

# Agilent 33250A

## Function/Arbitrary Waveform Generator

### Quick Reference Guide

- Square brackets ( [ ] ) indicate optional keywords or parameters.
- Braces ( { } ) enclose parameters within a command. Default parameters are shown in **bold**.
- Triangle brackets ( < > ) enclose parameters for which you must substitute a value.
- A vertical bar ( | ) separates multiple choices.

#### The APPLy Commands

(see page 144 in User's Guide)

APPLy

```
:SINusoid [<frequency> [ ,<amplitude> [ ,<offset> ] ] ]  
:SQUare [<frequency> [ ,<amplitude> [ ,<offset> ] ] ]  
:RAMP [<frequency> [ ,<amplitude> [ ,<offset> ] ] ]  
:PULSe [<frequency> [ ,<amplitude> [ ,<offset> ] ] ]  
:NOISe [<frequency>|DEF>1 [ ,<amplitude> [ ,<offset> ] ] ]  
:DC [<frequency>|DEF>1 [ ,<amplitude>|DEF>1 [ ,<offset> ] ] ]  
:USER [<frequency> [ ,<amplitude> [ ,<offset> ] ] ]
```

APPLy?

<sup>1</sup> This parameter has no effect for this command but you **MUST** specify a value or "DEFault".

#### State Storage Commands

(see page 209 in User's Guide)

```
*SAV {0|1|2|3|4}  
*RCL {0|1|2|3|4}
```

```
MEMory:STATe  
:NAME {0|1|2|3|4} [ ,<name> ]  
:NAME? {0|1|2|3|4}  
:DELeTe {0|1|2|3|4}  
:RECall:AUTO {OFF|ON}  
:RECall:AUTO?  
:STATE:VALId? {0|1|2|3|4}
```

MEMory:NStates?



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## Output Configuration Commands

(see page 153 in User's Guide)

```
FUNCTION {SINu|SQU|RAMP|PULSe|NOISe|DC|USER}
FUNCTION?

FREQuency {<frequency>|MINimum|MAXimum}
FREQuency? [MINimum|MAXimum]

VOLTage {<amplitude>|MINimum|MAXimum}
VOLTage? [MINimum|MAXimum]

VOLTage:OFFSet {<offset>|MINimum|MAXimum}
VOLTage:OFFSet? [MINimum|MAXimum]

VOLTage
:HIGH {<voltage>|MINimum|MAXimum}
:HIGH? [MINimum|MAXimum]
:LOW {<voltage>|MINimum|MAXimum}
:LOW? [MINimum|MAXimum]

VOLTage:RANGe:AUTO {OFF|ON|ONCE}
VOLTage:RANGe:AUTO?

VOLTage:UNIT {VPP|VRMS|DBM}
VOLTage:UNIT?

FUNCTION:SQUare:DCYCLE {<percent>|MINimum|MAXimum}
FUNCTION:SQUare:DCYCLE? [MINimum|MAXimum]

FUNCTION:RAMP:SYMMetry {<percent>|MINimum|MAXimum}
FUNCTION:RAMP:SYMMetry? [MINimum|MAXimum]

OUTPut {OFF|ON}
OUTPut?

OUTPut:LOAD {<ohms>|INFinity|MINimum|MAXimum}
OUTPut:LOAD? [MINimum|MAXimum]

OUTPut:POLarity {NORMal|INVERTed}
OUTPut:POLarity?

OUTPut:SYNC {OFF|ON}
OUTPut:SYNC?
```

## Pulse Configuration Commands

(see page 166 in User's Guide)

```
PULSe:PERiod {<seconds>|MINimum|MAXimum}
PULSe:PERiod? [MINimum|MAXimum]

PULSe
:WIDTh {<seconds>|MINimum|MAXimum}
:WIDTh? [MINimum|MAXimum]
:TRANsition {<seconds>|MINimum|MAXimum}
:TRANsition? [MINimum|MAXimum]
```

## Modulation Commands

(see page 169 in User's Guide)

### AM Commands

```
AM:INTERNAL
:FUNCTION {SIN|SQU|RAMP|NRAMP|TRI|NOISE|USER}
:FUNCTION?

AM:INTERNAL
:FREQUENCY {<frequency>|MINimum|MAXimum}
:FREQUENCY? [MINimum|MAXimum]

AM:DEPTH {<depth in percent>|MINimum|MAXimum}
AM:DEPTH? [MINimum|MAXimum]

AM:SOURCE {INTERNAL|EXTERNAL}
AM:SOURCE?

AM:STATE {OFF|ON}
AM:STATE?
```

### FM Commands

```
FM:INTERNAL
:FUNCTION {SIN|SQU|RAMP|NRAMP|TRI|NOISE|USER}
:FUNCTION?

FM:INTERNAL
:FREQUENCY {<frequency>|MINimum|MAXimum}
:FREQUENCY? [MINimum|MAXimum]

FM:DEVIATION {<peak deviation in Hz>|MINimum|MAXimum}
FM:DEVIATION? [MINimum|MAXimum]

FM:SOURCE {INTERNAL|EXTERNAL}
FM:SOURCE?

FM:STATE {OFF|ON}
FM:STATE?
```

### FSK Commands

```
FSKey:FREQUENCY {<frequency>|MINimum|MAXimum}
FSKey:FREQUENCY? [MINimum|MAXimum]

FSKey:INTERNAL:RATE {<rate in Hz>|MINimum|MAXimum}
FSKey:INTERNAL:RATE? [MINimum|MAXimum]

FSKey:SOURCE {INTERNAL|EXTERNAL}
FSKey:SOURCE?

FSKey:STATE {OFF|ON}
FSKey:STATE?
```

## Sweep Commands

(see page 179 in User's Guide)

```
FREQuency
:START {<frequency>|MINimum|MAXimum}
:START? [MINimum|MAXimum]
:STOP {<frequency>|MINimum|MAXimum}
:STOP? [MINimum|MAXimum]

FREQuency
:CENTer {<frequency>|MINimum|MAXimum}
:CENTer? [MINimum|MAXimum]
:SPAN {<frequency>|MINimum|MAXimum}
:SPAN? [MINimum|MAXimum]

SWEep
:SPACing {LINear|LOGarithmic}
:SPACing?
:TIME {<seconds>|MINimum|MAXimum}
:TIME? [MINimum|MAXimum]

SWEep:STATe {OFF|ON}
SWEep:STATe?

TRIGger:SOURce {IMMediate|EXTernal|BUS}
TRIGger:SOURce?

TRIGger:SLOPe {POSitive|NEGative}
TRIGger:SLOPe?

OUTPut
:TRIGger:SLOPe {POSitive|NEGative}
:TRIGger:SLOPe?
:TRIGger {OFF|ON}
:TRIGger?

MARKer:FREQuency {<frequency>|MINimum|MAXimum}
MARKer:FREQuency? [MINimum|MAXimum]

MARKer {OFF|ON}
MARKer?
```

## Triggering Commands

(see page 195 in User's Guide)

These commands are used for Sweep and Burst only.

```
TRIGger:SOURce {IMMediate|EXTernal|BUS}
TRIGger:SOURce?

TRIGger
*TRG

TRIGger:DELay {<seconds>|MINimum|MAXimum}
TRIGger:DELay? [MINimum|MAXimum]

TRIGger:SLOPe {POSitive|NEGative}
TRIGger:SLOPe?

BURSt:GATE:POLarity {NORMal|INVerted}
BURSt:GATE:POLarity?

OUTPut
:TRIGger:SLOPe {POSitive|NEGative}
:TRIGger:SLOPe?
:TRIGger {OFF|ON}
:TRIGger?
```

## Burst Commands

(see page 187 in User's Guide)

```
BURSt:MODE {TRIGgered|GATed}
BURSt:MODE?

BURSt:NCYCles {<# cycles>|INFinity|MINimum|MAXimum}
BURSt:NCYCles? [MINimum|MAXimum]

BURSt:INTernal:PERiod {<seconds>|MINimum|MAXimum}
BURSt:INTernal:PERiod? [MINimum|MAXimum]

BURSt:PHASe {<angle>|MINimum|MAXimum}
BURSt:PHASe? [MINimum|MAXimum]

BURSt:STATe {OFF|ON}
BURSt:STATe?

UNIT:ANGLE {DEGREE|RADian}
UNIT:ANGLE?

TRIGger:SOURce {IMMediate|EXTernal|BUS}
TRIGger:SOURce?

TRIGger:DELay {<seconds>|MINimum|MAXimum}
TRIGger:DELay? [MINimum|MAXimum]

TRIGger:SLOPe {POSitive|NEGative}
TRIGger:SLOPe?

BURSt:GATE:POLarity {NORMAL|INVerted}
BURSt:GATE:POLarity?

OUTPut
:TRIGger:SLOPe {POSitive|NEGative}
:TRIGger:SLOPe?
:TRIGger {OFF|ON}
:TRIGger?
```

## System-Related Commands

(see page 213 in User's Guide)

```
SYSTem:ERRor?

*IDN?

DISPlay {OFF|ON}
DISPlay?

DISPlay
:TEXT <quoted string>
:TEXT?
:TEXT:CLEar

*RST

*TST?

SYSTem:VERSion?

SYSTem
:BEEPer
:BEEPer:STATe {OFF|ON}
:BEEPer:STATe?

*LRN?

*OPC

*OPC?

*WAI
```

## Arbitrary Waveform Commands

(see page 198 in User's Guide)

```
DATA VOLATILE, <value>, <value>, ...
DATA
  :DAC VOLATILE, {<binary block>|<value>, <value>, ... }
FORMat:BORDer {NORma1|SWApped}
FORMat:BORDer?
DATA:COpy <destination arb name> [ ,VOLATILE]
FUNctio:n:USER {<arb name>1|VOLATILE}
FUNctio:n:USER?
FUNctio:n USER
FUNctio:n?
DATA
  :CATalog?
  :NVOlatile:CATalog?
  :NVOlatile:FREE?
DATA:DELeTe <arb name>
DATA:DELeTe:ALL
DATA
  :ATTRibute:AVErAge? [ <arb name>1]
  :ATTRibute:CFActoR? [ <arb name>1]
  :ATTRibute:POINts? [ <arb name>1]
  :ATTRibute:PTPeak? [ <arb name>1]
```

<sup>1</sup> The names of the built-in arb waveforms are:  
EXP\_RISE, EXP\_FALL, NEG\_RAMP, SINC, and CARDIAC.

## Interface Configuration Commands

(see page 218 in User's Guide)

```
SYSTem:INTErface {GPiB|RS232}
SYSTem:LOCal
SYSTem:RWLock
```

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## Status Reporting Commands

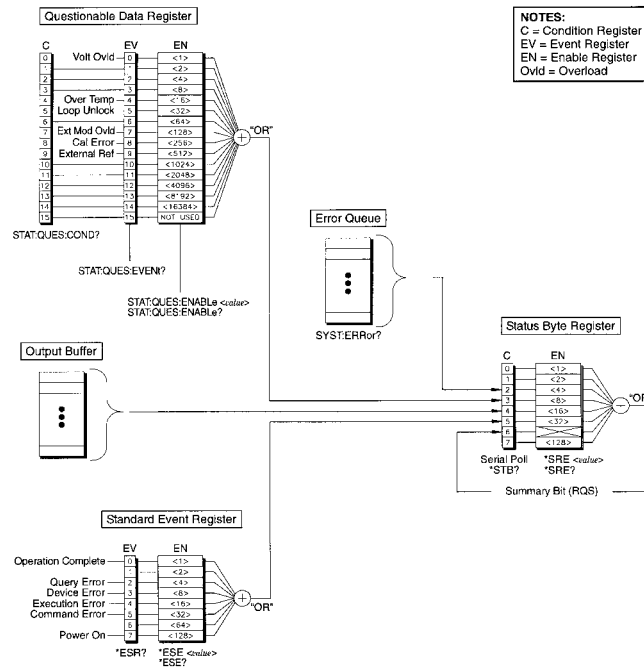
(see page 235 in User's Guide)

```

*STB?
*SRE <enable value>
*SRE?
STATus
:QUESTionable:CONDition?
:QUESTionable[:EVENT]?
:QUESTionable:ENABLe <enable value>
:QUESTionable:ENABLe?
*ESR?
*ESE <enable value>
*ESE?
*CLS
STATus:PRESet
*PSC {0|1}
*PSC?
*OPC
  
```

## SCPI Status System

(see page 225 in User's Guide)



### Phase-Lock Commands

(see page 223 in User's Guide)

```
PHASE {<angle>|MINimum|MAXimum}
PHASE? [MINimum|MAXimum]
PHASE:REFERENCE
PHASE:UNLock:ERRor:STATe {OFF|ON}
PHASE:UNLock:ERRor:STATe?
UNIT:ANGLE {DEGREE|RADIAN}
UNIT:ANGLE?
```

### Calibration Commands

(see page 239 in User's Guide)

```
CALibration?
CALibration
:SECure:STATe {OFF|ON}, <code>
:SECure:STATe?
:SECure:CODE <new code>
:SETup <0|1|2|3| . . . |115>
:SETup?
:VALue <value>
:VALue?
:COUNt?
:STRing <quoted string>
:STRing?
```

### IEEE 488.2 Common Commands

```
*CLS
*ESR?
*ESE <enable value>
*ESE?
*IDN?
*LRN?
*OPC
*OPC?
*PSC {0|1}
*PSC?
*RST
*SAV {0|1|2|3|4}
*RCL {0|1|2|3|4}
*STB?
*SRE <enable value>
*SRE?
*TRG
*TST?
```



## Simplified Programming Overview

### Using the APPLy Command

The APPLy command provides the most straightforward method to program the function generator over the remote interface. For example, the following command string sent from your computer will output a 3 Vpp sine wave at 5 kHz with a -2.5 volt offset.

```
APPL:SIN 5.0E+3, 3.0, -2.5
```

### Using the Low-Level Commands

Although the APPLy command provides the most straightforward method to program the function generator, the low-level commands give you more flexibility to change individual parameters. For example, the following command strings sent from your computer will output a 3 Vpp sine wave at 5 kHz with a -2.5 volt offset.


```
FUNC SIN  
FREQ 5000  
VOLT 3.0  
VOLT:OFFS -2.5
```

### Reading a Query Response

Only the query commands (commands that end with “?”) will instruct the function generator to send a response message. Queries return internal instrument settings. For example, the following command string sent from your computer will read the function generator’s error queue and retrieve the response from the most recent error.

```
dimension statement  
SYST:ERR?  
enter statement
```

### Selecting a Trigger Source

When *Sweep* or *Burst* is enabled, the function generator will accept an immediate internal trigger, a hardware trigger from the rear-panel *Trig In* connector, a manual trigger from the  key, or a software (bus) trigger. By default, the internal trigger source is selected. If you want to use an external or a software trigger source, you must first select that source. For example, the following command strings sent from your computer will output a 3-cycle burst each time the rear-panel *Trig In* connector receives the rising edge of a TTL pulse.

```
BURS:NCYC 3  
TRIG:SLOP POS  
TRIG:SOUR EXT  
BURS:STAT ON
```

## Factory Default Settings

<b>Output Configuration</b>	<b>Factory Setting</b>
Function	Sine wave
Frequency	1 kHz
Amplitude / Offset	100 mVpp / 0.000 Vdc
Output Units	Vpp
Output Termination	50W
Autorange	On
<b>Modulation (AM, FM, FSK)</b>	<b>Factory Setting</b>
Carrier Waveform	1 kHz Sine wave
Modulating Waveform	100 Hz Sine wave
AM Depth	100%
FM Deviation	100 Hz
FSK "Hop" Frequency	100 Hz
FSK Rate	10 Hz
Modulation State	Off
<b>Sweep</b>	<b>Factory Setting</b>
Start / Stop Frequency	100 Hz / 1 kHz
Sweep Time	1 Second
Sweep Mode	Linear
Sweep State	Off
<b>Burst</b>	<b>Factory Setting</b>
Burst Frequency	1 kHz
Burst Count	1 Cycle
Burst Period	10 ms
Burst Starting Phase	0°
Burst State	Off
<b>System-Related Operations</b>	<b>Factory Setting</b>
• Power-Down Recall	• Disabled
Display Mode	On
Error Queue	Errors are Cleared
Stored States, Stored Arbs	No Change
Output State	Off
<b>Triggering Operations</b>	<b>Factory Setting</b>
Trigger Source	Internal (Immediate)
<b>Remote Interface Configuration</b>	<b>Factory Setting</b>
• GPIB Address	• 10
• Interface	• GPIB (IEEE-488)
• Baud Rate	• 57,600 Baud
• Parity	• None (8 data bits)
• Handshake	• DTR / DSR
<b>Calibration</b>	<b>Factory Setting</b>
Calibration State	Secured

Parameters marked with a bullet (•) are stored in *non-volatile* memory.