STATus[:DEVice]:CONDition?
	STATus[:DEVice]:ENABle value
	STATus[:DEVice]:NTRansition?
	STATus[:DEVice]:PTRansition?
	STATus:DQUestionalbe[:EVENT]?
	STATus:DQUestionalbe:CONDition?
	STATus:DQUestionalbe:ENABle value
	STATus:DQUestionalbe:NTRansition?

## HP8643 emulation mode

Status	Command / Function / Remark / Limitation
	STATus:DQUestionalbe:PTRansition?
	STATus:DQUestionalbe:SINtegrity[EVENT]?
	STATus:DQUestionalbe:SINtegrity:CONDition?
	STATus:DQUestionalbe:SINtegrity:ENABle value
	STATus:DQUestionalbe:SINtegrity:NTRansition?
	STATus:DQUestionalbe:SINtegrity:PTRansition?
	STATus:DQUestionalbe:SINtegrity:AMPLitude[:EVENT]?
	STATus:DQUestionalbe:SINtegrity:AMPLitude:CONDition?
	STATus:DQUestionalbe:SINtegrity:AMPLitude:ENABle value
	STATus:DQUestionalbe:SINtegrity:AMPLitude:NTRansition?
	STATus:DQUestionalbe:SINtegrity:AMPLitude:PTRansition?
	STATus:DQUestionalbe:SINtegrity:FREQuency[:EVENT]?
	STATus:DQUestionalbe:SINtegrity:FREQuency:CONDition?
	STATus:DQUestionalbe:SINtegrity:FREQuency:ENABle value
	STATus:DQUestionalbe:SINtegrity:FREQuency:NTRansition?
	STATus:DQUestionalbe:SINtegrity:FREQuency:PTRansition?
	STATus:DQUestionalbe:SINtegrity:HARDware[:EVENT]?
	STATus:DQUestionalbe:SINtegrity:HARDware:CONDition?
	STATus:DQUestionalbe:SINtegrity:HARDware:ENABle value
	STATus:DQUestionalbe:SINtegrity:HARDware:NTRansition?
	STATus:DQUestionalbe:SINtegrity:HARDware:PTRansition?
	STATus:DQUestionalbe:SINtegrity:MODulation[:EVENT]?
	STATus:DQUestionalbe:SINtegrity:MODulation:CONDition?
	STATus:DQUestionalbe:SINtegrity:MODulation:ENABle value
	STATus:DQUestionalbe:SINtegrity:MODulation:NTRansition?
	STATus:DQUestionalbe:SINtegrity:MODulation:PTRansition?
	STATus:DQUestionalbe:SINtegrity:REFerence[:EVENT]?
	STATus:DQUestionalbe:SINtegrity:REFerence:CONDition?
	STATus:DQUestionalbe:SINtegrity:REFerence:ENABle value
	STATus:DQUestionalbe:SINtegrity:REFerence:NTRansition?
	STATus:DQUestionalbe:SINtegrity:REFerence:PTRansition?

## HP8643 emulation mode

Table 122: STATUS subsystem commands

- SWEep Subsystem**





Status	Command / Function / Remark / Limitation
	SWEep[:FREQuency]:GENeration value
	SWEep[:FREQuency]:MODE value Set / Query sweep mode. <b>Value:</b> AUTO   MANual <b>Default:</b> AUTO
	SWEep[:FREQuency]:SPACing value Set / Query sweep spacing. <b>Value:</b> LINear   LOGarithmic <b>Default:</b> LINear
	SWEep[:FREQuency]:TIME value Set / Query the (total) sweep time. <b>Value:</b> value [S   MS   US   NS]   UP   DOWN   MINimum   MAXimum <b>Default:</b> 1.0 S <b>Remark:</b> Only 1-2-5-10 items are valid. sweep time is divided into dwell time and count.
	SWEep[:FREQuency]:TIME:MODE? Query the sweep time mode informations.
	SWEep[:FREQuency]:TIME:STEP[:INCRement]? Query the sweep time step informations.

Table 123: SWEep subsystem commands

- SYSTEM Subsystem**




Status	Command / Function / Remark / Limitation
	SYSTEM:ERRor? Query and clear the oldest error.
	SYSTEM:STATe:CALL
	SYSTEM:SECurity value

Table 124: SYSTEM subsystem commands



## HP8643 emulation mode

- **TSweep Subsystem**


Status	Command / Function / Remark / Limitation
	TSweep Start a continuous or single sweep.

Table 125: TSweep subsystem commands

- **VMETer Subsystem**



Status	Command / Function / Remark / Limitation
	VMETer[:VOLTage]?
	VMETer:MODE value

Table 126: VMETer subsystem commands

### Instrument initialisation

The (factory) default setting of the HP8643 is applied and activated when

- applying the DCL, SDC to the GPIB interface.
- transmitting the \*RST command
- transmitting the first command after activating this emulation mode.

During initialisation, the emulated instrument (HP8643, HP8644, HP8645) applies and activates the setting, which was active just before power down.

The SM\* however applies and activates the (factory) default setting of the HP8643 / HP8644 / HP8645.

This different behaviour has to be taken in consideration.

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
AM	DEPTH = 0.0 PCT DEPTH STEP = 1.0 PCT STATE = OFF SOURCE = INTERNAL COUPLING = DC INTERNAL
AMPLITUDE	LEVEL = -140.DBM STEP = 10.0 DB

## HP8643 emulation mode

	STEP UNIT = DB STATE = OFF UNIT = DBM ATTENUATION AUTO = ON GAIN = 0.0 DB
CALIBRATION	-
DISPLAY	STATE = ON
FM	DEVIATION = 1.0 KHZ DEVIATION STEP = 1.0 KHZ STATE = OFF SOURCE = INTERNAL COUPLING = DC INTERNAL
FREQUENCY	CW = 1500.0 MHZ CW STEP = 10.0 MHZ START = freqmin STOP = freqmax CENTER = 0.5 * (freqmin + freqmax) SPAN = (freqmax - freqmin) MANUAL = freqmin OFFSET = 0.0 HZ MODE = CW
INITIALIZE	MODE = CONTINUOUS
LFSOURCE	FREQUENCY = 1.0 KHZ FREQUENCY STEP = 100.0 HZ STATE = OFF WAVEFORM = SINE LEVEL = 1.0 V LEVEL STEP = 0.1 V
MARKER	-
MODULATION	STATE = OFF
PHASE	ADJUST = 0.0 DEG ADJUST STEP = 1.0 DEG
PM	DEVIATION = 0.0 DEG DEVIATION STEP = 1.0 DEG STATE = OFF SOURCE = INTERNAL COUPLING = DC
PMETER	-
PULSE	STATE = OFF SOURCE = EXTERNAL DELAY = 1.0 US DELAY STEP = 1.0 US

## HP8643 emulation mode

---

	WIDTH = 1.0 US WIDTH STEP = 1.0 US SLOPE = POSITIVE
ROSCILLATOR	-
SEQUENCE	-
STATUS	-
SWEEP	TIME = 1.0 S MODE = AUTO SPACING = LINEAR
SYSTEM	-
TSWEEP	-
VMETER	-

Table 127: Factory default settings

### Status reporting

Status reporting is not supported so far.

## 11 HP8648 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the SCPI-compatible language, implemented in Agilent's signal generators of type

- HP8647A
- HP8648A / B / C / D

The emulation software is supported on signal generators of type

- SMB100

**The signal generator HP8647 / HP8648 also supports a HP8657 compatible Pre-SCPI-language. For more information on that language, please refer to the *HP8657 emulation*.**

The emulation software simulates the HP8648 data model in the execution unit and transfers all of the HP8648 parameters into the SM\* database and vice versa.

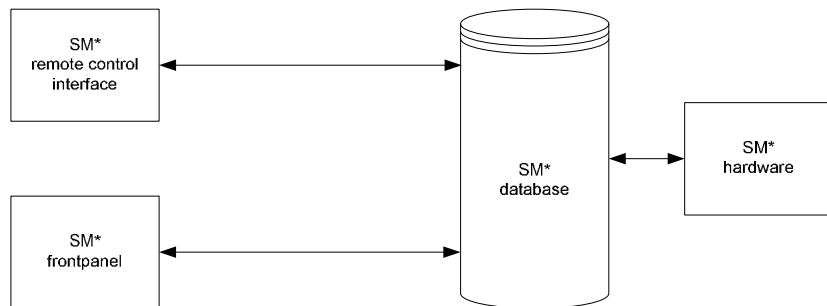


Figure 8: HP8648 emulation model

The parameters

- Frequency Reference
- Frequency Reference State
- Power Reference
- Power Reference State

are virtual parameters in the SM\* database and do not have a related item or combination of items on the frontpanel.

## HP8648 emulation mode

### GPIB functions

The following table shows the GPIB functions, supported by the HP8648.



















Status	Function	Function / Remark / Limitation
	DCL	Device clear.
	GTL	Goto local mode.
	IFC	Interface clear.
	LLO	Local lockout.
	PPC	Parallel-Poll configure.
	PPU	Parallel-Poll unconfigure.
	REN	Goto remote mode.
	SDC	Selective device clear.
	SPD	Serial-Poll disable.
	SPE	Serial Poll enable.
	SRQ	Request service.

Table 128: GPIB functions

### Commands

The following table shows the commands, supported by the HP8648

- **Common**

Status	Command / Function / Remark / Limitation
	*CLS Clear the status register.
	*ESE value Set / Query the bits of the extended status enable register.
	*ESR? Query the bits of the extended status register.
	*IDN? Query the ID string. <b>Remark:</b> ID string has to be provided in frontpanel.
	*OPC *OPC?
	*RCL value Recall an instrument setup.
	*RST Reset the instrument to a default state.

## HP8648 emulation mode










Status	Command / Function / Remark / Limitation
	*SAV value Save an instrument setup.
	*SRE value Set / Query the bits of the status enable register.
	*STB? Query the bits of the status register.
	*TST? Execute the instruments self test
	*WAI Wait until al commands are completed.

Table 129: Common commands

- **AM Subsystem**

Status	Command / Function / Remark / Limitation
	[SOURce:]AM[:DEPT] value Set /Query the modulation depth. <b>Value:</b> 0 ... 100 PCT <b>Default:</b> 30 PCT
	[SOURce:]AM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF
	[SOURce:]AM:SOURce value Select / Query the signal source of the modulation. <b>Value:</b> INTernal[1], EXTernal   EXTernal, INTernal[1]   INTernal2 <b>Default:</b> INTernal
	[SOURce:]AM:EXTernal:COUPling value Select / Query the coupling type, when modulation source is set to external. <b>Value:</b> AC   DC <b>Default:</b> DC

## HP8648 emulation mode




Status	Command / Function / Remark / Limitation
	[SOURce:]AM:INTernal[1]:FREQUency value Set / Query the frequency of the signal source. <b>Value:</b> 400 HZ   1 KHZ <b>Default:</b> 1 KHZ
	[SOURce:]AM:INTernal2:FREQUency value Set / Query the frequency of the signal source. <b>Value:</b> 20 HZ ... 10 KHZ <b>Default:</b> 1 KHZ
	[SOURce:]AM:INTernal2:FUNCtion:SHAPe value Select / Query the waveform of the signal source. <b>Value:</b> SINe   TRIngle   SQUare   SAW <b>Default:</b> SINe <b>Remark:</b> SAW and TRIngle are not supported.

Table 130: AM subsystem

- CAL Subsystem**



Status	Command / Function / Remark / Limitation
	[SOURce:]CAL:DCFM Eliminate offset, when dc coupling is active. <b>Remark:</b> Not tested for compatibility so far (due to missing instrument). The elimination process takes about 10 secs.

Table 131: CAL subsystem

- FM Subsystem**

Status	Command / Function / Remark / Limitation
	[SOURce:]FM[:DEViation] value Set /Query the modulation deviation. <b>Value:</b> 0 HZ ... tbd <b>Default:</b> 3 KHZ

## HP8648 emulation mode







Status	Command / Function / Remark / Limitation
	<p>[SOURce:]FM:STATe value Set / Query the (activation) state of the modulation.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> OFF</p>
	<p>[SOURce:]FM:SOURce value Select / Query the signal source of the modulation.</p> <p><b>Value:</b> INTernal[1], EXTernal   EXTernal, INTernal[1]   INTernal2</p> <p><b>Default:</b> INTernal</p>
	<p>[SOURce:]FM:EXTernal:COUPling value Select / Query the coupling type, when modulation source is set to external.</p> <p><b>Value:</b> AC   DC</p> <p><b>Default:</b> DC</p>
	<p>[SOURce:]FM:INTernal[1]:FREQuency value Set / Query the frequency of the signal source.</p> <p><b>Value:</b> 400 HZ   1 KHZ</p> <p><b>Default:</b> 1 KHZ</p>
	<p>[SOURce:]FM:INTernal2:FREQuency value Set / Query the frequency of the signal source.</p> <p><b>Value:</b> 20 HZ ... 10 KHZ</p> <p><b>Default:</b> 1 KHZ</p>
	<p>[SOURce:]FM:INTernal2:FUNCTion:SHAPE value. Select / Query the waveform of the signal source.</p> <p><b>Value:</b> SINe   TRlangle   SQUare   SAW</p> <p><b>Default:</b> SINe</p> <p><b>Remark:</b> SAW and TRlangle are not supported.</p>

Table 132: FM subsystem



## HP8648 emulation mode

- FREQUENCY Subsystem**




Status	Command / Function / Remark / Limitation
	[:SOURce:]FREQUency[:CW   :FIXed] value Set / Query the RF output frequency. <b>Value:</b> Fmin - Fmax <b>Default:</b> 100 MHZ
	[:SOURce:]FREQUency:REFerence value Set / Query the frequency reference. <b>Value:</b> Fmin - Fmax <b>Default:</b> 0 MHZ
	[:SOURce:]FREQUency:REFerence:STATe value Selects / Query the (activation) state of the frequency reference. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

Table 133: FREQUENCY subsystem

- OUTPut Subsystem**



Status	Command / Function / Remark / Limitation
	OUTPut[:STATe] value Set / Query the state of the RF output. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

Table 134: OUTPUT subsystem

- PM Subsystem**

Status	Command / Function / Remark / Limitation
	[SOURce:]PM[:DEVIation] value Set /Query the modulation deviation. Set /Query the modulation deviation. <b>Value:</b> 0 RAD ... tbd <b>Default:</b> 1 RAD

## HP8648 emulation mode







Status	Command / Function / Remark / Limitation
	<p>[SOURce:]PM:STATe value Set / Query the (activation) state of the modulation.</p> <p><b>Value:</b> ON   OFF   1   0</p> <p><b>Default:</b> OFF</p>
	<p>[SOURce:]PM:SOURce value Select / Query the signal source of the modulation.</p> <p><b>Value:</b> INTernal[1], EXTernal   EXTernal, INTernal[1]   INTernal2</p> <p><b>Default:</b> INTernal</p>
	<p>[SOURce:]PM:EXTernal:COUPling value Select / Query the coupling type, when modulation source is set to external.</p> <p><b>Value:</b> AC   DC</p> <p><b>Default:</b> DC</p>
	<p>[SOURce:]PM:INTernal[1]:FREQUency value Set / Query the frequency of the signal source.</p> <p><b>Value:</b> 400 HZ   1 KHZ</p> <p><b>Default:</b> 1 KHZ</p>
	<p>[SOURce:]PM:INTernal2:FREQUency value Set / Query the frequency of the signal source.</p> <p><b>Value:</b> 20 HZ ... 10 KHZ</p> <p><b>Default:</b> 1 KHZ</p>
	<p>[SOURce:]PM:INTernal2:FUNCTion:SHAPE value. Select / Query the waveform of the signal source.</p> <p><b>Value:</b> SINe   TRIangle   SQUare   SAW</p> <p><b>Default:</b> SINe</p> <p><b>Remark:</b> SAW and TRIangle are not supported.</p>

Table 135: PM subsystem

## HP8648 emulation mode

- **POWER Subsystem**





Status	Command / Function / Remark / Limitation
	[:SOURce:]POWer[:LEVel][:IMMediate][:AMPLitude] value Set / Query the power level of the RF output. <b>Value:</b> Pmin ... Pmax <b>Default:</b> -136.0 DBM
	[:SOURce:]POWer:ATTenuation:AUTO value Set / Query the coupling of the attenuation to the amplitude level control circuit. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> ON
	[:SOURce:]POWer:REFerence value Set / Query the output reference level. <b>Value:</b> Pmin ... Pmax <b>Default:</b> 0 DBM
	[:SOURce:]POWer:REFerence:STATe value Set / Query the (activation) state of the output reference level <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

Table 136: POWER subsystem

- **PULM Subsystem**



Status	Command / Function / Remark / Limitation
	[SOURce:]PULM:STATe value Set / Query the (activation) state of the modulation. <b>Value:</b> ON   OFF   1   0 <b>Default:</b> OFF

Table 137: PULM subsystem

- **STATus Subsystem**



Status	Command / Function / Remark / Limitation
	STATus:QUESTionalbe[:EVENT]? Query the event bits of the questionable status register.

## HP8648 emulation mode

Status	Command / Function / Remark / Limitation
	STATus: QUESTionalbe:CONDition? Query the condition bits of the questionable status register.
	STATus: QUESTionalbe:ENABle value Set / Query the enable bits of the questionable status register.
	STATus:QUESTionalbe:POWer[:EVENT]? Query the event bits of the power questionable status register.
	STATus: QUESTionalbe:POWer:CONDition? Query the condition bits of the power questionable status register.
	STATus: QUESTionalbe:POWer:ENABle value Set / Query the enable bits of the power questionable status register.
	STATus:QUESTionalbe:MODulation[:EVENT]? Query the event bits of the modulation questionable status register.
	STATus: QUESTionalbe:MODulation:CONDition? Query the condition bits of the modulation questionable status register.
	STATus: QUESTionalbe:MODulation:ENABle value Set / Query the enable bits of the modulation questionable status register.
	STATus:QUESTionalbe:CALibration[:EVENT]? Query the event bits of the calibration questionable status register.
	STATus: QUESTionalbe:CALibration:CONDition? Query the condition bits of the calibration questionable status register.
	STATus: QUESTionalbe: CALibration:ENABle value Set / Query the enable bits of the calibration questionable status register.

Table 138: STATUS subsystem

- **SYSTEM Subsystem**

Status	Command / Function / Remark / Limitation
	SYSTem:ERRor? Query and clear the oldest error. <b>Remark:</b> The original error codes and error descriptions of the SM* are returned. No translation to the HP8648 error codes and descriptions are done.
	SYSTem:LANGuage value Select / Query the remote-control language. <b>Value:</b> "SCPI"   "COMP"   "EXIT" <b>Remark:</b> On select, only "EXIT" is supported (to return to the instruments native SCPI-language). On query, always "SCPI" is returned. "COMP" language is supported via "HP8657" emulation mode.

## HP8648 emulation mode


Status	Command / Function / Remark / Limitation
	SYSTem:VERSion? Query the SCPI software version. <b>Remark:</b> YYYY.V is returned.

Table 139: SYSTEM subsystem

### Instrument initialisation

The (factory) default setting of the HP8647 / HP8648 is applied and activated when

- applying the DCL, SDC to the GPIB interface.
- transmitting the \*RST command
- transmitting the first command after activating this emulation mode.

During initialisation, the HP8647 / HP8648 applies and activates the setting, which was active just before power down.

The SM\* however applies and activates the (factory) default setting of the HP8647 / HP8648.

This different behaviour has to be taken in consideration.

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
AM	DEPTH = 30.0 PCT STATE = OFF SOURCE = INTERNAL COUPLING = DC INTERNAL FREQUENCY = 1.0 KHZ SHAPE = SINE
CAL	-
FM	DEVIATION = 3.0 KHZ STATE = OFF SOURCE = INTERNAL COUPLING = DC INTERNAL FREQUENCY = 1.0 KHZ SHAPE = SINE
FREQUENCY	CW = 100.0 MHZ

## HP8648 emulation mode

---

	REFERENCE = 0.0 HZ REFERENCE STATE = OFF
OUTPUT	STATE = OFF
PM	DEVIATION = 1.0 RAD STATE = OFF SOURCE = INTERNAL COUPLING = DC INTERNAL FREQUENCY = 1.0 KHZ SHAPE = SINE
POWER	LEVEL = -136.0 DBM ATTENUATOR AUTO = ON REFERENCE = 0.0 DBM REFERENCE STATE = OFF
PULM	STATE = OFF
STATUS	-
SYSTEM	LANGUAGE = "SCPI"

Table 140: Factory default settings

### Status reporting

Status reporting is not supported so far.

## 12 HP8657 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the Pre-SCPI language, implemented in Agilent's signal generators of type

- HP8647A
- HP8648A / B / C / D
- HP8656A / B
- HP8657A / B

The emulation software is supported on signal generators of type

- SMB100

**The signal generator HP8647 / HP8648 also supports a SCPI-compatible language. For more information on that language, please refer to *HP8648 emulation*.**

The emulation software simulates the HP8657 data model in the execution unit transfers the HP8657 parameters into the SM\* database.

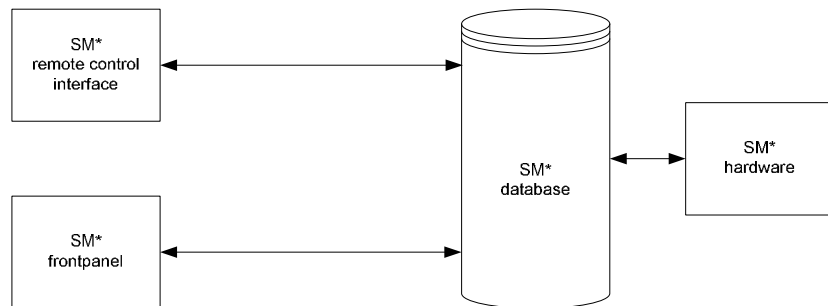


Figure 9: HP8657 emulation model

The following parameters

- amplitude modulation depth's increment / decrement value
- frequency modulation deviation's increment / decrement value

are virtual parameters in the SM\* database and do not have a related item on the frontpanel.

## HP8657 emulation mode

As an important fact, the HP8657 network analyzer language does not support query commands.

### GPIB functions

The following table shows the GPIB functions, supported by the HP8657.








Status	Command	Function / Remark / Limitation
	DCL	Device clear. <b>Remark:</b> SDC applies an IP command to the emulation software and presets the instrument.
	GTL	Goto local mode.
	LLO	Local lockout.
	REN	Goto remote mode.
	SDC	Selective device clear. <b>Remark:</b> SDC applies an IP command to the emulation software and presets the instrument.

Table 141: GPIB functions

### Commands

The following table shows the commands, supported by the HP8657.

- **Additional**

Status	Command / Function / Remark / Limitation
	EX Return to SCPI mode. <b>Remark:</b> This command has been added to the HP8657 command set.
	IP Preset instrument. <b>Remark:</b> SM* always presets to the HP8657 factory defaults. <ul style="list-style-type: none"> <li>○ 100 MHz frequency</li> <li>○ 10 MHz frequency increment / decrement</li> <li>○ 0 ° frequency phase</li> <li>○ – 143.5 dBm amplitude</li> <li>○ 10 dB amplitude increment / decrement</li> <li>○ 0 dB amplitude offset</li> <li>○ Active mode</li> <li>○ RF output on</li> </ul>



## HP8657 emulation mode

	<ul style="list-style-type: none"> <li>○ AM off</li> <li>○ AM depth 0 %</li> <li>○ FM off</li> <li>○ FM deviation 1 kHz</li> <li>○ PM off</li> <li>○ LF generator frequency 1 kHz</li> </ul> <p>All registers 0 ... 99 are also preset to the factory defaults.</p>
--	---

Table 142: Additional commands

### • Frequency


Status	Command / Function / Remark / Limitation
	<p>CW value</p> <p>Select fixed frequency function, optionally set fixed frequency.</p> <p><b>Value:</b> value in HZ   KZ   MZ</p> <p><b>Default:</b> 100.0 MZ</p>

Table 143: Frequency commands

### • Amplitude












Status	Command / Function / Remark / Limitation
	<p>AP value</p> <p>Select amplitude function, optionally set amplitude.</p> <p><b>Value:</b> value in DM   DF   DM VL   DM MV   DM UV   DM EM VL   DM EM UV   EM VL   EM MV   EM UV   VL   MV   UV</p> <p><b>Default:</b> -143.5 DM</p> <p><b>Remark:</b> DF (dBf) is not supported.</p>
	<p>AO value</p> <p>Set amplitude offset.</p> <p><b>Value:</b> value in DB</p> <p><b>Default:</b> 0.0 DB</p>

Table 144: Amplitude commands

### • Modulation

Status	Command / Function / Remark / Limitation
	<p>AM value</p> <p>Select amplitude modulation function, optionally set modulation depth.</p>

## HP8657 emulation mode










	<p><b>Value:</b> value in PCT   %</p> <p><b>Default:</b> 0.0 PCT</p> <p><b>Remark:</b> % is not supported. AM must be preceeded by either S1, S2 or S3.</p>
	<p>FM value Select frequency modulation function. Optionally set modulation deviation.</p> <p><b>Value:</b> value in HZ   KZ   MZ</p> <p><b>Default:</b> 0.0 HZ</p> <p><b>Remark:</b> FM must be preceeded by either S1, S2 or S3.</p>
	<p>S1 Select external modulation source.</p> <p><b>Remark:</b> Coupling is AC in any case.</p>
	<p>S2 Select internal 400 Hz sine wave as modulations source.</p> <p><b>Remark:</b> Selection S2 sets LF frequency to 400 Hz for both, AM and FM. Any preceeding selection of S3 is overridden.</p>
	<p>S3 Select internal 1000 Hz sine wave as modulations source.</p> <p><b>Remark:</b> Selection S3 sets LF frequency to 1000 Hz for both, AM and FM. Any preceeding selection of S3 is overridden.</p>
	<p>S4 Turn modulation completely or selectively off.</p>
	<p>S5 value Select DC frequency modulation function. Optionally set modulation deviation.</p> <p><b>Value:</b> Value in HZ   KZ   MZ</p> <p><b>Default:</b> 0.0 HZ</p> <p><b>Remark:</b> External modulation source is selected as well as DC coupling.</p>
	<p>PM Turn pulse modulation on.</p>
	<p>PF Turn pulse modulation (fast mode) on.</p> <p><b>Remark:</b></p>

## HP8657 emulation mode

	Implementation on SM* is identical to PM.
--	---

Table 145: Modulation commands

- Other

Status	Command / Function / Remark / Limitation
	HI Unknown function ...
	LO Unknown function ...
	UP Increment the value of the active function (frequency, amplitude, modulation depth, modulation deviation) by the value specified at command IS.
	DN Decrement the value of the active function (frequency, amplitude, modulation depth, modulation deviation) by the value specified at command IS.
	IS value Set increment/decrement value of the active function (frequency, amplitude, modulation depth, modulation deviation). <b>Value (frequency function):</b> value in HZ   KZ   MZ <b>Value (amplitude function):</b> value in DB <b>Value (AM):</b> value in PCT   % <b>Value (FM):</b> value in HZ   KZ   MZ <b>Remark:</b> % is not supported
	PI Increment RF frequency phase by 1.0 °. <b>Remark:</b> No wrap around occurs at the phase limits in opposition to the HP8657.
	PD Decrement RF frequency phase by 1.0 °. <b>Remark:</b> No wrap around occurs at the phase limits in opposition to the HP8657.
	R0 Select Standby mode. <b>Remark:</b> The implementation on SM* is identical to R2.
	R1 Select Active mode. <b>Remark:</b> The implementation on SM* is identical to R3.

## HP8657 emulation mode












	R2 Set Rf output off.
	R3 Set Rf output on.
	R5 Set Rf output dead. <b>Remark:</b> The implementation on SM* is identical to R2.
	ST value Save actual setup to backup register. <b>Value:</b> 0 ... 9 <b>Remark:</b> The contents of the registers 0 ... 9 are NOT persistent and are lost when power off or leaving the emulation mode.
	RC value Recall setup from backup register. <b>Value:</b> 0 ... 9 <b>Remark:</b> The contents of the registers 0 ... 9 are NOT persistent and are lost when power off or leaving the emulation mode.
	SV value Save actual setup to backup register. <b>Value:</b> 0 ... 99 <b>Remark:</b> The contents of the registers 0 ... 99 are NOT persistent and are lost when power off or leaving the emulation mode.
	RL value Recall actual setup from register <i>value</i> . <b>Value:</b> 0 ... 99 <b>Remark:</b> The contents of the registers 0 ... 99 are NOT persistent and are lost when power off or leaving the emulation mode.
	SQ Step forward to next register and recall setup.
	GT Setup a flexible sequence.
	QS Step backward to previous register and recall setup.
	RP Reset reverse power protection.

Table 146: Other commands

## **HP8657 emulation mode**

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### **Instrument initialisation**

The (factory) default setting of the HP8657 is applied when

- applying a DCL, SDC to the GPIB interface.
- transmitting the first command after activating this emulation mode.

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

<b>Subsystem</b>	<b>Default setting</b>
ADDITIONAL	-
FREQUENCY	CW = 100.0 MZ CW STEP = 10.0 MZ
AMPLITUDE	LEVEL = -143.5 DBM LEVEL STEP = 10.0 DB OFFSET = 0.0 DB OUTPUT = ON
MODULATION (AM)	DEPTH = 0.0 PCT DEPTH STEP = 1.0 PCT STATE = OFF SOURCE = INTERNAL FREQUENCY = 1.0 KHZ
MODULATION (AM)	DEVIATION = 0.0 KHZ DEVIATION STEP = 10.0 KHZ STATE = OFF SOURCE = INTERNAL FREQUENCY = 1.0 KHZ
MODULATION (PULSE)	STATE = OFF SOURCE = INTERNAL FREQUENCY = 1.0 KHZ

Table 147: factory default setting

Additionally, all (backup) registers 0 ... 99 are preset to the factory defaults, too.

### **Status reporting**

Status reporting is generally not supported by the HP8657.

## 13 HP8662 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the Pre-SCPI language, implemented in Agilent's signal generators of type

- HP8662A
- HP8663A

The emulation software is supported on signal generators of type

- SMA100

The emulation software simulates the HP8662 data model in the execution unit and transforms the HP8662 parameters into the SM\* parameters.

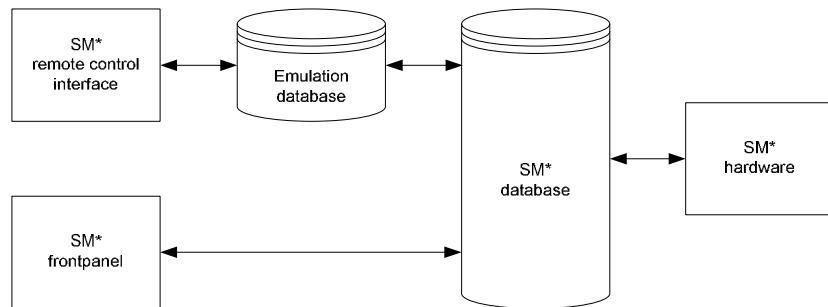


Figure 10: HP8662 emulation model

This mapping occurs only in one direction: Setting commands that arrive via the remote-control interface modify the HP8662 parameters. These parameters are converted into SM\* parameters and written to the database.

Modifying the SM\* parameters in any other manner, e.g., via manual operation at the frontpanel, causes no changes to the HP8662 parameters of the emulation software.

**While this is insignificant in pure remote-control operation, it can lead to inconsistencies and undesirable effects or malfunctions when you use both manual and remote control in this language emulation mode.**

### GPIB functions

The following table shows the GPIB functions, supported by the HP8662.

Status	Command	Function / Remark / Limitation
--------	---------	--------------------------------

## HP8662 emulation mode










Status	Command	Function / Remark / Limitation
	DCL	Device clear.
	GET	Goup execute trigger.
	GTL	Goto local mode.
	LLO	Local lockout.
	REN	Goto remote mode.
	SDC	Selective device clear.
	SPD	Serial-Poll disable.
	SPE	Serial-Poll enable.
	SRQ	Request service.

Table 148: HP8662 GPIB functions

## Commands

The following table shows the commands, supported by the HP8662.

- **Additional**


Status	Command / Function / Remark / Limitation
	EX Return to SCPI mode. <b>Remark:</b> This command has been added to the HP8662 command set.

Table 149: Additional commands

- **Frequency**


Status	Command / Function / Remark / Limitation
	FR value Set fixed frequency. <b>Value:</b> Fmin ... Fmax in {HZ   KZ   MZ   GZ}   UP   DN <b>Default:</b> 100.0 MZ <b>Remark:</b> Center frequency in rf sweep is also set with this command.

Table 150: Frequency commands

- **Amplitude**

Status	Command / Function / Remark / Limitation
--------	--

## HP8662 emulation mode












	<p>AP value</p> <p>Set output amplitude and turn output on.</p> <p><b>Value:</b> Pmin ... Pmax in {+D   -D   DM   MV   UV}   UP   DN</p> <p><b>Default:</b> -30 DM</p>
	<p>A0</p> <p>Alias for AO.</p>
	<p>AO</p> <p>Turn output off.</p>

Table 151: Amplitude commands

- **Modulation**

Status	Command / Function / Remark / Limitation
	<p>AM value</p> <p>Set rf carrier modulation depth and turn modulation on.</p> <p><b>Value:</b> 0.0 ... 95.0 in {PC}   UP   DN</p> <p><b>Default:</b> 30 PC</p>
	<p>BP</p> <p>Set bi-phase modulation on.</p>
	<p>F0</p> <p>Alias for FO.</p>
	<p>FO</p> <p>Turn actual selected modulation off.</p>
	<p>FM value</p> <p>Set rf carrier modulation deviation and turn modulation on.</p> <p><b>Value:</b> 0.0 ... 100.0 {HZ   KZ}</p> <p><b>Default:</b> 10.0 KZ</p>
	<p>MF value</p> <p>Set modulation signals's frequency.</p> <p><b>Value:</b> 0.0 ... 100.0 {HZ   KZ}</p> <p><b>Default:</b> ?</p>
	<p>M0</p> <p>Alias for MO</p>
	<p>MO</p>



## HP8662 emulation mode







	Set modulation off.
	M1 Select internal 400 Hz signal as modulation source.
	M2 Select internal 1000 Hz signal as modulation source.
	M3 Select external, dc coupled modulation source.
	M4 Select external, ac coupled modulation source.
	PL Set pulse modulation.
	PM value Set rf carrier modulation deviation and turn modulation on. <b>Value:</b> 0.0 ... 360.0 DG <b>Default:</b> 0.0 DG

Table 152: Modulation commands

- Data**









Status	Command / Function / Remark / Limitation
	'0' ... '9' Numerals 0-9
	'.' Decimalpoint
	BS Backspace

Table 153: Data

- Units**

Status	Command / Function / Remark / Limitation
	DB Power unit DB
	DG Phase unit Deg
	DM Power unit dBm
	+D Power unit + dBm
	-D Power unit - dBm

## HP8662 emulation mode


















	MV Level mV
	UV Level uV
	PC Relative unit %
	HZ Frequency unit Hz
	KZ Frequency unit KHz
	MZ Frequency unit MHz
	GZ Frequency unit GHz

Table 154: Units










- Sweep**

Status	Command / Function / Remark / Limitation
	W1 Set sweep operation off. <b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.
	W2 Set sweep operation on and select sweep mode AUTO. <b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.
	W3 Set sweep operation on and select sweep mode MANUAL. <b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.
	W4 Set sweep operation on and select sweep mode SINGLE. <b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.

## HP8662 emulation mode

	<p>FA value Set rf sweep start frequency.</p> <p><b>Value:</b> 100.0 KHz ... 2560.0 MHz in {HZ   KZ   MZ   GZ}   UP   DN</p> <p><b>Default:</b> ?</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>FB value Set rf sweep stop frequency.</p> <p><b>Value:</b> 100.0 KHz ... 2560.0 MHz in {HZ   KZ   MZ   GZ}   UP   DN</p> <p><b>Default:</b> ?</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>FS value Set rf sweep frequency span.</p> <p><b>Value:</b> 0.2 Hz ... 2560.0 MHz in {HZ   KZ   MZ   GZ}   UP   DN</p> <p><b>Default:</b> ?</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>N1 Set sweep steps to 100 and sweep spacing to linear.</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>N2 Set sweep steps to 1000 and sweep spacing to linear.</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>N3 value</p>

## HP8662 emulation mode

	<p>Set sweep step size.</p> <p><b>Value:</b> Value in {HZ   KZ   MZ}   UP   DN</p> <p><b>Default:</b> ?</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>N4</p> <p>Set sweep steps to 10 % and sweep spacing to logarithmic.</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>N5</p> <p>Set sweep steps to 1 % and sweep spacing to logarithmic.</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>T1</p> <p>Set rf sweep step (dwell) time to 0.5 ms.</p>
	<p>T2</p> <p>Set rf sweep step (dwell) time to 1.0 ms.</p>
	<p>T3</p> <p>Set rf sweep step (dwell) time to 2.0 ms.</p>
	<p>T4</p> <p>Set rf sweep step (dwell) time to 10.0 ms.</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>T5</p> <p>Set rf sweep step (dwell) time to 100.0 ms.</p> <p><b>Remark:</b> Rf carrier sweep is supported. Modulation sweep (Lf sweep) is not supported so far. Special Functions 40 and 41 have no effect.</p>
	<p>X1 value</p> <p>Turn marker 1 on, optionally set marker frequency.</p>
	<p>X2 value</p> <p>Turn marker 2 on, optionally set marker frequency.</p>

## HP8662 emulation mode



























	X3 value Turn marker 3 on, optionally set marker frequency.
	X4 value Turn marker 4 on, optionally set marker frequency.
	X5 value Turn marker 5 on, optionally set marker frequency.
	X6 Turn (actual selected) marker off.
	X7 Turn all markers off.
	Y0 Set sweep mode off <b>Remark:</b> Implementation identical to W1
	Y1 Set sweep operation on and select sweep mode MANUAL. <b>Remark:</b> Implementation identical to W3
	Y2 Set sweep operation on and select sweep mode MANUAL. <b>Remark:</b> Implementation identical to W3
	Y3 Advance to next sweep frequency step (in sweep mode).

Table 155: Sweep

- **Other**

Status	Command / Function / Remark / Limitation
	BL value Execute blue key function. <b>Value</b> APaa Call Special Function bbcc Call Copy function <b>Remark:</b> aa (special function code): See Spectial functions for codes bb (source of copy operation): FA, FB, FS, N3, X1, X2, X3, X4, X5 cc(destination of copy operation): FA, FB, FS, N3, X1, X2, X3, X4, X5
	UP Set value of active function one step up

## HP8662 emulation mode

	DN Set value of active function one step down
	IS value Set increment value for active function. <b>Value:</b> ... <b>Remark:</b> For valid value range and unit refer to the different functions
	RU Rotate knob cw
	RD Rotate knob ccw
	R1 Set resolution to x10
	R2 Set resolution to 1/10
	R3 Set knob to off
	R4 Set knob to hold
	R5 Set knob to increment
	SQ Execute sequence step
	AS Enable auto sequence
	SS value ... value Set sequence (to recall)
	ST value Store front panel setting. <b>Value:</b> 1 ... 9 <b>Remark:</b> Storage is <b>NOT</b> persistent and will be lost when on power down.
	RC value Recall front panel setting. <b>Value:</b> 1 ... 9 <b>Remark:</b> Storage is <b>NOT</b> persistent and will be lost when on power down. Recall immediately after power on recalls default settings on each register location.
	CT value Set function to be executed on trigger (GTL or TR).

## HP8662 emulation mode














	<p><b>Value:</b> UP   DN   AO   MO   M1   M2   M3   M4   N1   N2   N4   N5   T1   T2   T3   T4   T5   W1   W2   W3   W4</p> <p><b>Remark:</b> T1, T2, T3 are not supported.</p>
	<p>TR</p> <p>Executes function, specified by command CT.</p>
	<p>@1 value</p> <p>Set service request mask</p> <p><b>Value:</b> 0x00 ... 0xFF</p> <p><b>Remark:</b> Layout of status byte is different in both systems.</p>
	<p>RM</p> <p>Query service request mask</p> <p><b>Remark:</b> Layout of status byte is different in both systems.</p>
	<p>MS</p> <p>Query the instrument status.</p> <p><b>Remark:</b> Status codes from SM* are returned</p>
	<p>L1</p> <p>Front panel long learn mode</p>
	<p>L2</p> <p>Front panel fast learn mode</p>
	<p>@2</p> <p>Select deferred execution mode</p>
	<p>@3</p> <p>Select immediate execution mode</p>
	<p>SP</p> <p>See Special Functions</p>

















Table 156: Other

- **Special Function**

Status	Command / Function / Remark / Limitation
	BLAP00 see SP00
	BLAP10 see SP10
	BLAP11 see SP11
	BLAP12 see SP12

## HP8662 emulation mode





















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	BLAP20 see SP20
	BLAP21 see SP21
	BLAP30 see SP30
	BLAP31 see SP31
	BLAP32 see SP32
	BLAP40 see SP40
	BLAP41 see SP41
	BLAP50 see SP50
	BLAP51 see SP51
	BLAP60 see SP60
	BLAP61 see SP61
	BLAP62 see SP62
	BLAP70 see SP70
	BLAP71 see SP71
	BLAP80 see SP80
	BLAP81 see SP81
	BLAP82 see SP82
	BLAP83 see SP83
	BLAP84 see SP84
	BLAP85 see SP85
	BLAP86 see SP86
























## HP8662 emulation mode

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	BLAP87 see SP87
	BLAP88 see SP88
	BLAP89 see SP89
	BLAP90 see SP90
	BLAP91 see SP91
	BLAP92 see SP92
	BLAP93 see SP93
	BLAP94 see SP94
	BLAP95 see SP95
	BLAP96 see SP96
	BLAP97 see SP97
	BLAP98 see SP98
	BLAP99 see SP99
	SP00 Initialize frontpanel. <b>Remark:</b> Executes a initialization of the instrument.
	SP10 Turn frequency offset off
	SP11 value Set positive frequency and turn frequency offset on
	SP12 value Set negative frequency and turn frequency offset on
	SP20 Disable ALC bandwidth reduction.
	SP21 Enable ALC bandwidth reduction.
	SP30 Disable amplitude reference feature.

## HP8662 emulation mode

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	SP31 Enable amplitude reference feature (reference = 0.0 dB).
	SP32 Enable amplitude reference feature (reference = 1.0 mV).
	SP40 Disables modulation sweep mode.
	SP41 Enables modulation sweep mode.
	SP50 Disable rear panel AUX connector for FM.
	SP51 Enable rear panel AUX connector for FM.
	SP60 Disable PSK mode
	SP61 Enable PSK increment mode
	SP62 Enable PSK toggle mode
	SP70 Set external input impedance to 50 ohms.
	SP71 Set external input impedance to 600 ohms.
	SP80 Turns off special functions 10, 20, 30, 40, 50, 60, 70.
	SP81 Convert amplitude from [V] to [DBM]
	SP82 Recalls and displays GPIB settings.
	SP83 Perform ROM check
	SP84 Perform RAM check
	SP85 Disable amplitude correction in all modes.
	SP86 Disable amplitude correction in sweep modes.
	SP87 Enable amplitude correction in sweep modes.
	SP88 Enable auto sequence mode
	SP89 Service request by operator.

## HP8662 emulation mode











	SP90 value Set sequence step delay
	SP91 Enable generators rapid switching mode.
	SP92 Restore knob to 12Inc/Rev
	SP93 Allow user defined settings for vernier and attenuator
	SP94 Change knob to 120Inc/Rev without AUX reconfiguring
	SP95 Change knob to 120Inc/Rev with AUX reconfiguring
	SP96 Turn modulation oscillator off.
	SP97 Turn modulation oscillator on.
	SP98 Turns on readout and annunciators.
	SP99 Turns off readout and annunciators.

Table 157: Special Function

### Instrument initialization

The (factory) default setting of the HP8340 is applied when

- applying the DCL, SDC to the GPIB interface.
- transmitting the first command after activating this emulation mode.

During initialisation, the HP8340 applies and activates the backup register set 0.

The SM\* however applies and activates the (factory) default setting of the HP8340.

This different behaviour has to be taken in consideration:

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
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## ***HP8662 emulation mode***

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Table 158: Factory default setting

### **Status reporting**

Status reporting is not supported so far.

## 14 RC3102 emulation mode

### General

In this language emulation mode, the emulation software in the SM\* emulates the Pre-SCPI language, implemented in Racal's signal generators of type

- 3102
- 9087

The emulation software is supported on signal generators of type

- SMA100

The emulation software simulates the RC3102 data model in the execution unit and transfers most of the RC3102 parameters into the SM\* database.

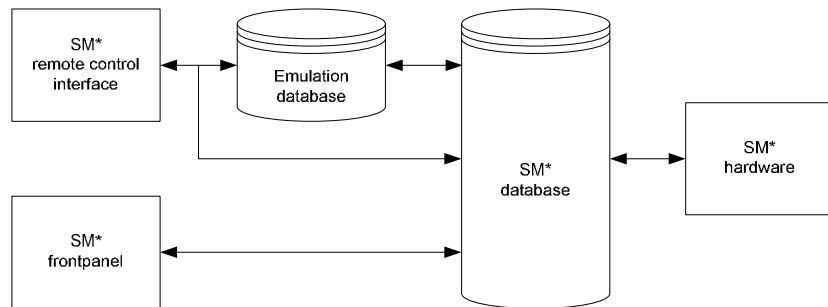


Figure 11: RC3102 emulation model

This mapping occurs only in one direction: Setting commands that arrive via the remote-control interface modify the RC3102 parameters. These parameters are converted into SM\* parameters and written to the database.

Modifying the SM\* parameters in any other manner, e.g., via manual operation at the frontpanel, causes no changes to the RC3102 parameters of the emulation software.

As an important fact, the RC3102 language does support query commands.

**Therefore, inconsistencies and undesirable effects or malfunctions can not occur when you use both manual operation and remote control operation in this language emulation mode.**

### GPIB functions

The following table shows the GPIB functions, supported by the RC3102.

## RC3102 emulation mode






Status	Command	Function / Remark / Limitation
	DCL	Device clear.
	GTL	Goto local mode.
	LLO	Local lockout.
	REN	Goto remote mode.
	SDC	Selective device clear. <b>Remark:</b> SDC applies an IP command to the emulation software and presets the instrument.

Table 159: RC3102 GPIB functions

## Commands

The following table shows the commands, supported by the RC3102.

- **Additional**




Status	Command / Function / Remark / Limitation
	EX Return to SCPI mode. <b>Remark:</b> This command has been added to the RC3102 command set. The emulation parameters (content of registers 0 ... 99) are <b>NOT</b> persistent and get lost when leaving the emulation mode.

Table 160: Additional commands

- **Frequency**

Status	Command / Function / Remark / Limitation
	FQ [value] Select fixed frequency function and fixed frequency mode, optionally set fixed frequency. <b>Value:</b> value in HZ   KZ   MZ   GZ <b>Default:</b> 100.0 MZ
	FR value Set frequency offset. <b>Value:</b> value in HZ   KZ   MZ   GZ <b>Default:</b> 0.0 MZ

## RC3102 emulation mode




	<p>FS value Set frequency step size in fixed and sweep mode.</p> <p><b>Value:</b> value in HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 12.5 KZ</p>
	<p>FU Increment fixed frequency by value specified with FS command.</p>
	<p>FD Decrement fixed frequency by value specified with FS command.</p>

Table 161: Frequency commands

- **Level**























Status	Command / Function / Remark / Limitation
	<p>AP value Select amplitude function, optionally set amplitude.</p> <p><b>Value:</b> value in DB   VO   MV   UV   NV</p> <p><b>Default:</b> -30.0 DB</p>
	<p>AR value Set amplitude offset.</p> <p><b>Value:</b> value in DB   VO   MV   UV   NV</p> <p><b>Default:</b> 0.0 DB</p>
	<p>AS value Set amplitude step size.</p> <p><b>Value:</b> value in DB   VO   MV   UV   NV</p> <p><b>Default:</b> 3.0 DB</p>
	<p>AU Increment amplitude by value specified with AS command.</p>
	<p>AD Decrement amplitude by value specified with AS command.</p>
	<p>OP1 Turn Rf output on.</p>
	<p>OP0 Turn Rf output off.</p>

Table 162: Level commands

## RC3102 emulation mode

- Modulation

Status	Command / Function / Remark / Limitation
	AM value Select amplitude modulation function, optionally set modulation depth. <b>Value:</b> value in PCT   % <b>Default:</b> 0.0 PCT <b>Remark:</b> % is not supported.
	MA0 Turn amplitude modulation off.
	MA1 Turn amplitude modulation on. <b>Remark:</b> AM can be combined with FM and HM, but <b>NOT</b> with PM.
	MA2 Select internal 400 Hz sine wave as modulations source.
	MA3 Select internal 1000 Hz sine wave as modulations source.
	MA4 Select external modulation source in AC coupling mode.
	MA5 Select external modulation source in DC coupling mode.
	PM Select pulse modulation function.
	MP0 Turn pulse modulation off.
	MP1 Turn pulse modulation on. <b>Remark:</b> PM can be combined with FM and HM, but <b>NOT</b> with AM.
	MP2 Select internal 400 Hz sine wave as modulations source.
	MP3 Select internal 1000 Hz sine wave as modulations source.
	MP4 Select external modulation source in AC coupling mode.
	MP5 Select external modulation source in DC coupling mode.
	FM value Select frequency modulation function, optionally set modulation deviation. <b>Value:</b>



## RC3102 emulation mode














	<p>value in HZ   KZ   MZ   GZ</p> <p><b>Default:</b> 0.0 KZ</p>
	<p>MF0</p> <p>Turn frequency modulation off.</p>
	<p>MF1</p> <p>Turn frequency modulation on.</p> <p><b>Remark:</b> FM can be combined with AM and PM, but <b>NOT</b> with HM.</p>
	<p>MF2</p> <p>Select internal 400 Hz sine wave as modulations source.</p>
	<p>MF3</p> <p>Select internal 1000 Hz sine wave as modulations source.</p>
	<p>MF4</p> <p>Select external modulation source in AC coupling mode.</p>
	<p>MF5</p> <p>Select external modulation source in DC coupling mode.</p>
	<p>HM value</p> <p>Select phase modulation function, optionally set modulation deviation.</p> <p><b>Value:</b> value in RAD</p> <p><b>Default:</b> 0.0 RAD</p>
	<p>MH0</p> <p>Turn phase modulation off.</p>
	<p>MH1</p> <p>Turn phase modulation on.</p> <p><b>Remark:</b> HM can be combined with AM and PM, but <b>NOT</b> with FM.</p>
	<p>MH2</p> <p>Select internal 400 Hz sine wave as modulations source.</p>
	<p>MH3</p> <p>Select internal 1000 Hz sine wave as modulations source.</p>
	<p>MH4</p> <p>Select external modulation source in AC coupling mode.</p>
	<p>MH5</p> <p>Select external modulation source in DC coupling mode.</p> <p><b>Remark:</b> This command has been added for compatibility to the other modulations modes. The command is <b>NOT</b> supported on the RC3102.</p>

Table 163: Modulation commands

## RC3102 emulation mode

- **Increments**


























Status	Command / Function / Remark / Limitation
	IN0 Enable spin wheel.
	IN1 Disable spin wheel.
	IN2 Select step size to coarse (fixed).
	IN3 Select step size to medium (fixed).
	IN4 Select step size to fine (fixed).
	IN5 Set step size to the value specified by the FS or AS command.

Table 164: Increment commands

- **Common**

Status	Command / Function / Remark / Limitation
	RS value Set status byte mask.
	GS1 Turn Standby mode on. <b>Remark:</b> Standby is simulated, RF output is turned off.
	GS0 Turn Standby mode off. <b>Remark:</b> RF output is restored to the state before entering standby mode.
	SF value Execute special function. <b>Value:</b> 80      transfer cw frequency to sweep start frequency 81      transfer cw frequency to sweep stop frequency 82      set sweep dwell time to 2(10) ms 83      set sweep dwell time to 20 ms 84      set sweep dwell time to 200 ms 85      set sweep dwell time to 1 s <b>Remark:</b> Only special functions noted above are supported.
	DG value Execute special function. <b>Remark:</b>

## RC3102 emulation mode

	Alias for command SF.
	IP Preset instrument. <b>Remark:</b> SM* always presets to the RC3102 factory defaults.
	RM1 Select deferred data acceptance mode.
	RM2 Select immediate data acceptance mode.
	IS Output instrument status string.
	ID Output instrument data string.
	LM1 Output learn data (short mode).
	LM2 Output learn data (long mode).
	@9 Input learn data (short mode).
	@A Input learn data (long mode).
	WY Display actual error code.
	CE Clear instruments error queue.
	MS value Select register to save actual setup. <b>Value:</b> 0 ... 99 <b>Remark:</b> The contents of the registers 0 ... 99 are <b>NOT</b> persistent and are lost when power off or leaving the emulation mode.
	MR value Select register to recall or exchange. <b>Value:</b> 0 ... 99 <b>Remark:</b> The contents of the registers 0 ... 99 are <b>NOT</b> persistent and are lost when power off or leaving the emulation mode.
	MI value Select register to exchange with previously specified register in MR command. <b>Value:</b> 0 ... 99

## RC3102 emulation mode



	<p>ME</p> <p>Execute the actual memory function (save IMS, recall MR or exchange MI).</p>
	<p>MRME value</p> <p>Recall setup from register <i>value</i>.</p> <p><b>Value:</b></p> <p>0 ... 99</p> <p><b>Remark:</b></p> <p>RC3102 allows up to 100 value specifications. Specified register locations are subsequently recalled.</p> <p>SM* allows exactly one register location, which is recalled immediately.</p>

Table 165: Other commands

### Instrument initialization

The (factory) default setting of the RC3102 is applied and activated when

- applying the DCL, SDC to the GPIB interface.
- transmitting the first command after activating this emulation mode.

**It is strongly recommended to explicitly setup all necessary parameters by applying the corresponding command.**

The following table shows the (factory) default setting, applied by the SM\*'s emulation software.

Subsystem	Default setting
FREQUENCY	CW = 100.0 MHZ CW STEP = 12.5 KHZ OFFSET = 0.0 MHZ MODE = FIXED START = 1.0 MHZ STOP = 1.3 GHZ
LEVEL	LEVEL = -30.0 DB LEVEL STEP = 3.0 DB OFFSET = 0.0 DB OUTPUT = ON
MODULATION (AM)	DEPTH = 0.0 PCT SOURCE = INTERNAL STATE = OFF, SELECTED FREQUENCY = 400.0 HZ
MODULATION (PULSE)	SOURCE = INTERNAL STATE = OFF, DESELECTED

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	FREQUENCY = 400.0 HZ
MODULATION (FM)	DEVIATION = 0.0 KHZ SOURCE = INTERNAL STATE = OFF, SELECTED FREQUENCY = 400.0 HZ
MODULATION (PHASE)	DEVIATION = 0.0 RAD SOURCE = INTERNAL STATE = OFF, DESELECTED FREQUENCY = 400.0 HZ
INCREMENTS	USER DEFINED STEP SIZE

Table 166: Factory default setting

Additionally, all (backup) registers 0 ... 99 are preset to the factory defaults, too.

### **Status reporting**

Status reporting is not supported so far.

## **15 Literature**

- [1] R&S® SMA100A Operating Manual
- [2] R&S® SMA100A Specifications
- [3] R&S® SMB100A Operating Manual
- [4] R&S® SMB100A Specifications
- [5] R&S® SMF100A Operating Manual
- [6] R&S® SMF100A Specifications

## **16 Additional Information**

This Application Note is updated from time to time.

Please visit the website [www.rohde-schwarz.com/appnotes/1GP71](http://www.rohde-schwarz.com/appnotes/1GP71) in order to download the newest version.

## ***Ordering information***

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### **17 Ordering information**

<b>Part name</b>	<b>Part description</b>	<b>Part code</b>
R&S® SMA100A	Signal Generator	1400.6000.02
R&S® SMB100A	Signal Generator	1406.6000.02
R&S® SMF100A	Signal Generator	1167.0000.02

Table 167: Ordering informations