



**HEWLETT  
PACKARD**

## **LANGUAGE REFERENCE**

# **70900A LOCAL OSCILLATOR**

### **LOCAL OSCILLATOR ROM VERSIONS 860203 OR EARLIER**

This manual applies directly to the following modules:

HP 70300A	Tracking Generator
HP 70310A	Precision Frequency Reference
HP 70900A	Local Oscillator
HP 70902A	IF Section (RES BW 10 Hz–300 kHz)
HP 70903A	IF Section (RES BW 100 kHz–3 MHz)
HP 70904A	RF Section (100 Hz–2.9 GHz)
HP 70905A	RF Section (50 kHz–22 GHz)
HP 70906A	RF Section (50 kHz–26.5 GHz)
HP 70907A	External Mixer Interface

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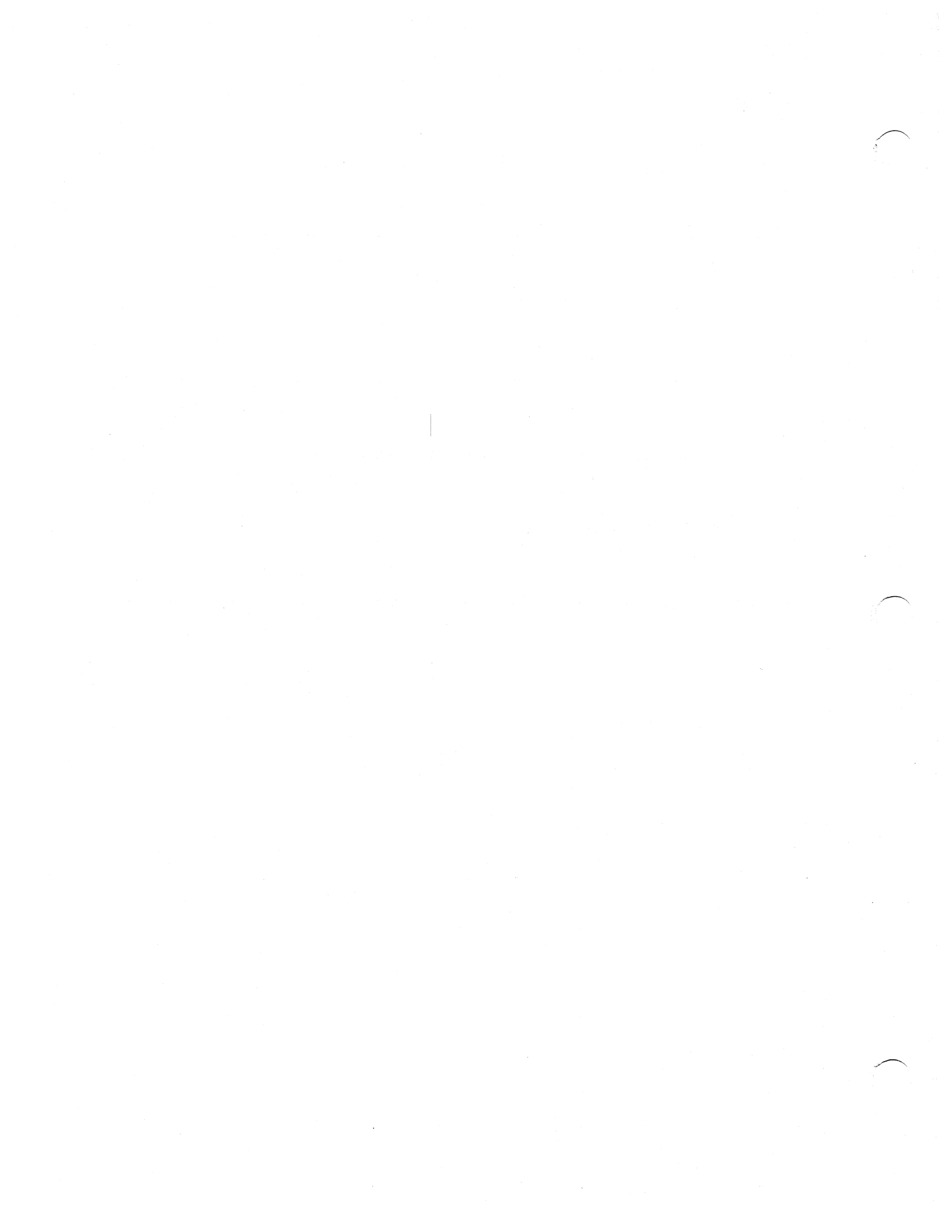
## ASSISTANCE

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## INTRODUCTION

This manual is a language reference for the HP 70900A Local Oscillator firmware. Here you will find a description for each command recognized by the local oscillator. This is a command dictionary; commands are listed alphabetically.

There are several versions of this language in use today. The ROM version which this manual documents is shown on the title page of the manual. To determine the current ROM version in your local oscillator, press [MENU], <CONFIG>, and then <ROM VERSION>. The ROM version date will appear on the display. A ROM version which pre-dates this manual may not contain all of the commands documented here.

Your system may not contain the module necessary for the function of certain commands. Commands that are specific to certain hardware include a statement: "This command can be used only when the HP XXXXX module is configured in your system."

### Where to Start:

If you are totally unfamiliar with HP 71000 programming, do not start with this manual. New programmers should refer to the HP 71000 Operating Manual "Remote Operation" section.

If you are familiar with HP 71000 programming, the command summary at the back of this manual will help direct you.

### Printing History:

This manual's part number and printing date indicate its current edition. The printing date changes when a new edition is printed. Each edition has a corresponding ROM (firmware) version.

New editions of this manual will incorporate all material updated since the previous edition. Update packages may be issued between editions. These will contain replacement and additional pages to be merged into the manual by the user. Each update page will include a revision date at the bottom of the page. A vertical bar in the margin indicates the changes on each page.



## FUNDAMENTAL CONCEPTS

### UNITS:

#### Parameter Units:

Parameter units are the fundamental units normally associated with a particular parameter. The fundamental amplitude units can be changed with the *ABSOLUTE AMPLITUDE UNITS (AUNITS)* command. The following is a list of parameter units:

Frequency	Hz
Amplitude	set by AUNITS
Time	Sec
Current	Amp
Resistance	Ohms

#### Measurement Units:

Measurement units are the internal units stored in trace data. For log data the measurement units are 16 bit 2's complement numbers representing hundredth's of dBm. Log measurement units are independent of any reference level or scale commands. For linear data, measurement units are defined as 0=bottom of screen, 10000=top of screen.

#### User Units For Graphics:

User units are determined by the *SCALE GRAPHICS (SCALE)* command. These are set by the user to facilitate his own graphics applications.

When display data is output to the display in measurement units scaling is set appropriately for the current scale and reference level. Rather than force the user to consider the current reference level and scale states, user units allow specification of measurement-independent graphics.

#### User Defined Variables:

User defined variables are 64 bit IEEE real representations. No parameter units (eg. Hz, dBm, etc) are assumed.

#### User Defined Traces:

User defined traces consist of 16 bit 2's complement integers. There are no unit assumptions made.

## TRACE OPERATIONS:

If two traces have different lengths, the smallest length is used for the specified span. The longer trace will only acquire data until the shorter trace is filled up. When a trace of a larger length is operated on and stored in a trace of shorter length, the trace is truncated to fit. When a trace of a shorter length is operated on and stored in trace of longer length, the last trace element is extended for operations with the longer length. For example, a single element trace would act like a display line in trace operations.



## COMMANDS

### SYNTAX CONVENTIONS:

#### Circle or Oval:

A Circle or Oval contains literal characters.

#### Rectangle:

A rectangle contains the description of a syntax element defined elsewhere (See Appendix A).

#### Solid Line:

A solid line represented the recommended path.

#### Dotted Line:

A dotted line represents an optional path. When using the optional path, the syntax rules are not as exacting as the recommended path. A space will not properly separate two numbers even though a strict reading of some option paths might imply this.

#### Space:

Spaces are allowed anywhere in the input data stream except where binary data is accepted or within alpha identifiers.

#### Comma:

Commas are used as parameter separators. Spaces are allowed, but not recommended as an alternative parameter separator.

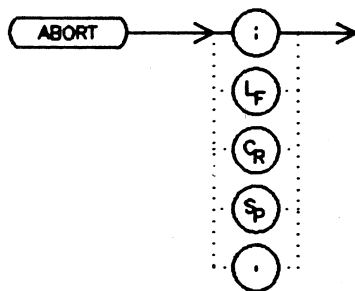
#### Semicolon:

Semicolon is the recommended command terminator. Any number of the optional commands' terminators (line feed, carriage return, space, comma) are also allowed at these command termination points.

# ABORT

## ABORT USER FUNCTIONS

### COMMAND SYNTAX:

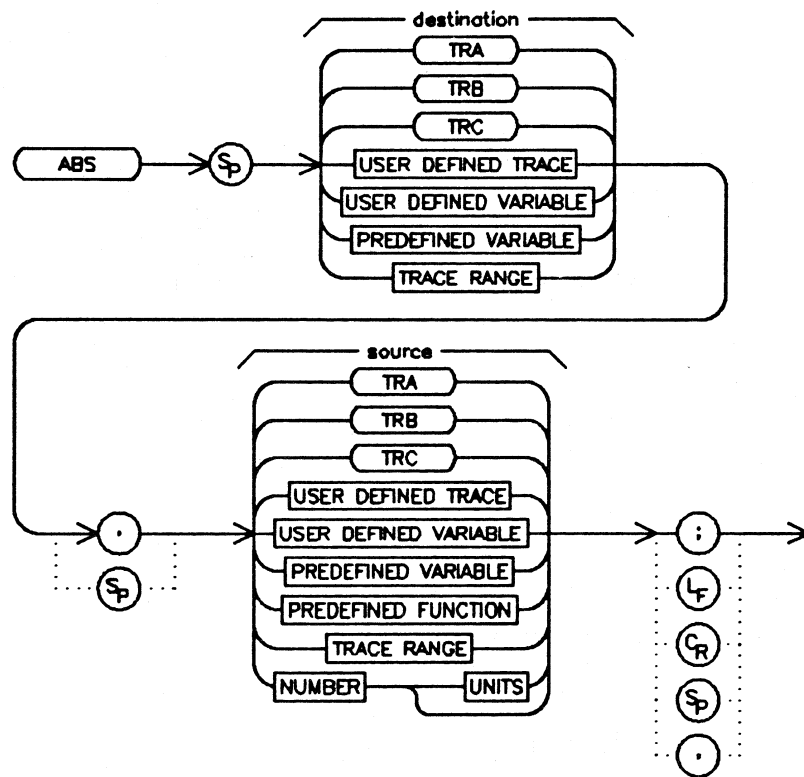


### DESCRIPTION:

If a user defined function is executing, nested to any level, it is aborted and control is returned to the normal command input level.

# ABS ABSOLUTE

## COMMAND SYNTAX:

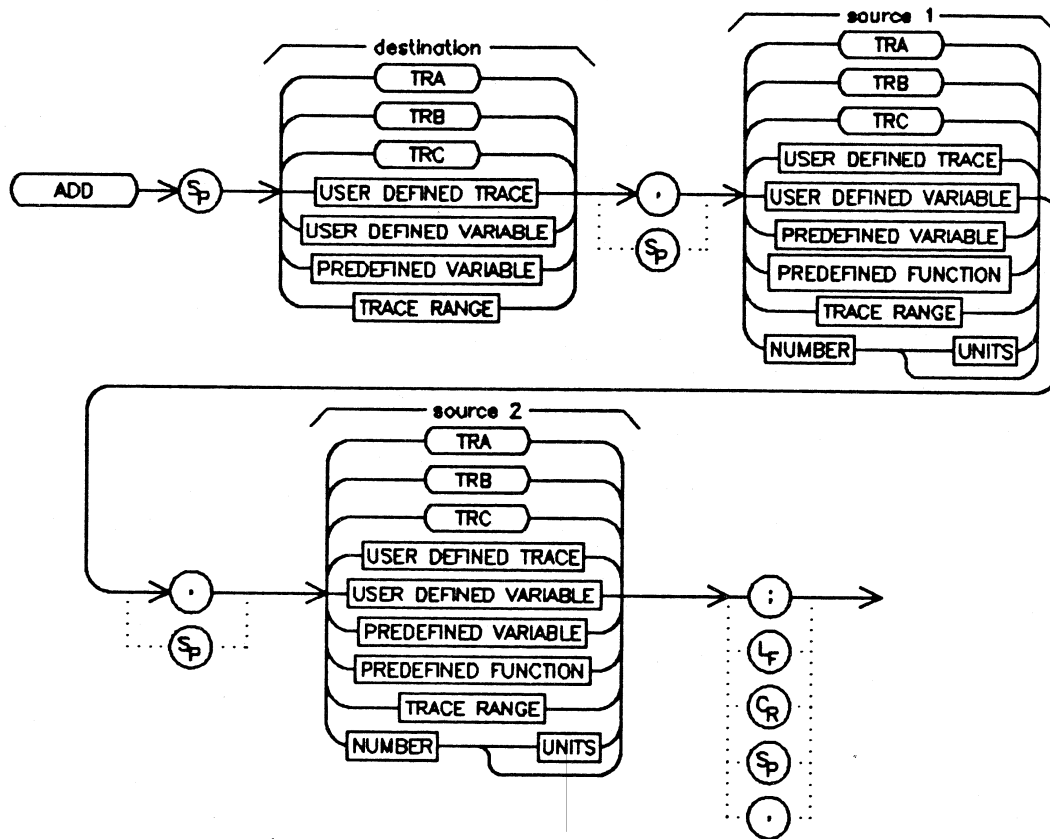


## DESCRIPTION:

The absolute value of the source is put in the destination.

# ADD ADDITION

COMMAND SYNTAX:



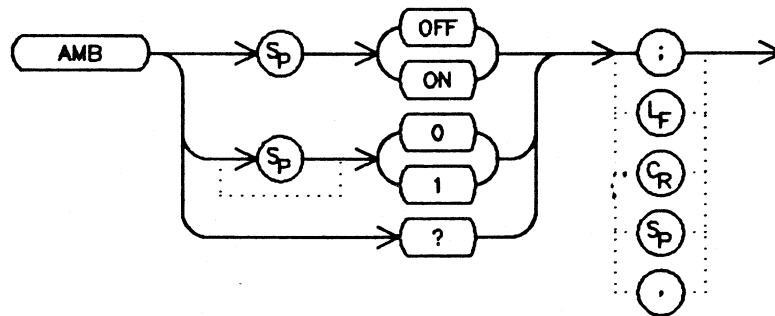
## DESCRIPTION:

The values of source 1 and source 2 are added and put in the destination.

# AMB

## TRACE A MINUS TRACE B

### COMMAND SYNTAX:



### DESCRIPTION:

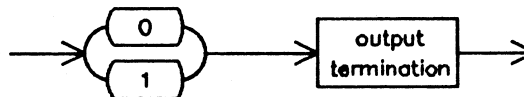
Trace B is subtracted from Trace A and the result is stored in Trace A. Trace B is frozen, no longer being affected by input data (writing status Off). As new data is measured, the subtraction is performed as each data point is measured. The command *TRACE A MINUS TRACE B PLUS DISPLAY LINE (AMBPL)* overrides this command.

A - B ---> A

### PRESET STATE:

OFF

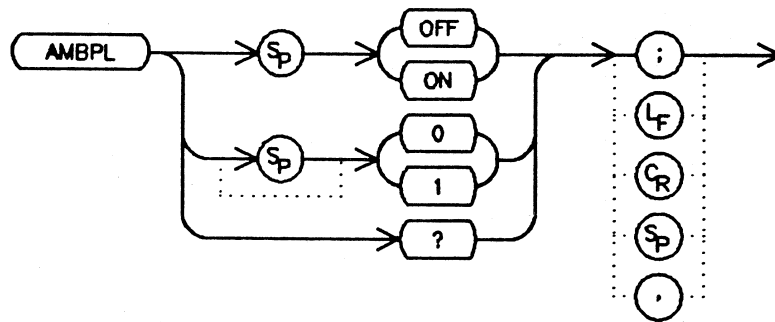
### QUERY RESPONSE:



# AMBPL

## TRACE A MINUS TRACE B PLUS DISPLAY LINE

COMMAND SYNTAX:



DESCRIPTION:

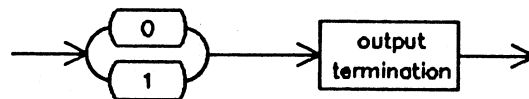
Trace B is subtracted from Trace A, the display line is added, and the result is stored in Trace A. Trace B is frozen, no longer being affected by input data (writing status Off). As new data is measured, the subtraction and addition is performed point by point. This command overrides the command *TRACE A MINUS TRACE B (AMB)*.

A - B + DL --> A

PRESET STATE:

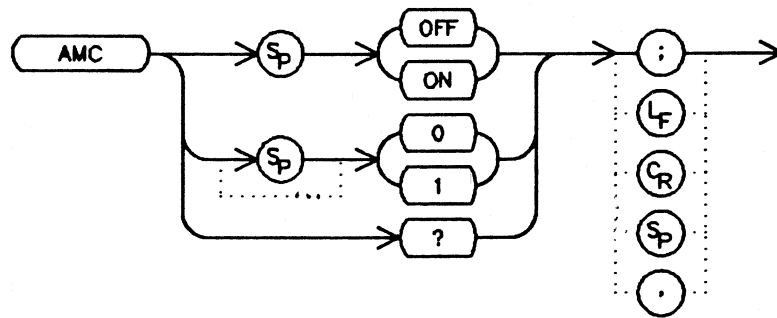
OFF

QUERY RESPONSE:



TRACE A MINUS TRACE C

COMMAND SYNTAX:



DESCRIPTION:

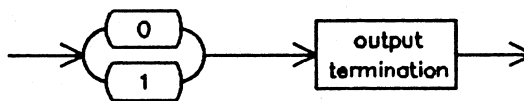
Trace C is subtracted from Trace A and the result is stored in Trace A. Trace C is frozen, no longer being affected by input data (writing status Off). As new data is measured, the subtraction is performed as each data point is measured.

A - C --> A

PRESET STATE:

OFF

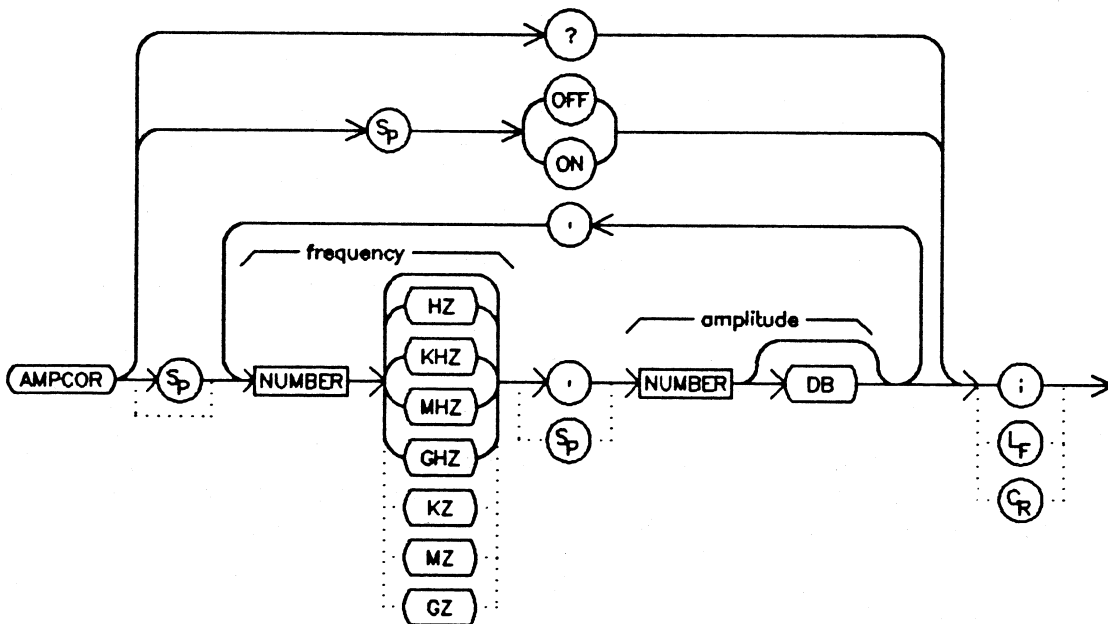
QUERY RESPONSE:



# AMPCOR

## AMPLITUDE CORRECTION

### COMMAND SYNTAX:



### DESCRIPTION:

The frequency and amplitude data points are used as correction points across the frequency range determined by the first and last correction point. The frequency values must be increasing values with each data point, otherwise the new frequency amplitude pair will be thrown out and an error will be generated. Between points the correction value is interpolated. The correction value is added to the measured result. When measuring outside of the first and last correction points these values are used as the correction value. Amplitude correction values are part of the user state. This means that there is one amplitude correction function per instrument that is not included in the save and recall Trace storage. Amplitude correction ON/OFF control is included in the save and recall instrument state.

The maximum number of correction data points is 20. Correction may be specified to the nearest hundredth of a dB.

The response to a query is the list of frequency amplitude pairs stored in the amplitude correction function.

### PRESET STATE:

OFF



# AMPCOR AMPLITUDE CORRECTION

## PARAMETER RANGE:

### Frequency:

Minimum: 0  
Maximum: 1000 GHz

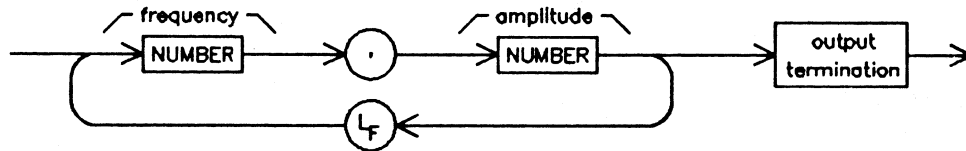
### Amplitude:

Minimum: -100 dB  
Maximum: 100 dB

## FUNDAMENTAL UNIT:

Frequency: Hz  
Amplitude: dB

## QUERY RESPONSE:

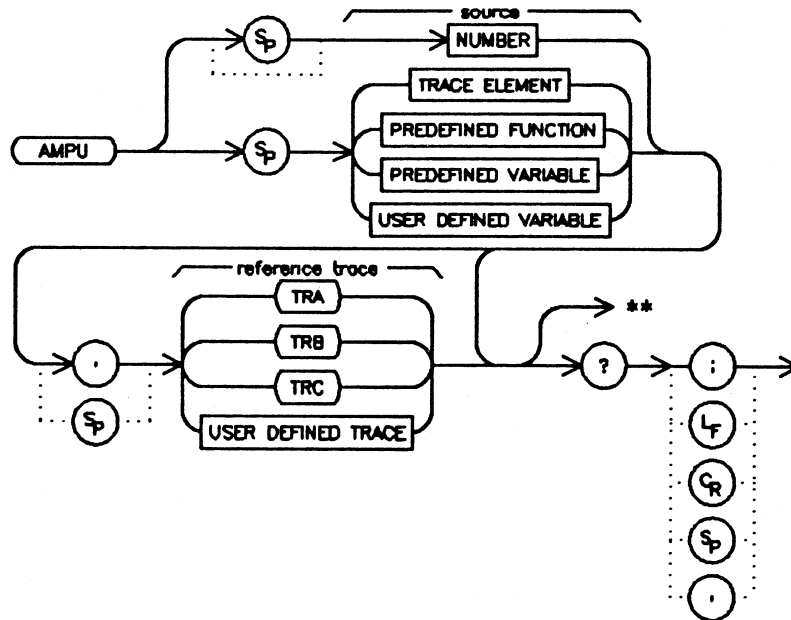


When AMPCOR is OFF the response is 0,0.

# AMPU

## AMPLITUDE UNIT CONVERSION

### COMMAND SYNTAX:

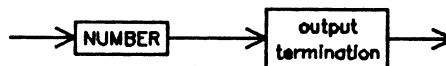


\*\* For use as a Predefined Function

### DESCRIPTION:

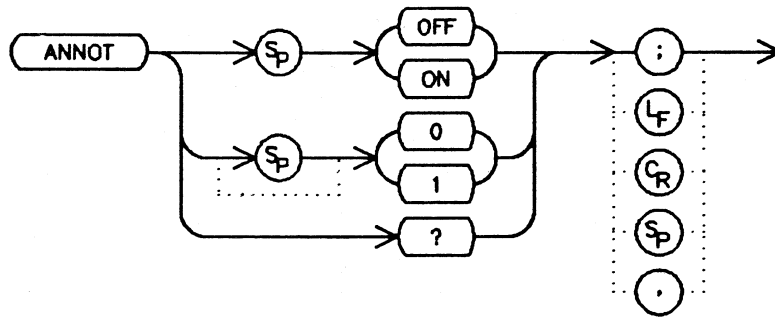
The source value is converted from measurement units to amplitude units based on the trace conditions of the reference trace. If the reference trace is omitted, the current measurement conditions (reference level and vertical scale) are used. If the reference trace was taken in absolute amplitude mode, the resultant amplitude value is based upon the current *ABSOLUTE AMPLITUDE UNITS (AUNITS)*. If the reference trace was taken in relative amplitude mode, the resultant amplitude value is in dB.

### QUERY RESPONSE:



# ANNOT ANNOTATION ON/OFF

## COMMAND SYNTAX:



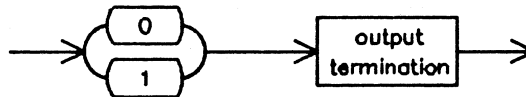
## DESCRIPTION:

The display annotation is turned on or off with this command. When the display annotation is turned off, the total sweep to sweep time can be decreased.

## PRESET STATE:

ON

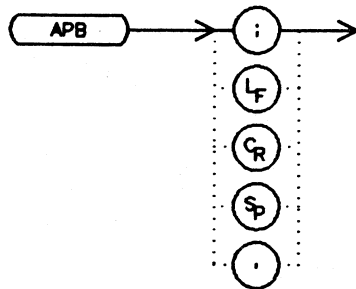
## QUERY RESPONSE:



# APB

## TRACE A PLUS TRACE B

COMMAND SYNTAX:



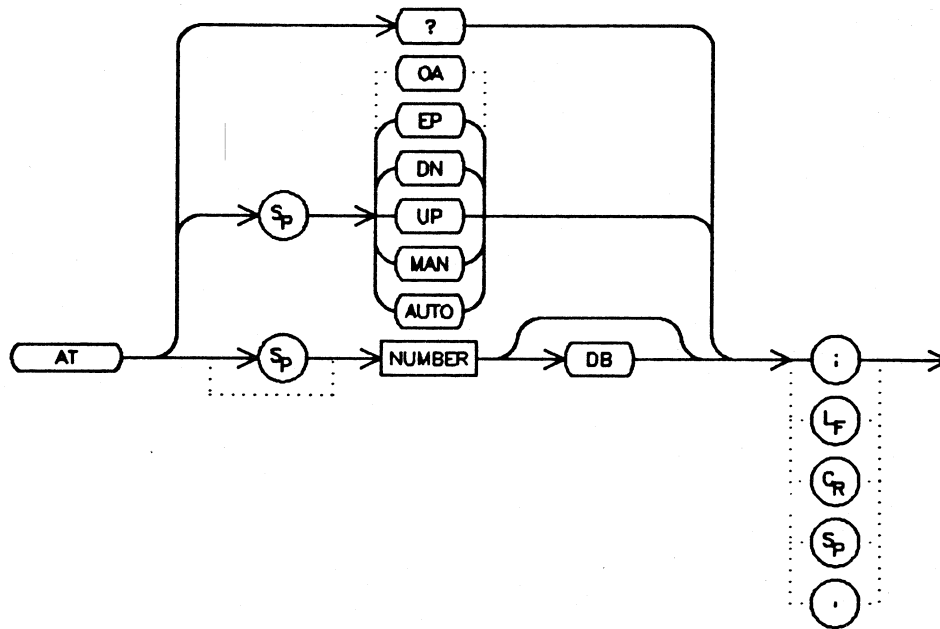
### DESCRIPTION:

Trace B is added to Trace A and the result is stored in Trace A. This is done immediately and not on a repetitive basis, and is equivalent to the the command "ADD TRA,TRA,TRB;".

A + B --> A

# AT INPUT ATTENUATOR

## COMMAND SYNTAX:



## DESCRIPTION:

The input attenuator function sets the amount of attenuation between the input and the first mixer. This may be automatically determined or manually set

The attenuator may be set to 0 dB only by numeric entry.

## COUPLING:

Auto, The minimum value which satisfies:  
 $AT \geq \text{max\_input\_level} - \text{max\_mixer\_level}$   
 $AT > 0$   
 where  $\text{max\_mixer\_level}$  is set by the *MIXER LEVEL (ML)* command and  $\text{max\_input\_level}$  is set by the *MAXIMUM INPUT LEVEL (MIL)* command.

## PRESET STATE:

Auto Coupled.

# AT

## INPUT ATTENUATOR

### PARAMETER RANGE:

Minimum: 0  
Maximum: Hardware Limit

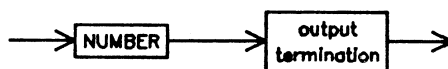
### STEP INCREMENT:

Dependent upon hardware resolution (typically, 10 dB).

### FUNDAMENTAL UNIT:

dB

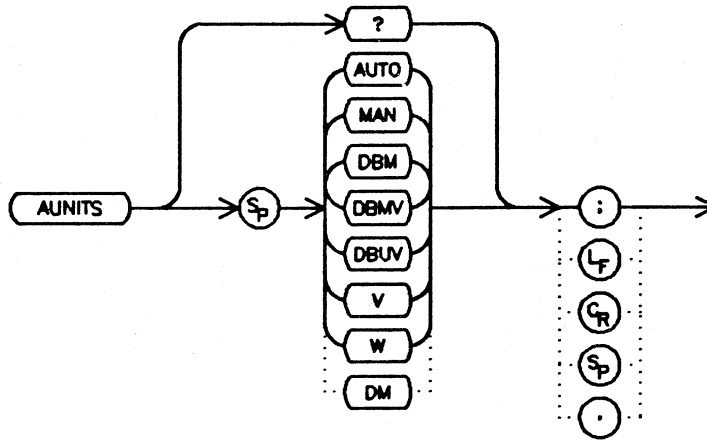
### QUERY RESPONSE:



# AUNITS

## ABSOLUTE AMPLITUDE UNITS

**COMMAND SYNTAX:**



**DESCRIPTION:**

The *ABSOLUTE AMPLITUDE UNITS (AUNITS)* function sets the absolute amplitude units for input, output, and display.

**COUPLING:**

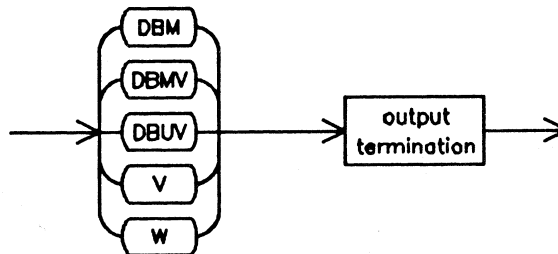
**AUTO**

Log Scale: *AUNITS* is DBM  
 Linear Scale: *AUNITS* is V

**PRESET STATE:**

**AUTO**

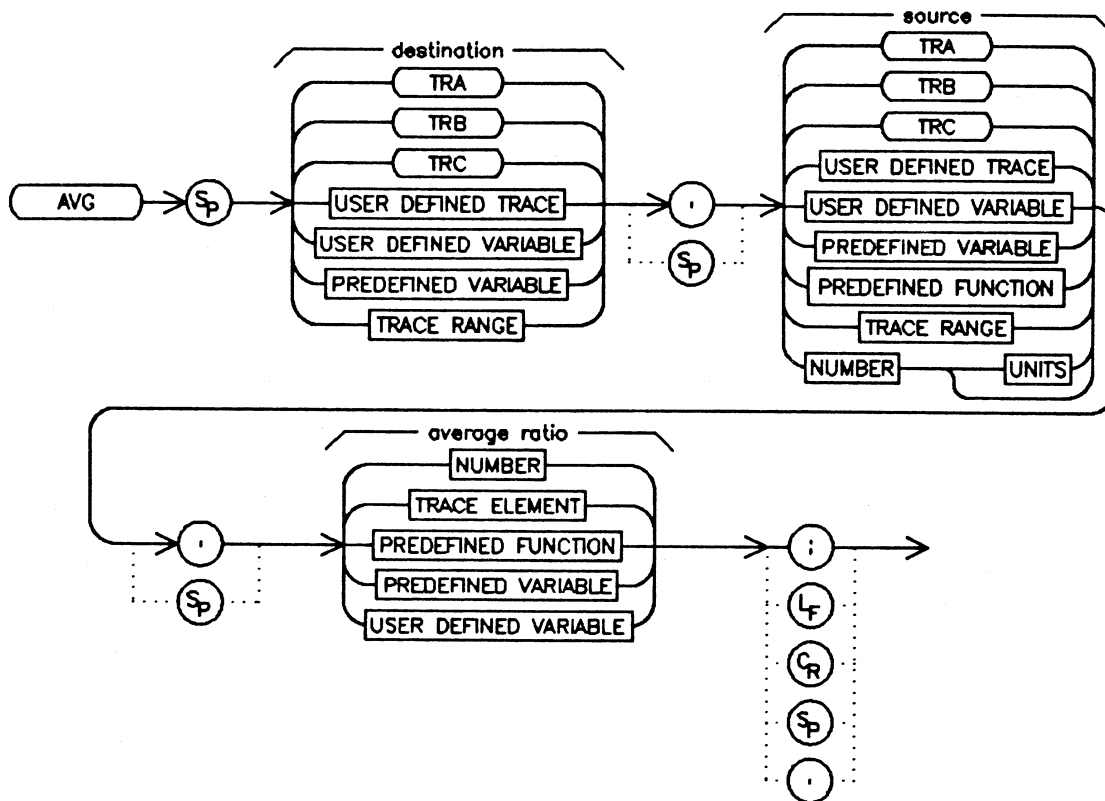
**QUERY RESPONSE:**



# AVG

## AVERAGE

### COMMAND SYNTAX:



### DESCRIPTION:

The data in the source and destination are averaged and stored in the destination. The average ratio controls the portion of the result from each input.

$$DEST_{new} = ( (RATIO - 1) * DEST_{old} + SOURCE ) / RATIO$$

### PARAMETER RANGE:

#### Average Ratio

0 is not allowed

Minimum: -32767

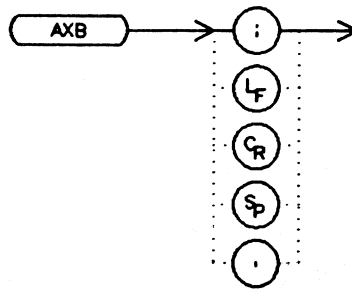
Maximum: +32767



AXB

## TRACE A EXCHANGE TRACE B

### COMMAND SYNTAX:



### DESCRIPTION:

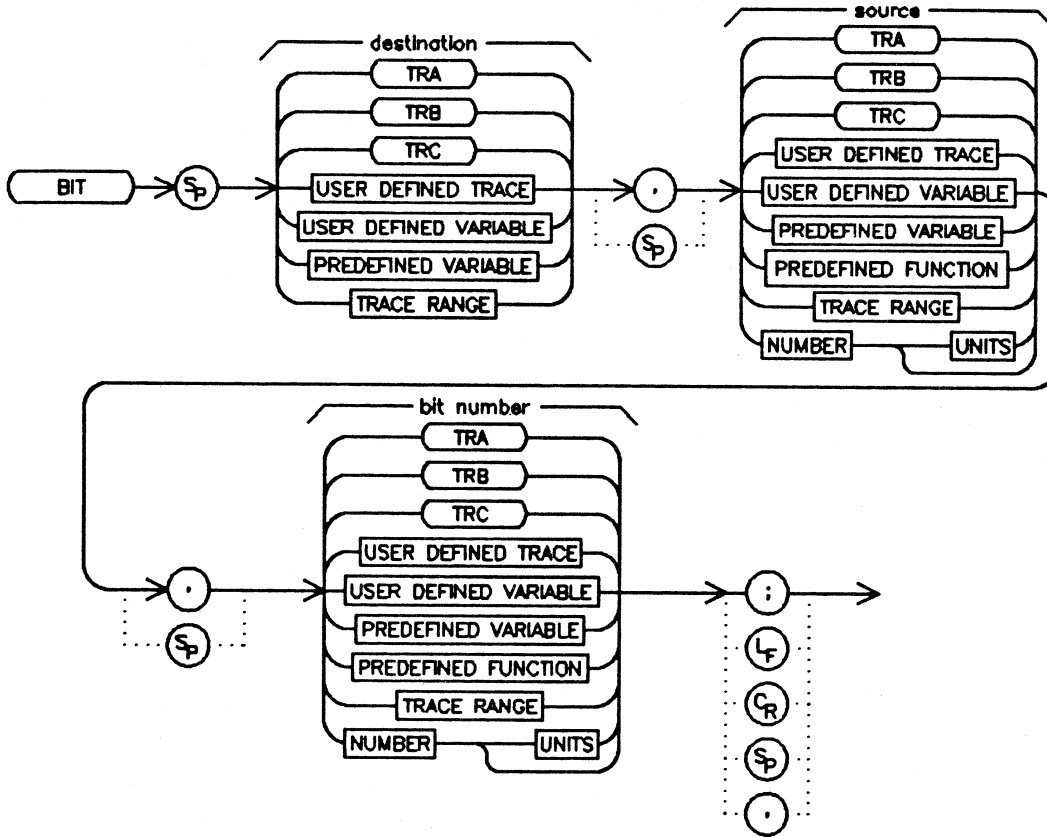
Trace B and Trace A are exchanged. Both Trace A and Trace B are frozen, no longer being affected by the input data.

A <--> B

# BIT

## BIT TEST

### COMMAND SYNTAX:

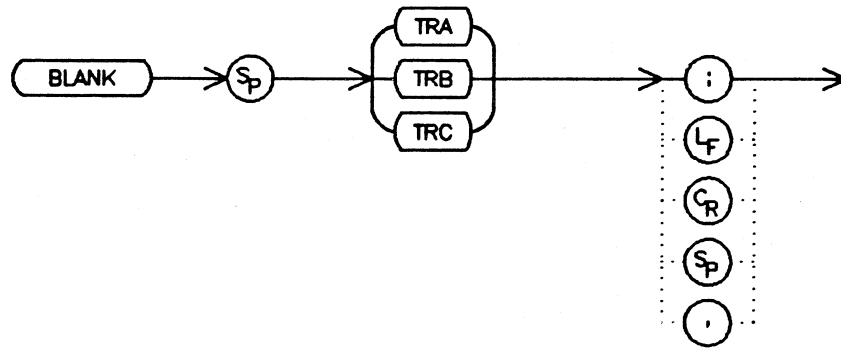


### DESCRIPTION:

The specified bit of the trace element is returned as a number 0 or 1 in the destination. The least significant bit is bit 0.

# BLANK BLANK TRACE

## COMMAND SYNTAX:



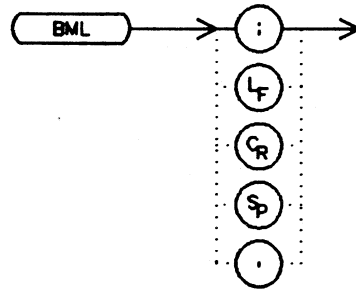
## DESCRIPTION:

The *BLANK TRACE* (*BLANK*) command disconnects the Trace from the input data source. The Trace is also disabled from being displayed.

# BML

## TRACE B MINUS DISPLAY LINE

COMMAND SYNTAX:



### DESCRIPTION:

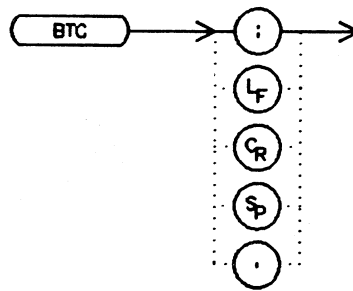
The display line is subtracted from Trace B and the result is stored in Trace B. The display of Trace B is enabled. Trace B is frozen and is no longer affected by the input data.

B - DL --> B

**BTC**

**MOVE TRACE B TO TRACE C**

**COMMAND SYNTAX:**



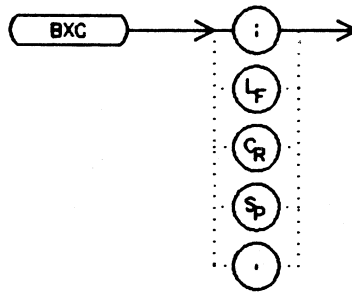
**DESCRIPTION:**

Trace B is moved to Trace C. Trace C is disconnected from the input data source. The display of Trace C is not affected by this command.

# BXC

## TRACE B EXCHANGE TRACE C

COMMAND SYNTAX:



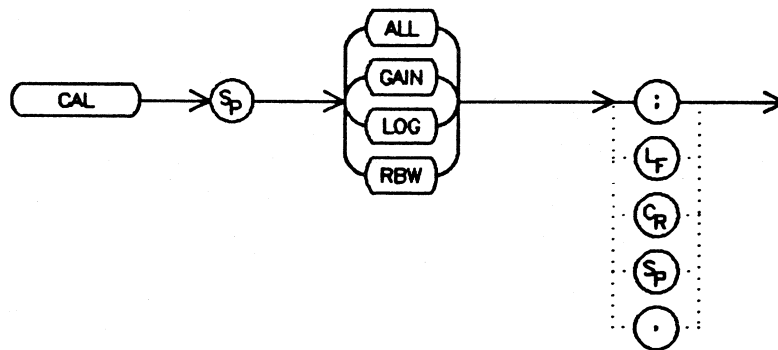
### DESCRIPTION:

Trace B is exchanged with Trace C. Both Trace B and Trace C are frozen and no longer affected by the input data.

B <--> C

# CAL CALIBRATE

## COMMAND SYNTAX:



## DESCRIPTION:

Several calibration functions can be performed by the instrument.

The calibration command initiates a calibration according to the CAL parameters. The calibration source, frequency, and power can be entered with the the *CALIBRATION SOURCE (CALSRC)*, *CALIBRATION FREQUENCY (CALFREQ)*, and *CALIBRATION POWER (CALPWR)* commands. The calibrate parameters are described below.

### ALL:

All correction factors.

### GAIN:

Attenuation and amplification gain corrections. (The log fidelity calibration must be done first for accurate results.)

### LOG:

Log amplifier fidelity.

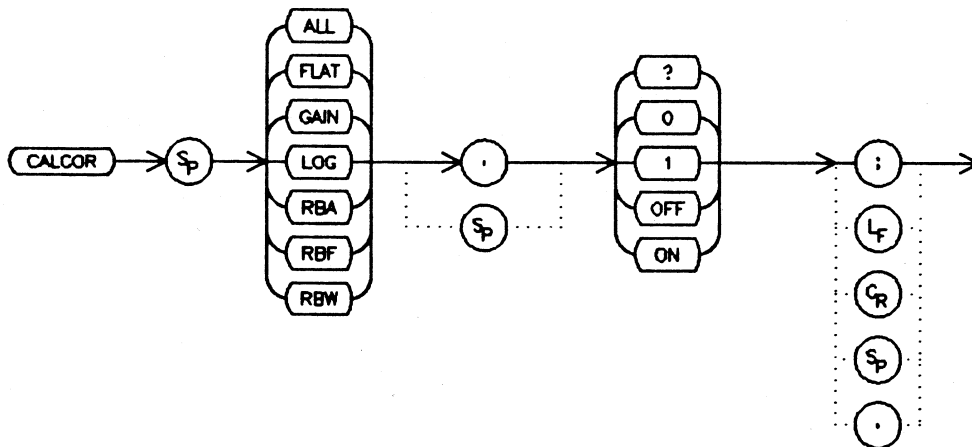
### RBW:

Resolution bandwidth filter amplitude and frequency corrections. (The log fidelity calibration must be done first for accurate results.)

# CALCOR

## CALIBRATION CORRECTION

COMMAND SYNTAX:



### DESCRIPTION:

There are several calibration functions performed by the instrument. These can be turned off to facilitate diagnostics or user supplied calibration. It is expected that the user will provide his own calibration procedures when the internal calibration functions are turned off.

The *CALIBRATION CORRECTION* (CALCOR) parameters are:

#### ALL:

All correction factors.

#### FLAT:

Flatness - frequency dependent gain correction (internal corrections not *AMPCOR*).

#### GAIN:

Attenuation and amplification gain corrections.

#### LOG:

Log amplifier fidelity.

#### RBA:

Resolution bandwidth filter amplitude correction.

#### RBF:

Resolution bandwidth filter frequency correction.



# CALCOR CALIBRATION CORRECTION

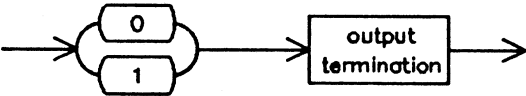
**RBW:**

Resolution bandwidth filter amplitude and frequency corrections.

**PRESET STATE:**

ALL ON

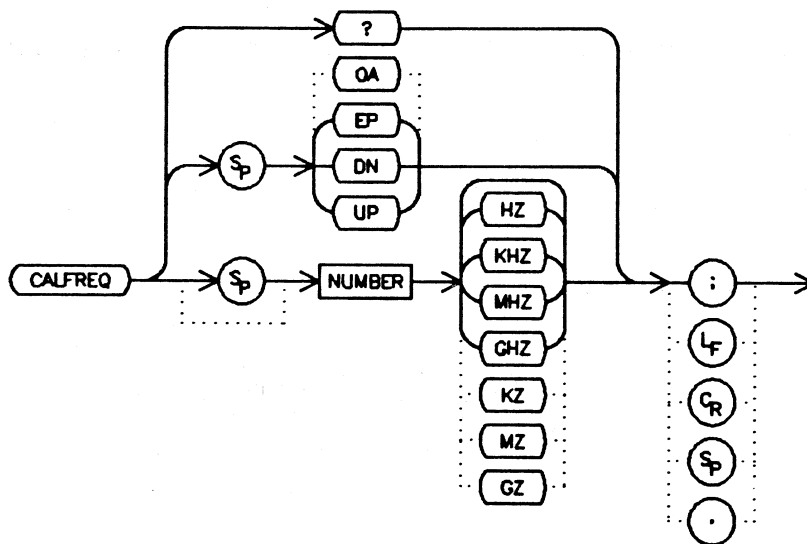
**QUERY RESPONSE:**



# CALFREQ

## CALIBRATION FREQUENCY

### COMMAND SYNTAX:



### DESCRIPTION:

The calibration frequency can be specified for either an external source (one which requires external cabling) or an internal source (if there is more than one frequency available). If the frequency does not exist for an internal source, an error is flagged and no operation is performed. The *CALIBRATION SOURCE* (*CALSRC*) command specifies whether an internal or external calibration source is expected.

Whenever an *INPUT* command is executed, the analyzer is set to the default *CALIBRATION SOURCE* (*CALSRC*), *CALIBRATION FREQUENCY* (*CALFREQ*), and *CALIBRATION POWER* (*CALPWR*). Using the *CALFREQ* command, the user can override this default frequency.

### PRESET STATE:

300 MHz (Hardware dependent)

### PARAMETER RANGE:

Minimum: 0  
Maximum: 1000 GHz

# CALFREQ CALIBRATION FREQUENCY

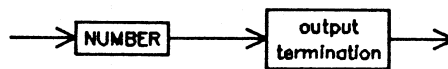
**STEP INCREMENT:**

10% of Span

**FUNDAMENTAL UNIT:**

Hz

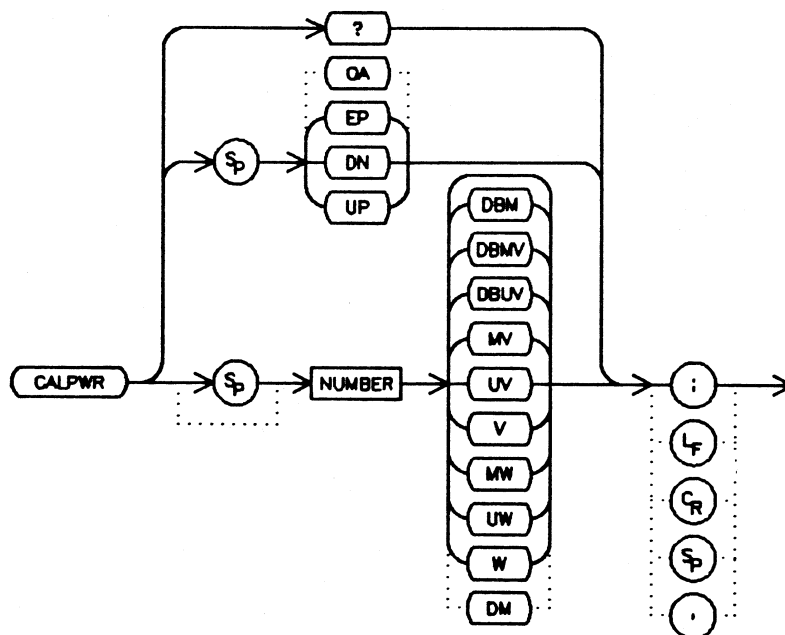
**QUERY RESPONSE:**



# CALPWR

## CALIBRATION POWER

COMMAND SYNTAX:



### DESCRIPTION:

The calibration power can be specified for an external source (one which requires external cabling) or an internal source (if there is more than one amplitude available at the frequency specified by *CALIBRATION FREQUENCY (CALFREQ)*). The *CALIBRATION SOURCE (CALSRC)* command specifies whether an internal or external calibration source is expected. If the amplitude does not exist from an internal source, an error is flagged and no operation is performed.

Whenever an *INPUT* command is executed, the analyzer is set to the default *CALIBRATION SOURCE (CALSRC)*, *CALIBRATION FREQUENCY (CALFREQ)*, and *CALIBRATION POWER (CALPWR)*. The user can override the default calibration power using the *CALPWR* command.

### PRESET STATE:

-10 dBm

### PARAMETER RANGE:

Minimum: -300 dBm

Maximum: function of the maximum hardware input power, ML, RLPOS, and display scale (LOG/LN).

# CALPWR CALIBRATION POWER

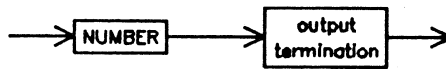
## STEP INCREMENT:

1 vertical scale division

## FUNDAMENTAL UNIT:

Set by *ABSOLUTE AMPLITUDE UNITS (AUNITS)*

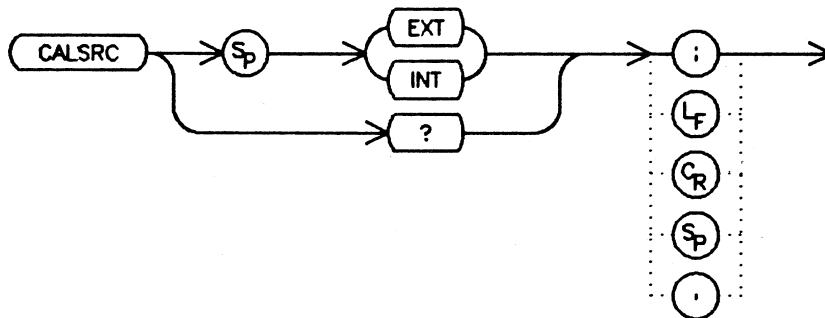
## QUERY RESPONSE:



# CALSRC

## CALIBRATION SOURCE

### COMMAND SYNTAX:



### DESCRIPTION:

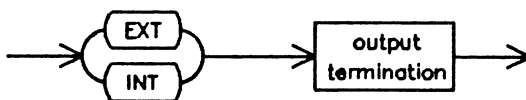
Internal or external calibration source can be selected. Internal source is a source in the current input path that can be switched in without the use of external cabling. An external source is connected with external cables. A built in source from another module is considered an external source.

Whenever an *INPUT* command is executed, the analyzer picks the default *CALIBRATION SOURCE* (*CALSRC*) (internal/external), *CALIBRATION FREQUENCY* (*CALFREQ*), and *CALIBRATION POWER* (*CALPWR*). Using this command, the user can override the default calibration source.

### PRESET VALUE:

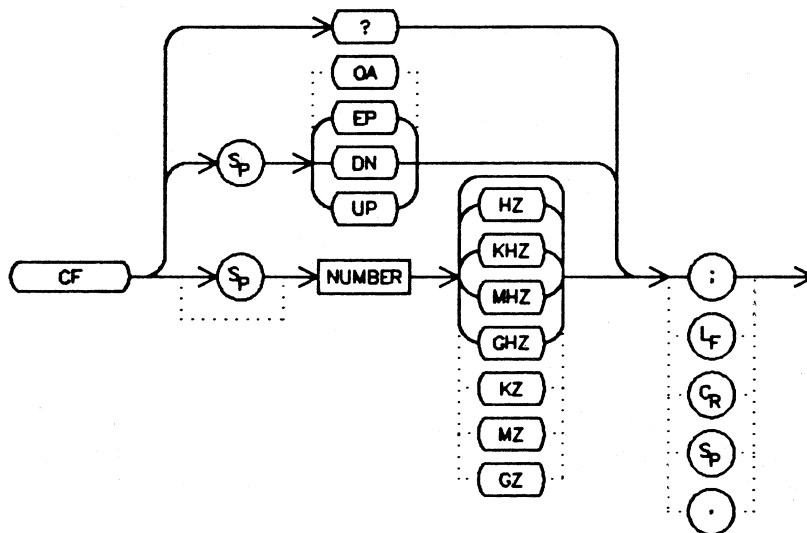
Determined by the default input selector (*INPUT 1*).

### QUERY RESPONSE:



# CF CENTER FREQUENCY

**COMMAND SYNTAX:**



**DESCRIPTION:**

The center frequency function sets the center frequency of the measured frequency spectrum. Span remains constant. Start and Stop frequency are changed with changes in center frequency.

**COUPLING:**

$$\text{Center Frequency} = (\text{Stop} + \text{Start})/2 \text{ (in Start-Stop mode)}$$

**PRESET STATE:**

One-half of the sum of the minimum frequency and the maximum frequency allowed by the hardware.

**PARAMETER RANGE:**

+/- 1000 GHz

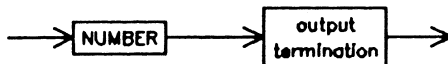
**STEP INCREMENT:**

Set by SS command.

**FUNDAMENTAL UNIT:**

Hz

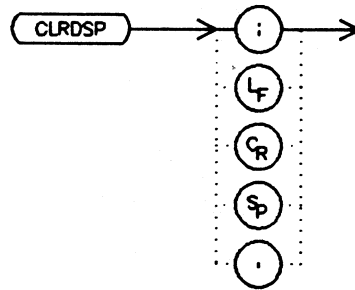
**QUERY RESPONSE:**



# CLRDSP

## CLEAR DISPLAY

COMMAND SYNTAX:



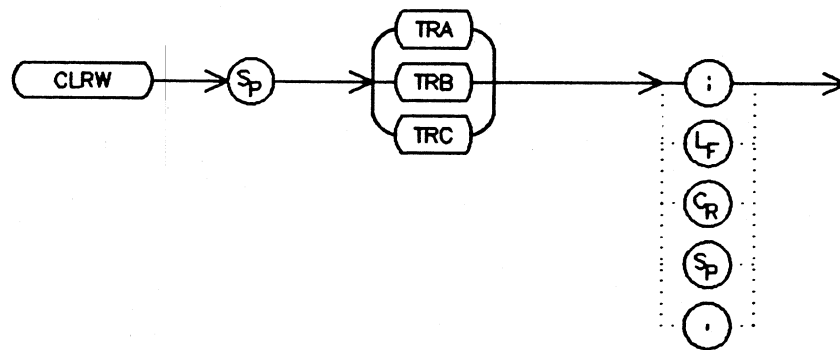
### DESCRIPTION:

All user supplied display graphics and text are removed. All referenced items are deleted. *CLEAR DISPLAY (CLRDSP)* is executed on instrument preset.



# CLRW CLEAR WRITE

## COMMAND SYNTAX:



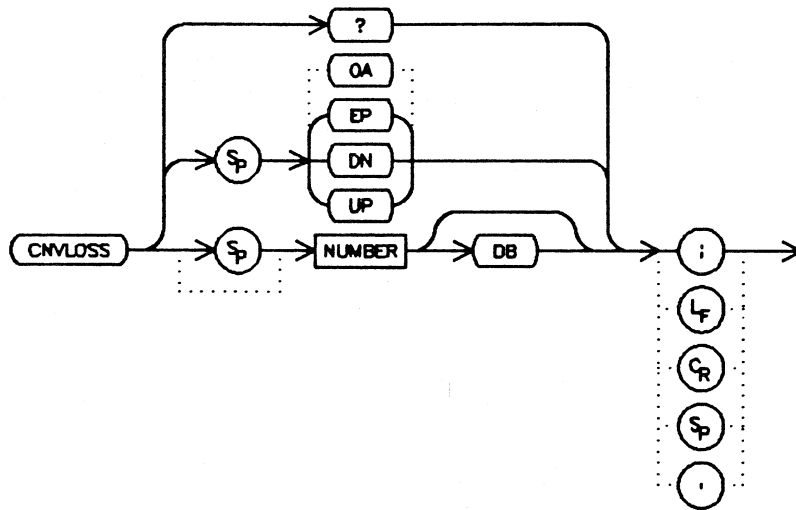
## DESCRIPTION:

The clear write function causes a sequence of events to occur. First, each element in the indicated Trace is set to the bottom of screen value. Then, new data from the detector is put in the Trace with each sweep. Trace display is enabled for the specified Trace.

# CNVLOSS

## CONVERSION LOSS

COMMAND SYNTAX:



### DESCRIPTION:

Conversion loss compensates for losses that are not within the instrument system. The conversion loss command can be used to calibrate the input of an external mixer to the measurement results.

### PRESET STATE:

0

### PARAMETER RANGE:

+/- 100 dBm

### STEP INCREMENT:

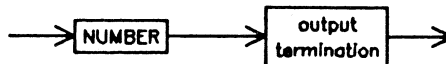
LOG: 1 Vertical Scale Division

LINEAR: 1 Vertical Scale Division at Top of Screen (.915 dB)

### FUNDAMENTAL UNIT:

dB

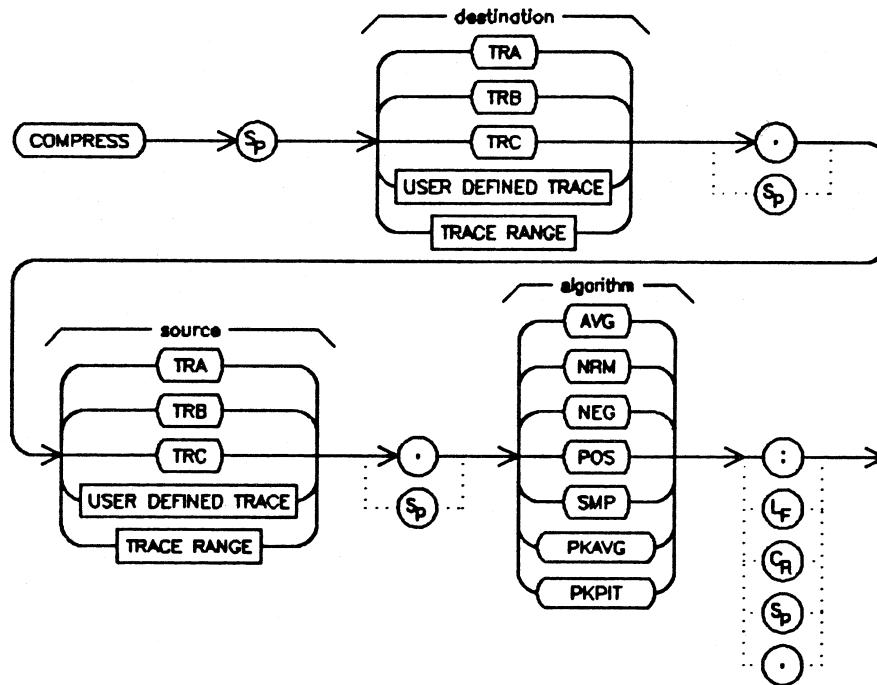
### QUERY RESPONSE:



# COMPRESS

## COMPRESS TRACE

### COMMAND SYNTAX:



### DESCRIPTION:

The *COMPRESS* command stores a compressed copy of the source Trace into a smaller destination Trace. The source Trace is divided into the same number of intervals as points in the destination Trace, and the data within each interval compressed into the value for the corresponding destination trace point. The means used to compress the data is given as an argument to the command. The seven options available are:

#### Average (AVG):

The average of the points within an interval is used.

#### Negative (NEG):

The lowest value in each interval is used.

#### Normal (NRM):

NRM computes the compressed value of the interval by using NEG and POS values on alternate points.

#### Positive (POS):

Specifying POS selects the highest point in the interval as the compressed value

## COMPRESS

### COMPRESS TRACE

#### Peak Average (PKAVG):

The PKAVG algorithm will select the difference of the peak and the average value of the interval as the compressed value.

#### Peak Pit (PKPIT):

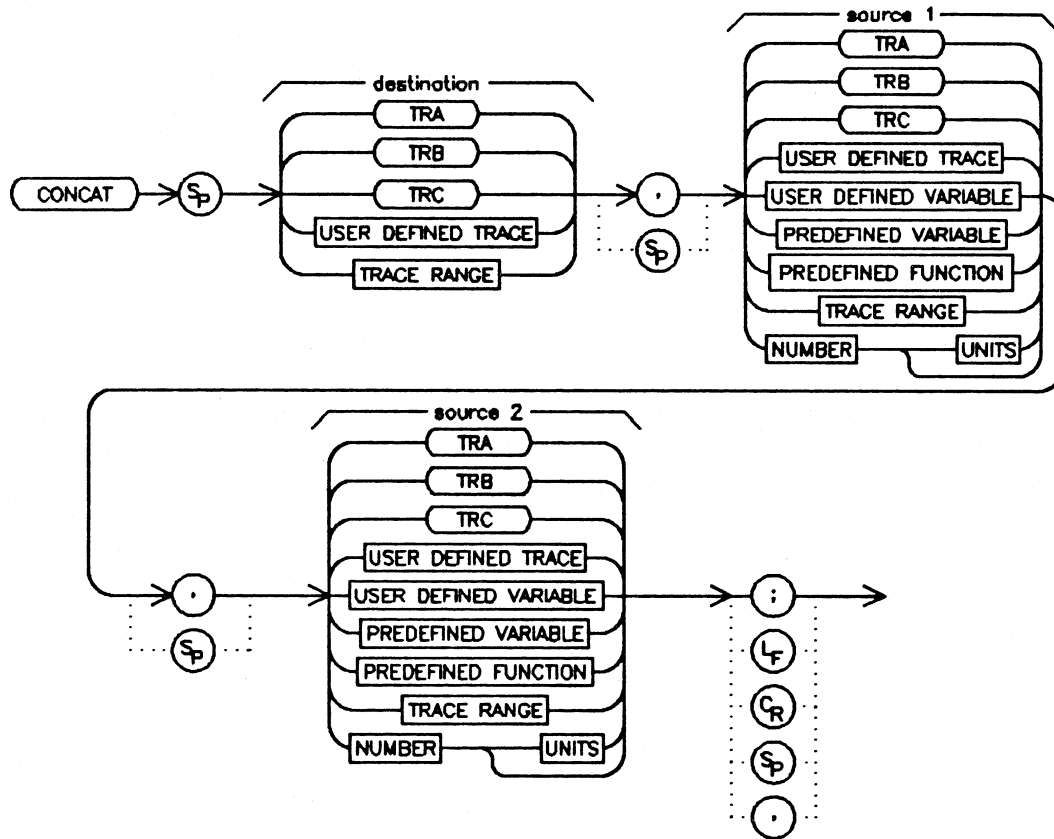
The PKPIT algorithm returns the difference between the positive and negative peaks within the interval.

#### Sample (SMP):

Specifying SMP selects the last point in the interval as the compressed value.

# CONCAT CONCATENATE

## COMMAND SYNTAX:



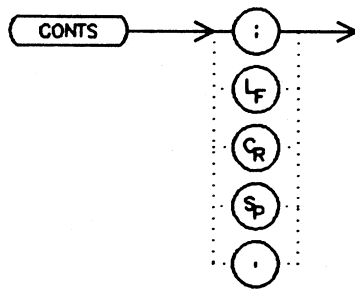
## DESCRIPTION:

The Trace at source 2 is concatenated to the end of the Trace at source 1 and stored at destination.

# CONTS

## CONTINUOUS SWEEP

### COMMAND SYNTAX:

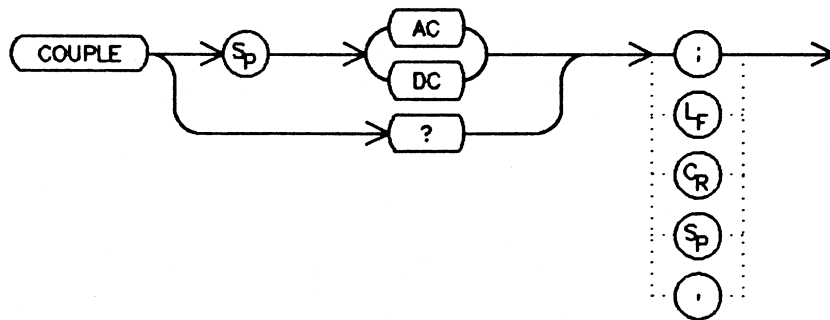


### DESCRIPTION:

This function allows another sweep at the completion of the current sweep once the trigger conditions are met. The execution of this command causes the analyzer to immediately return to its start frequency.

# COUPLE INPUT COUPLING

## COMMAND SYNTAX:



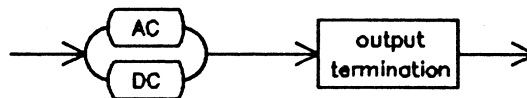
## DESCRIPTION:

The input coupling is set with this command. When an input is selected input coupling is preset.

## PRESET STATE:

AC - If available.

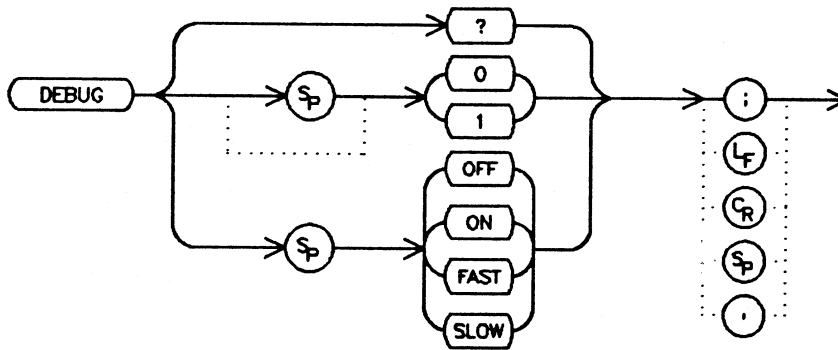
## QUERY RESPONSE:



# DEBUG

## DEBUG MODE

### COMMAND SYNTAX:



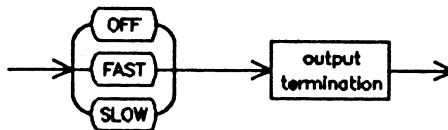
### DESCRIPTION:

This command assists in the debugging of remote programming of the instrument. When *DEBUG* is on, the title line shows the data that is currently being processed by the instrument. When *FAST* is selected, the input is processed at full speed. When *SLOW* is selected, input is processed slowly so it can be viewed. With *DEBUG* on, any detected error will cause *PAUSE* to be executed. With *DEBUG* on, a menu is provided to single step, halt, or continue the processing of remote input. When *DEBUG* is off, the menus are blanked when the instrument goes into the remote HP-IB state.

### PRESET STATE:

OFF, but preset to FAST

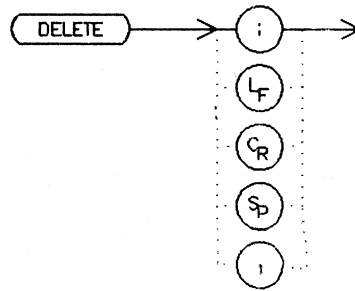
### QUERY RESPONSE:





# DELETE DELETE ITEM

## COMMAND SYNTAX:



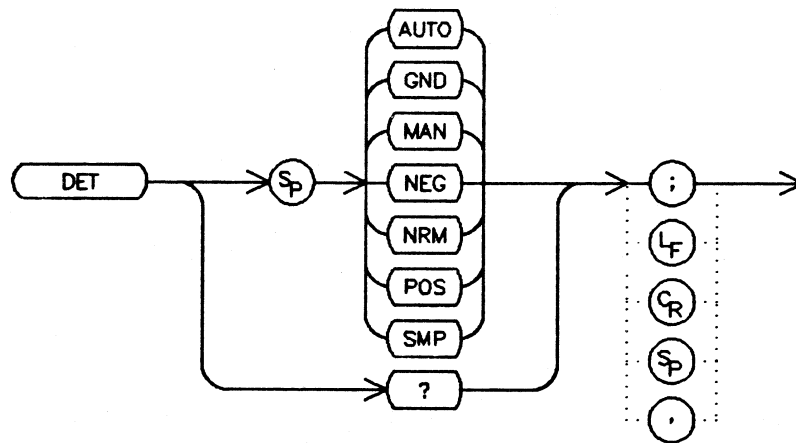
## DESCRIPTION:

The currently selected graphics display item is deleted. This command does not apply to item 0. (See *IDENTIFY ITEM (IT)* command.)

# DET

## DETECTION MODE

COMMAND SYNTAX:



### DESCRIPTION:

The *DET* function specifies the input detector used for acquiring measurement data. One of five detection modes can be selected for acquiring input data. They are:

#### AUTO:

Automatic - The detector mode used is determined by the following rules:

1. If *VIDEO AVERAGE (VAVG)* or *MARKER NOISE (MKNOISE)* is on, the sample detector mode *SMP* is used.
2. If *MAXIMUM HOLD (MXMH)* is on, the positive peak detector mode *POS* is used.
3. If *MINIMUM HOLD (MINH)* is on, the negative peak detector mode *NEG* is used.
4. If none of the above rules applies, the normal detection mode *NRM* is used.
5. If more than one of the above rules apply, the first rule listed is used.

#### GND:

Ground - Connect ground to input. This is primarily for diagnostic purposes.

#### MAN:

Manual - The detector in use will remain in effect until changed by the *DETECTION MODE (DET)* command.

# DET DETECTION MODE

## NEG:

Negative Peak - The minimum signal value over the conversion period is acquired.

## NRM:

Normal - The normal detection algorithm selectively chooses between the positive and negative peak values to be displayed.

## POS:

Positive Peak - The maximum signal value over the conversion period is acquired.

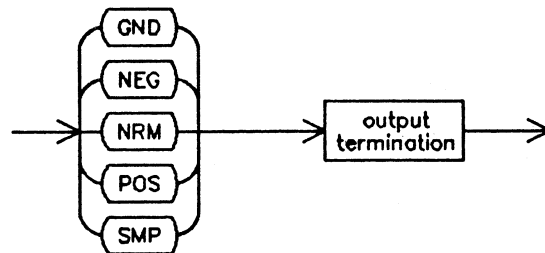
## SMP:

Sample - The instantaneous signal value of the video a/d conversion is placed in memory. Sample mode is selected automatically when video averaging from the input and when a noise level marker is activated.

## PRESET STATE:

AUTO

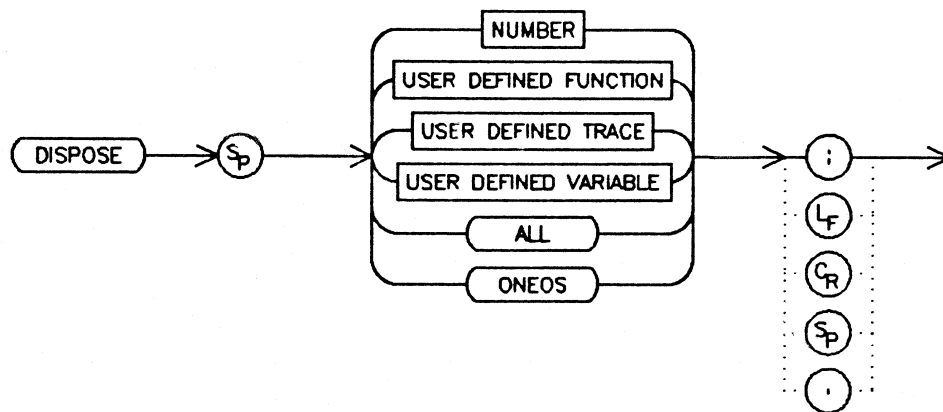
## QUERY RESPONSE



# DISPOSE

# DISPOSE

## COMMAND SYNTAX:



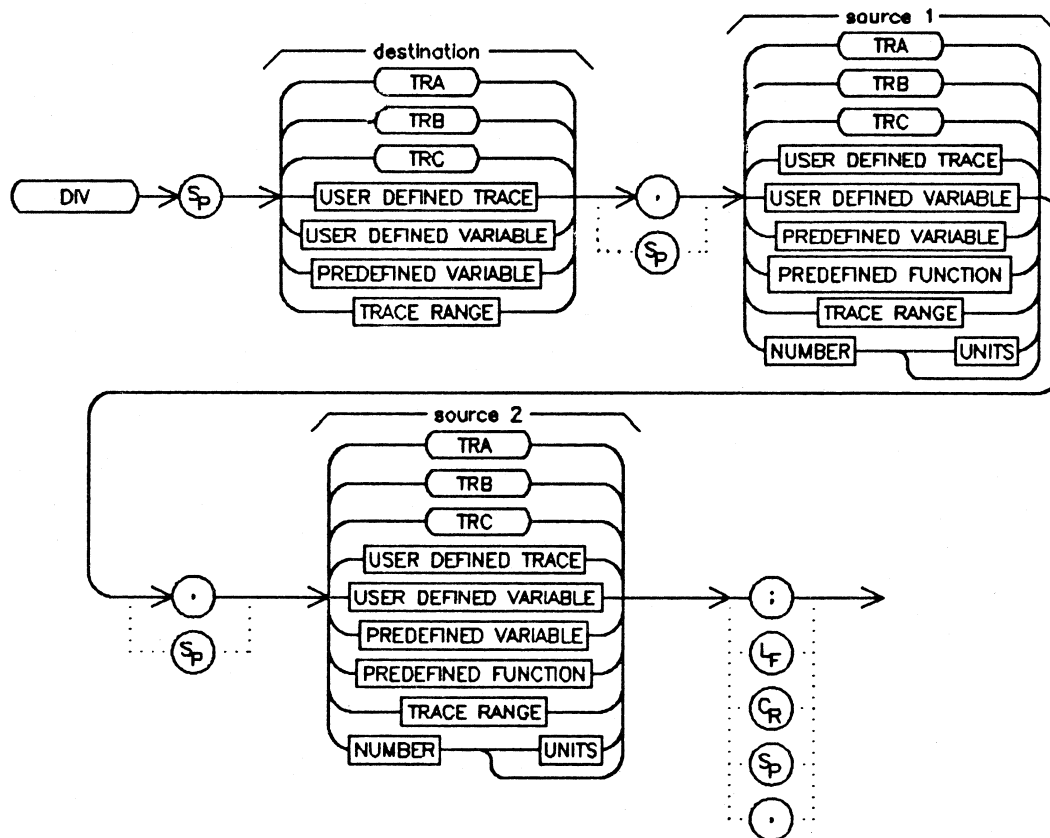
## DESCRIPTION:

The `dispose` function allows the user to free memory which has previously been allocated for user defined functions. These functions include: user defined variables, user defined traces, user defined functions, the `ONEOS` function, and key definitions. A Number entry applies to user defined keys.

The `DISPOSE ALL` function will free all memory, making the total available memory the maximum size, excepting the `NUMBER OF STATE REGISTERS` (`NSTATE`) and the predefined traces (`TRA`, `TRB`, `TRC`).

# DIV DIVIDE

## COMMAND SYNTAX:



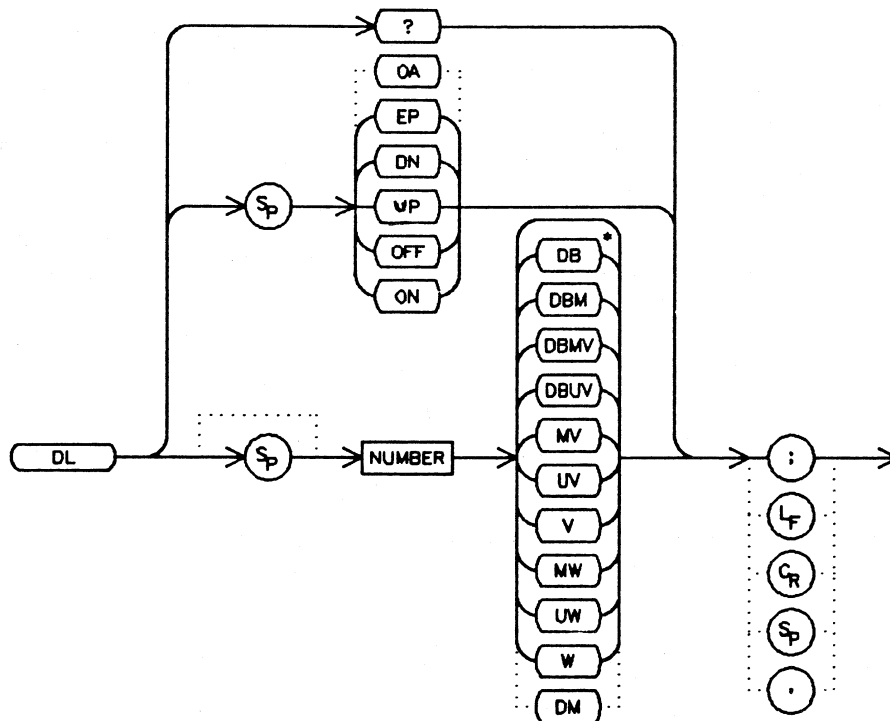
## DESCRIPTION:

The result of source 1 divided by source 2 is stored in the destination. Division by zero reports an error and results in the maximum value for the destination with the sign of source 1.

# DL

## DISPLAY LINE

### COMMAND SYNTAX:



\* DB is used in relative amplitude mode (See *MEASURE SR*).

### DESCRIPTION:

The display line function provides a reference line in units corresponding to the vertical scale, for visual and computational purposes. It may be turned on and off and can be assigned a display line level.

The display line is enabled when a numeric data field is input, an up or down is entered, or an enable parameter entry is terminated.

### PRESET STATE:

OFF, 0 dBm

### PARAMETER RANGE:

+/- 300 dBm

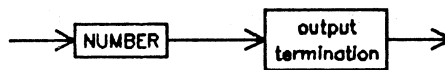
**STEP INCREMENT:**

1 Vertical Scale Division.

**FUNDAMENTAL UNIT:**

Set by *ABSOLUTE AMPLITUDE UNITS (AUNITS)* when in absolute amplitude mode, dB when in relative amplitude mode.

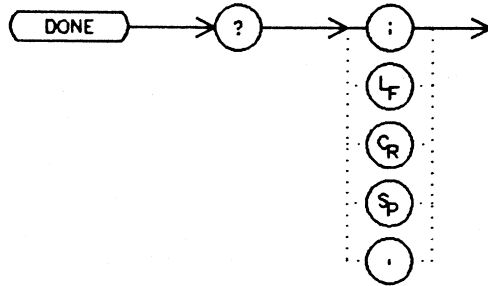
**QUERY RESPONSE:**



**DONE**

**DONE**

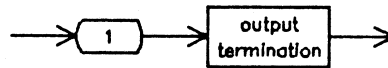
**COMMAND SYNTAX:**



**DESCRIPTION:**

This command will output a message when all commands entered before the *DONE?* have completed. When preceded by a *TS* command, the user is assured the complete trace data has been taken before proceeding on.

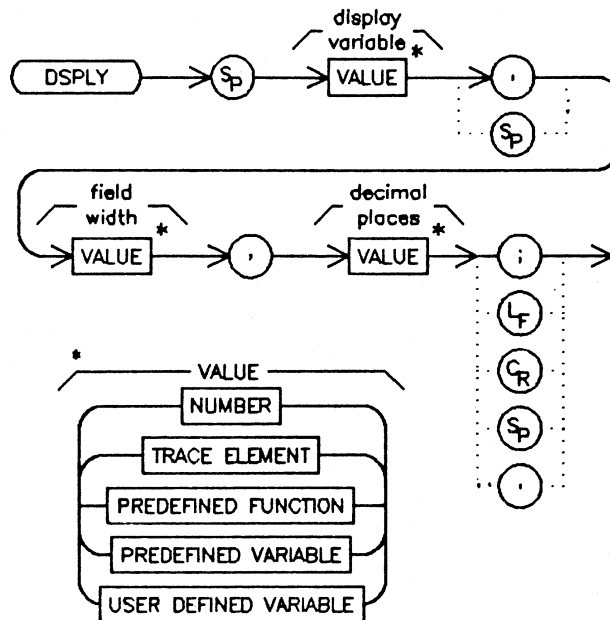
**QUERY RESPONSE:**





DISPLAY VARIABLE

COMMAND SYNTAX:



DESCRIPTION:

The value of the variable is displayed at the current position of the graphics pen (PA, PR, PU, or PD). It is formatted in a field of "field width" and "decimal places" to the right of the decimal point. Field includes all characters, including sign and decimal. If the value will not fit in the specified field width and decimal place then exponential notation will be used. *DSPLY* cannot be used when *DISPLAY WINDOW (DWINDOW)* is on.

PARAMETER RANGE:

Fieldwidth:

Minimum: 1  
Maximum: 18

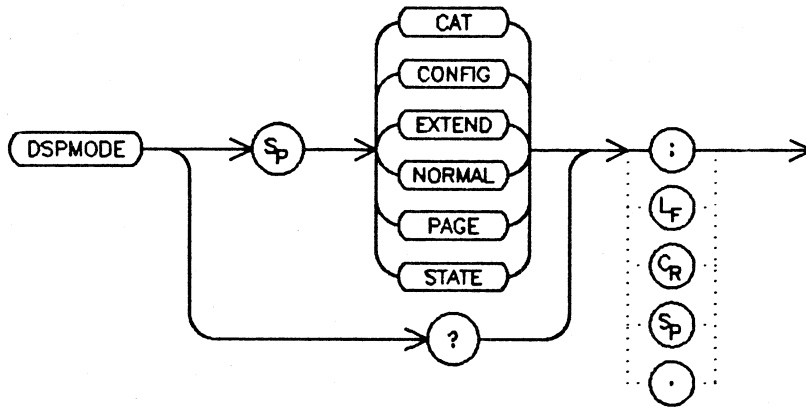
Decimal Places:

Minimum: 0  
Maximum: If the fieldwidth is > 3, the maximum is Fieldwidth - 3, otherwise it is 0.

# DSPMODE

## DISPLAY MODE

### COMMAND SYNTAX:



### DESCRIPTION:

This command sets the display readout mode. The following options are available:

#### CAT:

A catalog of all user functions, trace, and variable definitions is displayed.

#### CONFIG:

The instrument configuration is displayed in alphanumeric format.

#### EXTEND:

Additional state information about specific modules is displayed.

#### NORMAL:

Measured trace data and the primary measurement parameters are displayed. This is the normal display mode.

#### PAGE:

If more than one page is available, the next page is displayed. It has no effect on NORMAL display mode.

#### STATE:

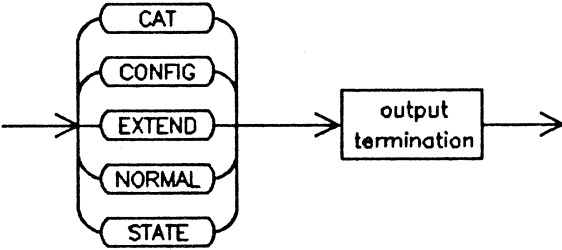
The state of all settable variables is displayed in alphanumeric format.

**DSPMODE  
DISPLAY MODE**

**PRESET STATE:**

**NORMAL**

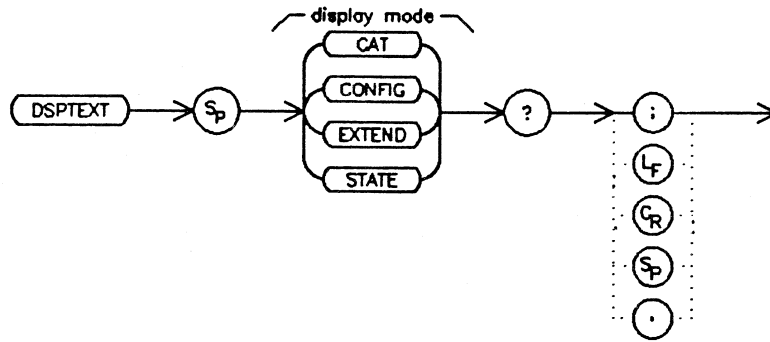
**QUERY RESPONSE:**



# DSPTXT

## OUTPUT DISPLAY TEXT

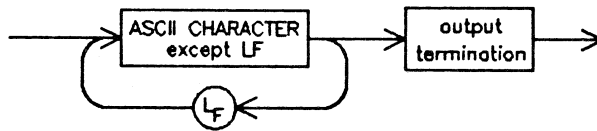
### COMMAND SYNTAX:



### DESCRIPTION:

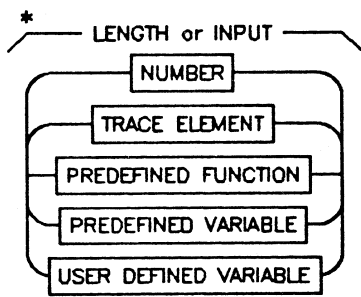
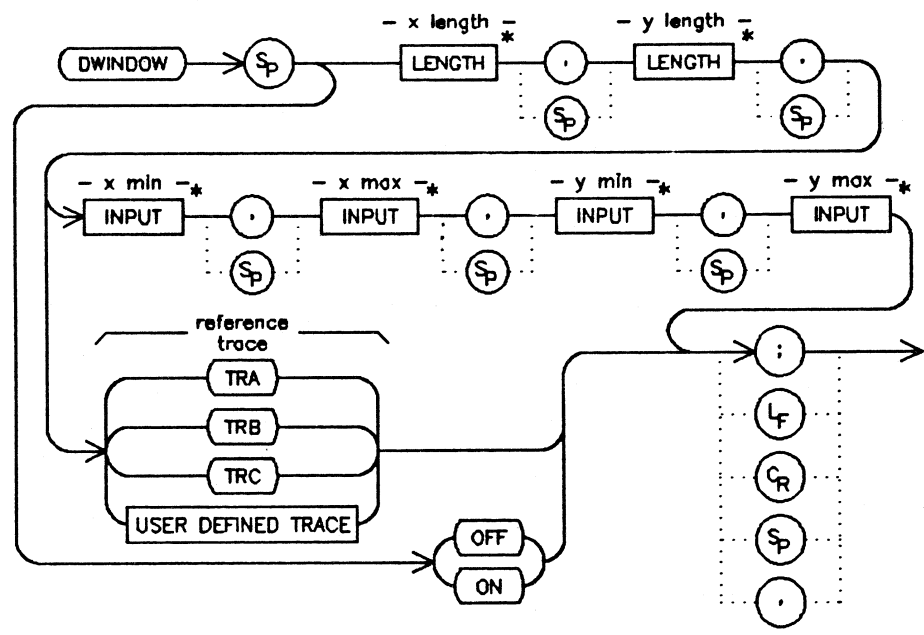
The display mode text defined by the mode parameter is output. Each line of a field is written as one record, separated by a line feed. The current *DISPLAY MODE* (*DSPMODE*) is not affected.

### QUERY RESPONSE:



# DWINDOW DISPLAY WINDOW

**COMMAND SYNTAX:**



**DESCRIPTION:**

When a display window is ON, graphics data is mapped into the user defined window. The window size (x length, y length) on the display area is defined in the user units, set by the *SCALE GRAPHICS (SCALE)* command. The window position is defined in user units by the *SET ORIGIN (OR)* command. The minimum and maximum values of user input (x & y min/max) to be equated to the window outline are also allowed (in position and measurement units). When an input trace is specified (reference trace), the trace conditions of that trace are used for the input mapping. *DWINDOW* can be used successfully with *GRAPH TRACE (GRAPH)*, *MARKER DISPLAY (MK)*, *PLOT ABSOLUTE (PA)*, and *PLOT RELATIVE (PR)*, but not with *DISPLAY VARIABLE (DSPLY)*, *DISPLAY GRID (GRID)*, or *TEXT*. When a *DWINDOW* command is entered with new parameters, it is turned on.

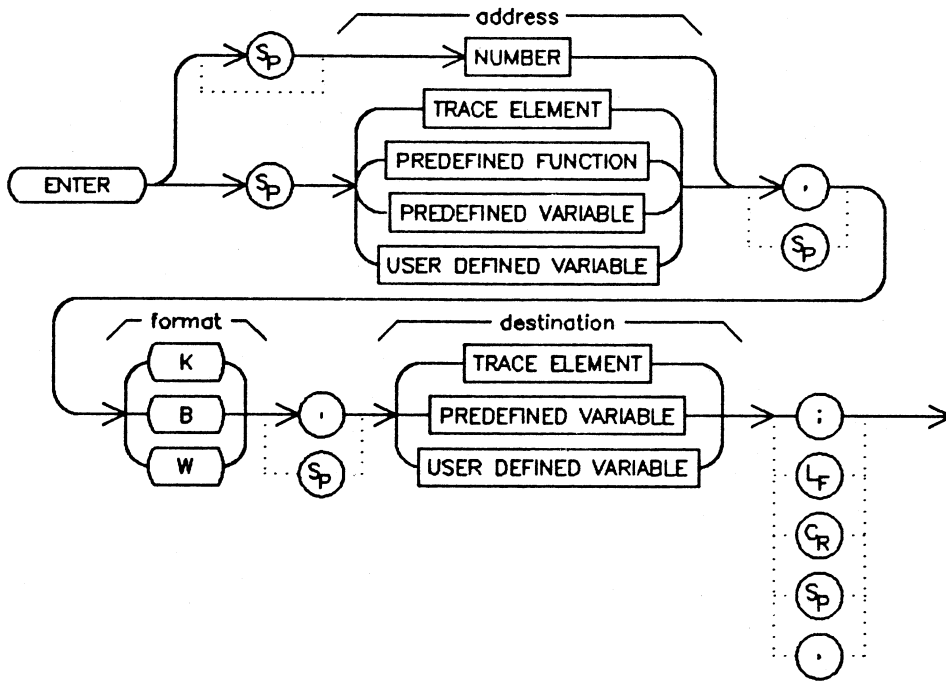
**PRESET STATE:**

Power up trace and *DWINDOW* OFF.

# ENTER

## ENTER FROM HP-IB

### COMMAND SYNTAX:



### DESCRIPTION:

The command *ENTER FROM HP-IB* (*ENTER*) allows a function definition to enter data from the HP-IB port. If a controller is detected on HP-IB, the command is aborted. This command causes the analyzer to assume controller capabilities on HP-IB. The *RELEASE HP-IB* (*RELHPIB*) command may be used to disable these capabilities. The entered data is formatted according to the format specified in the format field.

#### K:

Free field. ASCII real number format.

#### B:

One byte binary.

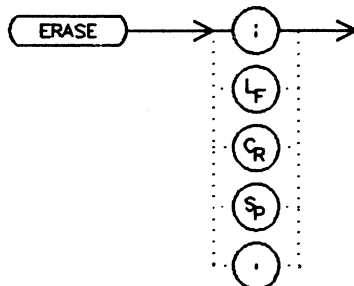
#### W:

One word (2 bytes) binary.

# ERASE

## ERASE ALL MEMORY

### COMMAND SYNTAX:



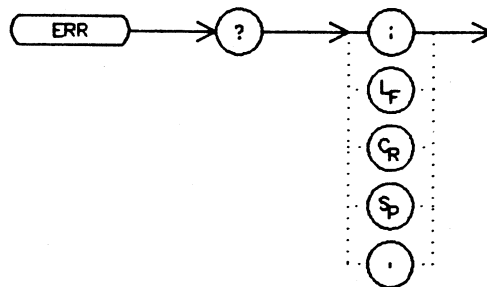
### DESCRIPTION:

All volatile memory, including serial number and calibration, is cleared with this command. This is intended for security applications where all previous instrument history needs to be removed. On completion of erase, the instrument will go through a power up configuration and be in an instrument preset state. All calibration will have to be redone. The instrument will have to be reselected to a display window (automatically done when power is cycled).

# ERR

## ERROR

### COMMAND SYNTAX:



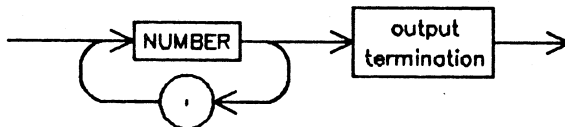
### DESCRIPTION:

The error query outputs a list of error numbers. An error code of 0 means there are no errors present.

### PRESET STATE:

Error list cleared. (Persistent errors are re-entered into the error list.)

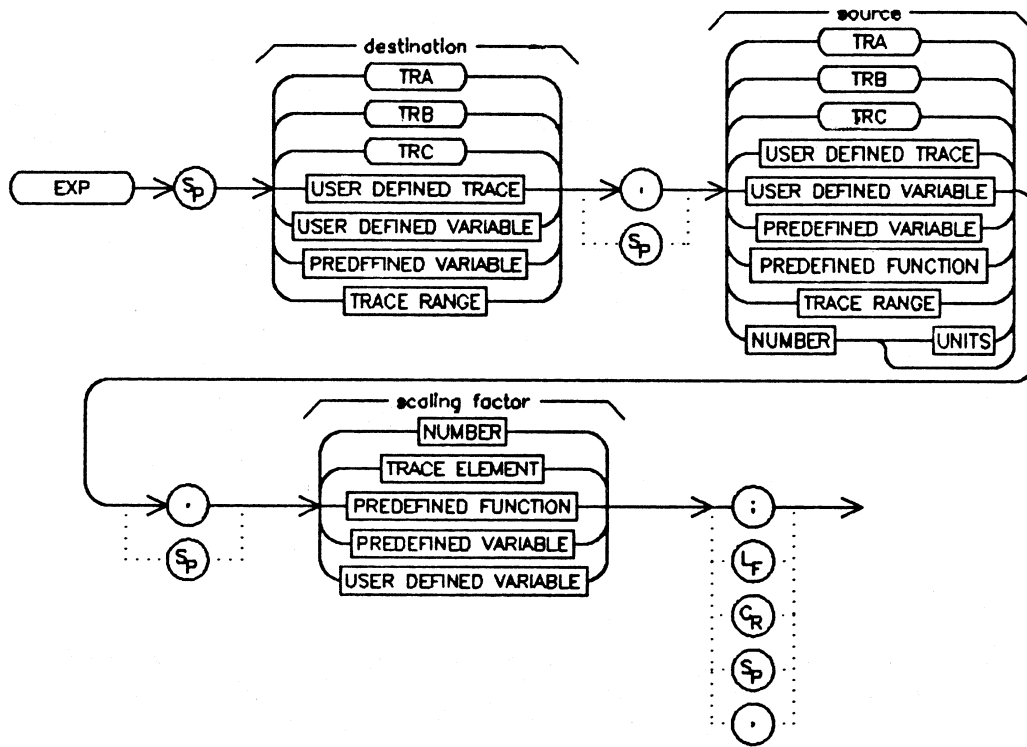
### QUERY RESPONSE:





# EXP EXPONENT

## COMMAND SYNTAX:



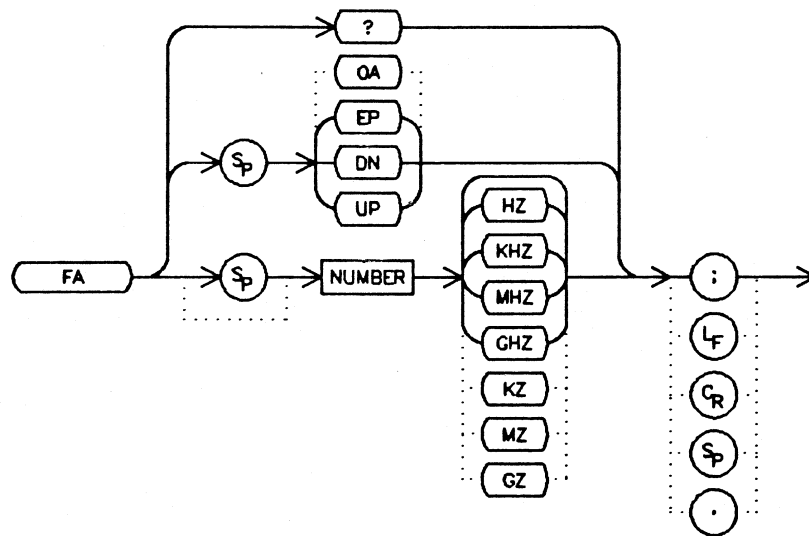
## DESCRIPTION:

The source is divided by the scaling factor and the result is raised as a power of 10 and then stored in the destination.

# FA

## START FREQUENCY

### COMMAND SYNTAX:



### DESCRIPTION:

The start frequency function determines the starting frequency to be measured and displayed. Stop frequency does not change as the start frequency is entered unless the start frequency exceeds the stop frequency. When this occurs, the stop frequency is set equal to the start frequency with zero span. The center frequency and span change with changes in the start frequency.

### COUPLING:

Start Frequency = Center - Span/2 (In Center Frequency-Span Mode)

### PRESET STATE:

The minimum frequency value allowed by the hardware configuration.

### PARAMETER RANGE:

+/- 1000 GHz

### STEP INCREMENT:

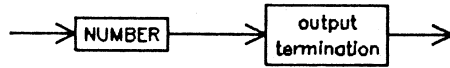
Span/10 (The number of horizontal divisions)

**FA**  
**START FREQUENCY**

**FUNDAMENTAL UNIT:**

**Hz**

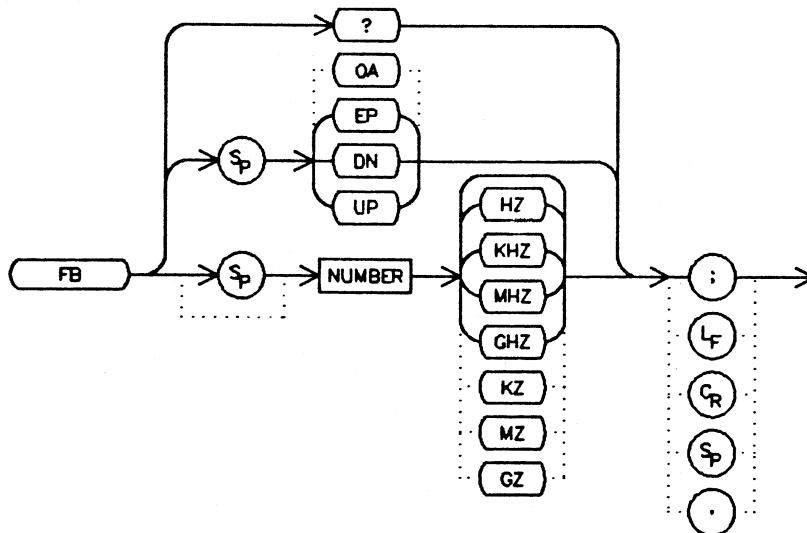
**QUERY RESPONSE:**



# FB

## STOP FREQUENCY

### COMMAND SYNTAX:



### DESCRIPTION:

The stop frequency function determines the ending frequency to be measured and displayed. Start frequency does not change as the stop frequency is entered unless the stop frequency would be less than the start frequency. When this occurs, the start frequency is set equal to the stop frequency with zero span. The center frequency and span change with changes in the stop frequency.

### COUPLING:

Stop Frequency = Center + Span/2 (In Center Frequency-Span Mode)

### PRESET STATE:

The maximum frequency value allowed by the hardware configuration.

### PARAMETER RANGE:

+/- 1000 GHz

### STEP INCREMENT:

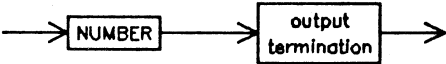
Span/10 (The number of horizontal divisions)

**FB**  
**STOP FREQUENCY**

**FUNDAMENTAL UNIT:**

**Hz**

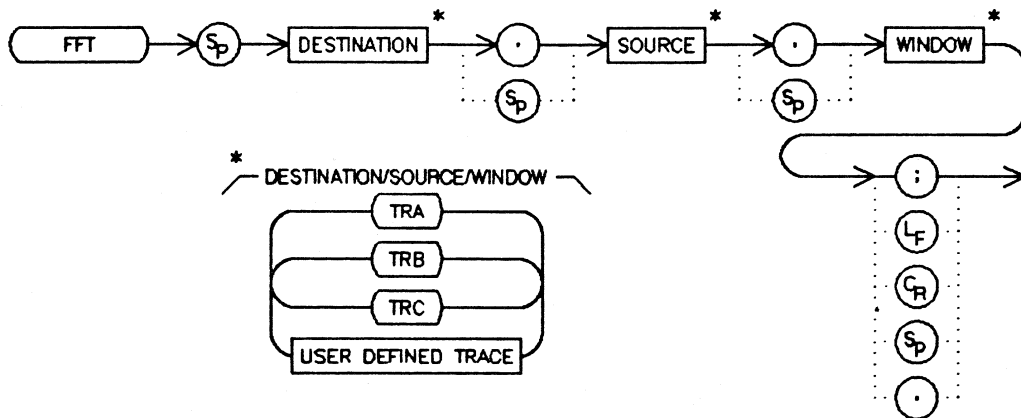
**QUERY RESPONSE:**



# FFT

## FAST FOURIER TRANSFORM

### COMMAND SYNTAX.



### DESCRIPTION:

The *FAST FOURIER TRANSFORM (FFT)* command performs a Discrete Fourier Transform on the source trace array and stores the logs of the magnitudes of the results in the destination array. If necessary, the source trace data is padded with zeros at the end to result in a sufficient number of points, and it is converted to linear values if stored logarithmically. The source array is then weighted with the function in the window trace to minimize amplitude inaccuracies, side lobes, etc. The transform is then computed and the results placed in the destination array. No phase or absolute sign information is preserved in the results. If needed, phase or absolute sign information may be obtained by using the *FAST FOURIER KERNEL (FFTKNL)* command instead. The source trace is returned unchanged.

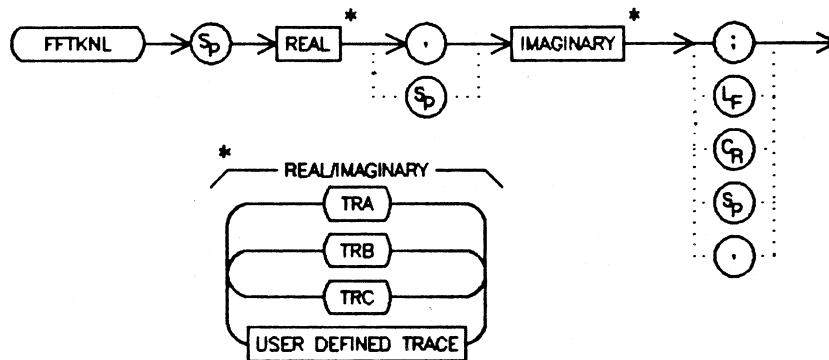
The windowing function stored in the window trace may be created with the *TRACE WINDOW (TWINDOW)* command or by the user storing his own values in that trace. The values in the window trace are treated as fractional numbers. No offset is used. The average window value is computed and used to correct the results in absolute units. For maximum precision, the peak values of user created traces should approach +32767 or -32768. Windowing is described in greater detail under the *TWINDOW* command.

The lengths of the source and window traces must both be greater than four. Due to aliasing, the *FFT* command only directly computes the values of the even points of the destination trace. The odd values are obtained by interpolation.

This command requires user memory to execute. Memory is not permanently allocated, so that the largest amount of memory is available for the functions that are used in a particular application. When the command is complete the memory is returned to the free user memory.

FAST FOURIER TRANSFORM KERNAL

COMMAND SYNTAX:



DESCRIPTION:

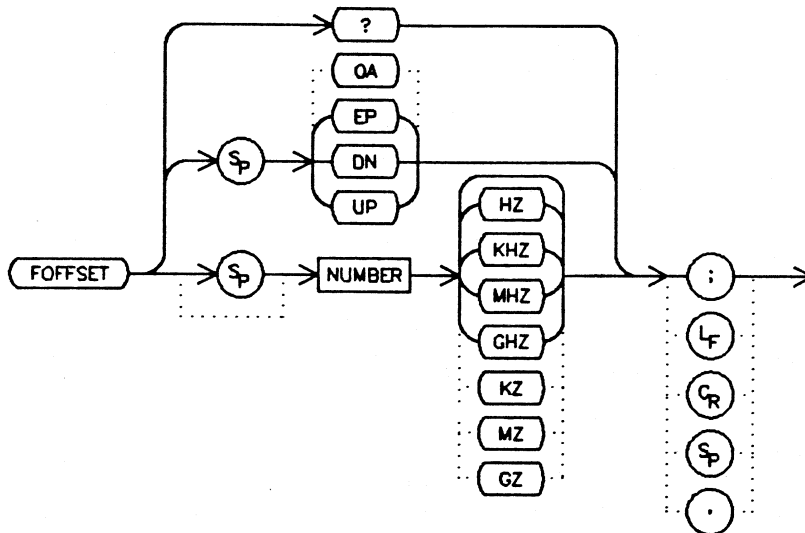
This command performs a 16 bit Discrete Fourier Transform on the specified traces, overlaying them with the results. Both traces must be the same length, and the length must be a power of two. The two traces represent the real and imaginary components of one complex valued trace. *FFTKNL* does no other normalization, scaling, clipping, or magnitude determination. Any such manipulation is the user's responsibility.

If the results of the Discrete Fourier Transform are to be multiplied by the length of the traces, the command *SCALED FAST FOURIER TRANSFORM (IFTKNL)* should be used instead of this command.

# FOFFSET

## FREQUENCY OFFSET

### COMMAND SYNTAX:



### DESCRIPTION:

The *FREQUENCY OFFSET* function offsets the frequency scale for input, output, and display on absolute frequency readouts such as center frequency and marker frequency but not for relative frequency readouts such as span and delta marker.

### PRESET STATE:

0

### PARAMETER RANGE:

+/- 1000 GHz

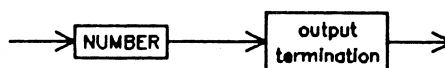
### STEP INCREMENT:

Span/10 (The number of horizontal divisions)

### FUNDAMENTAL UNIT:

Hz

### QUERY RESPONSE:

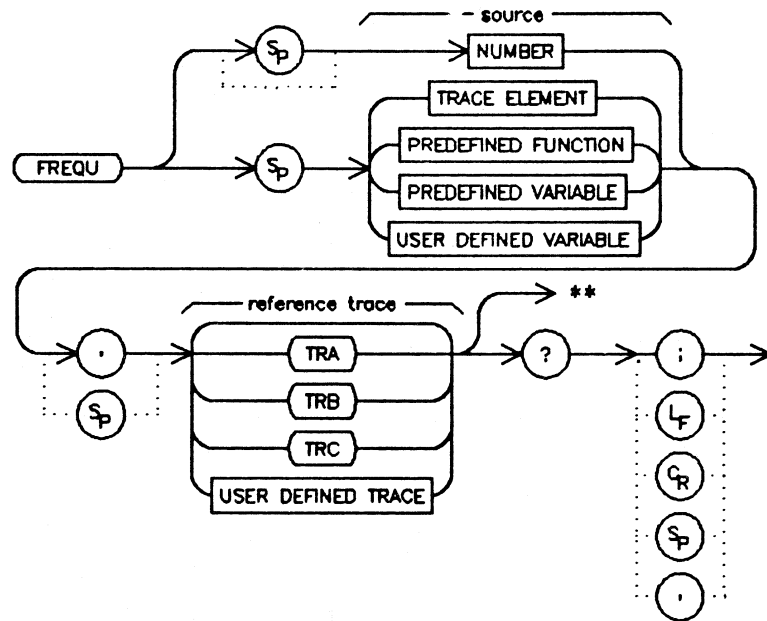




# FREQU

## FREQUENCY UNIT CONVERSION

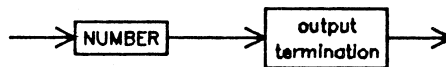
### COMMAND SYNTAX:



### DESCRIPTION:

The source value is converted to frequency units based on the trace conditions of the reference trace. If the reference trace is omitted, the current measurement conditions (start and stop frequency) are used. In spans other than zero, the result is a value in Hertz. In zero span, the result is a time in seconds.

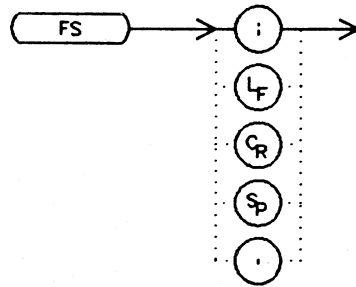
### QUERY RESPONSE:



# FS

## FULL SPAN

### COMMAND SYNTAX:

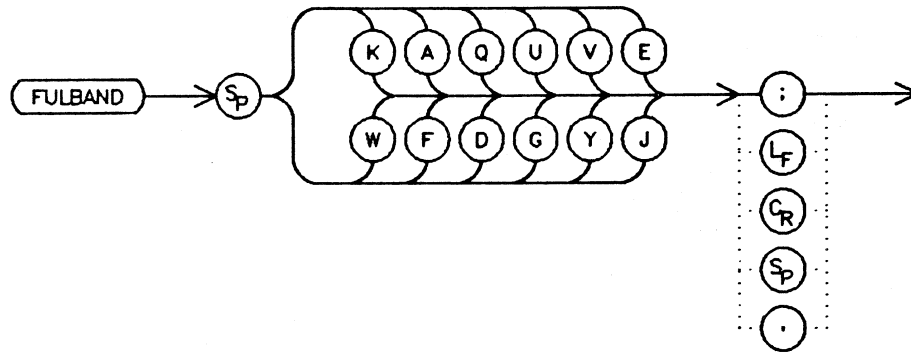


### DESCRIPTION:

This command sets the measurement start and stop frequencies to the minimum and maximum frequencies allowed by hardware.

# FULBAND FULL BAND

## COMMAND SYNTAX:



## DESCRIPTION:

The analyzer is tuned to the full band frequency range as listed in the table below. A harmonic lock is also set for the harmonic of the selected band.

### Harmonic Bands:

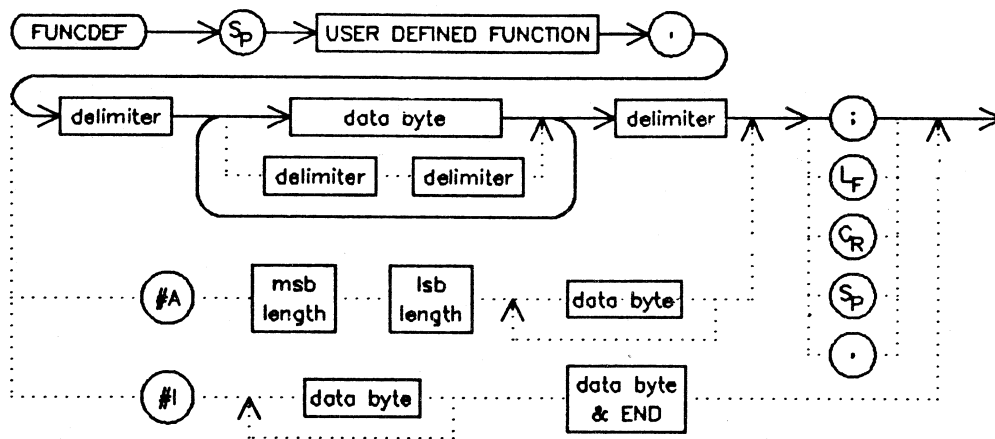
BAND	HARMONIC #	FREQUENCY RANGE (GHz)
K	6-	18 - 26.5
A	8+	26.5 - 40.0
Q	10+	33.0 - 50.0
U	10+	40.0 - 60.0
V	14+	50.0 - 75.0
E	16+	60.0 - 90.0
W	18+	75.0 - 110.0
F	24+	90.0 - 140.0
D	30+	110.0 - 170.0
G	36+	140.0 - 220.0
Y	42+	170.0 - 260.0
J	50+	220.0 - 330.0

The frequency annunciator is set to start/stop frequency display. This command is only applicable when the selected input is an external mixer.

# FUNCDEF

## FUNCTION DEFINITION

### COMMAND SYNTAX:



### DESCRIPTION:

Function Definition allows the user to define a program which is identified as the USER DEFINED FUNCTION specified in the command. Some care must be used with string and block fields to list commands using only compatible terminators. Also, if any block field command exists within the list, the #A block format must be used so that an END terminator of the #I block format would not terminate the entire *FUNCDEF* command.

An error is generated and the command is ignored if the USER DEFINED FUNCTION label is the same as a command mnemonic.

This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. Memory is allocated by executing this function and is returned to free user memory with the *DISPOSE* command.

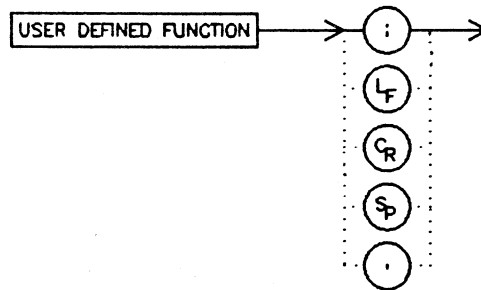
Once a USER DEFINED FUNCTION has been defined it can be executed as shown below:

# FUNCDEF

## FUNCTION DEFINITION

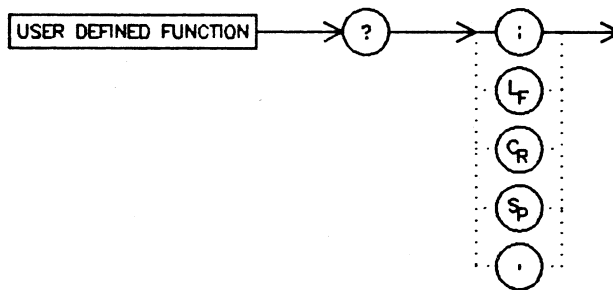
### Executing a Command

A function may be executed simply by executing:

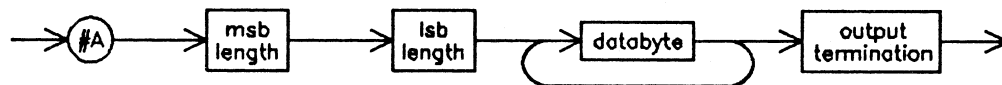


### Query of a Command

The definition of a function may be queried. This is done by executing the function with a query.



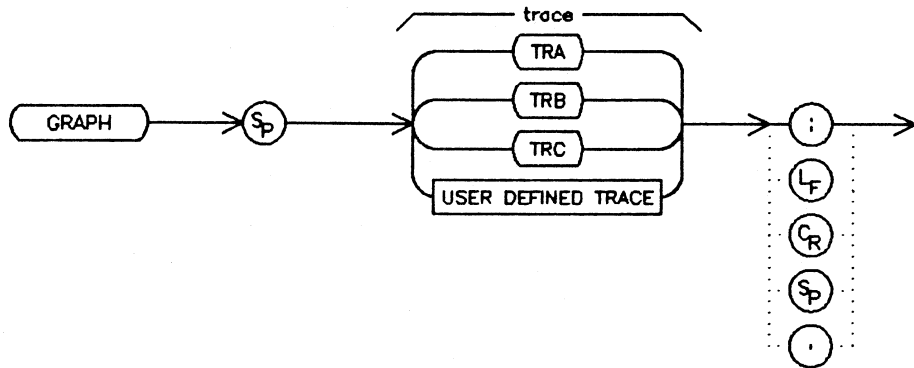
### Response to a USER DEFINED FUNCTION Query



# GRAPH

## GRAPH TRACE

### COMMAND SYNTAX:

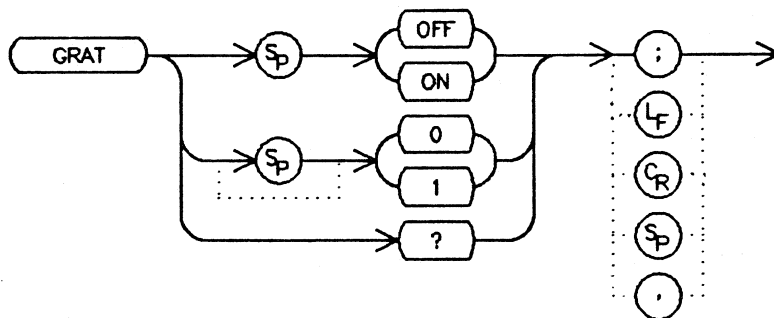


### DESCRIPTION:

The specified trace is graphed on the display. The points in the specified trace are plotted in either the current scaling units (See *SCALE*) or are in *DWINDOW* units, if *DWINDOW* is on.

# GRAT GRATICULE ON/OFF

## COMMAND SYNTAX:



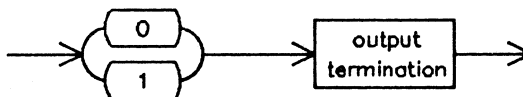
## DESCRIPTION:

The display graticule may be turned on or off with this command.

## PRESET STATE:

ON

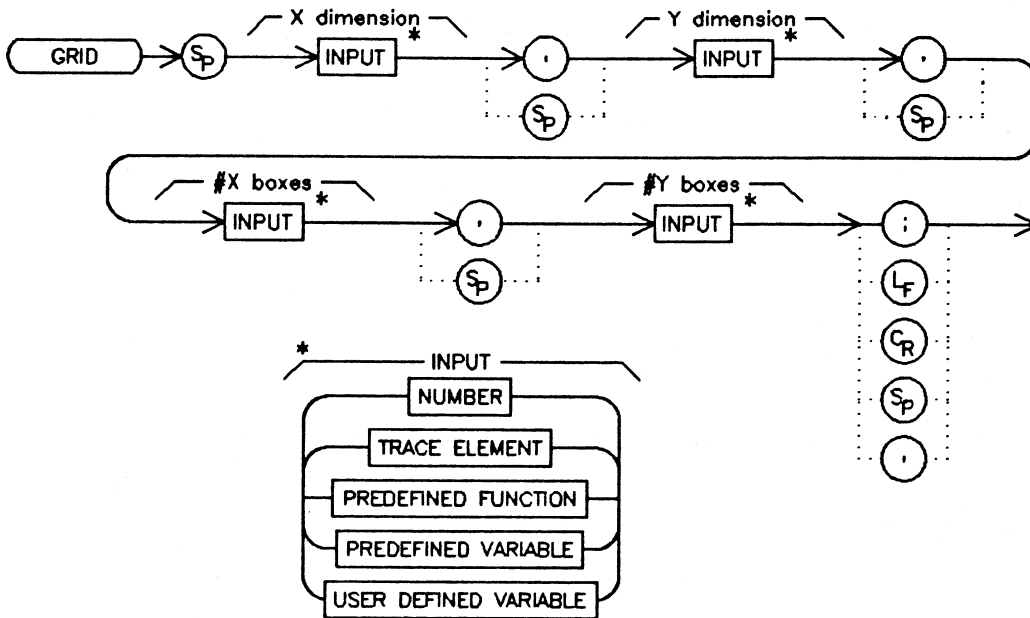
## QUERY RESPONSE:



# GRID

## DISPLAY GRID

### COMMAND SYNTAX:



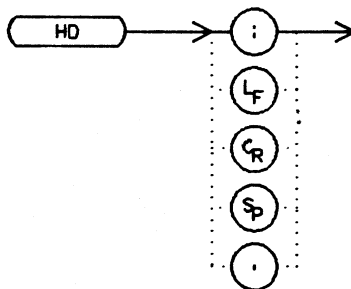
### DESCRIPTION:

The *GRID* command draws a grid with the lower left vertex located at the origin (OR). The resulting grid will be a rectangle with a dimension in the x direction which is equal to the product of the x dimension parameter times the # x boxes parameter. The grid's y direction dimension will be the product of the parameters y dimension and # y boxes. *DISPLAY GRID (GRID)* can not be used when *DISPLAY WINDOW (DWINDOW)* is on.



**HD**  
**HOLD**

**COMMAND SYNTAX:**



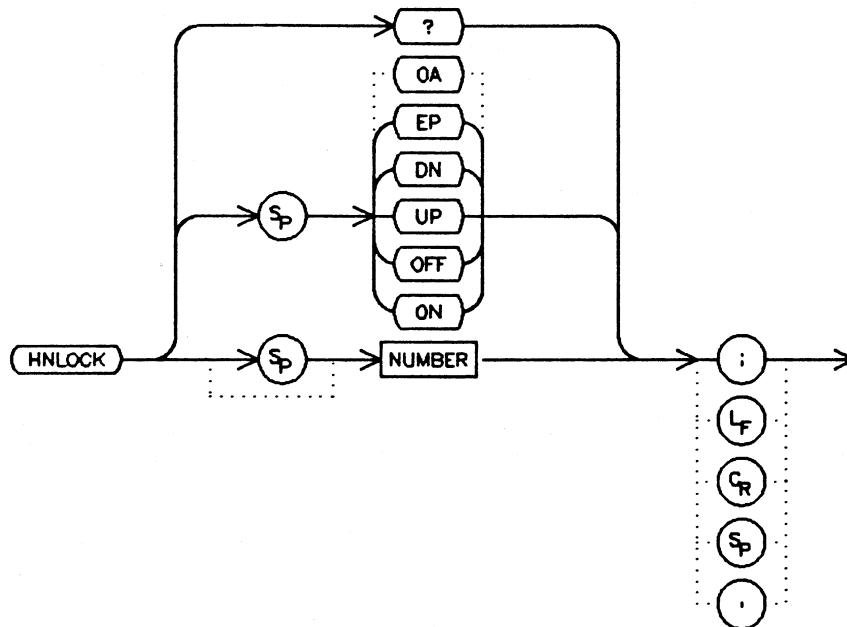
**DESCRIPTION:**

This command turns the active parameter function off. If there is no active function, then no operation is performed.

# HNLOCK

## HARMONIC NUMBER LOCK

COMMAND SYNTAX:



### DESCRIPTION:

This command sets the harmonic number (pos or neg) for frequency calibration and limits tuning to this band. The tuning is not affected if it is already tuned to this harmonic. This command is only applicable when the selected input is an external mixer.

### PRESET STATE:

OFF

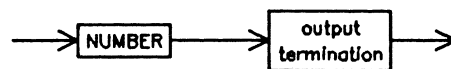
### PARAMETER RANGE:

+/- 100

### STEP INCREMENT:

1

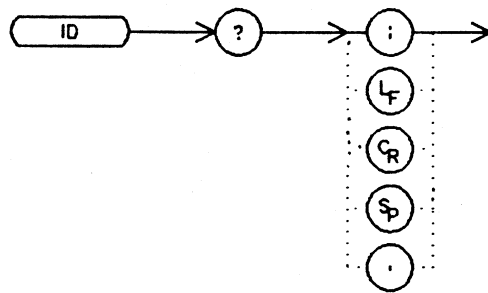
### QUERY RESPONSE:



If Off, 0 will be output.

# OUTPUT IDENTIFICATION

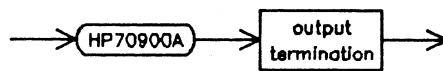
## COMMAND SYNTAX:



## DESCRIPTION:

The ID query will output the model number of the control module.

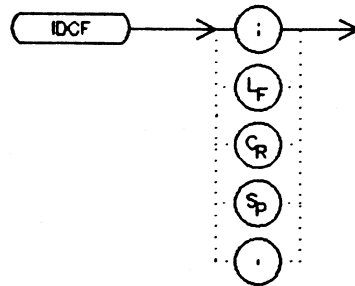
## QUERY RESPONSE:



# IDCF

## SIGNAL IDENTIFIED FREQUENCY TO CENTER FREQUENCY

COMMAND SYNTAX:



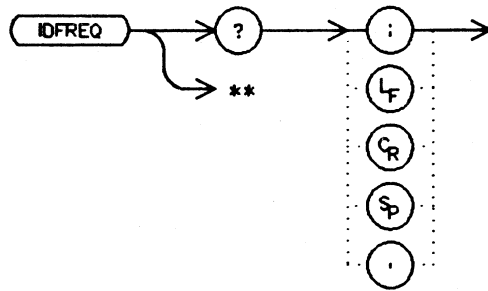
### DESCRIPTION:

Center Frequency (*CF*) is set to the *SIGNAL IDENTIFIED FREQUENCY* (*IDFREQ*).

# IDFREQ

## SIGNAL IDENTIFIED FREQUENCY

### COMMAND SYNTAX



\*\* For use as a Predefined Function

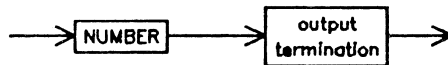
### DESCRIPTION:

The frequency of the last identified signal is returned in response to this query. If this command is sent after an instrument preset or an invalid identification, then a 0 is returned

### FUNDAMENTAL UNITS

Hz

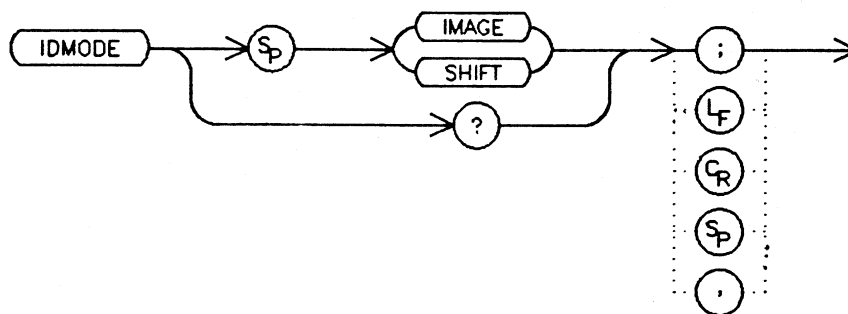
### QUERY RESPONSE:



## IDMODE

### SIGNAL IDENTIFICATION MODE

#### COMMAND SYNTAX:



#### DESCRIPTION:

This command is used to set the method to be used by the *SIGNAL IDENTIFY (SIGID)* command for its different modes. Two methods are provided:

#### IMAGE:

The IMAGE method only requires an IF frequency sufficiently small in comparison with the signal frequency so that the images are spaced reasonably close together. The even harmonics are searched first, then the odd harmonics, then the even harmonics at a five times slower sweep time, and finally the odd harmonics at a five times slower sweep time.

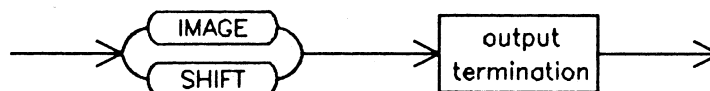
#### SHIFT

The SHIFT method accomplishes an LO shift by using an oscillator to shift the IF and signal image verification. The LO shift method requires special hardware in the signal path to shift the IF.

#### PRESET STATE:

Set to SHIFT if the selected input hardware supports this function. Otherwise, it is set to IMAGE.

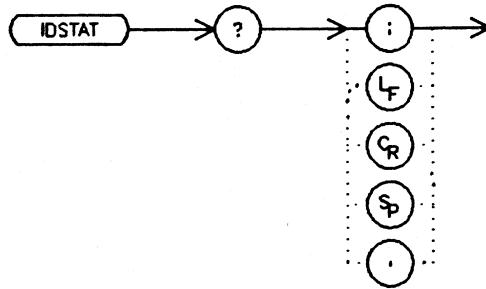
#### QUERY RESPONSE:



# IDSTAT

## SIGNAL IDENTIFICATION STATUS

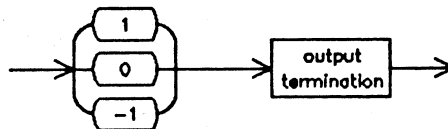
### COMMAND SYNTAX:



### DESCRIPTION:

The status of the last signal identification execution result can be inquired.

### QUERY RESPONSE:

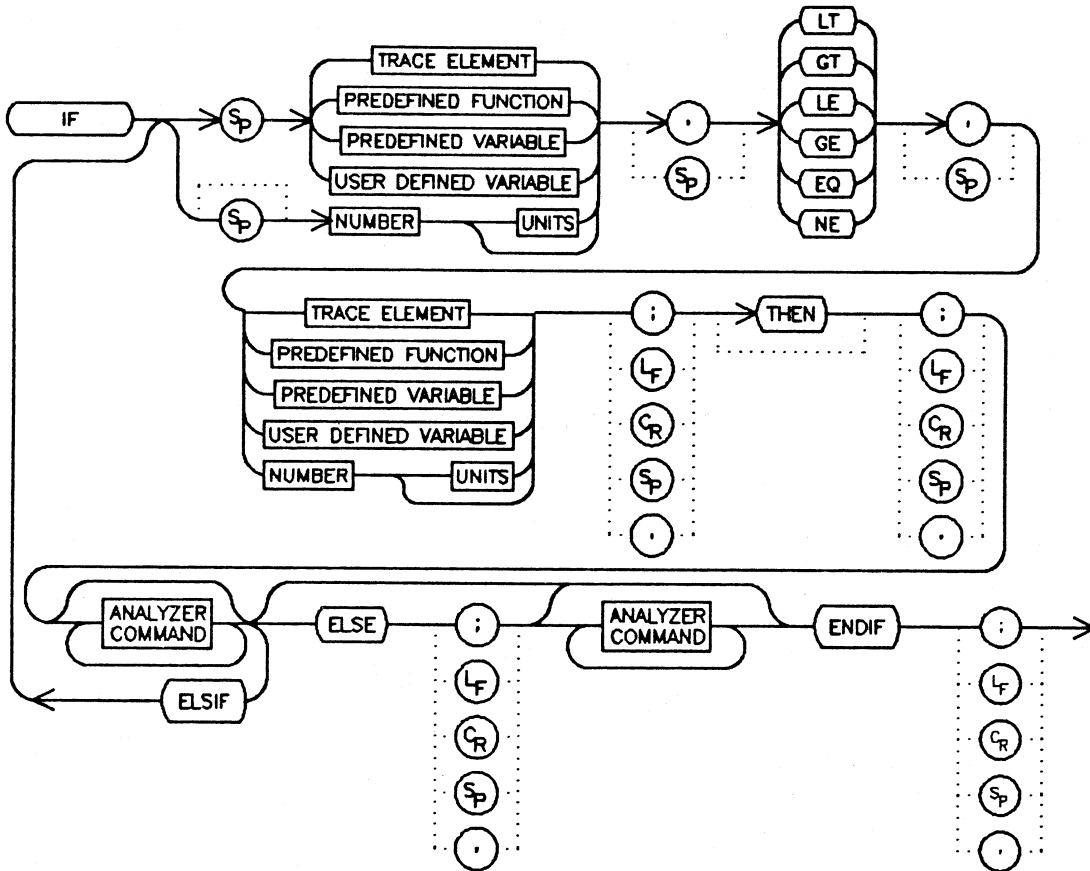


0: Not Found  
1: Found in Band  
-1: Found Out of Band

# IF/THEN/ELSIF/ELSE/ENDIF

# IF/THEN/ELSIF/ELSE/ENDIF

## COMMAND SYNTAX:



## DESCRIPTION:

The IF/THEN/ELSIF/ELSE/ENDIF statement combination allows the comparison of two operands by a condition. The conditions are less than (LT), greater than (GT), less than or equal to (LE), greater than or equal to (GE), equal (EQ) and not equal (NE). If the result is true, the following commands are executed up to the next ELSE or ENDIF. If the condition is false, then commands following either the next ELSIF, ELSE, or ENDIF are executed.

## THEN:

This command is treated as a no-operation function, but is allowed for user program format reasons.

## ELSIF:

This delimits an alternate ELSE condition and if test of an IF command.



**IF/THEN/ELSIF/ELSE/ENDIF**

**IF/THEN/ELSIF/ELSE/ENDIF**

**ELSE:**

This command delimits the alternate condition of an *IF* command.

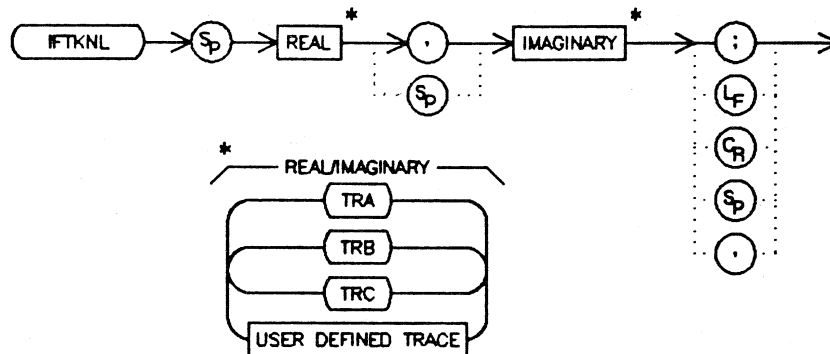
**ENDIF:**

This command delimits the end of a conditional command sequence.

# IFTKNL

## SCALED FAST FOURIER TRANSFORM KERNAL

### COMMAND SYNTAX:



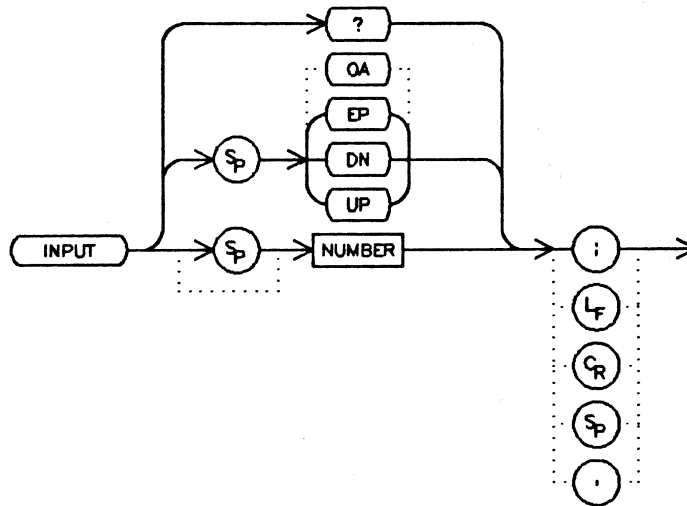
### DESCRIPTION:

This command performs a 16 bit Discrete Fourier Transform on the specified traces, overlaying them with the results multiplied by N (the length of each trace). Both traces must be the same length, and the length must be a power of two. The two traces represent the real and imaginary components of one complex valued trace. *IFTKNL* does no other normalization, scaling, clipping, or magnitude determination. Any such manipulation is the user's responsibility.

The only difference between *SCALED FAST FOURIER TRANSFORM KERNAL (IFTKNL)* and *FAST FOURIER TRANSFORM KERNAL (FFTKNL)* is that the former returns results which are scaled by the length of the traces. If *IFTKNL* is used as an Inverse Discrete Fourier Transform (IFT), the results are in time reversed order. To do an IFT, the imaginary trace must have its sign changed before and after the *IFTKNL*.

# INPUT SELECT INPUT

## COMMAND SYNTAX:



## DESCRIPTION:

The 70900A automatically assigned input numbers in address order to each input found during power up.

With this command, the input associated with the number is connected to the measurement system.

## PRESET STATE:

Determined by *PRESET INPUT (PINPUT)*

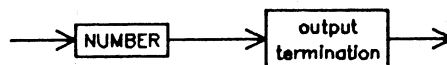
## PARAMETER RANGE:

Minimum: 1  
Maximum: Hardware Limit

## STEP INCREMENT:

1

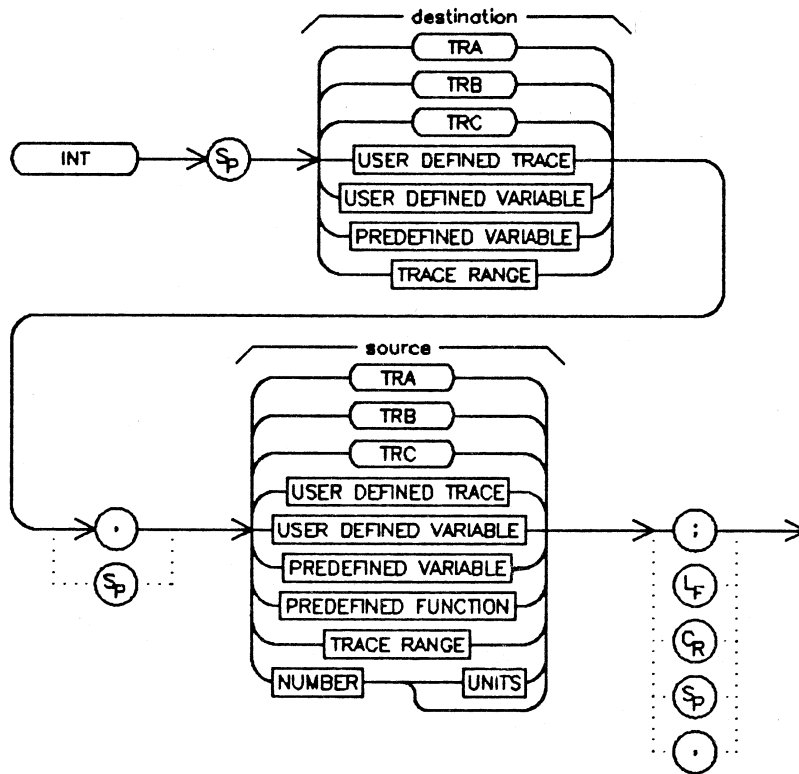
## QUERY RESPONSE:



# INT

## INTEGER

### COMMAND SYNTAX:

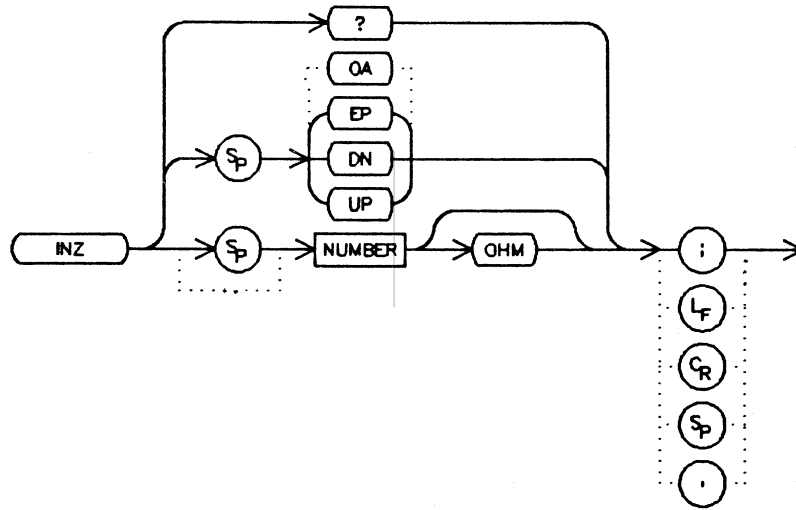


### DESCRIPTION:

The greatest integer which is less than or equal to the source real number is stored in the destination. Since traces and trace ranges only consist of integers, using them as source data in the *INTEGER* (*INT*) command will yield the same result as that accomplished by using them as source data for the *MOVE* (*MOV*) command.

# INZ INPUT IMPEDANCE

**COMMAND SYNTAX:**



**DESCRIPTION:**

The input impedance command is to be used for power voltage conversions. This is for computational purposes only. The actual impedance can only be affected by hardware external to the instrument.

**PRESET STATE:**

50 Ohms

**PARAMETER RANGE:**

Minimum: 1 Ohm  
Maximum: 100 M Ohm

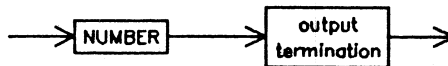
**STEP INCREMENT:**

1, 2, 5, 10 Sequence

**FUNDAMENTAL UNIT:**

Ohm

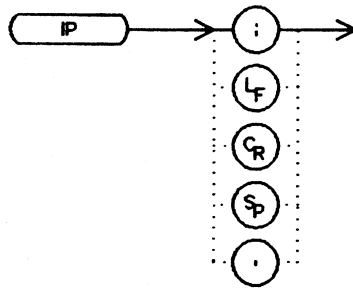
**QUERY RESPONSE:**



# IP

## INSTRUMENT PRESET

COMMAND SYNTAX:

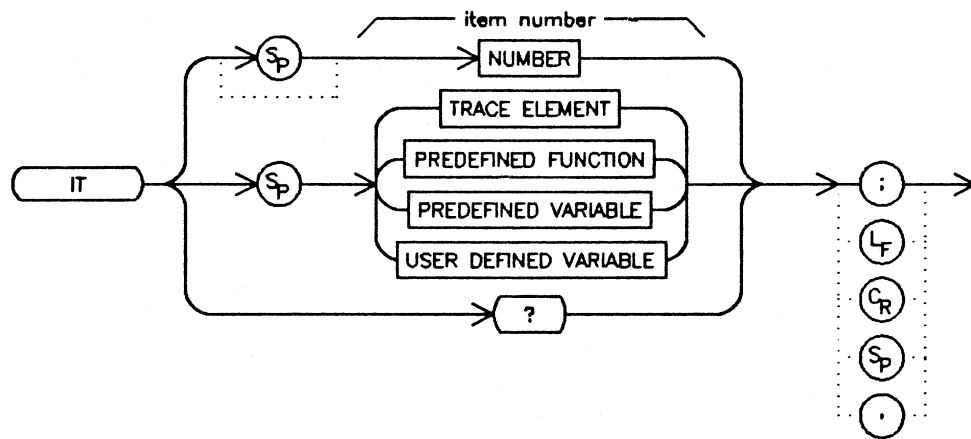


### DESCRIPTION:

The state of each measurement state function is set to its preset state.

**IDENTIFY ITEM**

**COMMAND SYNTAX:**



**DESCRIPTION:**

The *IDENTIFY ITEM* command references objects for user graphics. When an *IT* command with a non-zero item proceeds text or graphics, that object can be referenced in the future by again using the item command. An item number of 0 allows information to be written to the display screen but does not provide for future reference.

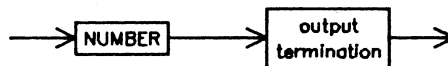
**PRESET STATE:**

0

**PARAMETER RANGE:**

Minimum: 0  
Maximum: 255

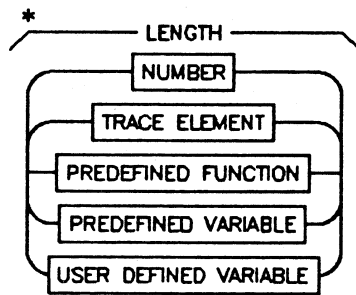
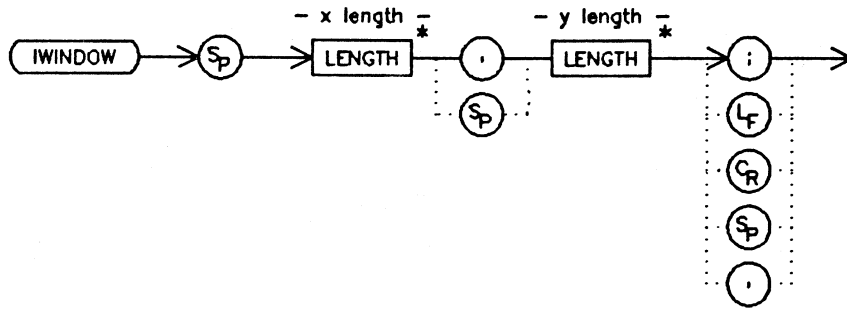
**QUERY RESPONSE:**



# IWINDOW

## INSTRUMENT WINDOW

### COMMAND SYNTAX.



#### DESCRIPTION:

*INSTRUMENT WINDOW* specifies the size of the normal display mode window within the display area. The X and Y length are specified in user units defined by the *SCALE GRAPHICS (SCALE)* command. The instrument's display output is located in the lower left corner of the display area.

#### PRESET STATE:

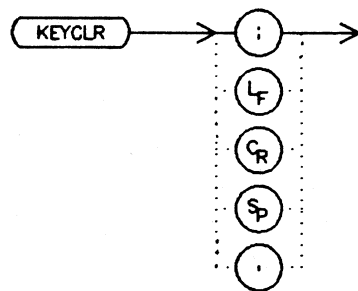
1000,1000



# KEYCLR

## CLEAR USER DEFINED KEYS

### COMMAND SYNTAX:



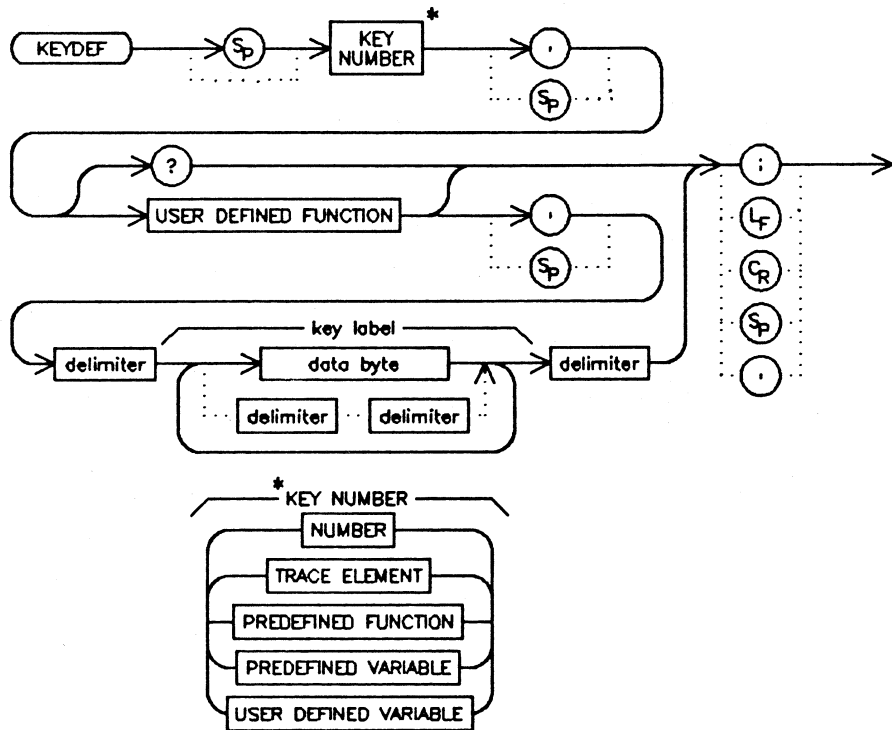
### DESCRIPTION:

The user defined keys are cleared.

# KEYDEF

## USER DEFINED KEY DEFINITION

### COMMAND SYNTAX:



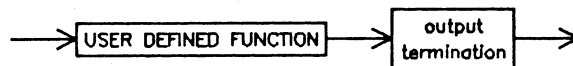
### DESCRIPTION:

The key definition allows a user defined function to be assigned to one of the manual user defined keys. The values for the number are limited to 1 through 14. Keys 1 through 7 are the right USER keys. Keys 8 through 14 are the left USER keys. If the key label is supplied it will be used to label the USER menu key. Otherwise, the name of the user defined function will be used to label the key. This user defined key definition will replace any previously existing user defined definition to the key. The key label can be up to two lines of seven characters. A line feed can be used to get to the second line of characters.

### PARAMETER RANGE:

Minimum: 1  
Maximum: 14

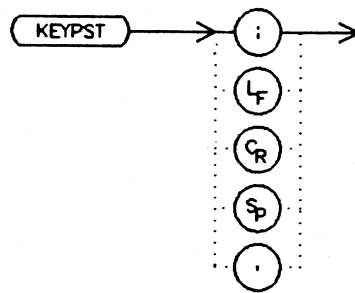
### QUERY RESPONSE



# KEYPST

## PRESET USER DEFINED KEYS

### COMMAND SYNTAX:



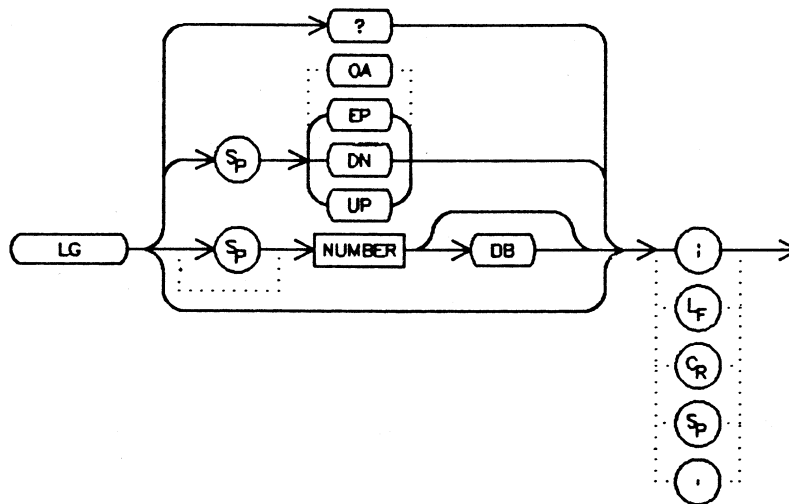
### DESCRIPTION:

The user defined keys are preset to their initial functions.

# LG

## LOGARITHM SCALE

### COMMAND SYNTAX:



### DESCRIPTION:

This command puts the display in log mode and sets the display's vertical scale.

### PRESET STATE:

10 dB/Division

### PARAMETER RANGE:

Minimum: .01

Maximum: 20

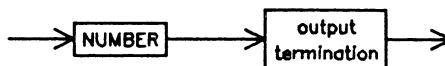
### STEP INCREMENT:

1, 2, 5, 10 Sequence

### FUNDAMENTAL UNIT:

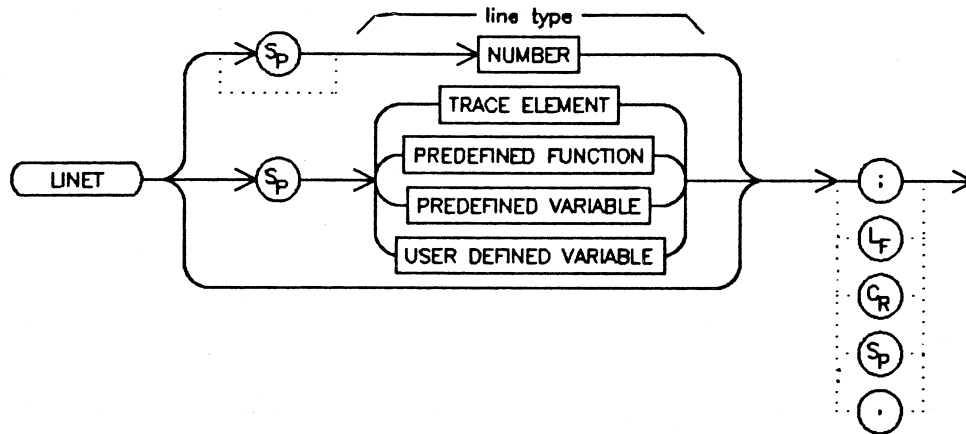
dB

### QUERY RESPONSE:



# LINET LINE TYPE

## COMMAND SYNTAX:



## DESCRIPTION:

This command sets the line type for plots, traces, and graticules. Shown below are the line types as identified by number. If the parameter is omitted, the line type is set to continuous.

- 0- End Points Only
- 1- . . . . .
- 2- \_ \_ \_ \_ \_
- 3- — — — — —
- 4- — — — — — . . . . .
- 5- - - - - -
- 6- \_ \_ \_ \_ \_
- 7- - - - - -
- 8- - - - - -

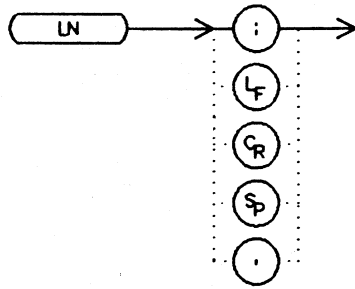
## PRESET STATE:

Continuous Line

**LN**

**LINEAR SCALE**

**COMMAND SYNTAX:**

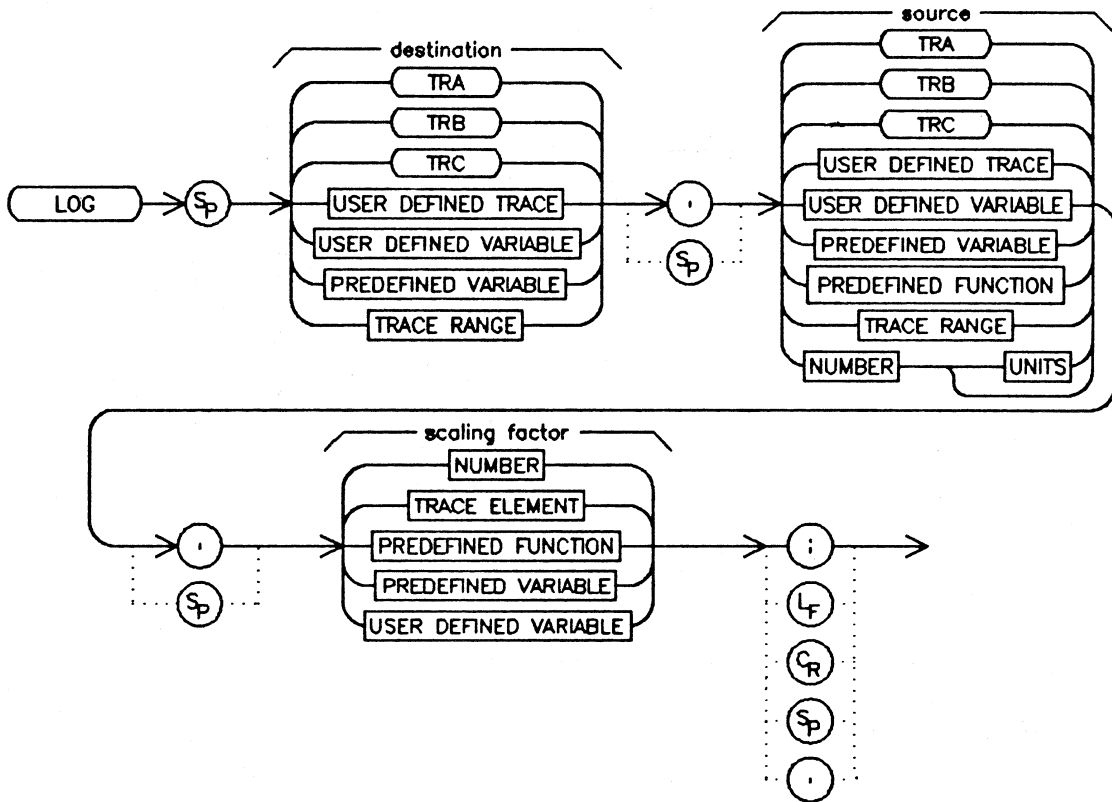


**DESCRIPTION:**

Linear mode is selected by this command. The bottom of the screen is 0 volts and the top of the screen is the reference level. Linear mode is not allowed when the measurement mode is stimulus response (SR).

# LOG LOGARITHM

## COMMAND SYNTAX:



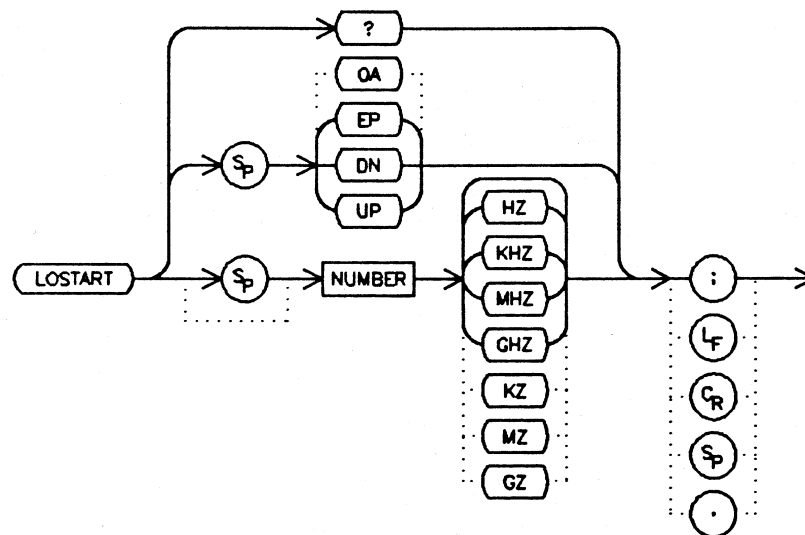
## DESCRIPTION:

The logarithm (base 10) of the source is taken. That result is then multiplied by the scaling factor and the final result is stored in the destination.

# LOSTART

## LOCAL OSCILLATOR START FREQUENCY

COMMAND SYNTAX:



### DESCRIPTION:

The start frequency of the local oscillator is set directly with this command. Center frequency and span are adjusted according to the current mixing harmonic.

### COUPLING:

*LOSTART* is coupled to the frequency tuning commands (e.g. *CF*, *FA*, *FB*, *FS*, *HNLOCK*, *SP*).

### PRESET STATE:

The LO frequency corresponding to the preset start frequency (*FA*).

### PARAMETER RANGE:

+/- 1000 GHz

### STEP INCREMENT:

$(LOSTOP - LOSTART)/10$

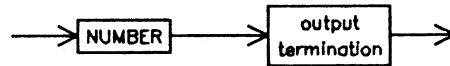


# LOSTART LOCAL OSCILLATOR START FREQUENCY

**FUNDAMENTAL UNIT:**

**Hz**

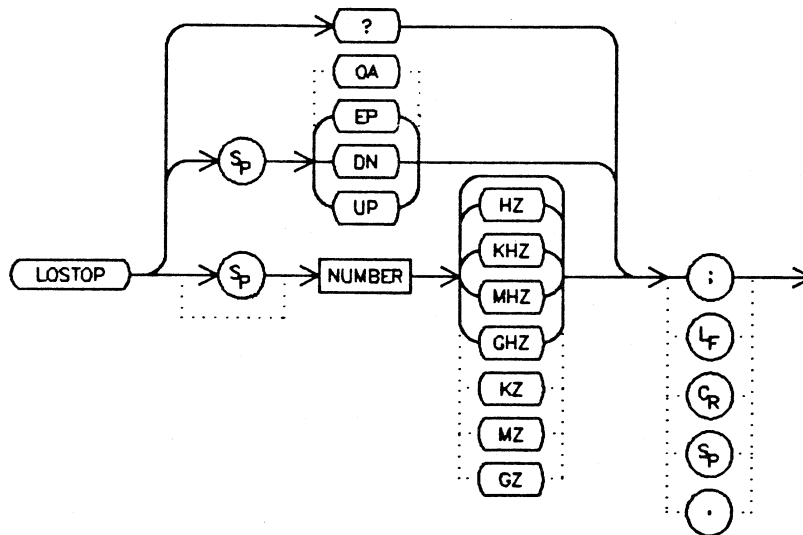
**QUERY RESPONSE:**



# LOSTOP

## LOCAL OSCILLATOR STOP FREQUENCY

COMMAND SYNTAX:



### DESCRIPTION:

The stop frequency of the local oscillator is set directly with this command. Center frequency and span are adjusted according to the current mixing harmonic.

### COUPLING:

*LOSTOP* is coupled to the frequency tuning commands (e.g. *CF*, *FA*, *FB*, *FS*, *HNLOCK*, *SP*).

### PRESET STATE:

The LO frequency corresponding to the preset stop frequency (*FB*).

### PARAMETER RANGE:

+/- 1000 GHZ

### STEP INCREMENT:

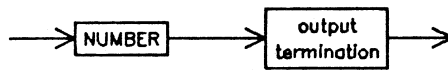
$(LOSTOP - LOSTART)/10$

# LOSTOP LOCAL OSCILLATOR STOP FREQUENCY

**FUNDAMENTAL UNIT:**

**Hz**

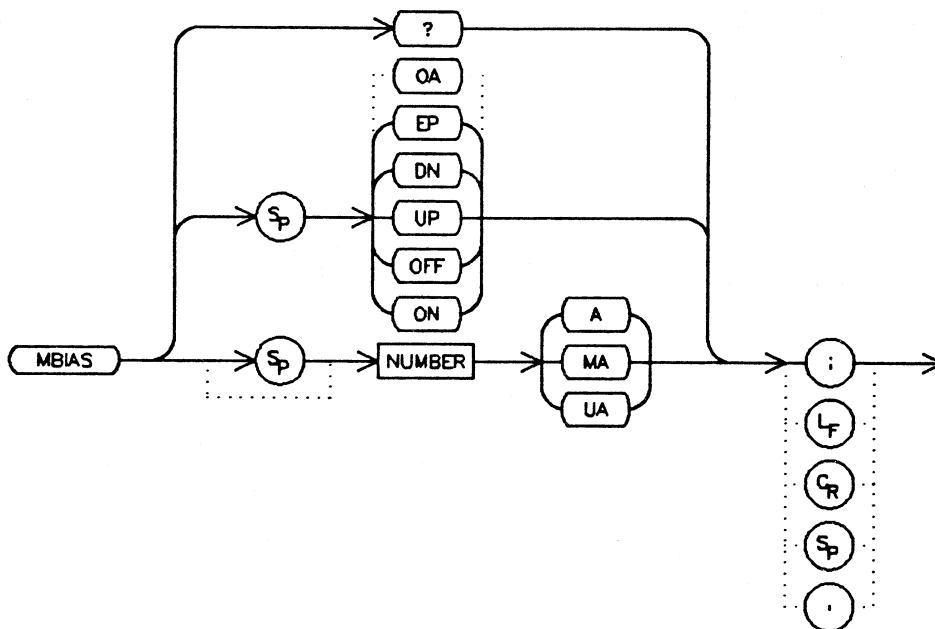
**QUERY RESPONSE:**



# MBIAS

## MIXER BIAS

COMMAND SYNTAX:



### DESCRIPTION:

The mixer bias for the external mixer is set to the entered value. When a number is entered for mixer bias, the function is automatically turned on. When turned OFF, the value for *MIXER BIAS (MBIAS)* is set to 0.

### PRESET STATE:

0

### PARAMETER RANGE:

Minimum: Hardware Limit  
Maximum: Hardware Limit

### STEP INCREMENT:

1, 2, 5, 10 Sequence

### FUNDAMENTAL UNIT:

A

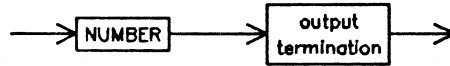
# MBIAS

## MIXER BIAS

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70907A External Mixer Interface Module is configured in the system

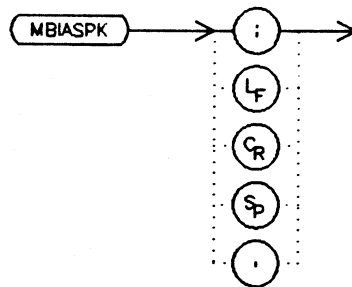
### QUERY RESPONSE:



## MBIASPK

### MIXER BIAS PEAK

#### COMMAND SYNTAX:



#### DESCRIPTION:

The mixer bias for the current input is peaked. The minimum and maximum bias and the resolution of the values to be tried are specified by the *MIXER BIAS MAXIMUM (MBMAX)*, *MIXER BIAS MINIMUM (MBMIN)*, and *MIXER BIAS RESOLUTION (MBRES)* commands.

The bias is peaked for the signal at the active marker. If there is no active marker then marker 1 is activated and placed at the highest signal on screen.

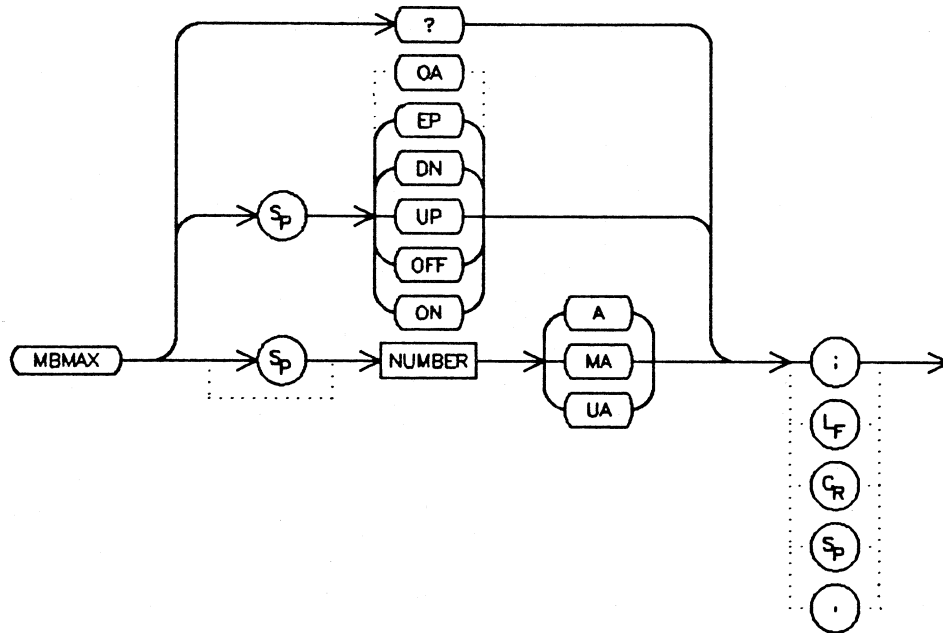
A localized peak function will try to maintain the same signal point if there is some instability from sweep to sweep. It is expected that the span is narrow enough and the signal is stable enough to make the adjustment.

#### HARDWARE REQUIREMENTS:

This command can only be used when an HP70907A External Mixer Interface Module is configured in the system.

# MBMAX MIXER BIAS MAXIMUM

**COMMAND SYNTAX:**



**DESCRIPTION:**

The maximum value of mixer bias current to be used with the *MIXER BIAS PEAK (MBIASPK)* command is set with this command.

**PRESET STATE:**

0

**PARAMETER RANGE:**

Minimum: Determined by hardware limit.  
Maximum: Determined by hardware limit.

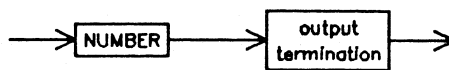
**STEP INCREMENT:**

1, 2, 5, 10 Sequence

**FUNDAMENTAL UNIT:**

A

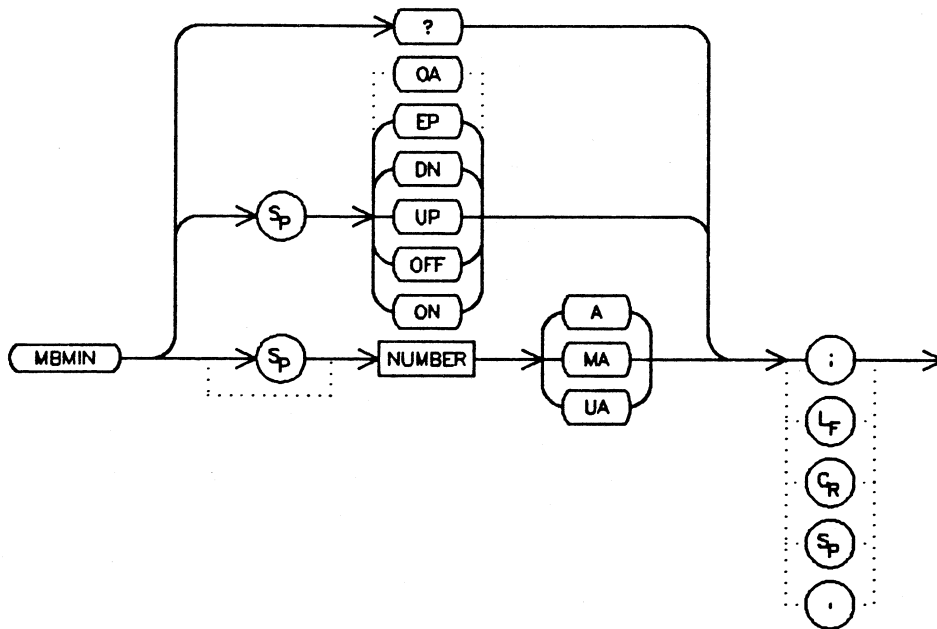
**QUERY RESPONSE:**



# MBMIN

## MIXER BIAS MINIMUM

COMMAND SYNTAX:



### DESCRIPTION:

The minimum value of mixer bias current to be used with the *MIXER BIAS PEAK (MBIASPK)* command is set with this command.

### PRESET STATE:

0

### PARAMETER RANGE:

Minimum: Determined by hardware limit.  
Maximum: Determined by hardware limit.

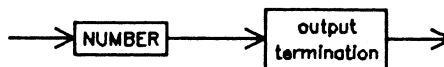
### STEP INCREMENT:

1, 2, 5, 10 Sequence

### FUNDAMENTAL UNIT:

A

### QUERY RESPONSE:

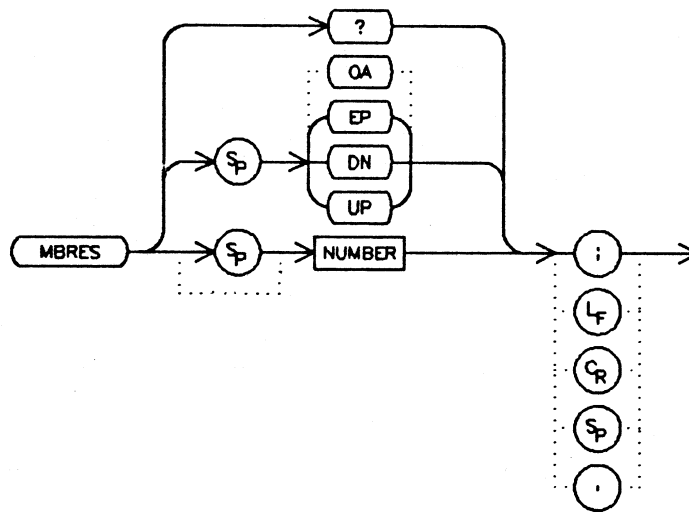




# MBRES

## MIXER BIAS RESOLUTION

### COMMAND SYNTAX:



### DESCRIPTION:

This command sets the number of points resolution for the *MIXER BIAS PEAK (MBIASPK)* command.

### PRESET STATE:

10

### PARAMETER RANGE:

Minimum: 1

Maximum: Determined by hardware limit.

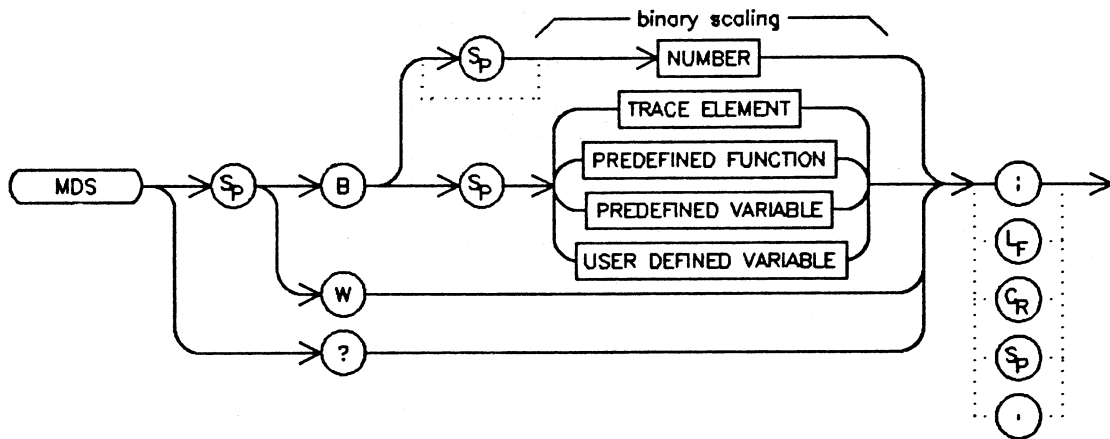
### STEP INCREMENT:

1, 2, 5, 10 Sequence

# MDS

## MEASUREMENT DATA SIZE

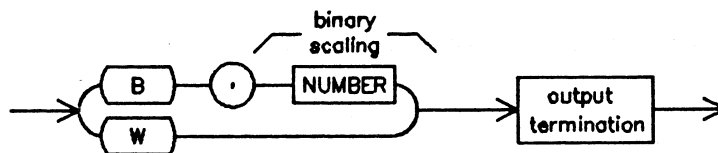
### COMMAND SYNTAX:



### DESCRIPTION:

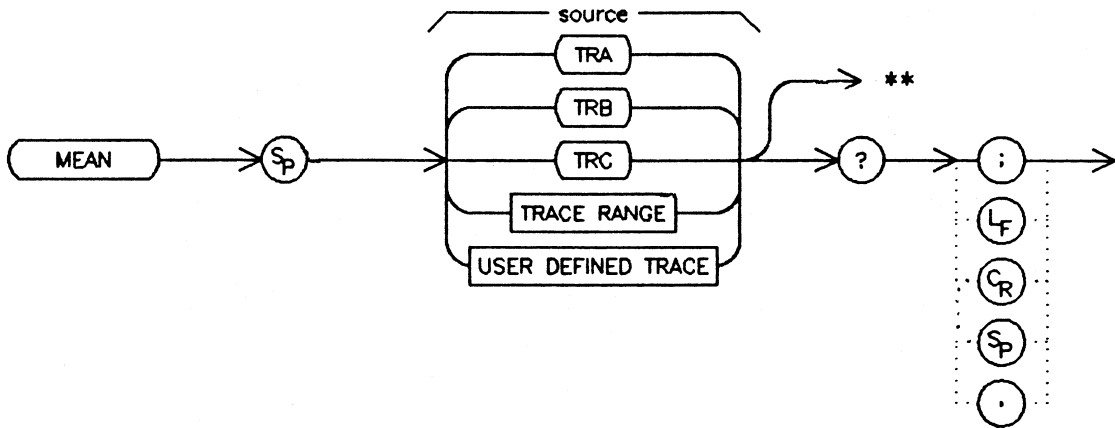
This command will set the measurement data size for binary output trace data (TDF B, I, OR A) to BYTE (B) or WORD (W). For byte output, each data point is divided by two to the power of the binary scaling factor. For each byte input, the data point is multiplied by two to the power of the binary scaling factor. A scaling value of 7 provides adequate resolution for most applications. MDS is set to W on powerup or on device clear.

### QUERY RESPONSE:



# MEAN TRACE MEAN

## COMMAND SYNTAX:

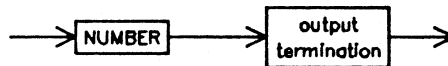


\*\* For use as a Predefined Function.

## DESCRIPTION:

The *MEAN* function outputs the arithmetic mean value of the given trace in measurement units.

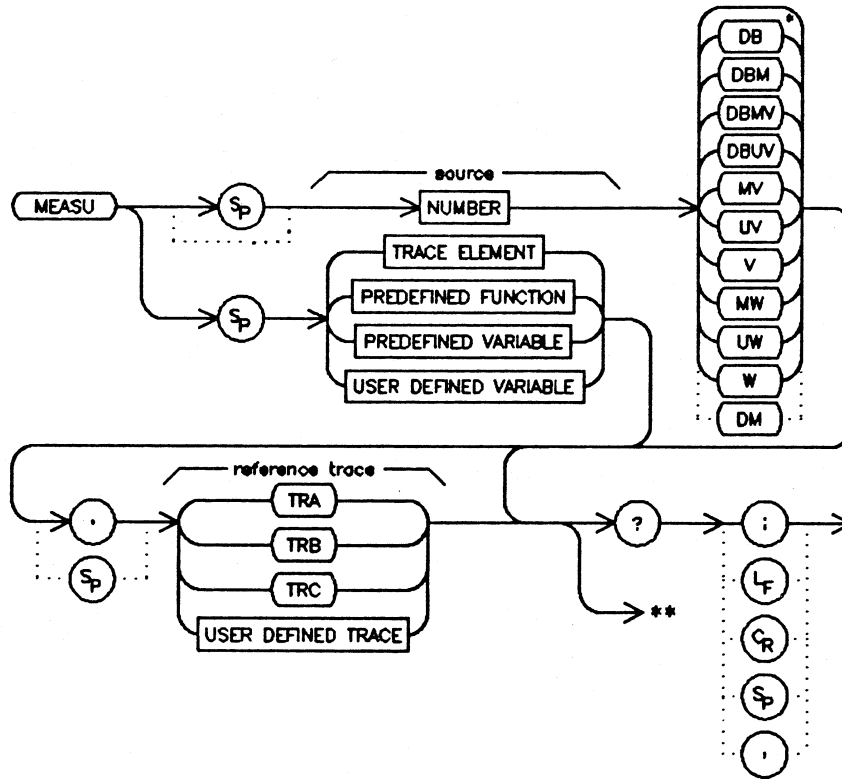
## QUERY RESPONSE:



# MEASU

## MEASUREMENT UNIT CONVERSION

### COMMAND SYNTAX:

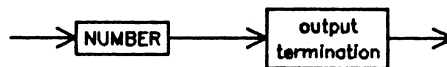


- \* DB is in relative amplitude mode (See *MEASURE SR*).
- \*\* For use as a Predefined Function.

### DESCRIPTION:

The source value is converted from amplitude units to measurement units based on the trace conditions of the reference trace. If input is provided without specifying units, the input will be interpreted as being in the units specified by *ABSOLUTE AMPLITUDE UNITS (AUNITS)*. If the reference trace is omitted, the current measurement conditions (reference level and vertical scale) are used.

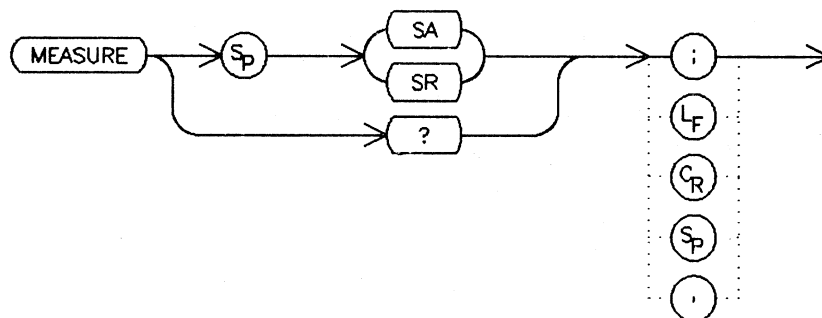
### QUERY RESPONSE:



# MEASURE

## MEASUREMENT MODE

### COMMAND SYNTAX:



### DESCRIPTION:

This command selects the measurement to be made. A different measurement is characterized by a different procedure or presentation of the data used by the instrument. Two types of measurements are currently available: Spectrum Analysis or Stimulus Response.

#### Signal Analysis (SA)

Signal analysis is the basic measurement provided by the 70900A. It provides a measurement of absolute amplitude over frequency and is referred to as absolute amplitude mode. In *MEASUREMENT MODE SPECTRUM ANALYSIS (MEASURE SA)*, the instrument will always be in absolute amplitude mode with the amplitude value based upon the current *ABSOLUTE AMPLITUDE UNITS (AUNITS)*.

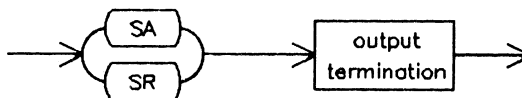
#### Stimulus Response (SR)

System operation is optimized for stimulus response measurements. This mode activates the stimulus response auto sweep time equations. In *MEASUREMENT MODE STIMULUS RESPONSE (MEASURE SR)*, if either *TRACE A MINUS TRACE B (AMB)* or *TRACE A MINUS TRACE C (AMC)* is also on, then the instrument will be in relative amplitude mode. When the system enters relative amplitude mode, the reference level is set to 0 dB and the following commands are displayed in dB units: *AMPLITUDE UNIT CONVERSION (AMPU)*, *DISPLAY LINE (DL)*, *MEASUREMENT UNIT CONVERSION (MEASU)*, *MARKER AMPLITUDE (MK)*, *REFERENCE LEVEL (RL)*, *THRESHOLD (TH)*, and *TRACE DATA INPUT/OUTPUT (TRA/TRB/TRC)*.

### PRESET STATE:

SA

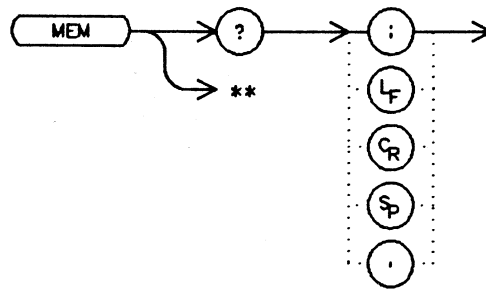
### QUERY RESPONSE:



# MEM

## MEMORY AVAILABLE

COMMAND SYNTAX:

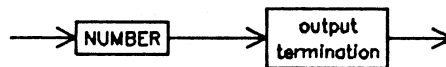


\*\* For Use as a Predefined Function

### DESCRIPTION:

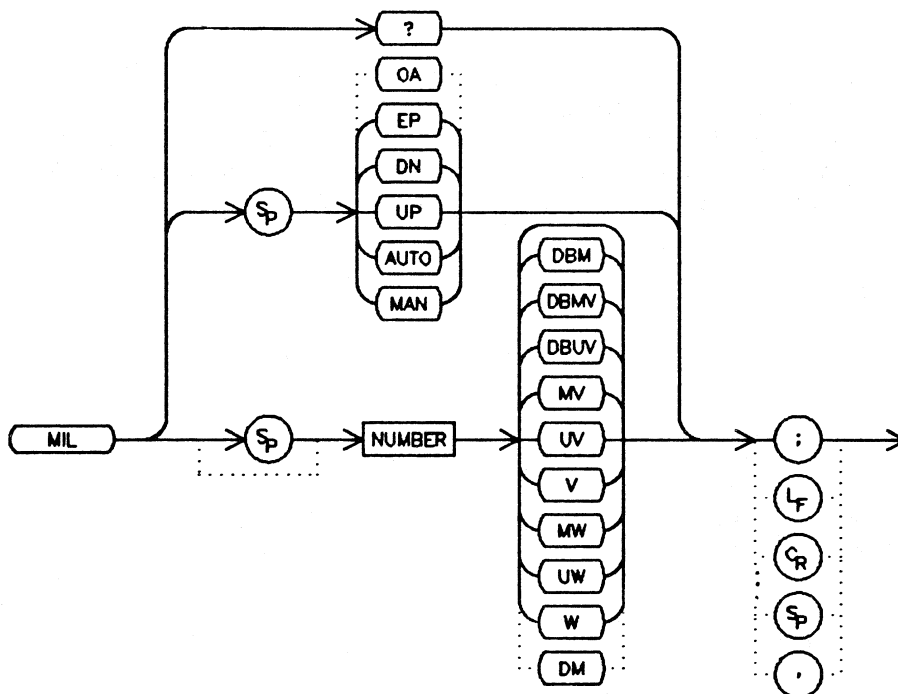
The memory available command allows the user to find out how much user allocable memory is currently available. The amount of user memory available is dependent on configuration of the instrument. The amount differs according to the number and type of modules in the user's system. The amount will also vary as functions which utilize this memory are employed.

### QUERY RESPONSE



## MAXIMUM INPUT LEVEL

## COMMAND SYNTAX:



## DESCRIPTION:

This command is used to tell the instrument the maximum input level that will be applied. The instrument will attempt to set up internal gain and input attenuation to accommodate signals at this level. If the attenuator is not in AUTO or within range, the instrument may not be able to accommodate the requested maximum input level. If the analyzer can not accommodate the requested level, analyzer settings will be used to achieve a level closest to the requested maximum input level. The maximum input level line (dashed line on the display) displays the maximum signal that can be measured accurately.

When the instrument is in normal use as a spectrum analyzer measuring absolute power, the *MAXIMUM INPUT LEVEL (MIL)* should be in AUTO mode. When *MIL* is in AUTO mode, the instrument will automatically maintain maximum input level at top of the display screen. The maximum input level line is not displayed when the maximum input level is at top or off screen.

Maximum input level is most useful in stimulus response applications in relative amplitude mode. *MIL* then becomes the primary mechanism for setting the gain controls of the instrument (since *REFERENCE LEVEL (RL)* is a relative value that no longer corresponds to an absolute value at top of screen). The maximum input level line is not displayed in relative amplitude mode since it is an absolute value.

# MIL

## MAXIMUM INPUT LEVEL

### COUPLING:

Auto, If in absolute amplitude mode, maximum input level is set to the top screen level (as defined by reference level, reference level position, and vertical scale). If in relative amplitude mode, maximum input level is fixed at the value it had when relative amplitude mode was entered.

### PRESET STATE:

AUTO

### PARAMETER RANGE:

Minimum: -300 dBm

Maximum: 300 dBm

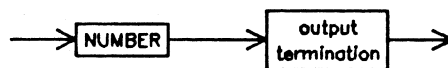
### STEP INCREMENT:

1 Vertical Scale Division

### FUNDAMENTAL UNIT:

Determined by *AUNITS*

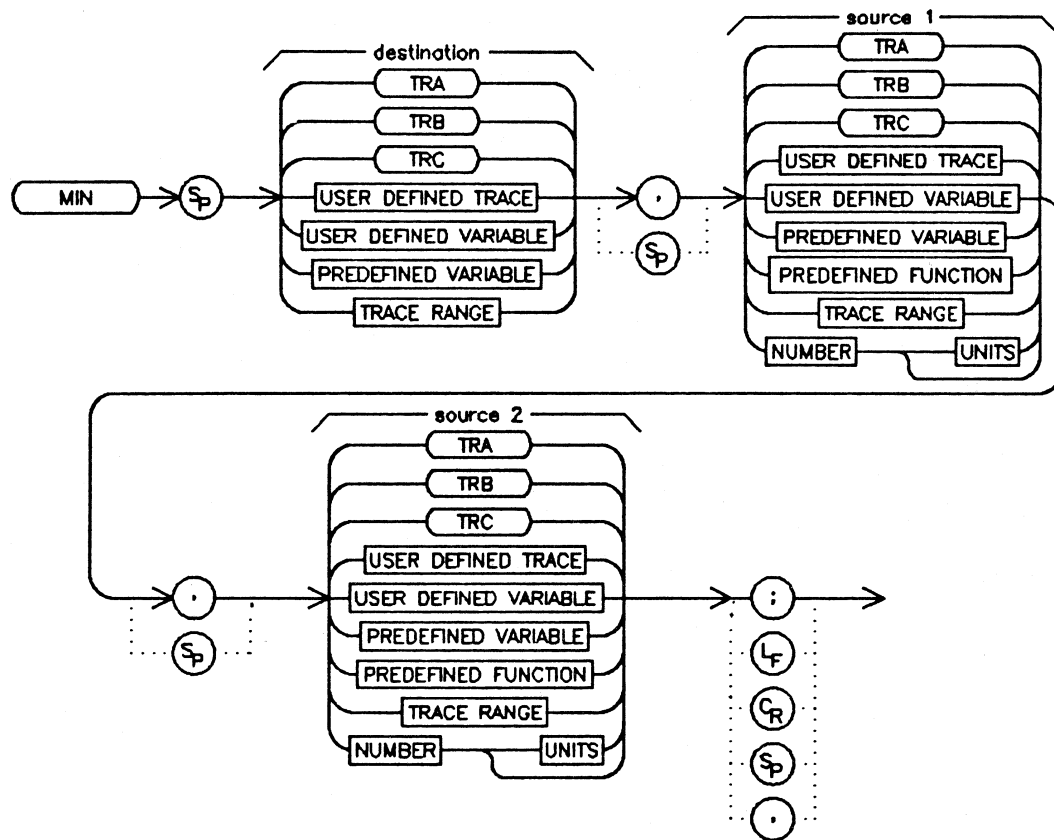
### QUERY RESPONSE:





# MIN MINIMUM

## COMMAND SYNTAX:



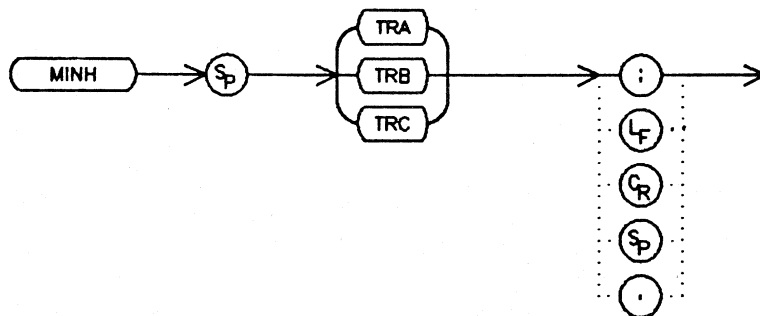
## DESCRIPTION:

The minimum of the two sources is stored in the destination.

# MINH

## MINIMUM HOLD

### COMMAND SYNTAX:

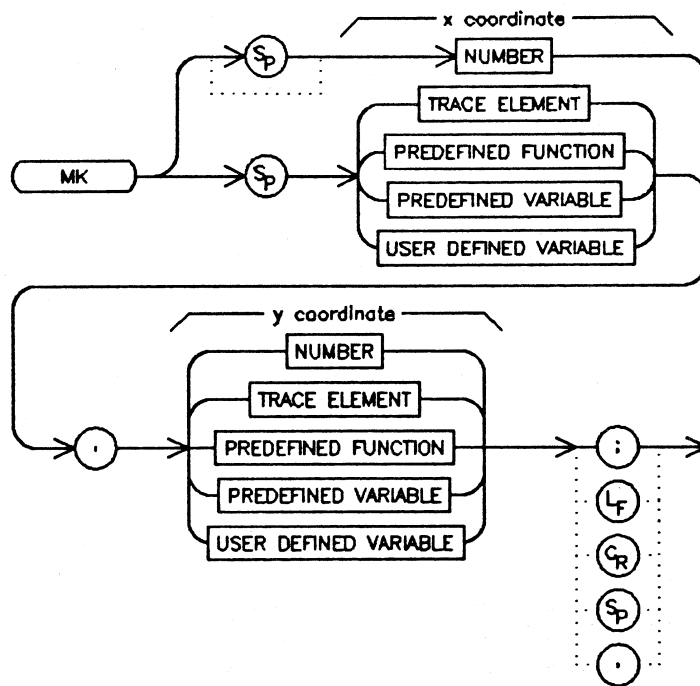


### DESCRIPTION:

The input data and the specified trace data are examined and the minimum of the two is selected and given to the trace register specified. Display of that trace register is enabled. *MINIMUM HOLD (MINH)* can affect detector operation. See the *DETECTION MODE (DET)* command for further explanation.

# MK MARKER DISPLAY

## COMMAND SYNTAX:



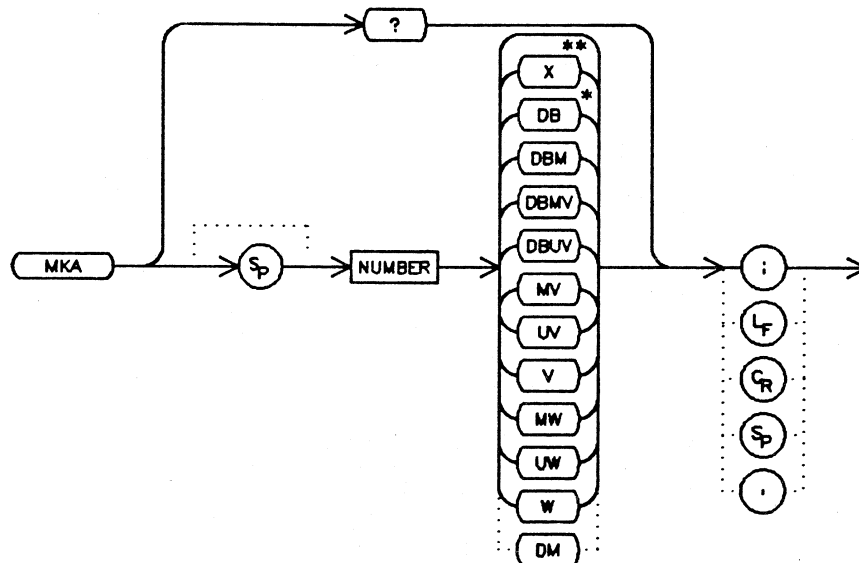
## DESCRIPTION:

This command is used to place a marker at the specified coordinates. Coordinates are either in the current scaling units (See *SCALE*) or are in *DISPLAY WINDOW (DWINDOW)* units, if *DWINDOW* is on .

# MKA

## MARKER AMPLITUDE

COMMAND SYNTAX:



\*\* X is voltage ratio for voltage derived amplitude units and is power ratio for power derived amplitude units.

\* DB is used in relative amplitude mode (See *MEASURE SR*).

### DESCRIPTION:

This command may be used to query the amplitude for any type of marker. If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

This command may also be used to set the relative amplitude for an amplitude relative marker.

### PARAMETER RANGE:

+/- 300 dB

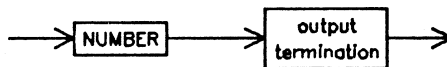
# MKA

## MARKER AMPLITUDE

### FUNDAMENTAL UNIT:

Units are dB for amplitude relative or delta markers. For linear (LN) scale, amplitude relative or delta markers units are ratio (unitless). Otherwise, units are set by *ABSOLUTE AMPLITUDE UNITS (AUNITS)* for position markers in absolute amplitude mode and dB for position markers in relative amplitude mode.

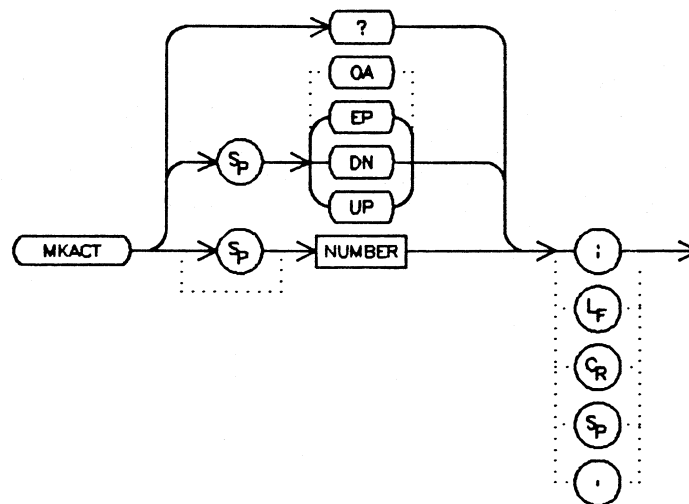
### QUERY RESPONSE:



# MKACT

## ACTIVE MARKER

### COMMAND SYNTAX:



### DESCRIPTION:

When this command is used the following results occur.

1. The marker number supplied by the command is made the active marker.
2. If the marker number is not already on, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.
3. The active marker is highlighted on the screen for identification.

### PRESET STATE:

OFF

### PARAMETER RANGE:

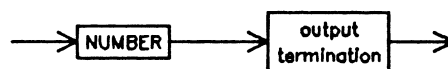
Minimum: 1

Maximum: 5

### STEP INCREMENT:

1

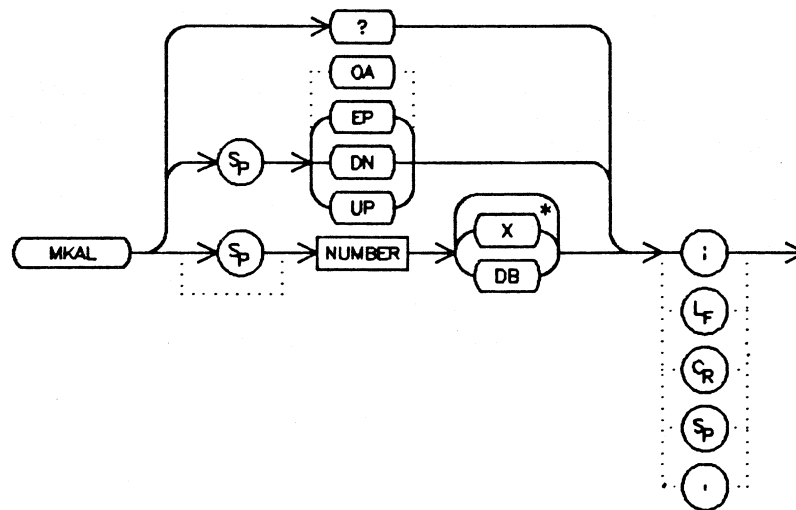
### QUERY RESPONSE:



If OFF, the response to a query will be 0

## MARKER AMPLITUDE RELATIVE LEFT

## COMMAND SYNTAX:



\* X is voltage ratio for voltage derived amplitude units and is power ratio for power derived amplitude units.

## DESCRIPTION:

The marker amplitude relative left command sets up marker #2 as an amplitude relative type marker and gives it an amplitude offset. Marker 2 becomes the active marker. If marker 1 is not active, it is activated as a normal marker.

## PRESET STATE:

0 dB

## PARAMETER RANGE:

+/- 300 dB

## STEP INCREMENT:

1 Vertical Scale Division

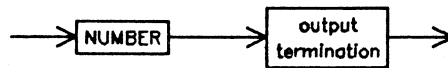
# MKAL

## MARKER AMPLITUDE RELATIVE LEFT

### FUNDAMENTAL UNIT:

Units are dB when *ABSOLUTE AMPLITUDE UNITS (AUNITS)* are log related (DBM, DEMV, DBUV). Units are ratio (unitless) when *ABSOLUTE AMPLITUDE UNITS (AUNITS)* are linear (V, W).

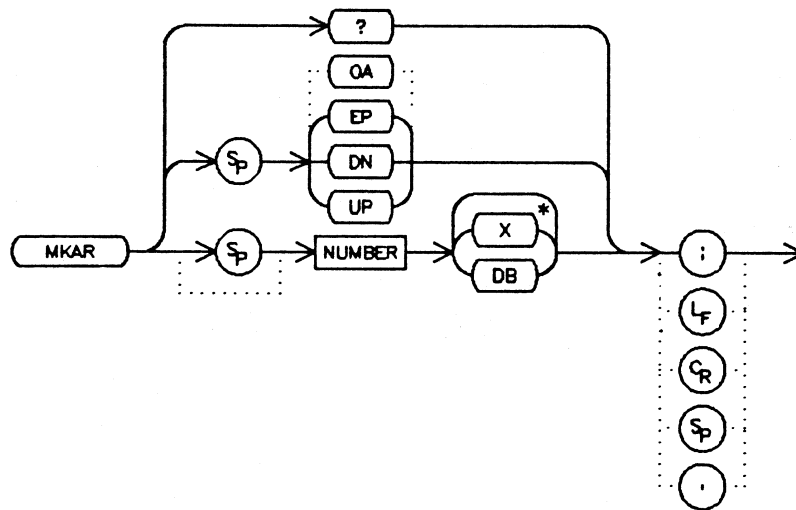
### QUERY RESPONSE:





MARKER AMPLITUDE RELATIVE RIGHT

COMMAND SYNTAX:



\* X is voltage ratio for voltage derived amplitude units and is power ratio for power derived amplitude units.

DESCRIPTION:

The marker amplitude relative right command sets up marker #3 as an amplitude relative type marker and gives it an amplitude offset. Marker 3 becomes the active marker. If marker 1 is not active, it is activated as a normal marker.

PRESET STATE:

0 dB

PARAMETER RANGE:

+/- 300 dB

STEP INCREMENT:

1 Vertical Scale Division

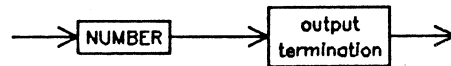
# MKAR

## MARKER AMPLITUDE RELATIVE RIGHT

### FUNDAMENTAL UNIT:

Units are dB when *ABSOLUTE AMPLITUDE UNITS (AUNITS)* are log related (DBM, DBMV, DBUV). Units are ratio (unitless) when *ABSOLUTE AMPLITUDE UNITS (AUNITS)* are linear (V, W).

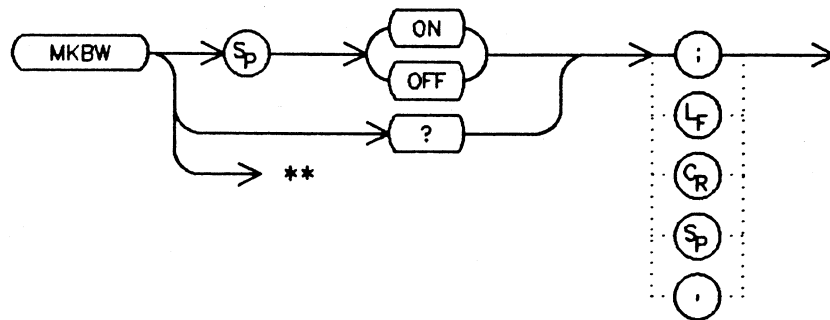
### QUERY RESPONSE:



# MKBW

## MARKER BANDWIDTH

### COMMAND SYNTAX:

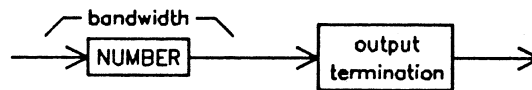


\*\* For use as a Predefined Function

### DESCRIPTION:

When the marker bandwidth function is on, the bandwidth specified by markers 2 and 3 is displayed on the message area. If no markers are active, an implicit "MKAL;MKRL;" is performed.

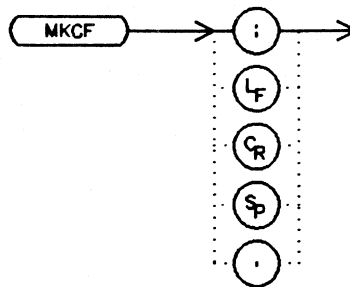
### QUERY RESPONSE:



# MKCF

## MARKER TO CENTER FREQUENCY

### COMMAND SYNTAX:



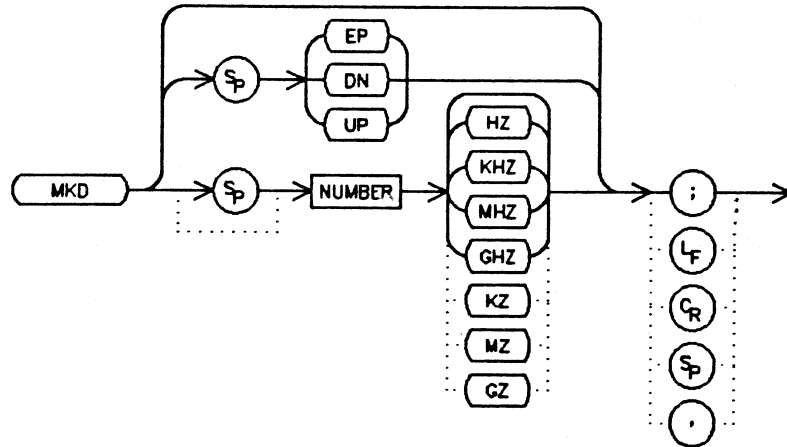
### DESCRIPTION:

Center frequency is set to the frequency (absolute) of the active marker. If the active marker is an amplitude relative type marker, no action is taken and an error is generated.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

# MKD MARKER DELTA

## COMMAND SYNTAX:



## DESCRIPTION:

Delta Marker sets the active marker to a delta type marker. A delta type marker is a position marker with one addition, a reference marker, fixed in amplitude and frequency, that is used as the reference for the delta computation. Only one marker at a time can be selected to be a delta marker.

Operation specifics are as follows:

1. If there is no active marker, the active marker is set to 1.
2. The active marker's type becomes delta and delta reference marker is placed at center screen.
3. If the delta function is active, the marker delta reference marker is placed at the same position as the active marker when the MKD function is executed. The first execution of MKD will always make the delta function active. The second execution without an intervening command of MKD will always cause the marker delta reference marker to be placed at the same position as the active marker.
4. If a marker delta frequency is provided, the active marker is moved to that frequency offset from the delta reference marker.
5. In time domain spans (span = 0), the delta reference acts like a position marker. In frequency domain spans (span <> 0), the delta reference is fixed to its current frequency.

When *AUNITS* are set to volts or watts, the readout is in voltage ratio or power ratio respectively.

**MKD**

**MARKER DELTA**

**PARAMETER RANGE:**

**+/- 1000 GHz**

**STEP INCREMENT:**

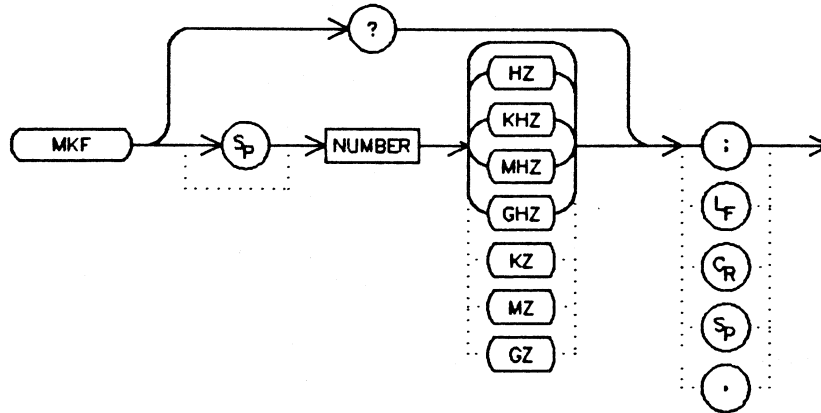
**1 Horizontal Scale Division**

**FUNDAMENTAL UNIT:**

**Hz**

# MKF MARKER FREQUENCY

## COMMAND SYNTAX:



## DESCRIPTION:

The frequency of the active marker is set to the entered value. If the active marker is a delta marker, then the frequency input or output is the delta frequency from the delta reference marker. The frequency can only be set on a delta or position type marker.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

The *MKF* command is also used for query of the marker frequency. If the instrument is in 0 span, executing *MARKER FREQUENCY (MKF)* has no effect.

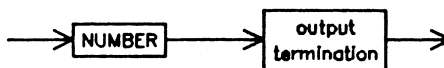
## PARAMETER RANGE:

+/- 1000 GHz

## FUNDAMENTAL UNIT:

Hz

## QUERY RESPONSE:

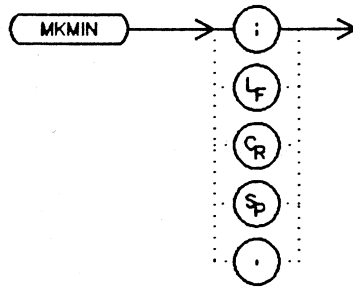


\* The output value is HZ or SEC as set by *MARKER READOUT (MKREAD)*.

# MKMIN

## MARKER TO MINIMUM

### COMMAND SYNTAX:



### DESCRIPTION:

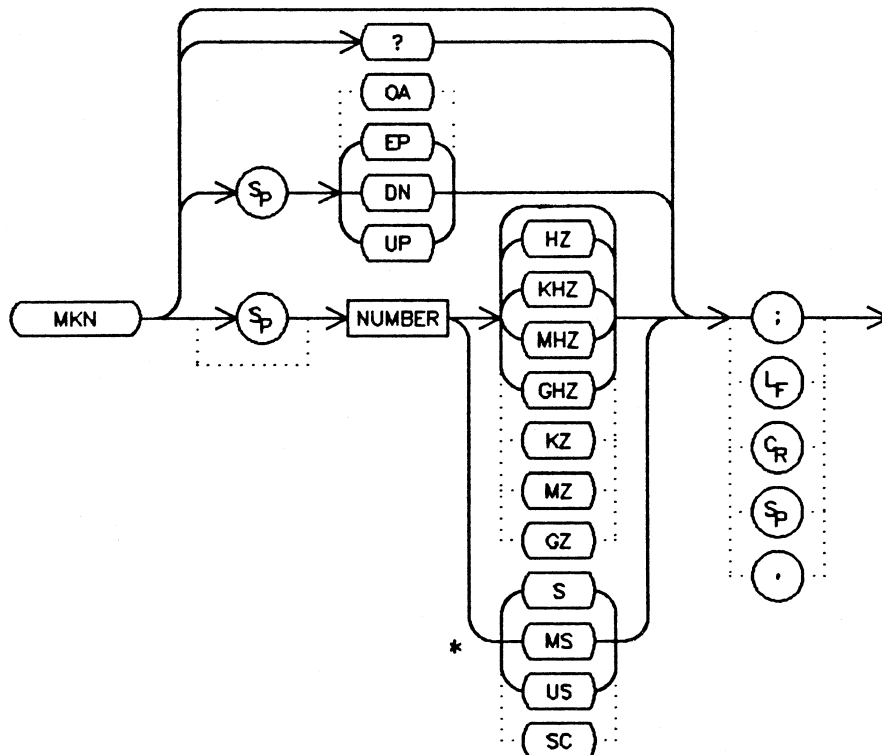
The active marker is placed at the minimum measured value.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.



# MKN MARKER NORMAL

## COMMAND SYNTAX:



\* For use with Zero Span only

## DESCRIPTION:

The marker normal function causes the following:

1. If there is no active marker, the active marker is set to 1.
2. The active marker's type is set to position. It is placed at center screen on the trace determined by the default algorithm (See *MKACT*). If already on, the trace and position do not change.
3. If a marker frequency is provided the active marker is placed at that frequency.
4. If the analyzer is in zero span, a unit of time can be entered manually. The active marker will be placed at the corresponding point of the trace.

## PARAMETER RANGE:

+/- 1000 GHz

**MKN**

**MARKER NORMAL**

**STEP INCREMENT:**

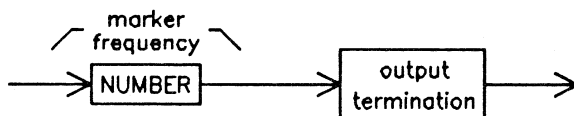
1 Horizontal Scale Division

**FUNDAMENTAL UNIT:**

Hz

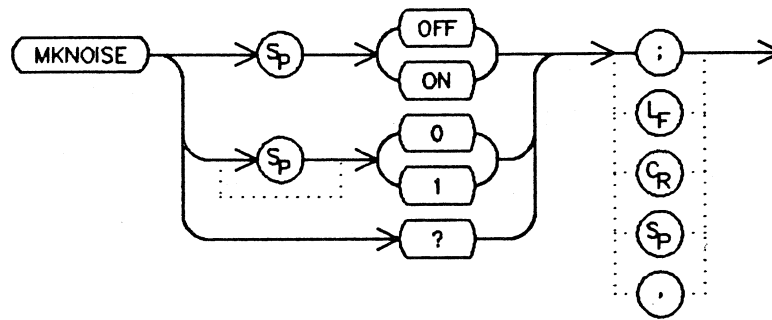
S, in zero span

**QUERY RESPONSE:**



# MKNOISE MARKER NOISE

## COMMAND SYNTAX:



## DESCRIPTION:

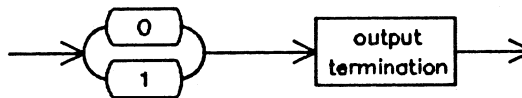
The rms noise level of the active marker is read out normalized to a 1 Hz bandwidth. The noise bandwidth of the IF filters and the logging error (if log in signal path) is taken into account.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

## PRESET STATE:

OFF

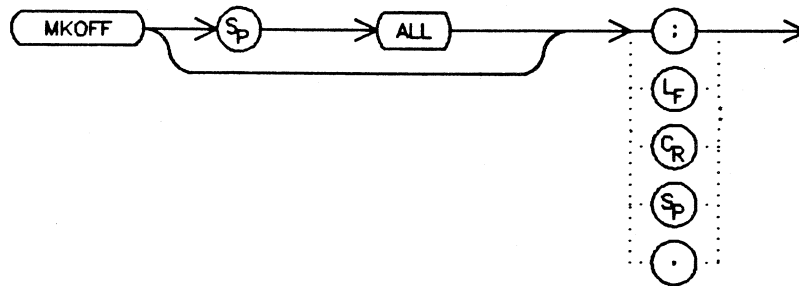
## QUERY RESPONSE:



# MKOFF

## MARKER OFF

### COMMAND SYNTAX:

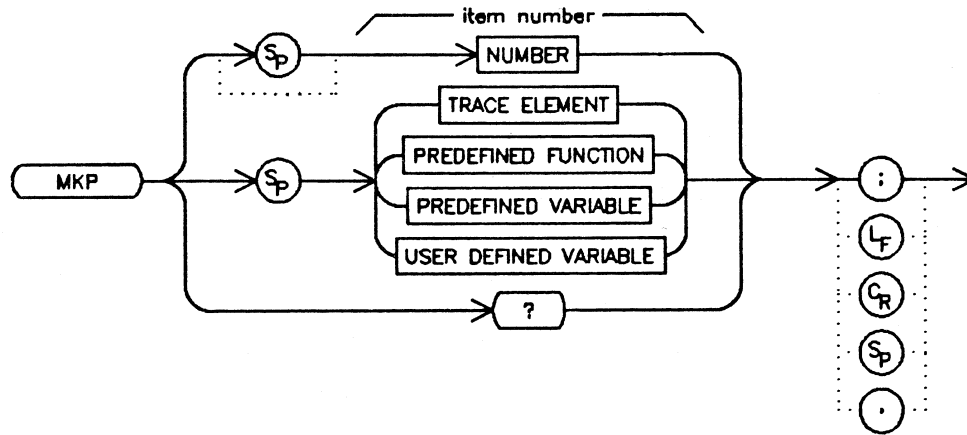


### DESCRIPTION:

Markers are automatically turned on when they are first activated. They may be individually or as a group turned off. If the ALL parameter is omitted, the active marker is turned off. If the ALL parameter is supplied, all markers are turned off. When a marker is turned off, there is no memory of its previous attributes.

# MKP MARKER POSITION

**COMMAND SYNTAX:**



**DESCRIPTION:**

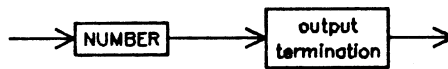
The position of the active marker, in trace data points is set to the numeric data field. The position can be set on a frequency, position, delta, or fixed type marker.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

**PARAMETER RANGE:**

+/- 1023

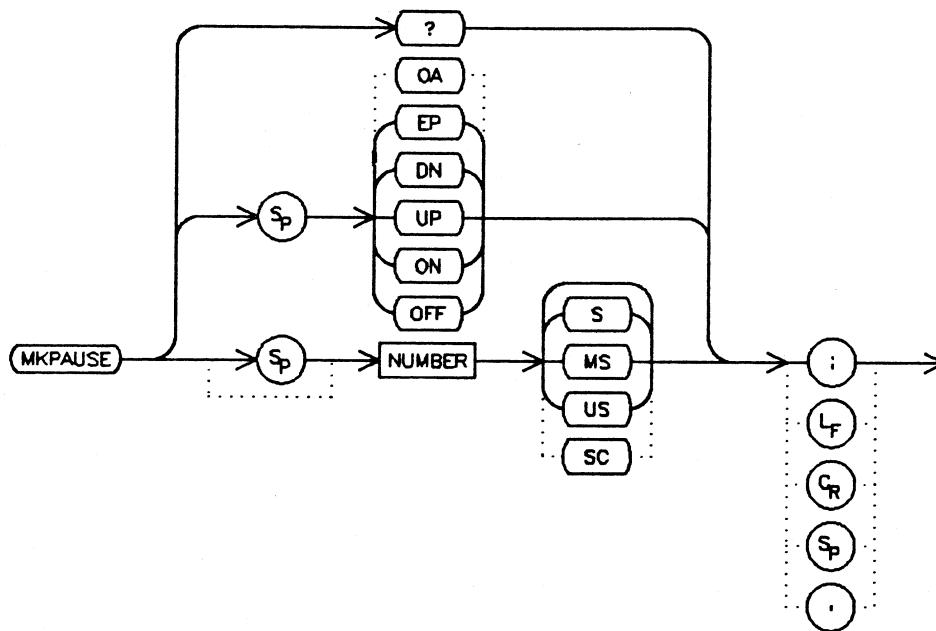
**QUERY RESPONSE:**



# MKPAUSE

## PAUSE AT MARKER

COMMAND SYNTAX:



### DESCRIPTION:

The sweep will stop and pause at the marker for the specified length of time. This command applies to the current active marker. A pause value of zero or turning the marker off turns the pause function off.

### PRESET STATE:

0, OFF

### PARAMETER RANGE:

Minimum: 0  
Maximum: 1000 Seconds

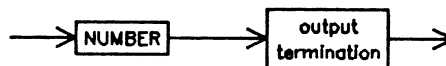
### STEP INCREMENT:

1, 3, 10 Sequence

### FUNDAMENTAL UNIT:

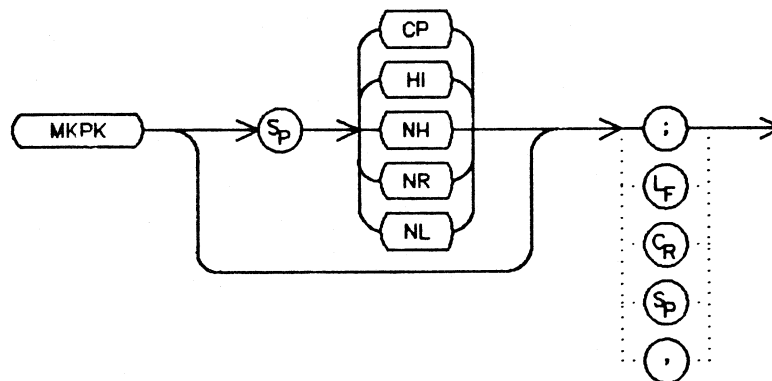
Second

### QUERY RESPONSE:



## MARKER PEAK SEARCH

## COMMAND SYNTAX:



## DESCRIPTION:

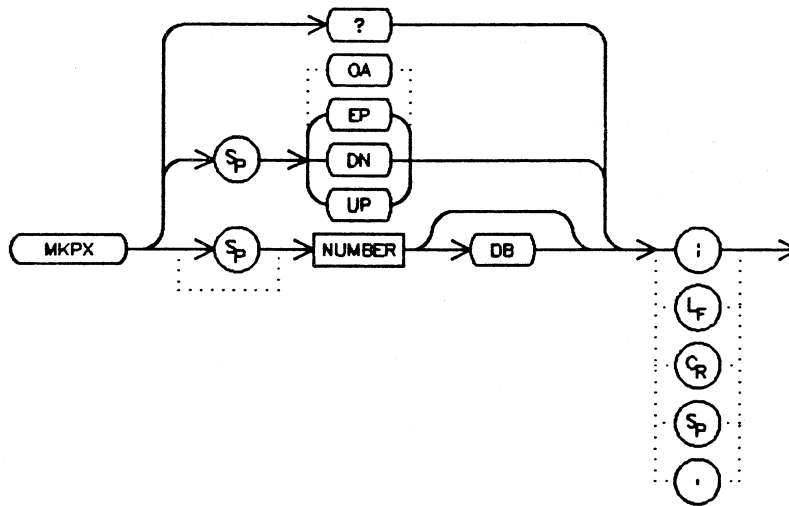
This function locates a peak in the trace and places the active marker there. Highest peak (HI) locates the absolute highest measured point. Closest peak (CP), next highest (NH), next left (NL), and next right (NR) locate peaks with respect to the current marker value. Threshold and signal excursion criteria help validate the peak. Threshold is the lowest value which will be considered in the search. The excursion criteria is the minimum amplitude excursion in dB required on each side of a peak for it to be identified as a peak. Threshold is set by the *THRESHOLD (TH)* command (whether it is on or not). Excursion is set by the *MARKER PEAK EXCURSION (MKPX)* command. The LO feedthrough is not considered for a potential peak on some instruments when evaluating the peak criteria. If the criteria of the peak search is not met, the marker is not moved.

If there is no active marker, the active marker is assumed to be 1 and the highest point is found. If the active marker is not already on, the marker is turned on with position type, and frequency, or sweep time (if zero span) readout, on the trace determined by the default algorithm, and is placed at peak as determined by the peak function. If no peak function is specified, then "highest" is the default.

# MKPX

## MARKER PEAK EXCURSION

### COMMAND SYNTAX:



### DESCRIPTION:

*MARKER PEAK EXCURSION* is the difference which must exist between a point and its two neighboring valley points for it to qualify as a peak point. In log mode, the minimum excursion is the difference in dB as set by *MKPX*. In linear mode, the minimum excursion (computed from the *MKPX* dB value) is the fraction of the display screen height as defined by the value of  $1 - 10^{-MKPX/200}$ .

### PRESET STATE:

6 dB

### PARAMETER RANGE:

Minimum: 0 dB  
Maximum: 300 dB

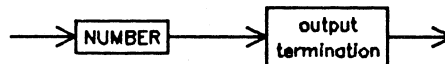
### STEP INCREMENT:

Log: 1 Vertical Scale Division  
Linear: 1 Vertical Scale Division at Top of Screen (.915 dB)

### FUNDAMENTAL UNIT:

dB

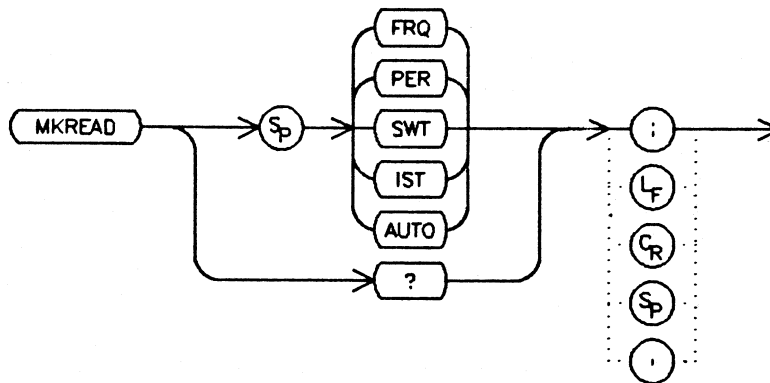
### QUERY RESPONSE:





# MKREAD MARKER READOUT

## COMMAND SYNTAX:



## DESCRIPTION:

The marker readout function determines the method that the frequency or time data of the active marker will be read out. There are two basic readout types: frequency related and sweep time related. The following table describes each of the readout types.

MKREAD PARM	DESCRIPTION	MKF RESPONSE	MKT RESPONSE
FRQ	Frequency Readout	Frequency	Mkr Sweep Time
PER	Period Readout	1/Frequency	Mkr Sweep Time
TIM	Sweep Time Readout	Frequency	Mkr Sweep Time
IST	Inverse Sweep Time	Frequency	1/Mkr Sweep Time
AUTO (span <> 0)	Frequency Readout	Frequency	Mkr Sweep Time
AUTO (span = 0)	Sweep Time Readout	Frequency	Mkr Sweep Time

When transitioning between different readout types, the position remains the same and the new readout type is assumed. The full range of readout possibilities are available in either zero or non-zero spans. The meanings of each of the readout types is explained below.

### FRQ (Zero Span)

The frequency value of the marker is the center frequency of the analyzer.

# MKREAD

## MARKER READOUT

### FRQ (Non-Zero Span)

The frequency value of the marker is associated with its position on the frequency scale.

### PER (Zero Span)

The period value of the marker is determined by  $1/\text{analyzer center frequency}$ .

### PER (Non-Zero Span)

The period value of the marker is determined by  $1/\text{marker's frequency value}$ .

### SWT

The time value is determined by the time point on the horizontal scale determined by sweep time.

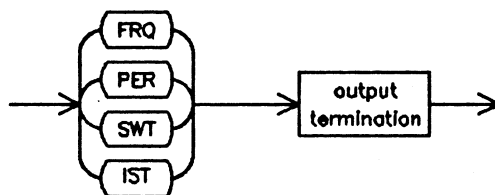
### IST

The inverse sweep time is determined by  $1/(\text{the TIM value})$ .

### PRESET STATE:

AUTO for all markers.

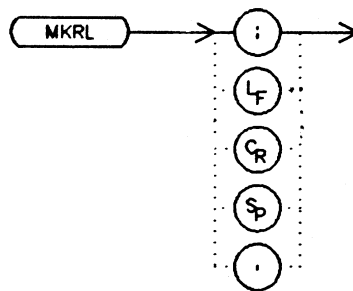
### QUERY RESPONSE:



# MKRL

## MARKER TO REFERENCE LEVEL

### COMMAND SYNTAX:



### DESCRIPTION:

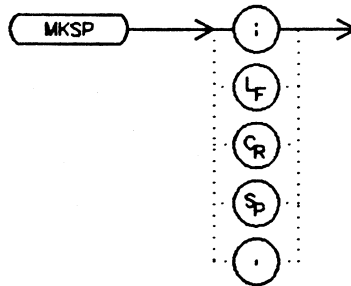
The reference level is set to the amplitude (absolute) of the active marker.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

## MKSP

### MARKER DELTA TO SPAN

COMMAND SYNTAX:

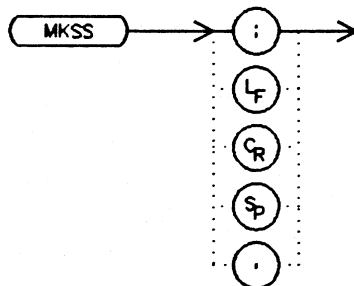


#### DESCRIPTION:

If the active marker type is AMPL, AMPR, or DELTA, the delta reference and active marker determine the start and stop frequencies. The left most marker indicates start frequency and the right most marker indicates stop frequency. If marker delta is off, then a marker is activated and the operation is performed.

## MARKER TO CENTER FREQUENCY STEP SIZE

## COMMAND SYNTAX:



## DESCRIPTION:

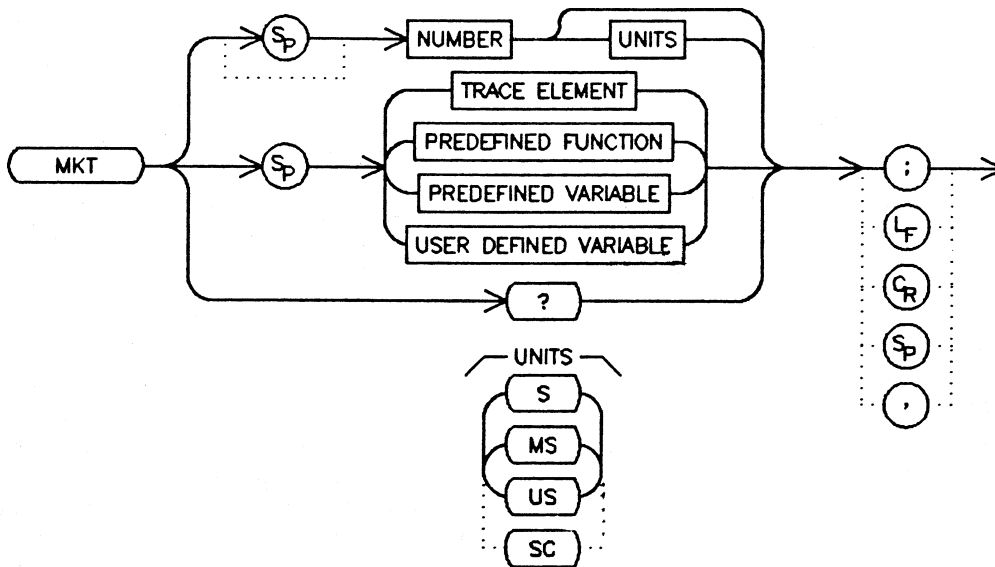
The value of the active marker is assigned to center frequency step size. If the delta function is on, the absolute difference between the delta reference and the active marker is assigned to center frequency step size. If the active marker is an amplitude relative type marker, no action is taken and an error is generated.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

# MKT

## MARKER TIME

### COMMAND SYNTAX:



### DESCRIPTION:

The marker is placed at a position corresponding to the sweep time from beginning of sweep. If the marker is of delta type, then the time is figured relative to the delta reference marker.

If no marker is active, the marker is turned on with preset type (position) and trace and is placed at the center screen. The trace chosen is the first displayed trace found in order: TRA, TRB, TRC.

### PARAMETER RANGE:

+/- 1000 Seconds

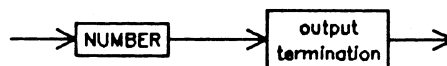
### STEP INCREMENT:

1 Horizontal Scale Division

### FUNDAMENTAL UNIT:

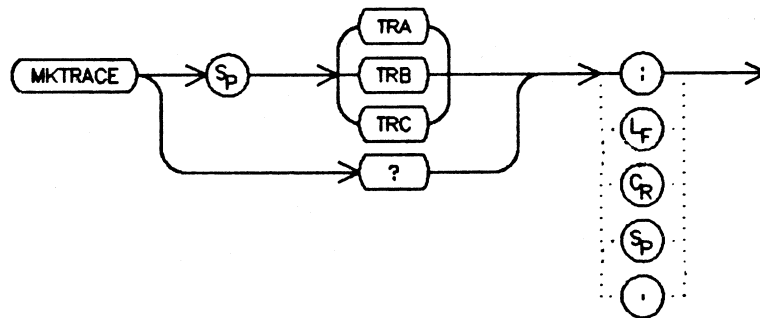
Second

### QUERY RESPONSE:



# MKTRACE MARKER TRACE

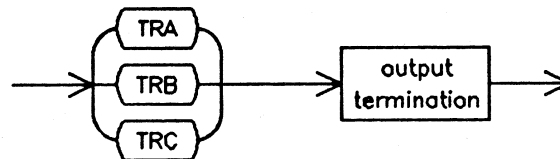
## COMMAND SYNTAX:



## DESCRIPTION:

The active marker is moved to the specified marker trace. When queried, this function will return the current trace on which the active marker is located.

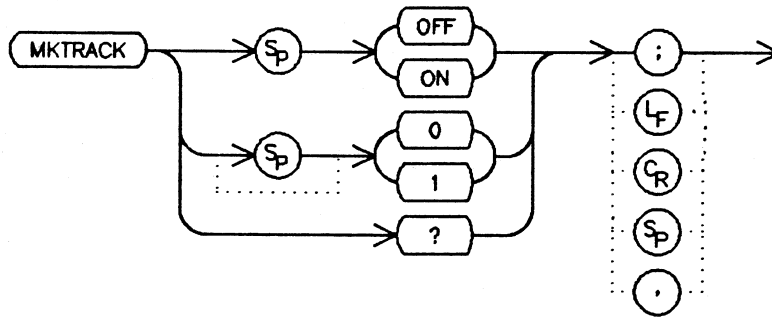
## QUERY RESPONSE:



# MKTRACK

## MARKER SIGNAL TRACK

### COMMAND SYNTAX.



### DESCRIPTION:

The signal at the marker location is maintained at center screen. Only one marker at a time may be in *Marker Signal Track*. Signal Track Mode is automatically turned off on any other marker when it is turned on for the active marker. Once the signal track function is turned on, the active marker can be changed without affecting the marker which is signal tracked.

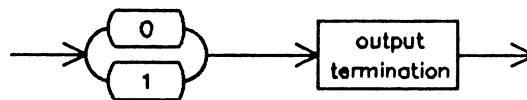
The response to a signal track query is the current status of signal track independent of which marker is the current active marker.

When *MARKER SIGNAL TRACK (MKTRACK)* is on and span is changed, an automatic zoom is performed. The span will reduce in steps so that the signal remains at center screen. If the instrument is in 0 span, then executing *MKTRACK* has no effect. If tracking is on and zero span is entered, *MKTRACK* is turned off.

### PRESET STATE:

OFF

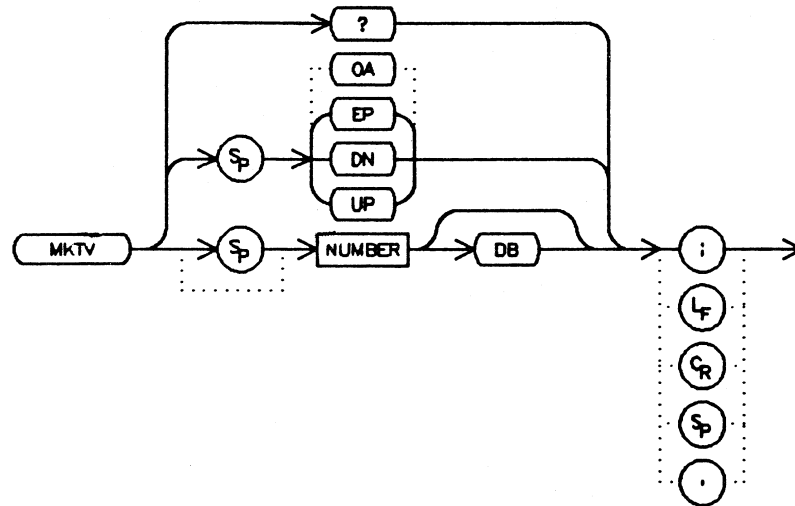
### QUERY RESPONSE:





MARKER TRACKING VARIANCE

COMMAND SYNTAX:



DESCRIPTION:

The marker tracking variance affects the amplitude limit used by the marker track function when determining the proper signal to track. When choosing between two closely spaced signals, the signal within the amplitude variance of the previous tracked signal amplitude will be tracked. The variance is allowed plus or minus from the previous signal amplitude.

PRESET STATE:

5 dB

PARAMETER RANGE:

Minimum: 0  
Maximum: 300 dB

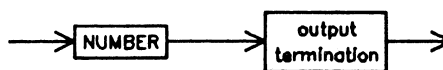
STEP INCREMENT:

Log: 1 Vertical Scale Division  
Linear: 1 Vertical Scale Division at Top of Screen (.915 dB)

FUNDAMENTAL UNIT:

dB

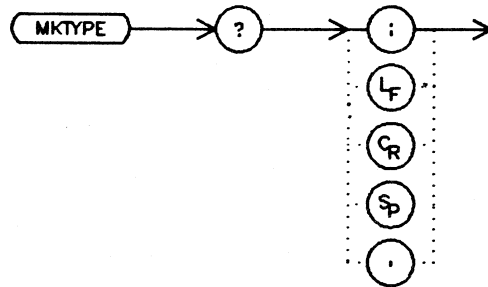
QUERY RESPONSE:



# MKTYPE

## MARKER TYPE

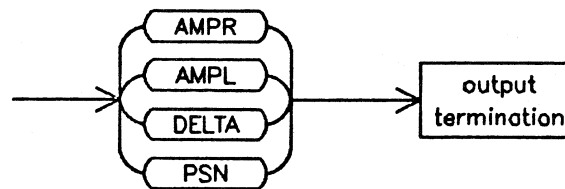
### COMMAND SYNTAX:



### DESCRIPTION:

The type of the active marker can be queried with this command.

### QUERY RESPONSE:



#### Amplitude Relative Left (AMPL)

The marker will be located at the first point which is left of the reference marker and meets the amplitude criteria. This mode is set by the *MARKER AMPLITUDE RELATIVE LEFT (MKAL)* command.

#### Amplitude Relative Right (AMPR)

The marker will be located at the first point which is right of the reference marker and meets the amplitude criteria. This mode is set by the *MARKER AMPLITUDE RELATIVE RIGHT (MKAR)* command.

#### Delta Type (DELTA)

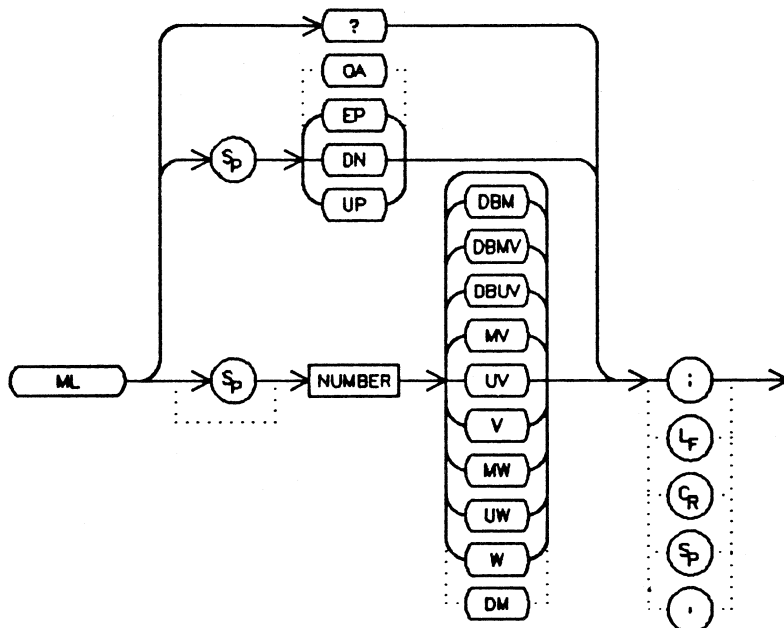
This mode is set by the *MARKER DELTA (MKD)* command.

#### Position Type (PSN)

This mode is set by the *MARKER NORMAL (MKN)* command.

# ML MIXER LEVEL

## COMMAND SYNTAX:



## DESCRIPTION:

The maximum mixer level is defined as the highest power level that can appear at the mixer and still result in valid amplitude measurements. When in automatic attenuator mode, the attenuator will be set such that a signal at the top of the screen will not exceed the maximum mixer level. If the maximum mixer level is less than the top of the screen value, the maximum mixer level will be indicated on the screen by a dotted line.

## PRESET STATE:

The value corresponding to the 1 dB compression point of the mixer.

## PARAMETER RANGE:

Minimum: -300 dBm  
Maximum: +300 dBm

## STEP INCREMENT:

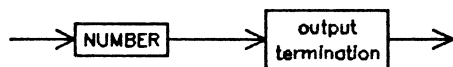
One Vertical Scale Division

**ML**  
**MIXER LEVEL**

**FUNDAMENTAL UNIT:**

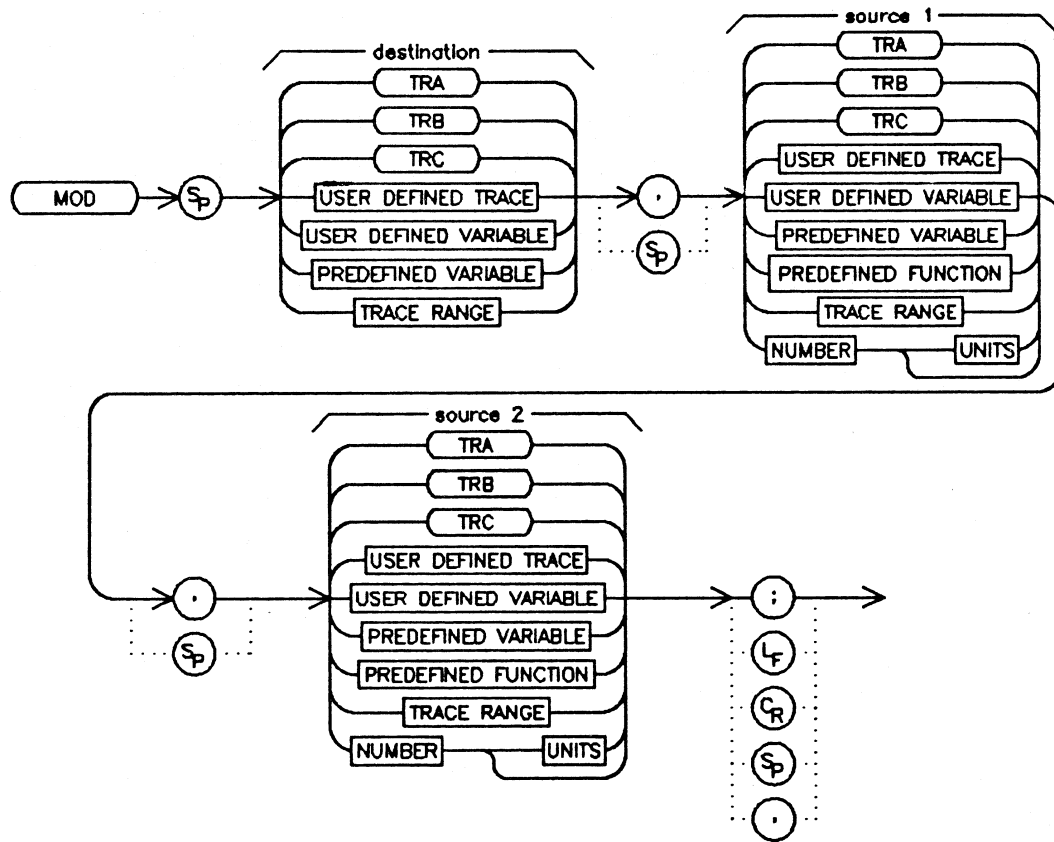
Set by *AUNITS*.

**QUERY RESPONSE:**



# MOD MODULO

## COMMAND SYNTAX:



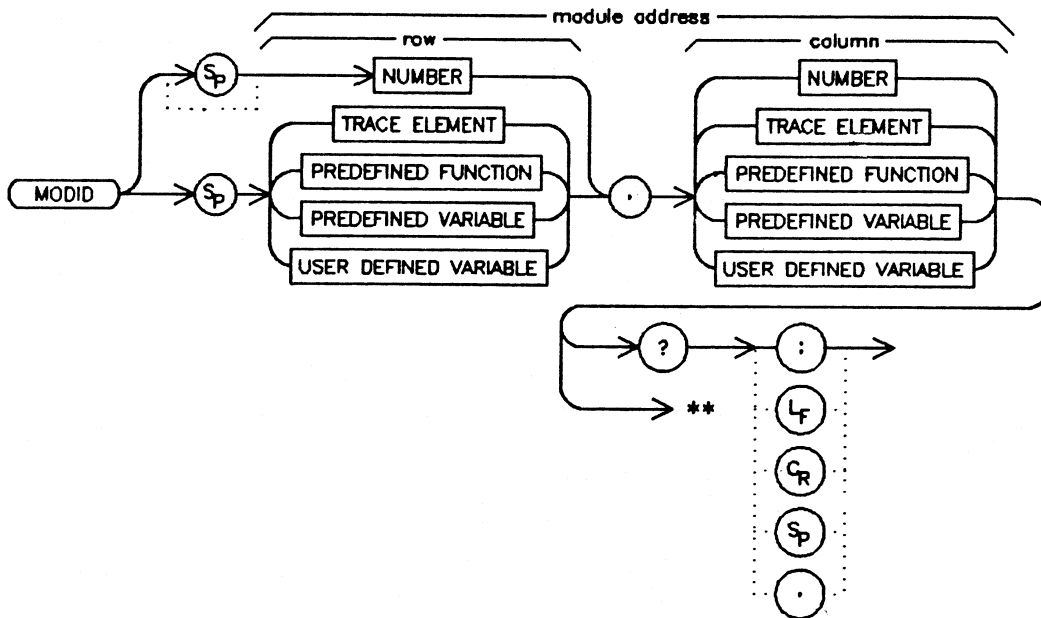
## DESCRIPTION:

The remainder of the division of source 1 by source 2 is stored in the destination. If source 2 is zero, an error will be reported and the result will be source 1.

# MODID

## MODULE IDENTIFICATION

### COMMAND SYNTAX:

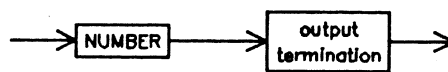


\*\* For use as a Predefined Function

### DESCRIPTION:

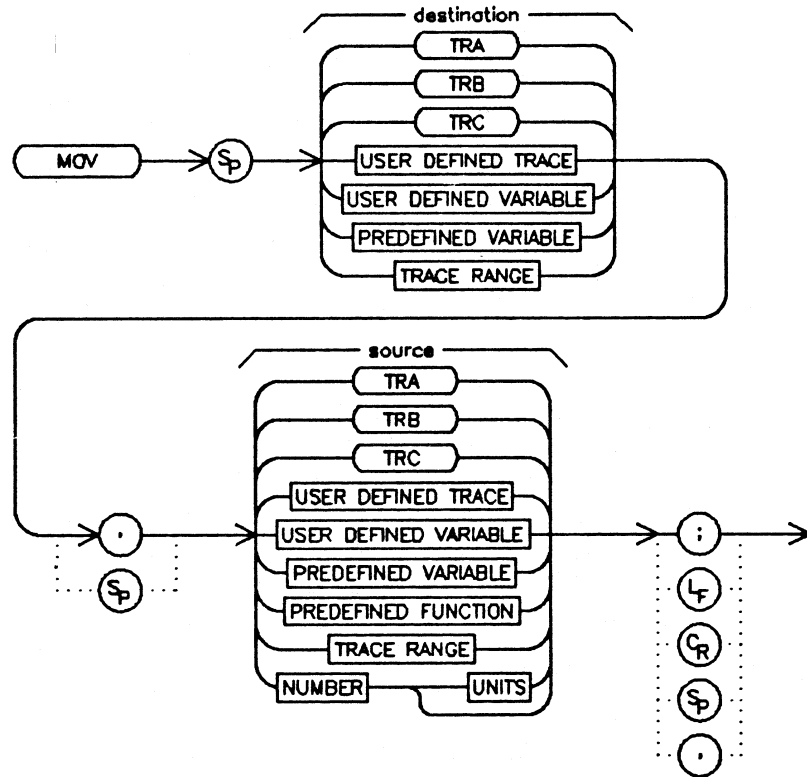
The model number, less any alpha character prefix or suffix is returned in response to a query. If no module is present or the address is not within the slave range, a 0 is returned.

### QUERY RESPONSE:



# MOV MOVE

## COMMAND SYNTAX:



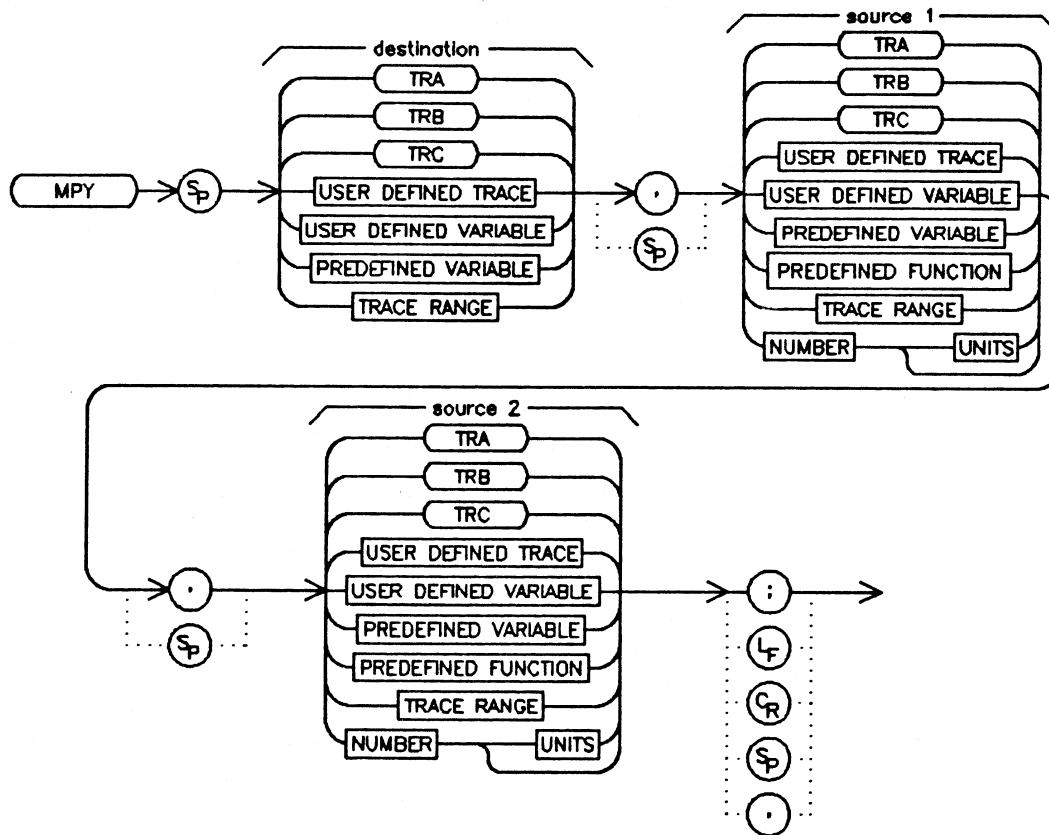
## DESCRIPTION:

The source is stored in the destination. If the destination is a trace and the source is a trace or trace range, then the trace conditions of the destination are updated accordingly.

# MPY

## MULTIPLY

### COMMAND SYNTAX:



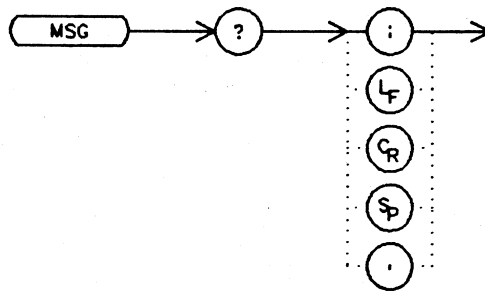
### DESCRIPTION:

The first source is multiplied by the second source and the result is stored in the destination. In case of overflow, an error is reported and the result is limited to the maximum legal value with the proper sign.



# MSG MESSAGE

## COMMAND SYNTAX:

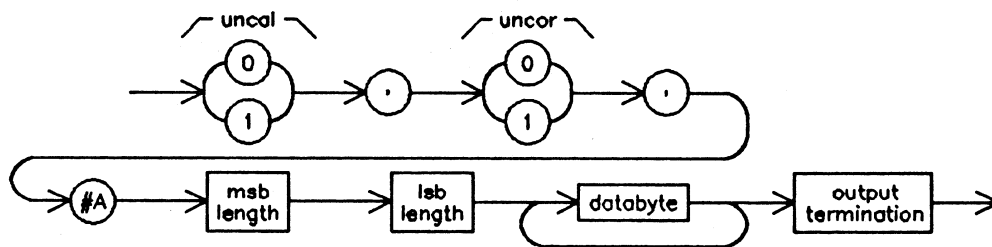


## DESCRIPTION:

The user messages are output with this command. The two fixed indicators UNCAL and UNCOR and the general message area are output.

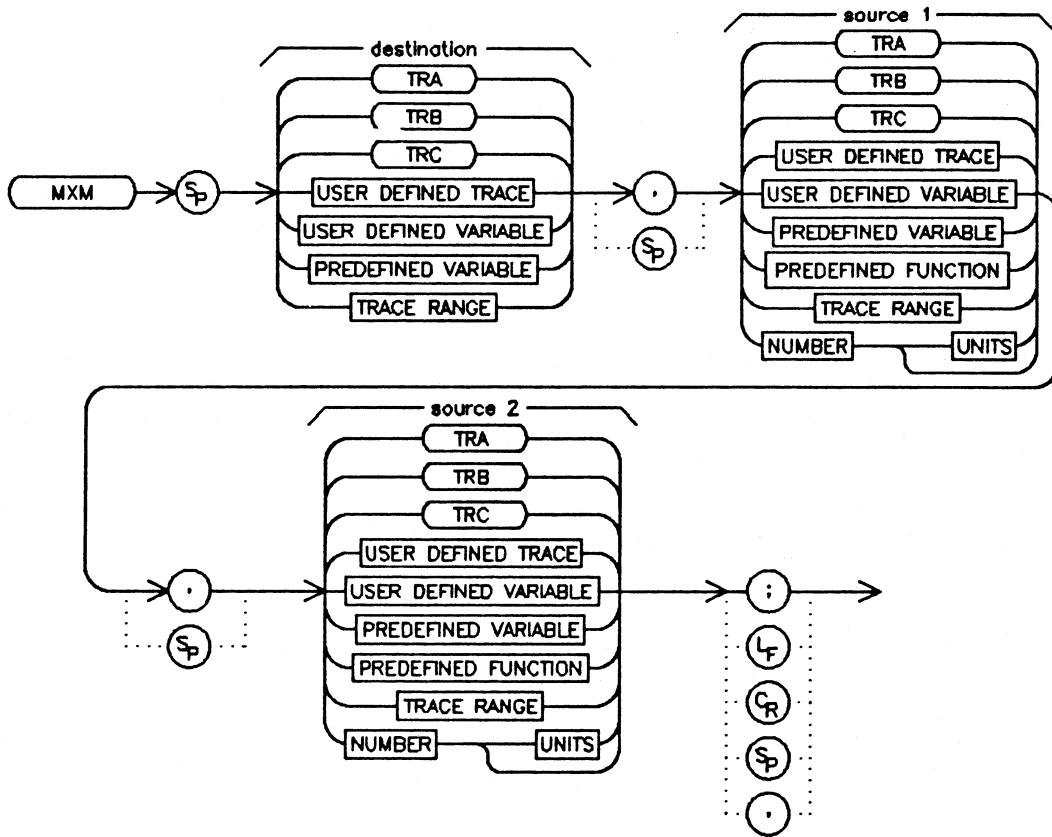
The message status bit is true whenever any one of the messages UNCOR, UNCAL, or the message area is on.

## QUERY RESPONSE:



# MXM MAXIMUM

## COMMAND SYNTAX:



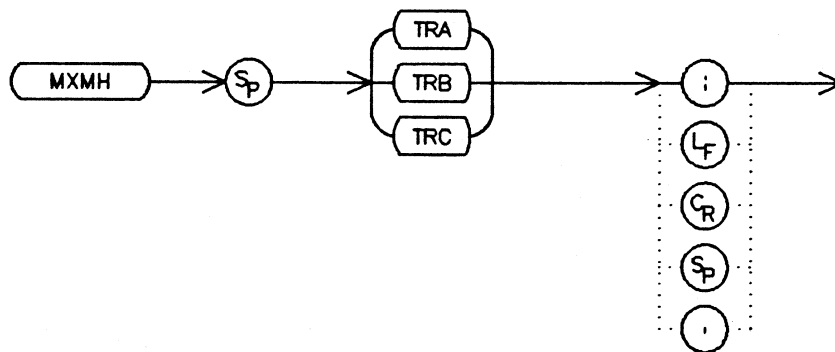
## DESCRIPTION:

The maximum of the two sources is stored in the destination.

# MXMH

## MAXIMUM HOLD

### COMMAND SYNTAX:



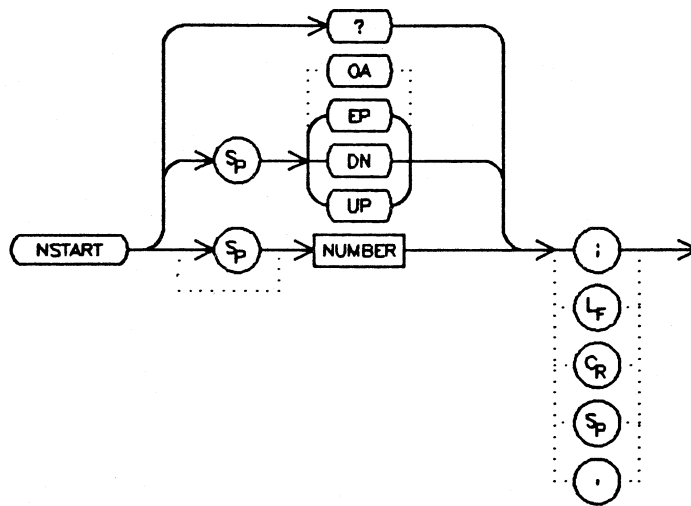
### DESCRIPTION:

The input data and the specified trace data are examined and the maximum of the two is selected and given to the trace specified. Display of that trace is enabled. *MAXIMUM HOLD (MXMH)* can affect detector operation. See the *DETECTION MODE (DET)* command for further explanation.

# NSTART

## START HARMONIC NUMBER

### COMMAND SYNTAX:



### DESCRIPTION:

The start harmonic number for AUTO/IMAGE signal identification is set.

### PRESET STATE:

1

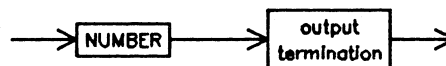
### PARAMETER RANGE:

Minimum: 1  
Maximum: 100

### STEP INCREMENT:

1

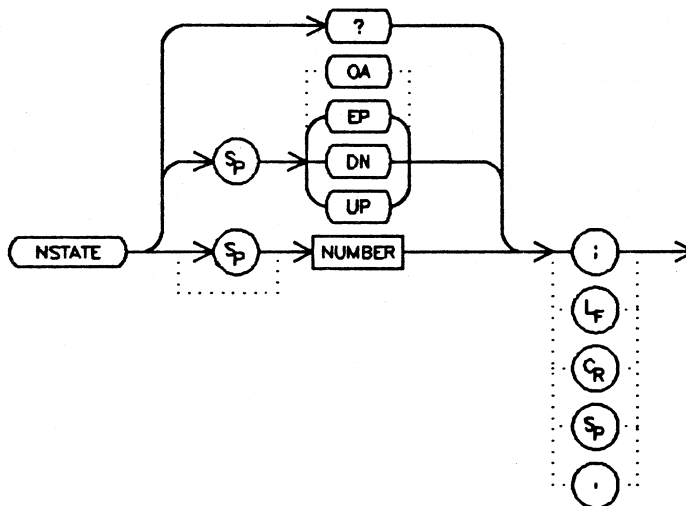
### QUERY RESPONSE:



# NSTATE

## NUMBER OF STATE REGISTERS

### COMMAND SYNTAX:



### DESCRIPTION:

This command sets the number of state registers. Since state registers consume large amounts of user memory, this allows the user to trade off the amount of memory used versus the number of state registers needed. When a smaller number of state registers is specified the memory for the previously used registers is reclaimed and the information stored in them is lost.

State registers are allocated starting with number 1. The "last state" register is not included in the number of state registers allocated.

This function is not affected by instrument preset. This command and the values of the state register are part of the user state area, which can be input and output with the *USER STATE (USTATE)* command.

The value of *NUMBER OS STATE REGISTERS (NSTATE)* is set at 2 whenever an *ERASE ALL MEMORY (ERASE)* command is executed.

### PARAMETER RANGE

Minimum: 0

Maximum: Limited by Available Memory

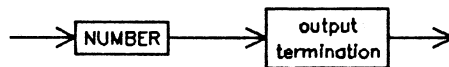
# NSTATE

## NUMBER OF STATE REGISTERS

STEP INCREMENT:

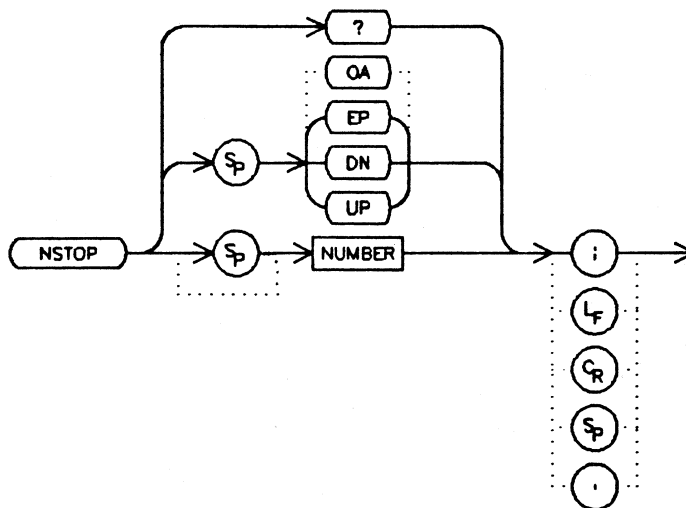
1

QUERY RESPONSE:



# NSTOP STOP HARMONIC NUMBER

## COMMAND SYNTAX:



## DESCRIPTION:

The stop harmonic for AUTO/IMAGE signal identification is set.

## PRESET VALUE:

40

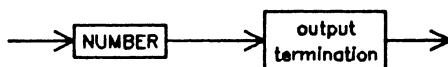
## PARAMETER RANGE:

Minimum: 1  
Maximum: 100

## STEP INCREMENT:

1

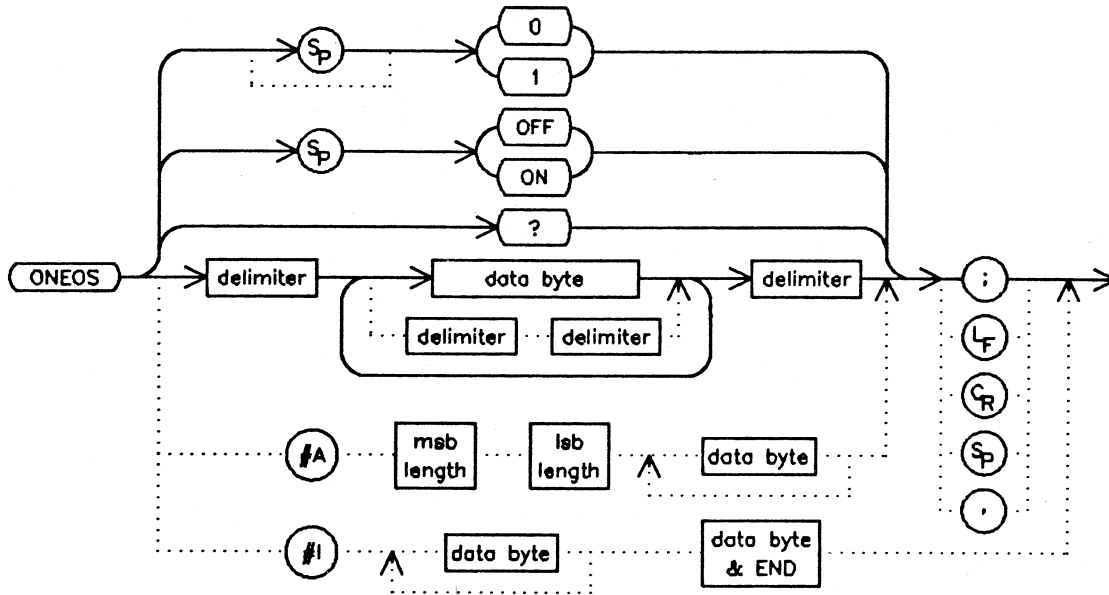
## QUERY RESPONSE:



# ONEOS

## ON END OF SWEEP

### COMMAND SYNTAX:

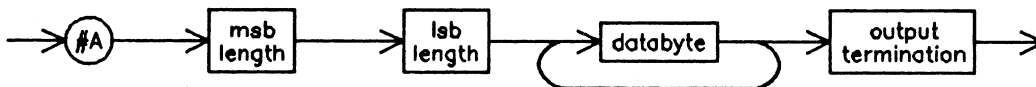


### DESCRIPTION:

*ONEOS* is a special predefined function name. The contents of the data field are executed at the end of a sweep after trace processing and all other internal end of sweep functions have completed but before the end of sweep status bit has been set.

This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. Memory is allocated by executing this function and is returned to free user memory with the *DISPOSE* command.

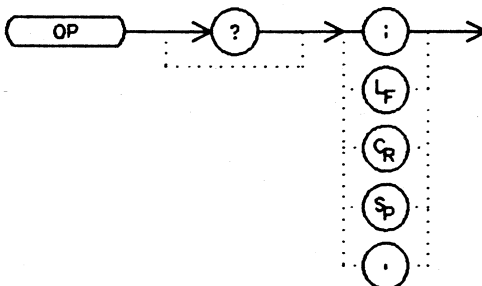
### QUERY RESPONSE





## OUTPUT DISPLAY PARAMETERS

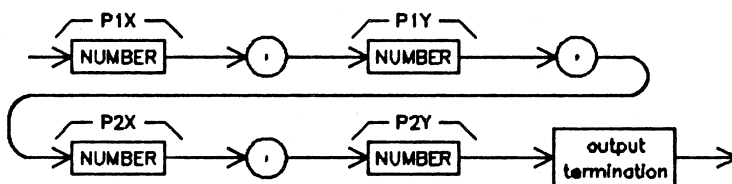
### COMMAND SYNTAX:



### DESCRIPTION:

Output P1,P2 coordinates of the display window in the display's hardware units. P1 corresponds to the lower left vertex and P2 corresponds to the upper right vertex of the display window.

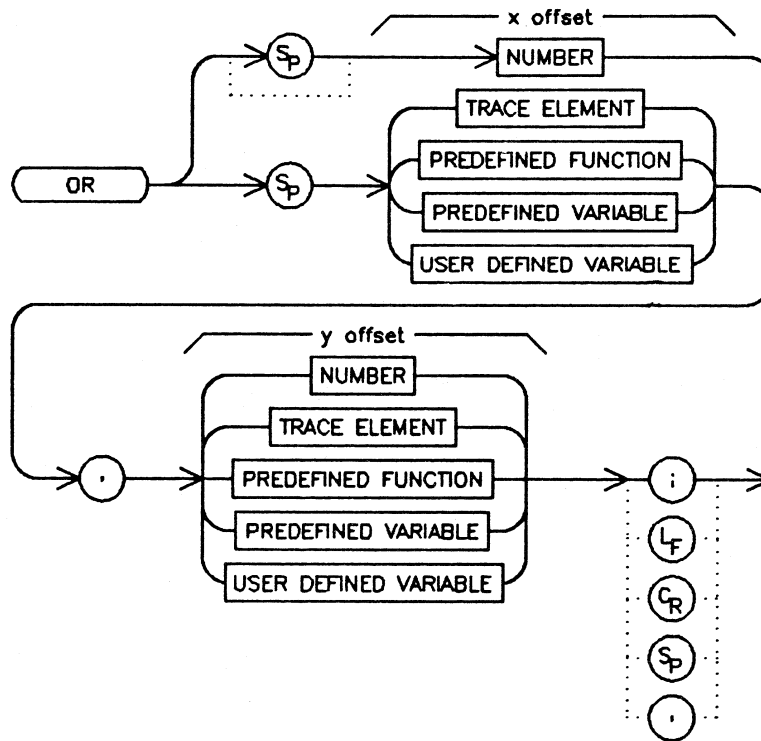
### QUERY RESPONSE:



# OR

## SET ORIGIN

### COMMAND SYNTAX:



### DESCRIPTION:

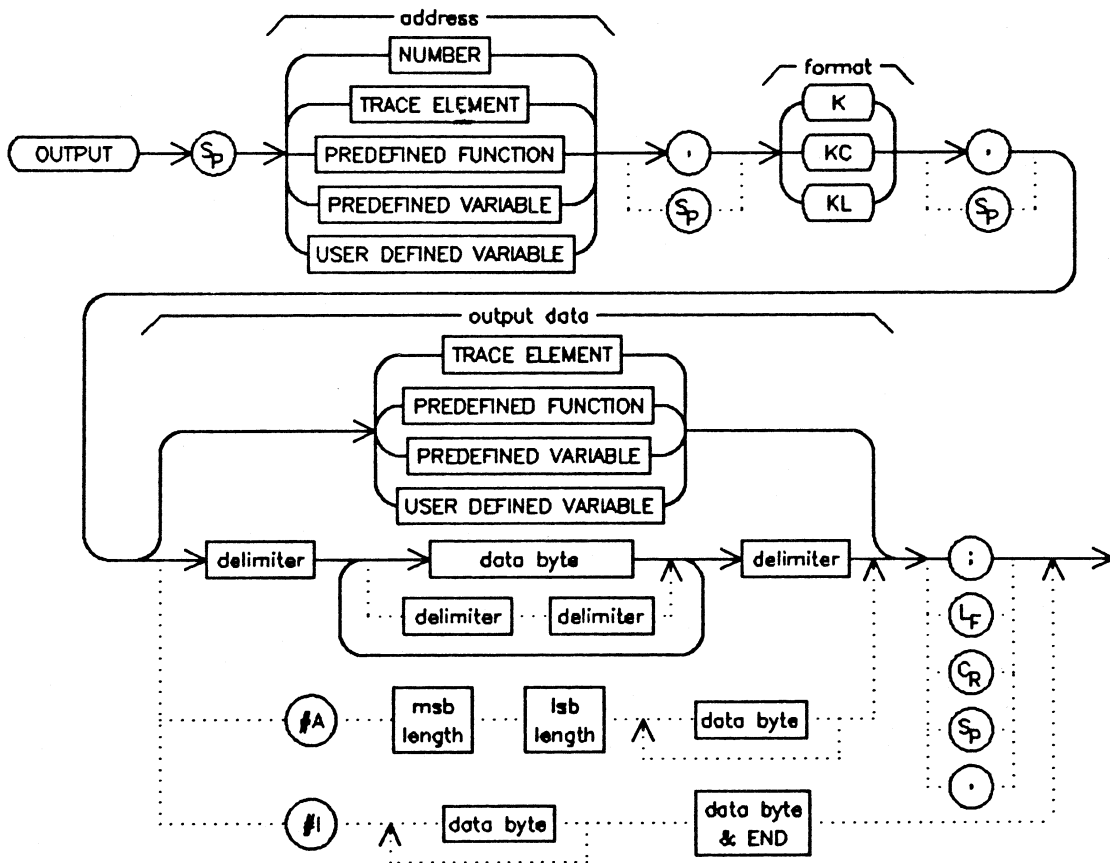
When an origin offset is set, that offset is added to the object drawn at the current item. Coordinates are always in the current scaling units (See *SCALE*), even when *DISPLAY WINDOW (DWINDOW)* is on.

### PRESET VALUE:

0,0

# OUTPUT OUTPUT TO HP-IB

## COMMAND SYNTAX:



## DESCRIPTION:

Output is provided for sending data to the HP-IB port from a function definition. If a controller is detected on HP-IB, the command is aborted. This command causes the analyzer to assume controller capabilities on HP-IB. The *RELEASE HP-IB (RELHPIB)* command may be used to disable these capabilities. The data is output according to the format specified in the format field.

## FORMAT FIELD OPTIONS:

### K:

Output in free field ASCII format with no terminator.

## OUTPUT

### OUTPUT TO HP-IB

**KC:**

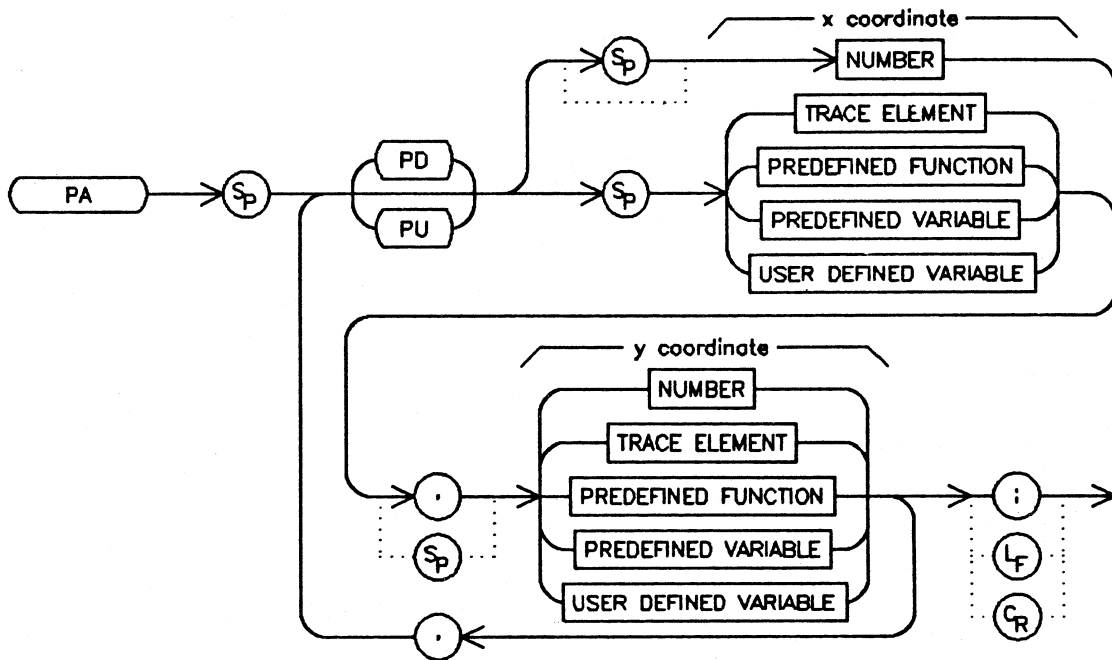
Output in free field ASCII with "CR" and "LF" terminator.

**KL:**

Output in free field ASCII with "LF" and "END" terminator.

## PLOT ABSOLUTE

## COMMAND SYNTAX:



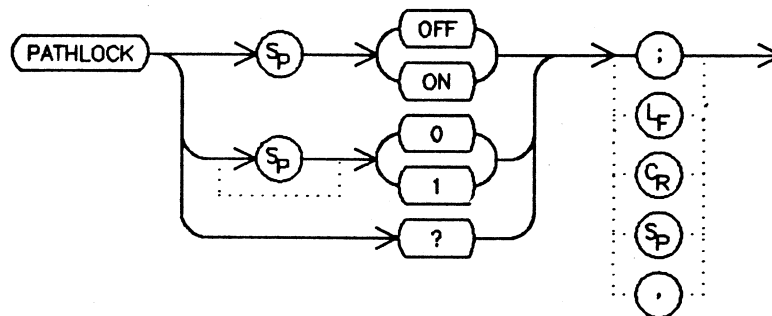
## DESCRIPTION:

The purpose of this command is to move the pen from the current position to the position specified. The line is drawn if the pen is down. See *PEN DOWN (PD)* and *PEN UP (PU)*. Coordinates are either in the current scaling units (See *SCALE*) or are in *DISPLAY WINDOW (DWINDOW)* units, if *DWINDOW* is on.

# PATHLOCK

## PATH LOCK

### COMMAND SYNTAX:



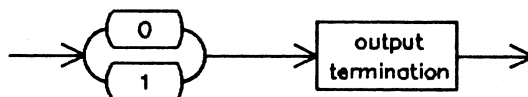
### DESCRIPTION:

Since this instrument is modular, there may be more than one path through which the signal may be routed to make a measurement. Based on the user's inputs the instrument automatically chooses the best path. Under certain measurement conditions, the measurement may require a specific path that is not normally available with automatic path selection. The path lock command locks the analyzer in the current measurement path. When path lock is on, the range of inputs is limited to those available on that path.

### PRESET STATE:

OFF

### QUERY RESPONSE:

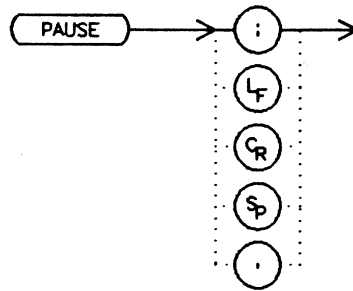


### EXAMPLE:

# PAUSE

## PAUSE COMMAND EXECUTION

### COMMAND SYNTAX:



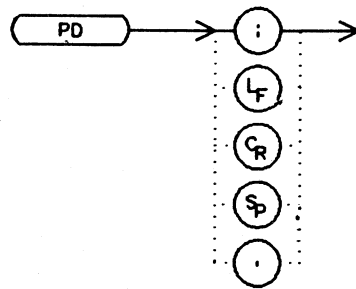
### DESCRIPTION:

The processing of remote commands is stopped until the CONTINUE soft key is pressed, manual instrument preset, DEBUG OFF is executed, or remote device clear occurs. *DEBUG MODE (DEBUG)* is turned on, if not previously on.

# PD

## PEN DOWN

### COMMAND SYNTAX:



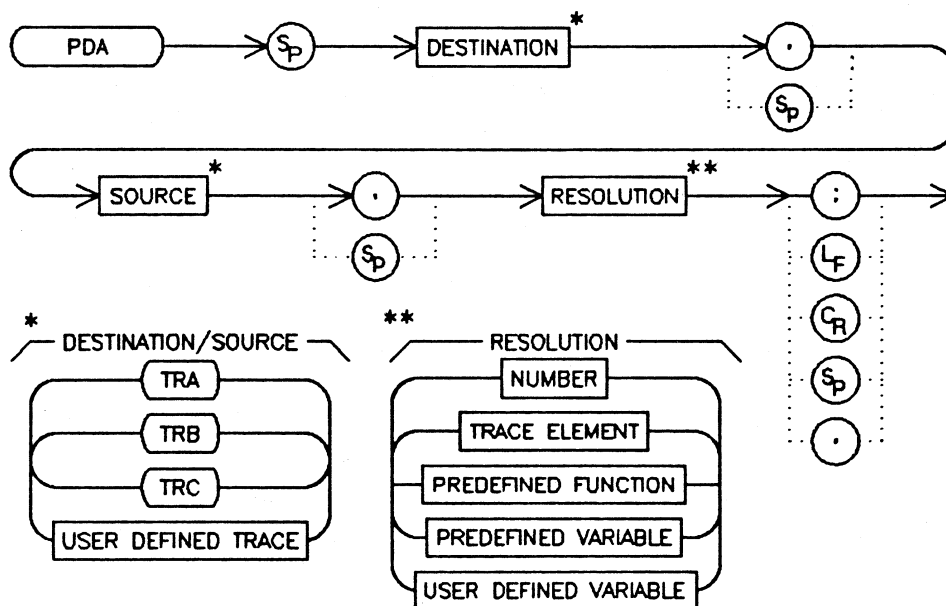
### DESCRIPTION:

Pen Down. Any plot statements will cause the pen to draw a line from the current location to the location specified in the plot statement.



# PROBABILITY DISTRIBUTION OF AMPLITUDE

## COMMAND SYNTAX:



## DESCRIPTION:

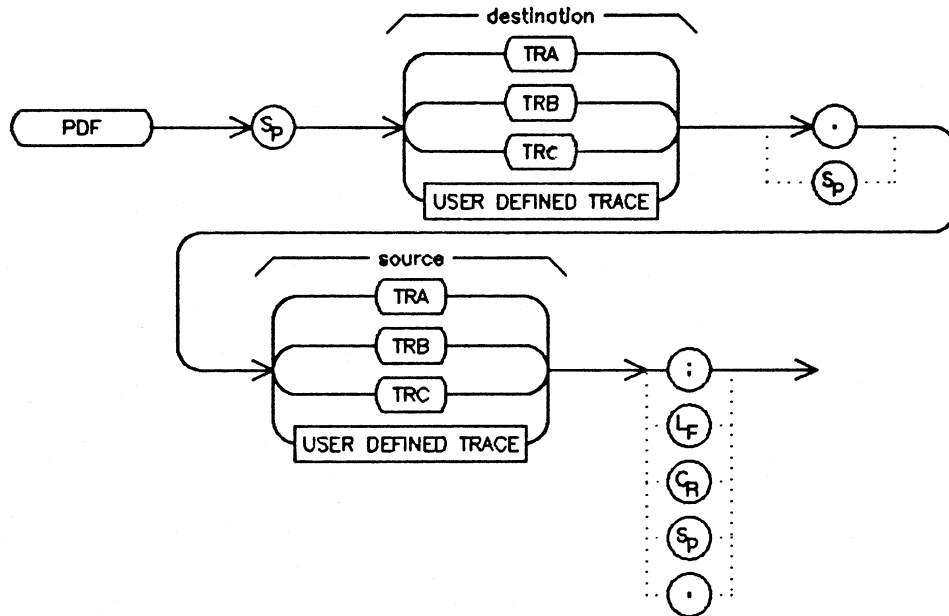
This command replaces the destination trace with the amplitude distribution function of the source trace. The data in the source trace is taken point by point. Each point's value has the value for the bottom of the screen (see *TRCOND*) subtracted from it, then the difference is divided by the resolution value (which is rounded to an integer). If the result falls within the range of the buckets of the destination trace, the content of the corresponding destination trace element is increased by one. When all source points have been dealt with, the function is complete.

This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. When the command is complete, memory is returned to the free user memory.

# PDF

## PROBABILITY DISTRIBUTION OF FREQUENCY

### COMMAND SYNTAX:

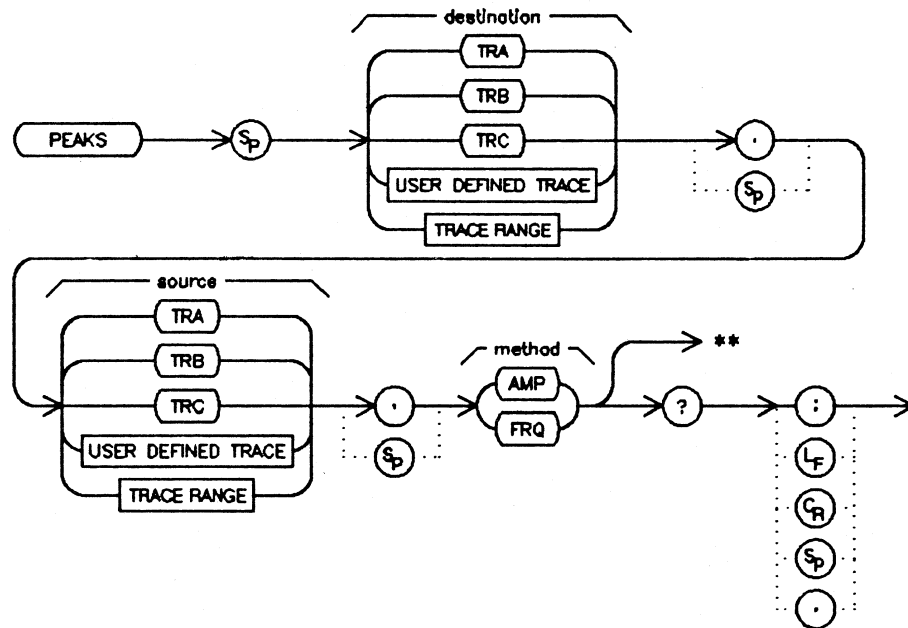


### DESCRIPTION:

The *PDF* command replaces the destination trace with the frequency distribution function of the source trace. Elements in the source trace above the threshold set by the *THRESHOLD (TH)* command cause corresponding elements in the destination trace to be increased in amplitude by one measurement unit. The default threshold value is nine major divisions below the reference level.

# PEAKS TRACE PEAKS

## COMMAND SYNTAX:



\*\* For use as a Predefined Function.

## DESCRIPTION:

The *PEAKS* command sorts signal peaks by frequency or amplitude, stores the results in the destination trace, and returns the number of peaks found. It uses the current value set by the *MARKER PEAK SEARCH (MKPX)* command as the criteria for determining peaks.

When sorting by frequency, *PEAKS* first computes the horizontal position of all peaks. These positions are consecutively loaded into the destination trace, the lowest value occupying the first element. Thus, signal frequencies, from low to high, determine the amplitude of the destination trace from left to right.

When sorting by amplitude, *PEAKS* first computes the amplitudes of all peaks in the source trace in measurement units, and sorts these values from high to low. The positions of the peaks are then loaded into the destination trace, with the position of the highest value occupying the first element. Thus, the destination trace amplitude, from left to right, corresponds to signal amplitudes from high to low.

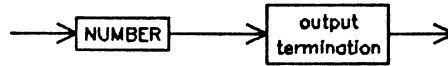
## PEAKS

### TRACE PEAKS

If necessary, the last sorted value is repeated to fill remaining elements of the destination trace. The destination trace values may range from 1 to the length of the source trace.

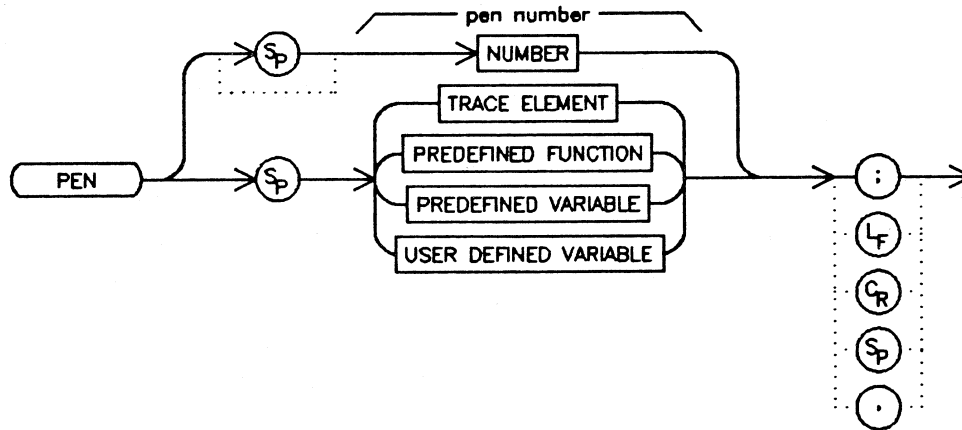
#### QUERY RESPONSE:

*PEAKS* command outputs the number of signal peaks found.



# PEN SELECT PEN

## COMMAND SYNTAX:



## DESCRIPTION:

When a pen is selected, the objects within that item will be drawn in color if the display or plot output device connected to the display is capable of color.

## PRESET STATE:

0

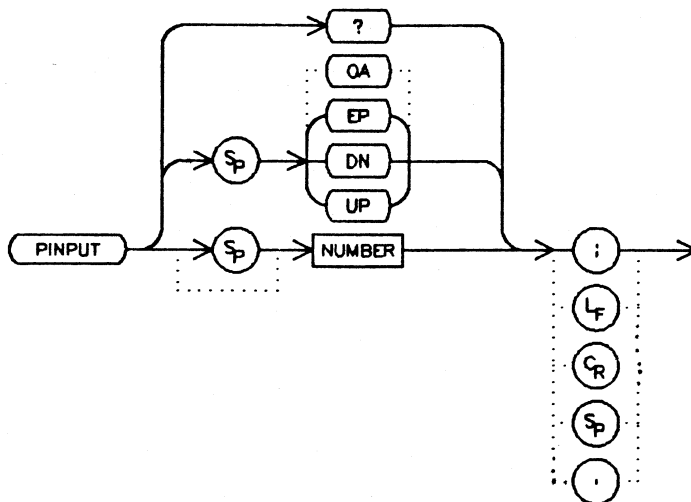
## PARAMETER RANGE:

Minimum: 0  
Maximum: 255

# PINPUT

## PRESET INPUT

### COMMAND SYNTAX:



### DESCRIPTION:

The instrument preset input selection is set by this command. This command is a part of the USER state and is not affected by instrument preset.

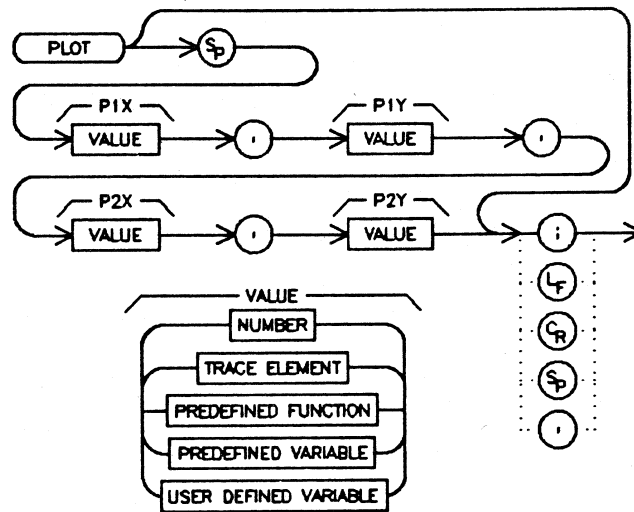
### PRESET STATE:

Minimum: 1  
Maximum: 100

# PLOT

## PLOT DISPLAY

### COMMAND SYNTAX:



### DESCRIPTION:

The current display that the instrument data is being displayed on is instructed to copy to the printer or plotter. The printer or plotter device specification must be properly configured prior to issuing this command. The command complete status bit becomes true when the plot is complete. If the values of (P1X,P1Y) and (P2X,P2Y) are omitted, then the current plotter position values of the display are used. To use this command, the display's keyboard must be assigned to the instrument.

#### P1X,P1Y:

Plotter dependent values that specify the lower left plotter position.

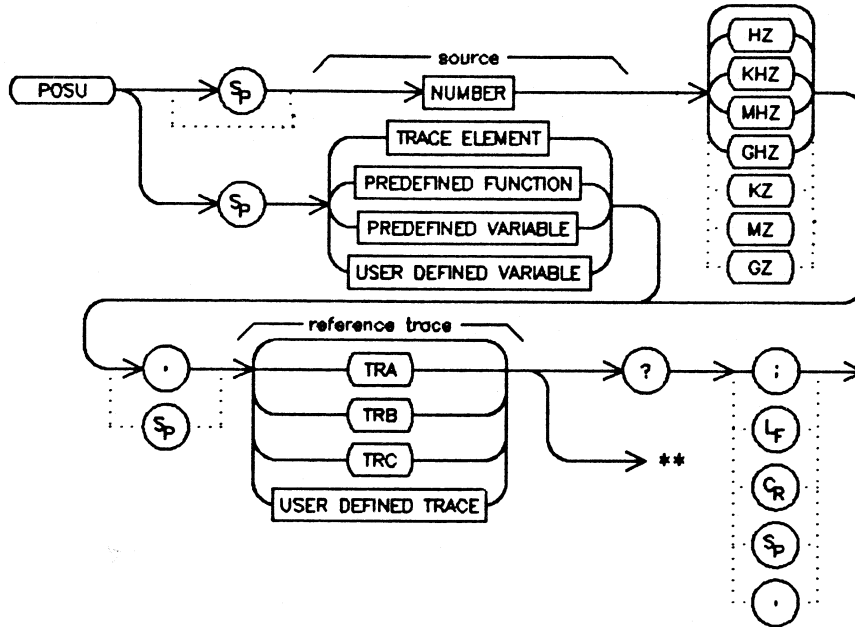
#### P2X,P2Y:

Plotter dependent values that specify the upper right plotter position.

# POSU

## POSITION UNIT CONVERSION

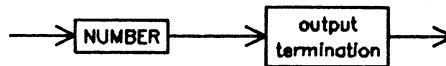
### COMMAND SYNTAX:



### DESCRIPTION:

The operand value is converted to position units based on the trace conditions of the reference trace. If the reference trace is omitted, the current measurement conditions (start and stop frequency) are used. In non-zero spans, the operand is a frequency in Hertz. In zero span, the operand is a time in seconds.

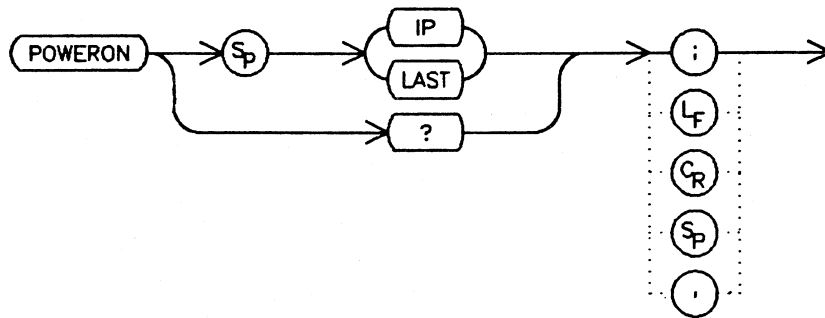
### QUERY RESPONSE:





# POWERON POWER ON STATE

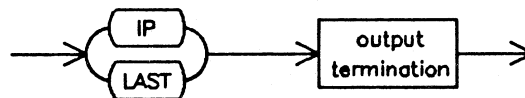
## COMMAND SYNTAX:



## DESCRIPTION:

*POWERON* sets the instrument state that the instrument will be set to when power is applied. If set to IP, the instrument will be set to its instrument preset state. If set to LAST, the instrument will be set to the state in which it was set when the power was turned off.

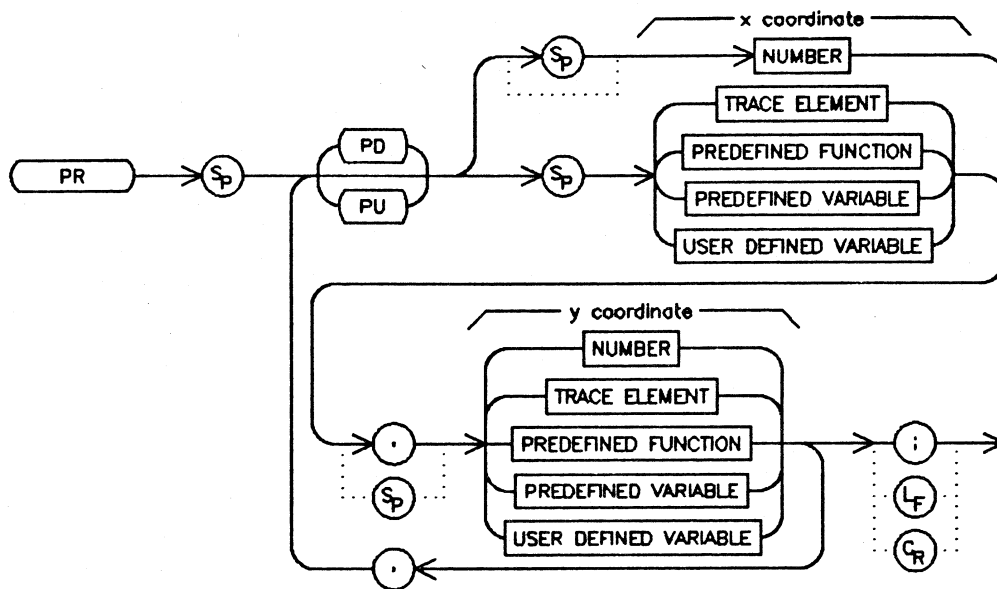
## QUERY RESPONSE



# PR

## PLOT RELATIVE

### COMMAND SYNTAX:

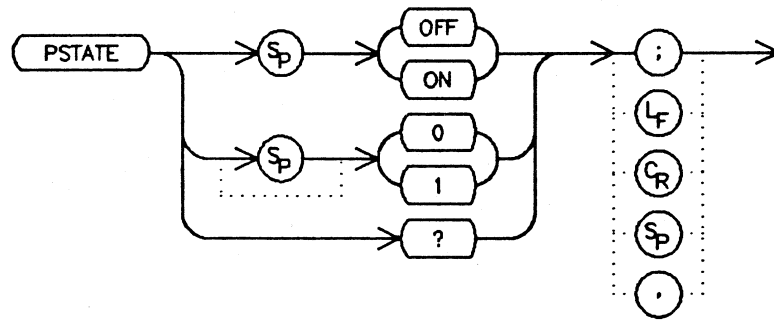


### DESCRIPTION:

The purpose of this command is to move the pen from the current position to a new position which is determined by adding the X and Y increments to the current (X,Y) position of the pen. Coordinates are either in the current scaling units (See *SCALE*) or are in *DISPLAY WINDOW (DWINDOW)* units, if *DWINDOW* is on.

# PSTATE PROTECT STATE

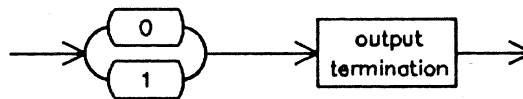
## COMMAND SYNTAX:



## DESCRIPTION:

With this command, the state registers can be protected so that they will not be accidentally changed. Protect State is not affected by instrument preset.

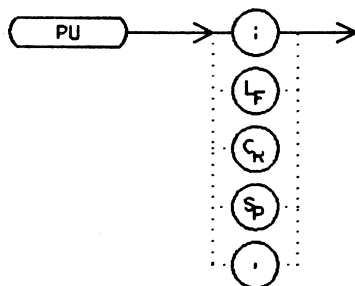
## QUERY RESPONSE



# PU

## PEN UP

### COMMAND SYNTAX:

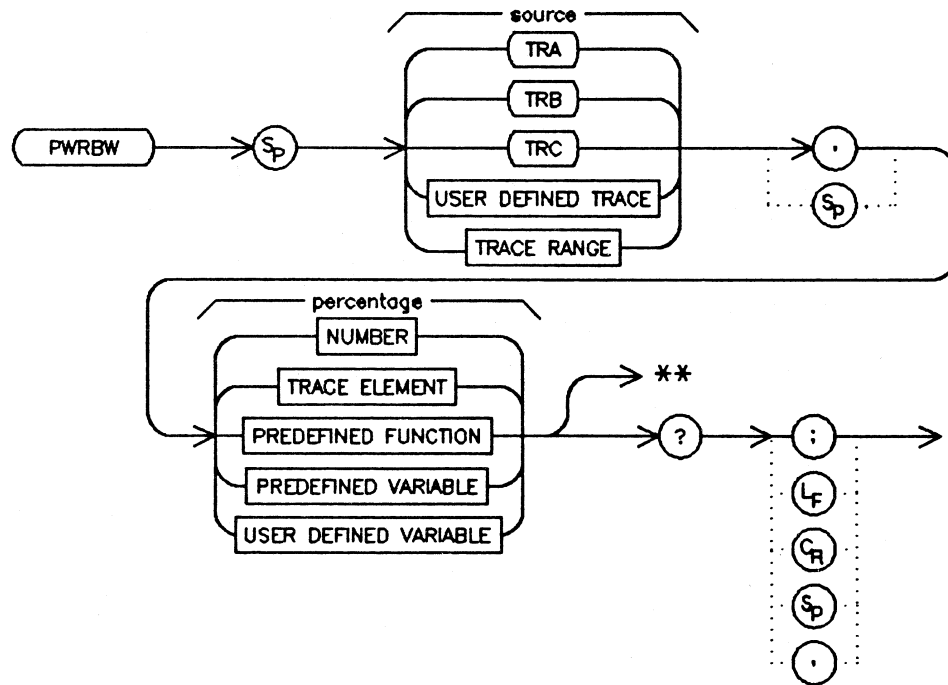


### DESCRIPTION:

Pen Up. Any plot statements will move the pen to the point specified without drawing a line.

TRACE POWER BANDWIDTH

COMMAND SYNTAX:



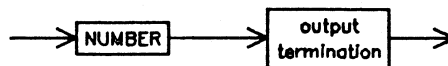
\*\* For use as a Predefined Function.

DESCRIPTION:

The *PWRBW* command first computes the combined power of all signal responses contained in a trace array. The command then computes the bandwidth equal to a percentage of the total power.

For example, if 100% is specified, the power bandwidth equals the frequency range of the CRT display, which is 100 MHz if the frequency span per division is 10 MHz. If 50% is specified, trace elements are eliminated from either end of the array, until the combined power of the remaining signal response equals half of the original power computed. The frequency span of these remaining trace elements is the power bandwidth output to the controller.

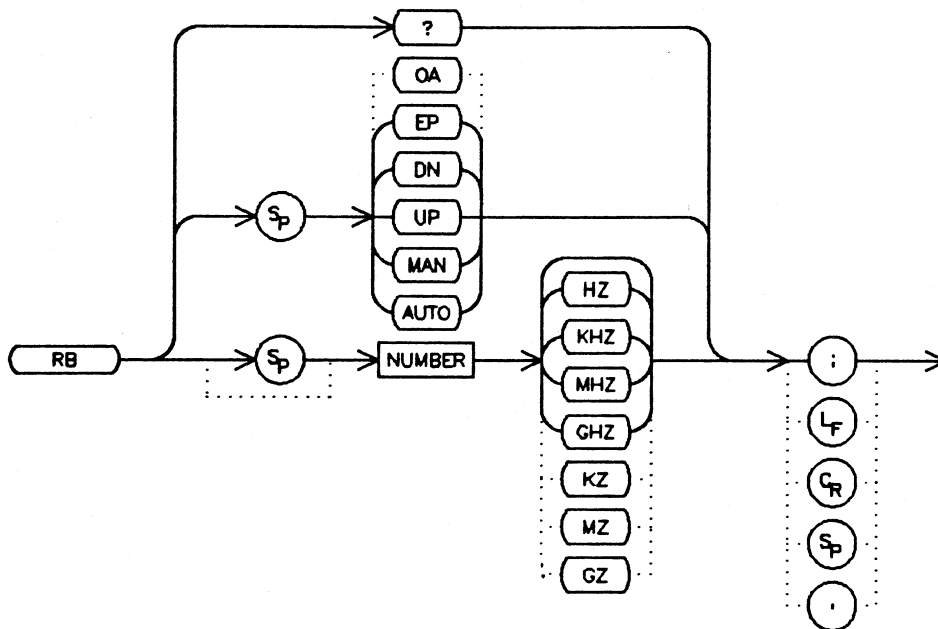
QUERY RESPONSE:



# RB

## RESOLUTION BANDWIDTH

### COMMAND SYNTAX:



### DESCRIPTION:

This function sets the analyzer's resolution bandwidth. Resolution bandwidth can be automatically coupled as a function of span or be manually set. In the automatic coupled mode, the ratio of resolution bandwidth to span is set by the *RES BW TO SPAN RATIO (RBR)* command. The coupling is set to manual when a numeric value is input, an up or down step is received, an entry is terminated from enable parameter, or the *MAN* parameter is received.

### COUPLING:

Set by the *RBR* command

### PRESET STATE:

Auto Coupled.

**RB**  
**RESOLUTION BANDWIDTH**

**PARAMETER RANGE:**

Minimum: 1 (or Hardware Limit)  
Maximum: 1000 GHz (or Hardware Limit)

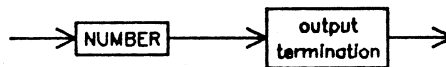
**STEP INCREMENT:**

1, 3, 10 Sequence

**FUNDAMENTAL UNIT:**

Hz

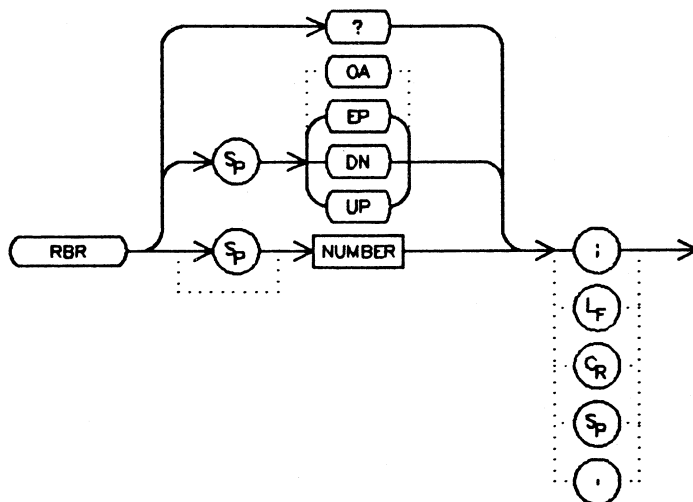
**QUERY RESPONSE:**



# RBR

## RES BW TO SPAN RATIO

### COMMAND SYNTAX:



### DESCRIPTION:

Resolution Bandwidth Ratio determines the automatic calculation of resolution bandwidth according to the following equation:

$$\text{RESOLUTION BANDWIDTH} = \text{SPAN} * \text{RBR}$$

### PRESET STATE:

.01

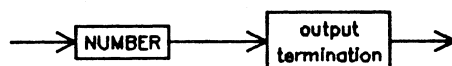
### PARAMETER RANGE:

Minimum: 10<sup>-100</sup>  
Maximum: 10<sup>+100</sup>

### STEP INCREMENT:

1, 3, 10 Sequence

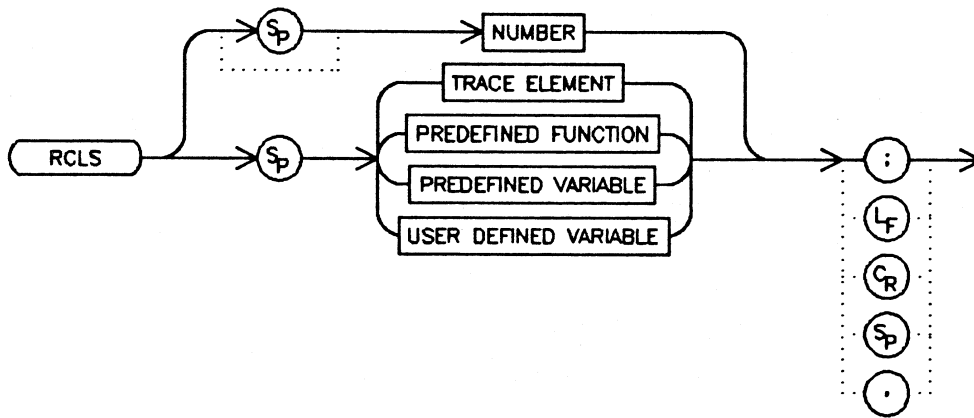
### QUERY RESPONSE:





# RCLS RECALL STATE REGISTER

## COMMAND SYNTAX:



## DESCRIPTION:

A previously saved state may be recalled using this function. If the referenced state number has not been previously saved, there will be no effect on the instrument state.

## PARAMETER RANGE:

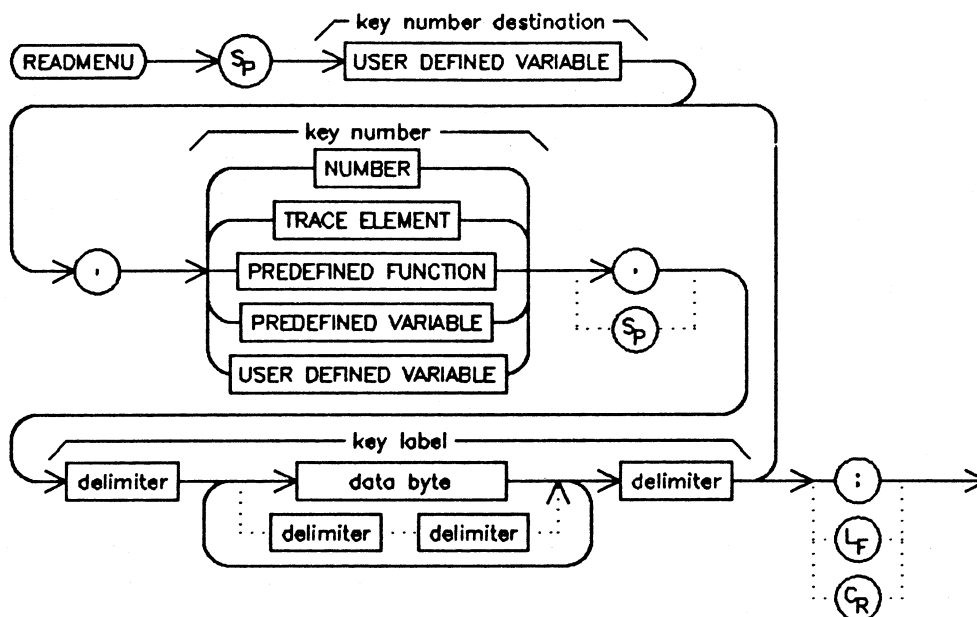
Minimum: 1

Maximum: Determined by *NUMBER OF STATE REGISTERS (NSTATE)*.

# READMENU

## READ MENU INPUT

### COMMAND SYNTAX:

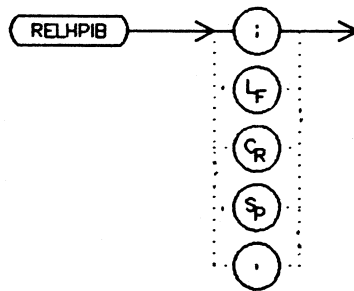


### DESCRIPTION:

The instrument menus are cleared and then labeled with the provided labels. No further commands are processed until the user presses one of the menu keys given by the *READMENU* command. After the execution is completed, the menus return to their previous state and the key number destination contains the number of the key that was pressed. *READMENU* supersedes both the manual and debug menus.

**RELHPIB**  
**RELEASE HP-IB**

**COMMAND SYNTAX:**



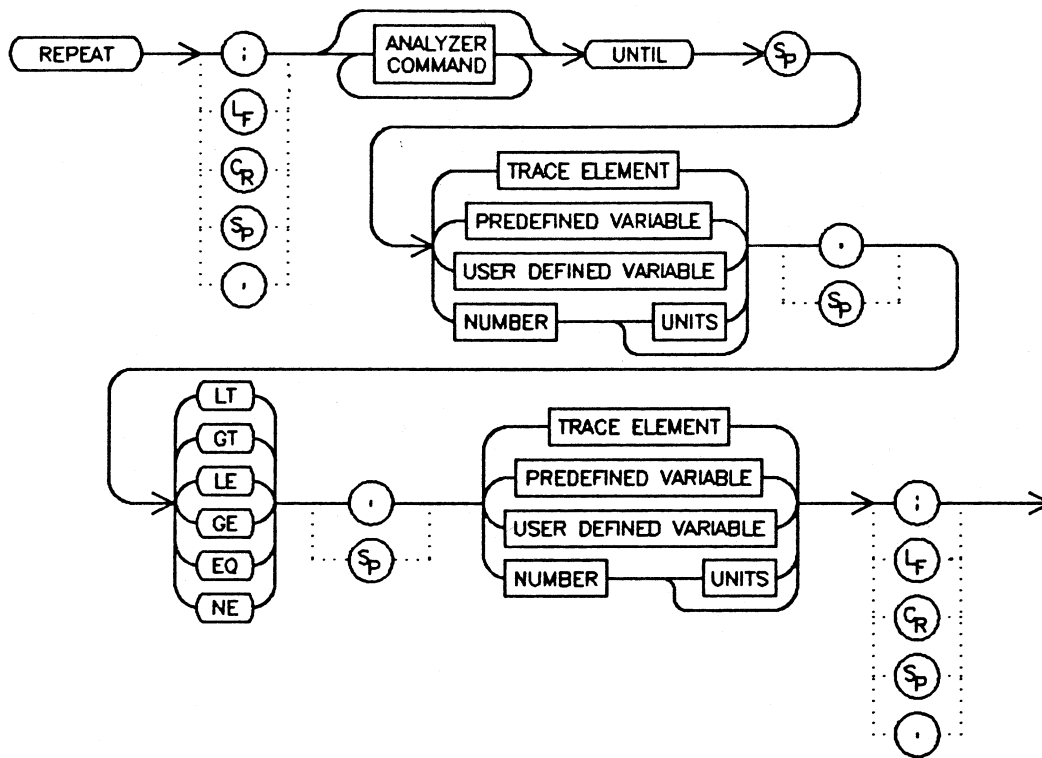
**DESCRIPTION:**

This command releases the HP-IB control assumed by the *ENTER FROM HP-IB (ENTER)* or the *OUTPUT TO HP-IB (OUTPUT)* command.

# REPEAT/UNTIL

# REPEAT/UNTIL

## COMMAND SYNTAX:



## DESCRIPTION:

### REPEAT

This command delimits the top of the REPEAT/UNTIL looping construct.

### UNTIL

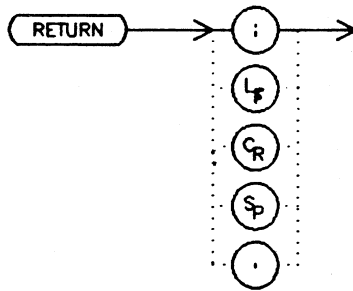
The UNTIL command determines the end of the REPEAT/UNTIL loop based on the comparison of two operands by a condition. The conditions are less than (LT), greater than (GT), less than or equal to (LE), greater than or equal to (GE), equal (EQ) and not equal (NE). If the result is true, commands are taken following this command. If the expression is false, commands are taken following the previous REPEAT command.

This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. When the command is complete, memory is returned to the free user memory.

# RETURN

## RETURN FROM FUNCTION

### COMMAND SYNTAX:



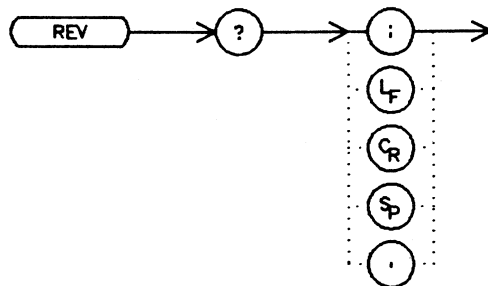
### DESCRIPTION:

When executing a user defined function the *RETURN FROM FUNCTION* (*RETURN*) command causes the function to terminate, returning the instrument to the point where the function was called.

# REV

## OUTPUT REVISION NUMBER

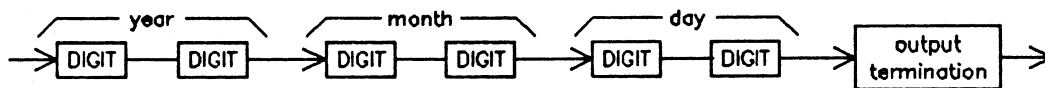
COMMAND SYNTAX:



### DESCRIPTION:

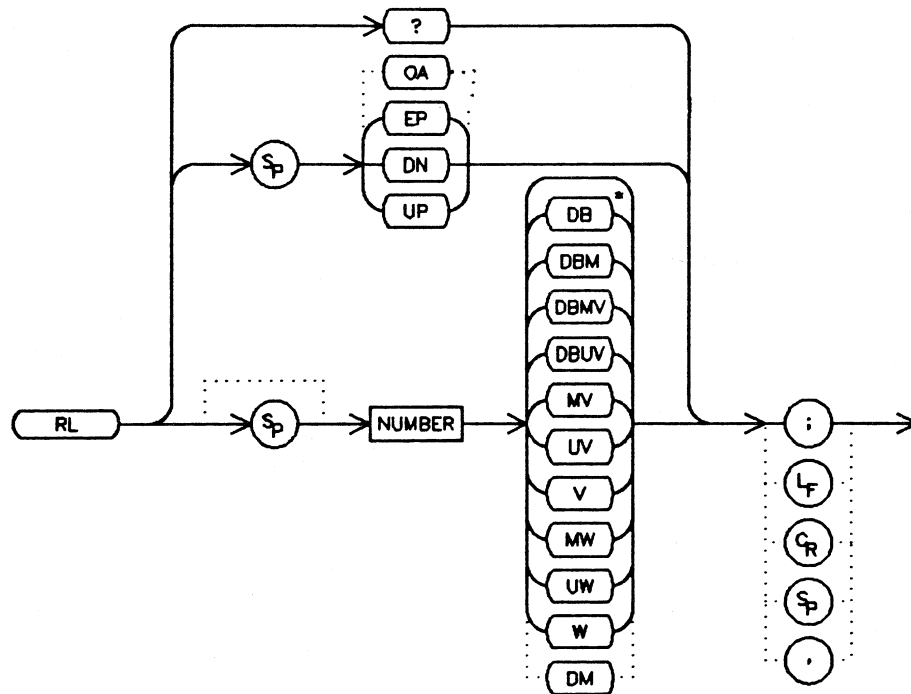
The *REV* query will output the revision number of the instrument firmware.

### QUERY RESPONSE:



# RL REFERENCE LEVEL

## COMMAND SYNTAX:



\* DB is in relative amplitude mode (See MEASURE SR).

## DESCRIPTION:

Reference level is the amplitude value that corresponds to the reference position (typically, top of screen) as set by the reference position command.

*REFERENCE LEVEL (RL)* can be set to values such that a signal present at that value could damage the input hardware. The power limits specified by the module input used must be observed.

When in relative amplitude mode (See *MEASURE SR*), reference level is dB relative to the reference trace B. When going from absolute amplitude mode to relative amplitude mode, reference level is set to 0 dB. When going from relative amplitude mode to absolute amplitude mode, reference level is set to a value determined by maximum input power, reference level position, and the vertical scale.

## PRESET STATE:

0 dBm

## RL

## REFERENCE LEVEL

### PARAMETER RANGE:

Minimum: -300 dBm

Maximum: +300 dBm

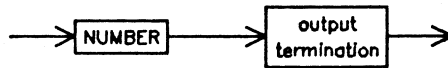
### STEP INCREMENT:

In steps of the vertical scale graticule.

### FUNDAMENTAL UNIT:

Set by *ABSOLUTE AMPLITUDE UNITS (AUNITS)* when in absolute amplitude mode. dB when in relative amplitude mode.

### QUERY RESPONSE:

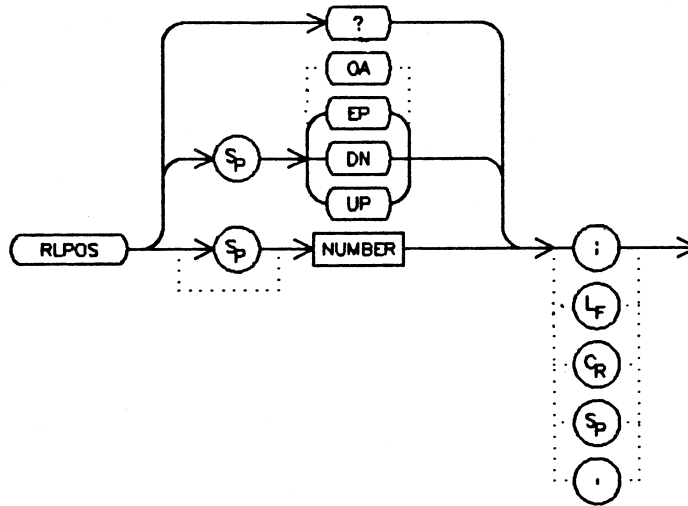




# RLPOS

## REFERENCE LEVEL POSITION

### COMMAND SYNTAX:



### DESCRIPTION:

This command sets the reference level position. The position is set in terms of graticule units from top of screen (10 = top of screen, 0 = bottom of screen). Reference level position applies only to log display scale. In linear display, top of screen is used for the reference level.

### PRESET STATE:

10

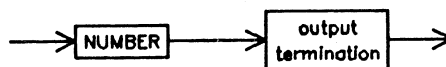
### PARAMETER RANGE:

Minimum: 0  
Maximum: 10

### STEP INCREMENT:

1 Vertical Scale Division

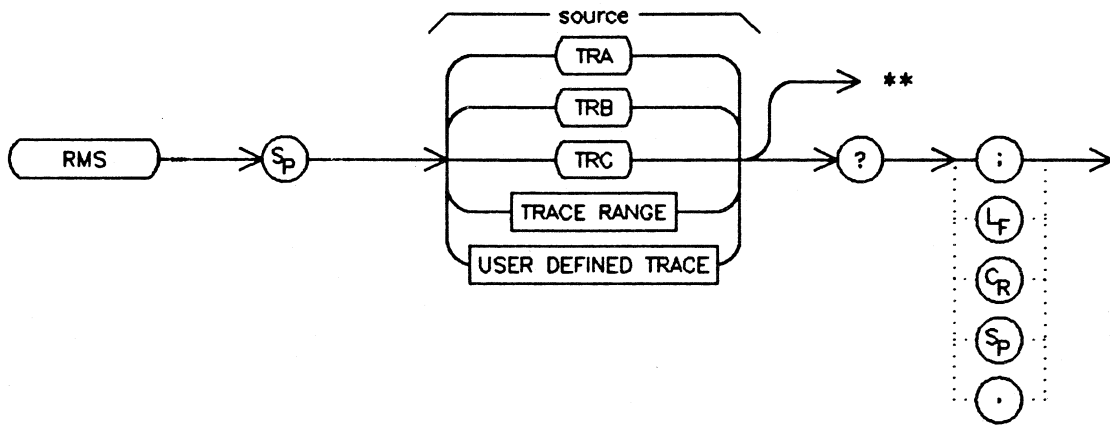
### QUERY RESPONSE:



# RMS

## TRACE ROOT MEAN SQUARE VALUE

### COMMAND SYNTAX:

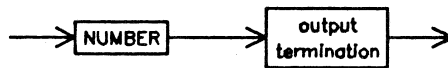


\*\* For use as a Predefined Function.

### DESCRIPTION:

This command returns the root means square value of the trace, in measurement units.

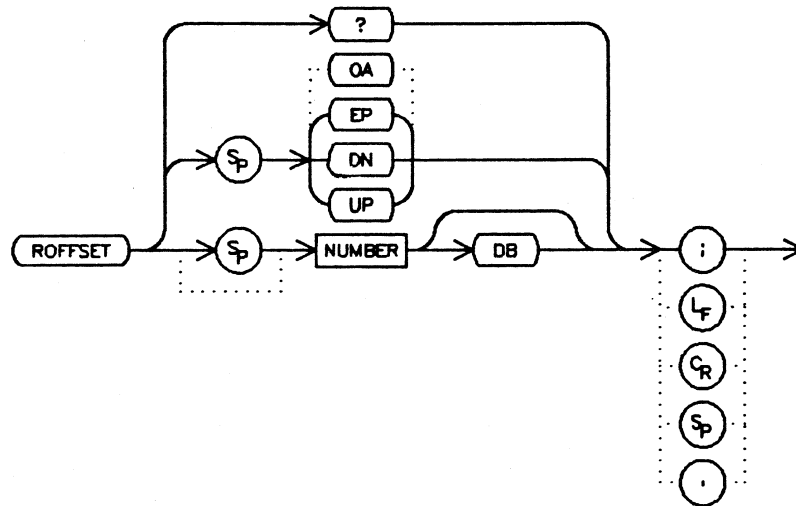
### QUERY RESPONSE:



# ROFFSET

## AMPLITUDE REFERENCE OFFSET

**COMMAND SYNTAX:**



**DESCRIPTION:**

The amplitude reference offset function allows the user to offset the amplitude scale on all absolute amplitude input, output, and display readouts.

**PRESET STATE:**

0

**PARAMETER RANGE:**

Minimum: -300 dB  
Maximum: 300 dB

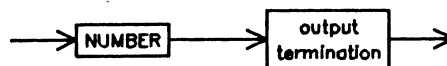
**STEP INCREMENT:**

Log: 1 Vertical Scale Division  
Linear: 1 Vertical Scale Division at Top of Screen (.915 dB)

**FUNDAMENTAL UNIT:**

dB

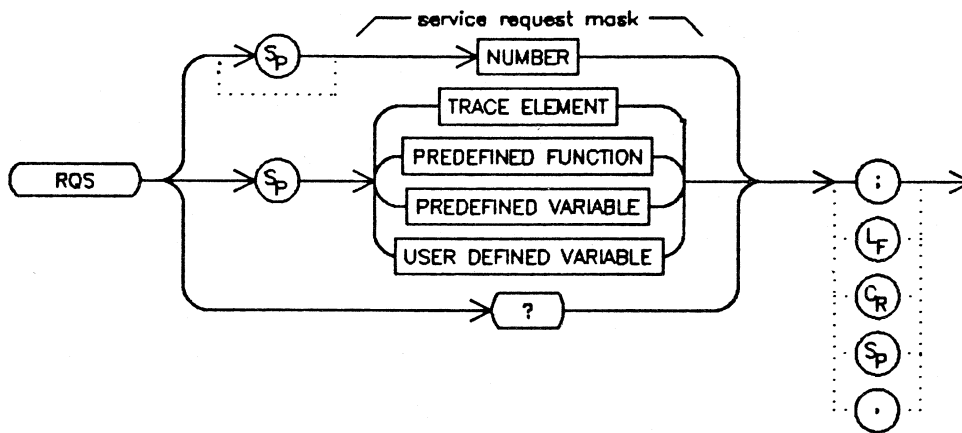
**QUERY RESPONSE:**



# RQS

## REQUEST SERVICE CONDITIONS

### COMMAND SYNTAX:



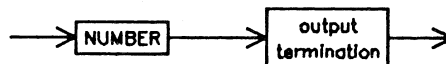
### DESCRIPTION:

The service request mask is an ASCII decimal number representing the decimal weighting of the status byte bits which are to be enabled for service request. The status byte is defined as follows:

BIT	DECIMAL	MEANING
7		Not used
6	64	Request Service
5	32	Error Present in Error Register
4	16	Command Complete
3		Not Used
2	4	End of Sweep
1	2	Message Occurred
0		Trigger Armed

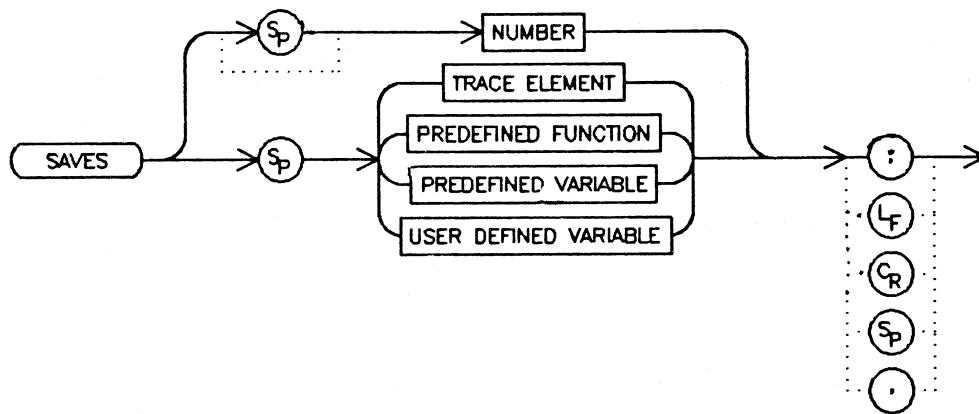
RQS is set to 0 on powerup or device clear.

### QUERY RESPONSE:



# SAVES SAVE STATE

## COMMAND SYNTAX:



## DESCRIPTION:

The current state of the analyzer can be saved in one of several registers referenced by numeric values. The number of state registers is set by the *NUMBER OF STATE REGISTERS (NSTATE)* command.

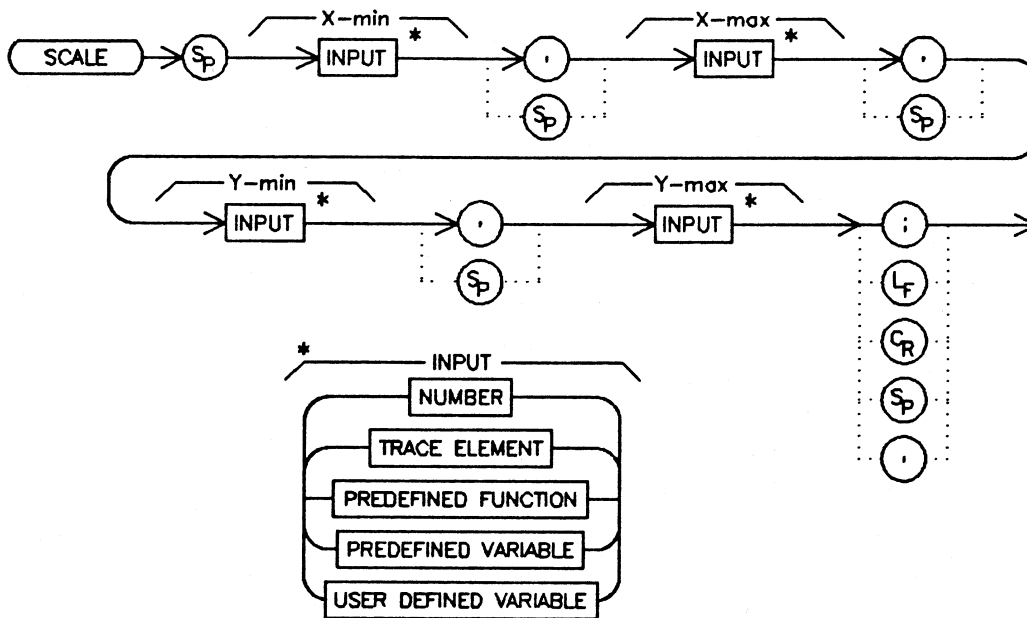
## PARAMETER RANGE:

Minimum: 1  
Maximum: Determined by *NSTATE*.

# SCALE

## SCALE GRAPHICS

### COMMAND SYNTAX:



### DESCRIPTION:

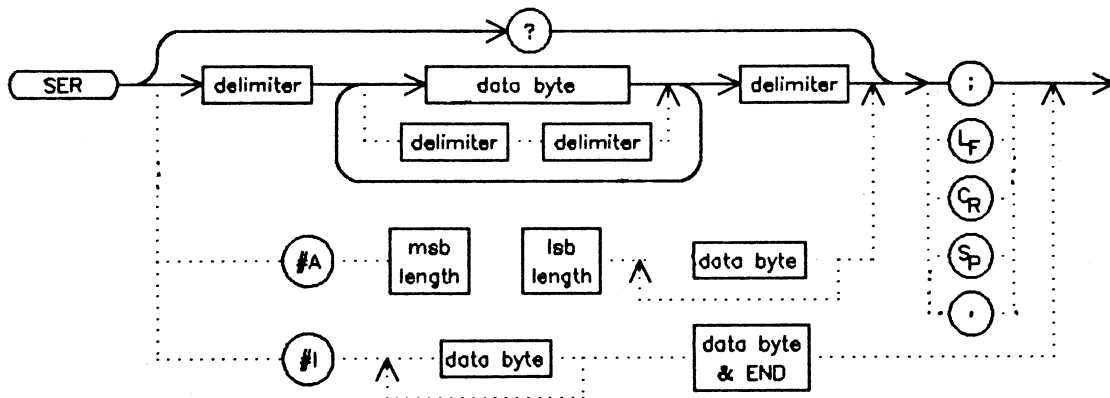
The plotting area is scaled to user units. The scale command affects incoming data as it is drawn. Changing the scale does not rescale previously drawn lines.

### PRESET STATE:

0, 1000, 0, 1000

# SER SERIAL NUMBER

## COMMAND SYNTAX:



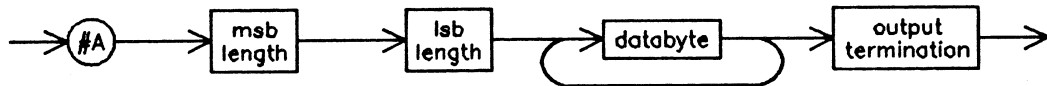
## DESCRIPTION:

The SER query will output the serial number of the instrument. The serial number may also be input using this same command.

## PARAMETER RANGE:

Maximum: 21 characters

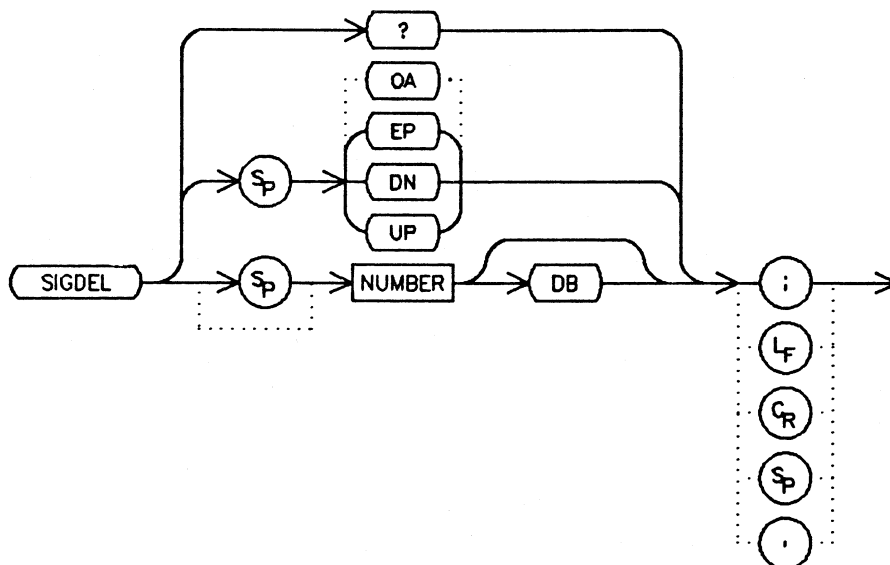
## QUERY RESPONSE:



# SIGDEL

## SIGNAL AMPLITUDE DELTA

COMMAND SYNTAX:



### DESCRIPTION:

This command specifies the amplitude difference which is allowed between a signal and its image in order for the pair to be recognized by the AUTO/IMAGE and AUTO/SHIFT signal identification functions.

### PRESET STATE:

10 dB

### PARAMETER RANGE:

Minimum: 0

Maximum: 300 dB

### STEP INCREMENT:

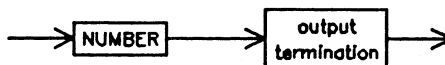
Log: 1 Vertical Division

Linear: 1 Vertical Division at Top of Screen (.915 dB)

### FUNDAMENTAL UNIT:

dB

### QUERY RESPONSE:

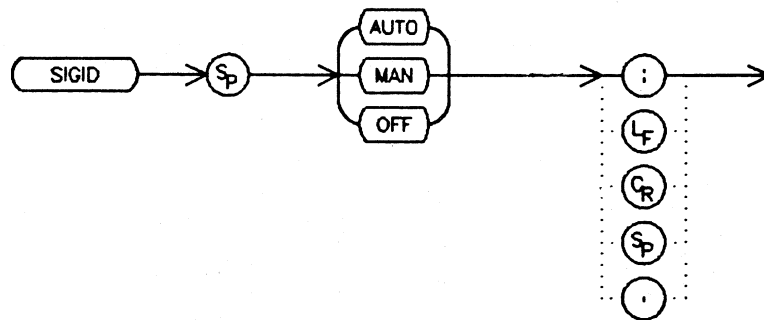




# SIGID

## SIGNAL IDENTIFY

### COMMAND SYNTAX:



### DESCRIPTION:

The signal identification function specified by *SIGNAL IDENTIFICATION MODE (IDMODE)* is initiated with the parameters *AUTO* or *MAN*. If there is no active marker, the analyzer activates a marker and places it on the highest peak. The current state is saved so that it can be recalled at the end of the identification process. There are four methods of signal identification as follows:

#### **AUTO/SHIFT:**

The difference in frequency from the "marked" response is divided by the IF shift to determine the harmonic number, and the true frequency of the signal is computed and displayed on the screen.

#### **MAN/SHIFT:**

The analyzer alternates sweeping between the "marked" response, and the shifted response, to allow the user to determine the difference in frequency.

#### **AUTO/IMAGE:**

The analyzer searches a range of bands for a response within the amplitude difference specified by the *SIGDEL* command that could have produced the "marked" response. The range of bands may be specified using *NSTART* AND *NSTOP* commands. If an image response is found, its frequency is displayed.

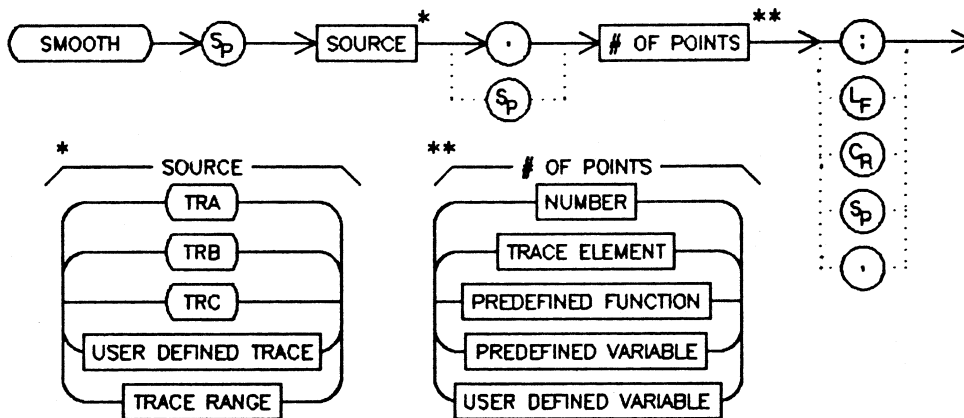
#### **MAN/IMAGE:**

The analyzer assumes the "marked" response is the signal, and alternates sweeping between that response and the image to allow the user to compare the two.

# SMOOTH

## SMOOTH TRACE

### COMMAND SYNTAX:



### DESCRIPTION:

The *SMOOTH* command smooths the trace according to the number of points specified for the running average. Each point's value is replaced with the average of the values (in measurement units) of the given number of points centered on it. Increasing the number of points increases smoothing at the cost of decreasing resolution.

The purpose of this function is to perform a spatial video averaging as compared to the temporal version supplied by the *VIDEO AVERAGE (VAVG)* command. By replacing the value of each point in a trace with the average of the values of a number of points centered about that point, any high frequency noise or signals are attenuated without a corresponding effect on low frequency signals. It thereby performs a function similar to reducing the video bandwidth without the corresponding changes in sweep time. As such, it does result in a reduction of frequency resolution.

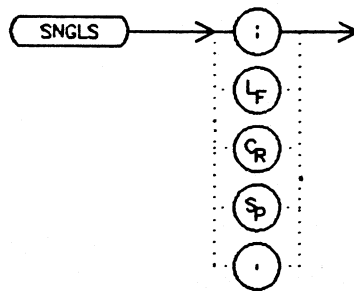
This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. When the command is complete, memory is returned to the free user memory.

### PARAMETER RANGE:

# of Points: The number of points must be an odd number greater than one and less than the trace length.

# SNGLS SINGLE SWEEP

## COMMAND SYNTAX.



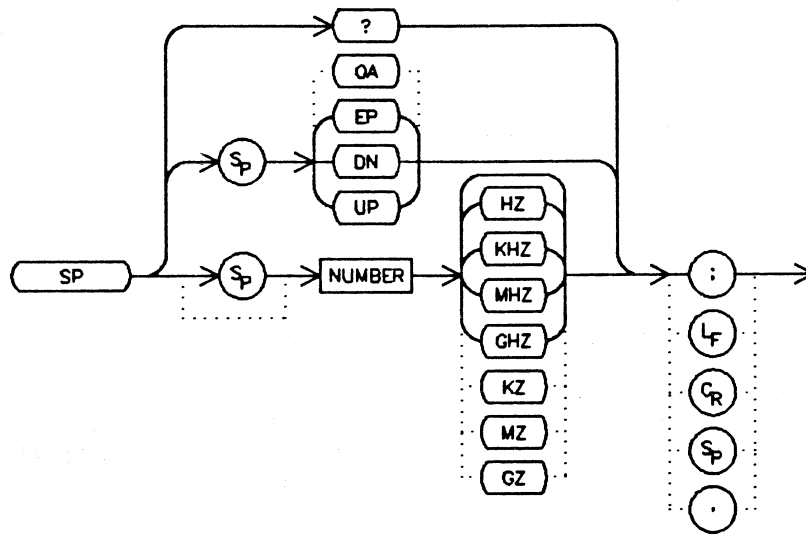
## DESCRIPTION:

This function arms the analyzer for one sweep once the trigger conditions are met. The execution of this command causes the analyzer to immediately retune to its start frequency.

# SP

## FREQUENCY SPAN

### COMMAND SYNTAX:



### DESCRIPTION:

The span function determines the frequency range measured and displayed. Center frequency is not changed as span is changed. Start and stop frequency are changed with span changes. Operation at band edges and frequency range limits may be different from instrument to instrument.

Specifying 0 Hz configures the analyzer as a fix-tuned receiver.

### COUPLING:

Span = Stop - Start (in Start-Stop mode)

### PRESET STATE:

The maximum value allowed by the hardware configuration.

### PARAMETER RANGE:

0 to 1000 GHz

**SP**  
**FREQUENCY SPAN**

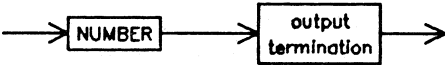
**STEP INCREMENT:**

1, 2, 5, 10 Sequence

**FUNDAMENTAL UNIT:**

Hz

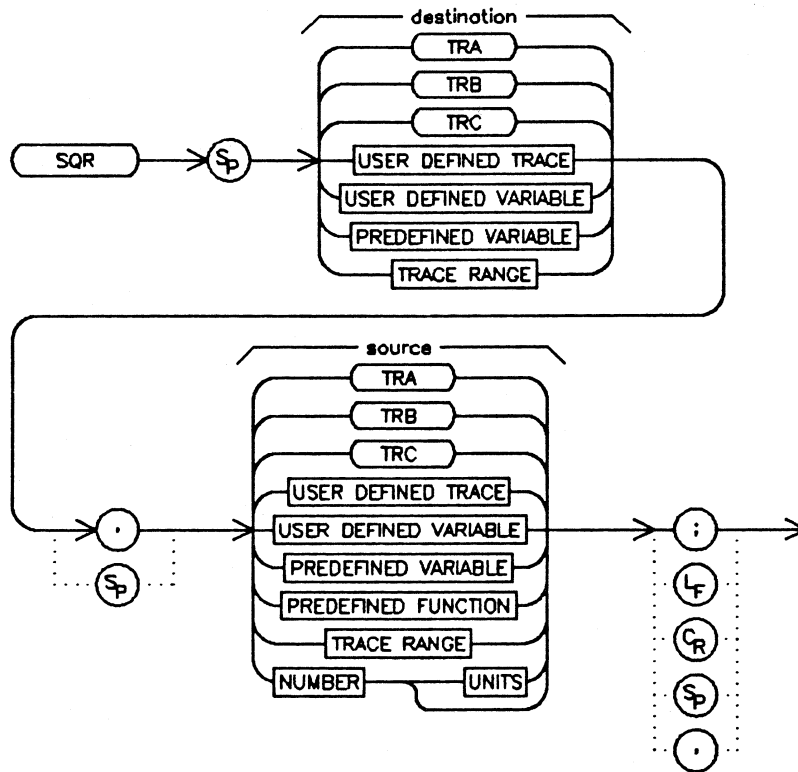
**QUERY RESPONSE:**



# SQR

## SQUARE ROOT

### COMMAND SYNTAX:

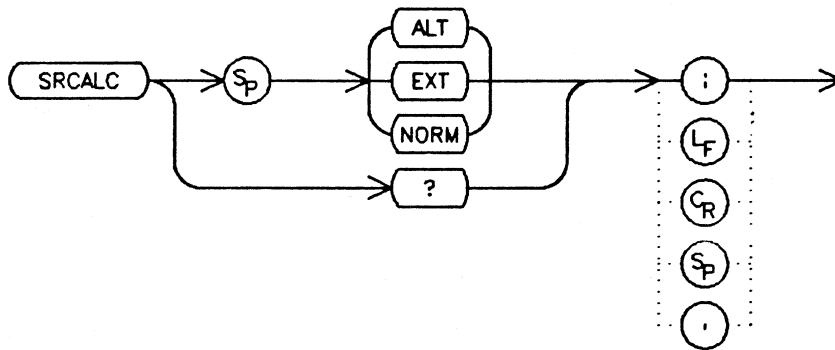


### DESCRIPTION:

The square root of the source is stored in the destination. If the source is negative, an error will be reported and the negative of the square root of the absolute value will be returned.

SOURCE AUTOMATIC LEVEL CONTROL MODE

COMMAND SYNTAX:



DESCRIPTION:

The source *ALC* mode is set with this command. The possible parameters are:

**ALT:**

Alternate Internal Detector

**EXT:**

External Detector

**NORM:**

Normal Internal Detector

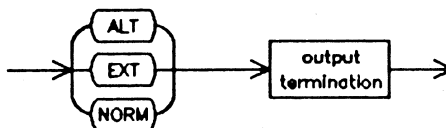
PRESET STATE:

NORM

HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

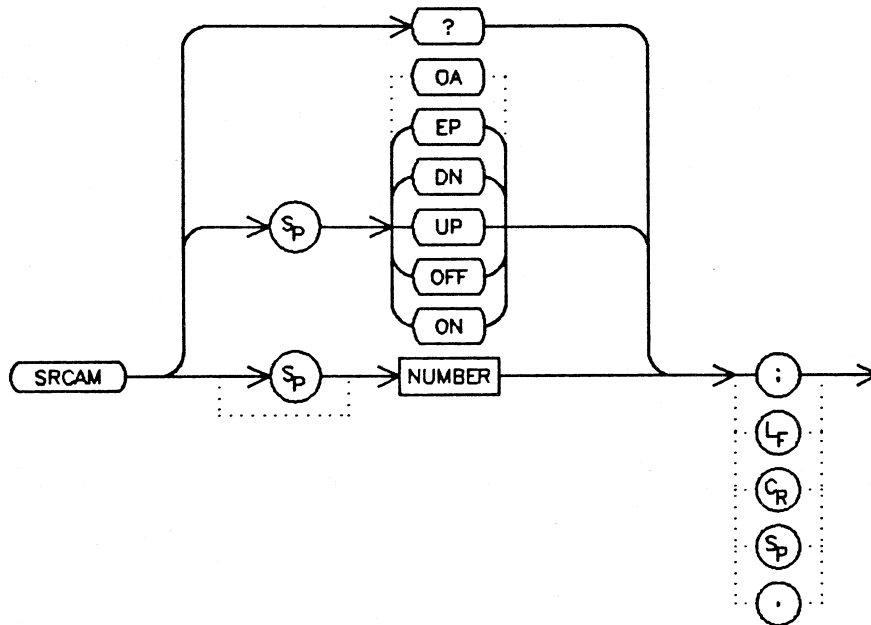
QUERY RESPONSE:



# SRCAM

## SOURCE AMPLITUDE MODULATION

COMMAND SYNTAX:



### DESCRIPTION:

The source amplitude modulation percentage can be entered and can be turned on or off. Entering an amplitude modulation percentage automatically turns it on. If turned on with ON, amplitude modulation will be turned on with the current percent amplitude modulation.

Special Note: The sweep is not stopped immediately for this command to complete. The command will be guaranteed complete at the beginning of the next sweep.

### PRESET STATE:

0% Modulation, OFF

### PARAMETER RANGE:

Minimum: 0 or Hardware Limit  
Maximum: 100 or Hardware Limit



**SRCAM**

**SOURCE AMPLITUDE MODULATION**

**STEP INCREMENT:**

10

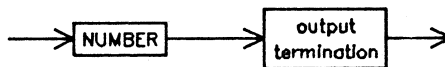
**FUNDAMENTAL UNIT:**

Percent

**HARDWARE REQUIREMENTS:**

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

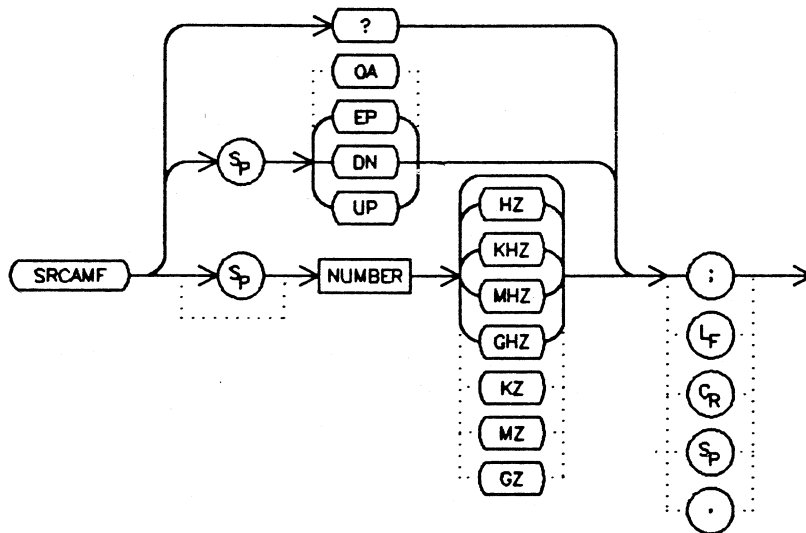
**QUERY RESPONSE:**



# SRCAMF

## AMPLITUDE MODULATION FREQUENCY

COMMAND SYNTAX:



### DESCRIPTION:

The source amplitude modulation frequency is selected. Selections are limited to the specific hardware capability.

Special Note: The sweep is not stopped immediately for the command to complete. The command will be guaranteed complete at the beginning of the next sweep.

### PRESET STATE:

1 kHz or Hardware Limit

### PARAMETER RANGE:

Minimum: 0 or Hardware Limit

Maximum: Hardware Limit

### STEP INCREMENT:

1, 3, 10 Sequence if hardware supports. Otherwise, to hardware available resolution.

**SRCAMF**

**AMPLITUDE MODULATION FREQUENCY**

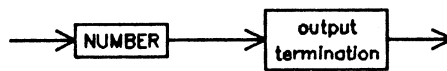
**FUNDAMENTAL UNIT:**

**Hz**

**HARDWARE REQUIREMENTS:**

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

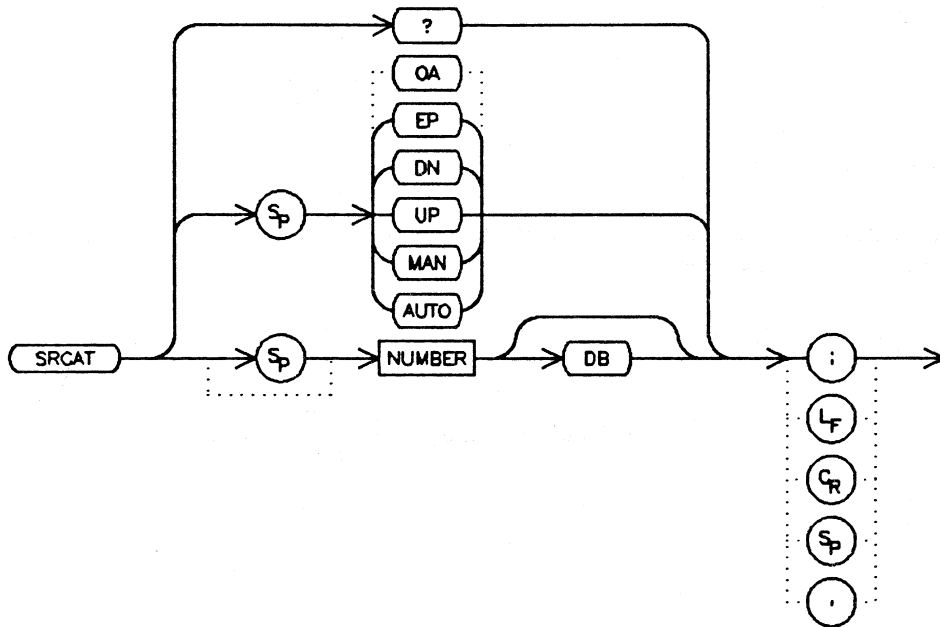
**QUERY RESPONSE:**



# SRCAT

## SOURCE ATTENUATOR

### COMMAND SYNTAX:



### DESCRIPTION:

In its preset state, the source attenuator is automatically controlled so that the requested *SOURCE POWER (SRCPWR)* is output from the source. The manual source attenuator control fixes the attenuator so that the full vernier power range is accessible. In the manual mode, the total source power is limited for any given source attenuator setting.

### COUPLING:

**AUTO**, The attenuator is automatically set to satisfy the source power value.

**MAN**, The attenuator's setting will not change when *SOURCE POWER (SRCPWR)* is changed.

### PRESET STATE:

**AUTO**

### PARAMETER RANGE:

Minimum: 0  
 Maximum: Hardware Limit

# SRCAT

## SOURCE ATTENUATOR

### STEP INCREMENT:

Dependent on hardware resolution (typically 10 dB)

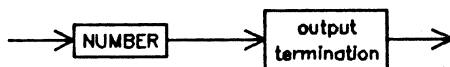
### FUNDAMENTAL UNIT:

dB

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

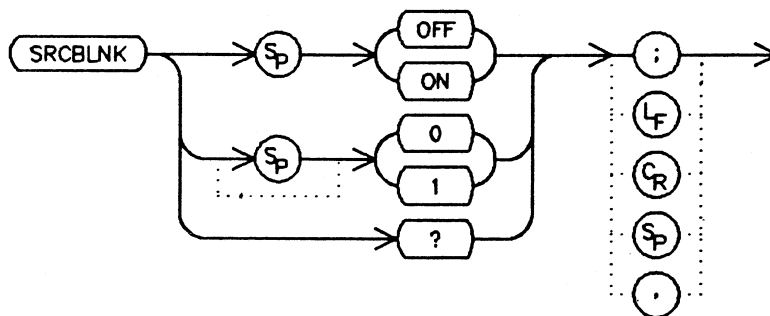
### QUERY RESPONSE:



# SRCBLNK

## SOURCE BLANKING

COMMAND SYNTAX:



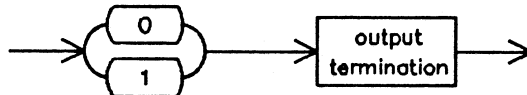
### DESCRIPTION:

The source output power is blanked to a low power level during reloading of the system.

### PRESET STATE:

OFF

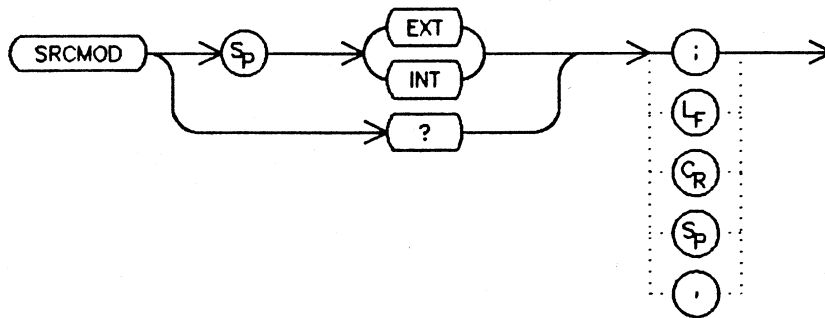
### QUERY RESPONSE:



# SRCMOD

## SOURCE MODULATION INPUT

### COMMAND SYNTAX:



### DESCRIPTION:

The source amplitude modulation input is selected with this command.

#### EXT:

The external modulation input is selected.

#### INT:

The internal continuous wave modulation input is selected.

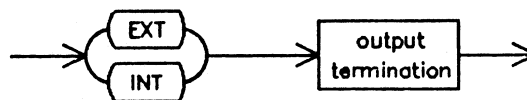
### PRESET STATE:

INT

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

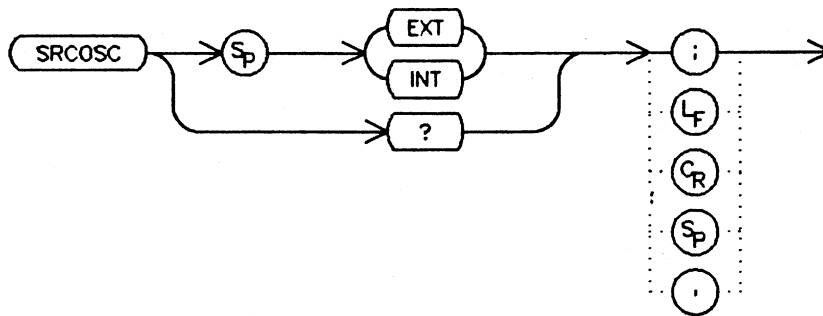
### QUERY RESPONSE:



# SRCOSC

## SOURCE OSCILLATOR

### COMMAND SYNTAX:



### DESCRIPTION:

The source oscillator used for the tracking source can be selected with this command.

#### EXT:

An external 21.4 MHz +/- Oscillator is selected.

#### INT:

The internal 21.4 MHz oscillator is selected.

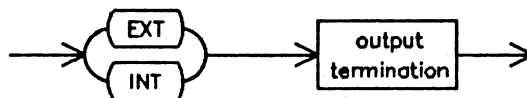
### PRESET STATE:

INT

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

### QUERY RESPONSE:

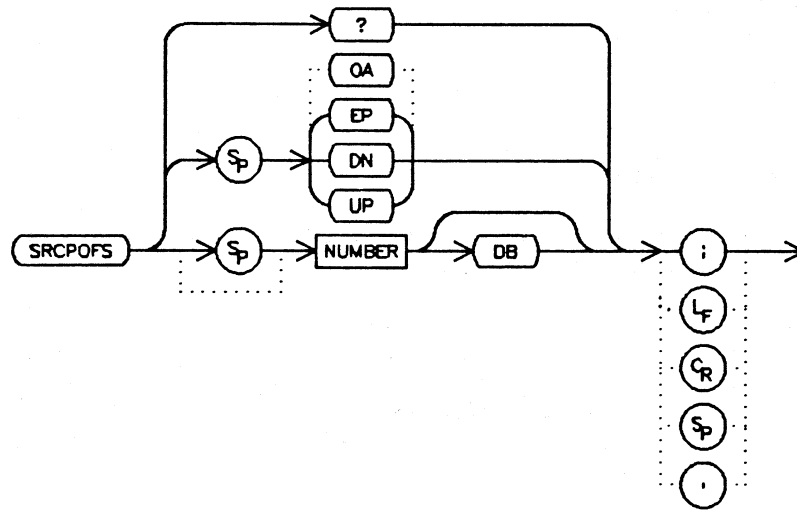




# SRCPOFS

## SOURCE POWER OFFSET

**COMMAND SYNTAX:**



**DESCRIPTION:**

This command allows a user-determined value to be added to the requested source power output level readout, enabling the user to calibrate the source output. This does not change the actual signal level produced by the tracking generator nor does it affect the displayed trace.

**PRESET STATE:**

0

**PARAMETER RANGE:**

+/- 300 dB

**STEP INCREMENT:**

Set by the *SOURCE POWER STEP (SRCSTP)* command.

# SRCPOFS

## SOURCE POWER OFFSET

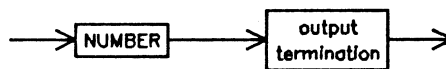
### FUNDAMENTAL UNIT:

dB

### HARDWARE REQUIREMENTS:

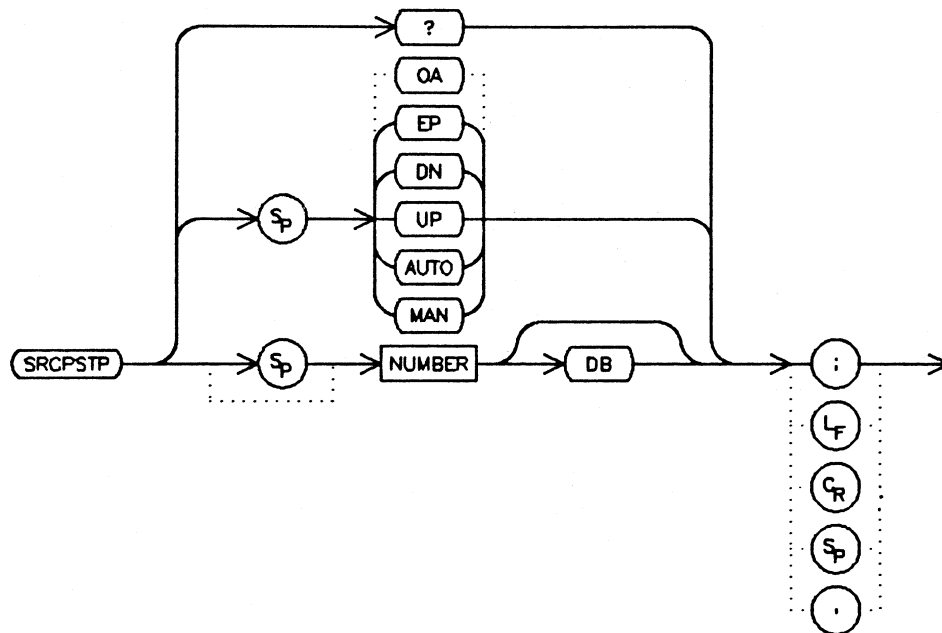
This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

### QUERY RESPONSE:



# SRCPSTP SOURCE POWER STEP

**COMMAND SYNTAX:**



**DESCRIPTION:**

The step size for the *SOURCE POWER OFFSET (SRCPOFS)*, the *SOURCE POWER SWEEP (SRCPSWP)*, and the *SOURCE POWER (SRCPWR)* functions is set with this command.

**COUPLING:**

AUTO, SRCPSTP = 1 Vertical Scale Division

**PRESET STATE:**

AUTO

**PARAMETER RANGE:**

+/- 300 dB

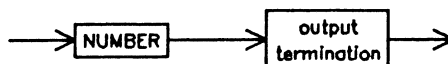
**STEP INCREMENT:**

1, 2, 5, 10 Sequence

**FUNDAMENTAL UNIT:**

dB

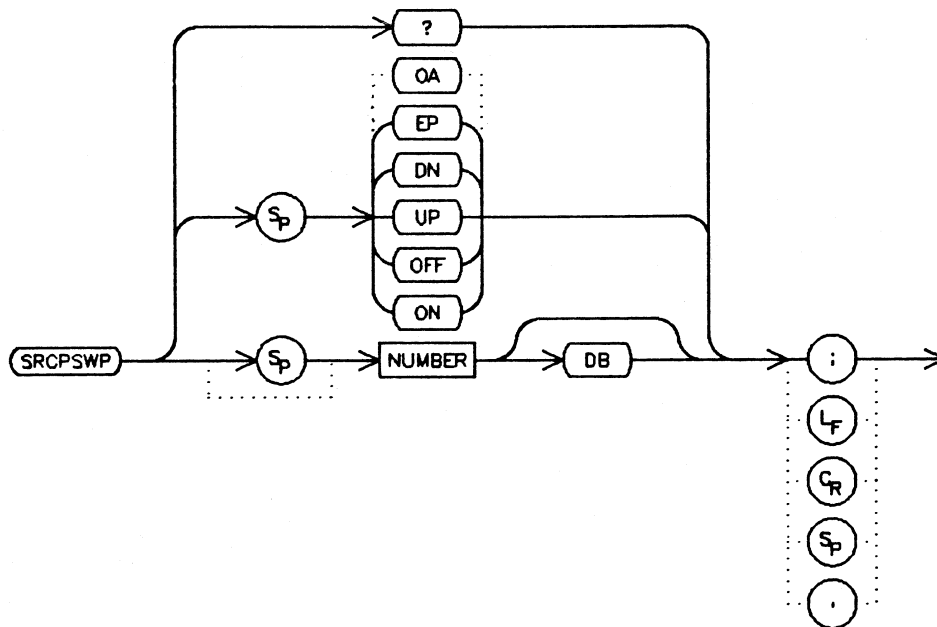
**QUERY RESPONSE:**



# SRCPSWP

## SOURCE POWER SWEEP

COMMAND SYNTAX:



### DESCRIPTION:

The source power sweep function can be controlled with this command. The power sweep amplitude is entered with the numeric parameter. When a power sweep value is entered, the power sweep function is automatically turned on. Power sweep may be turned on to the current amplitude value or turned off directly.

**Special Note:** The sweep is not stopped immediately for the command to complete. The command will be guaranteed complete at the beginning of the next sweep.

### PRESET STATE:

OFF, 0 dB

### PARAMETER RANGE:

Minimum: 0  
Maximum: 300 dB, or the Hardware Limit.

# SRCPSWP

## SOURCE POWER SWEEP

### STEP INCREMENT:

Set by the *SOURCE POWER STEP (SRCPSTP)* command.

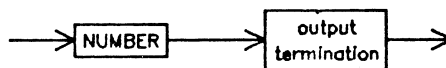
### FUNDAMENTAL UNIT:

dB

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

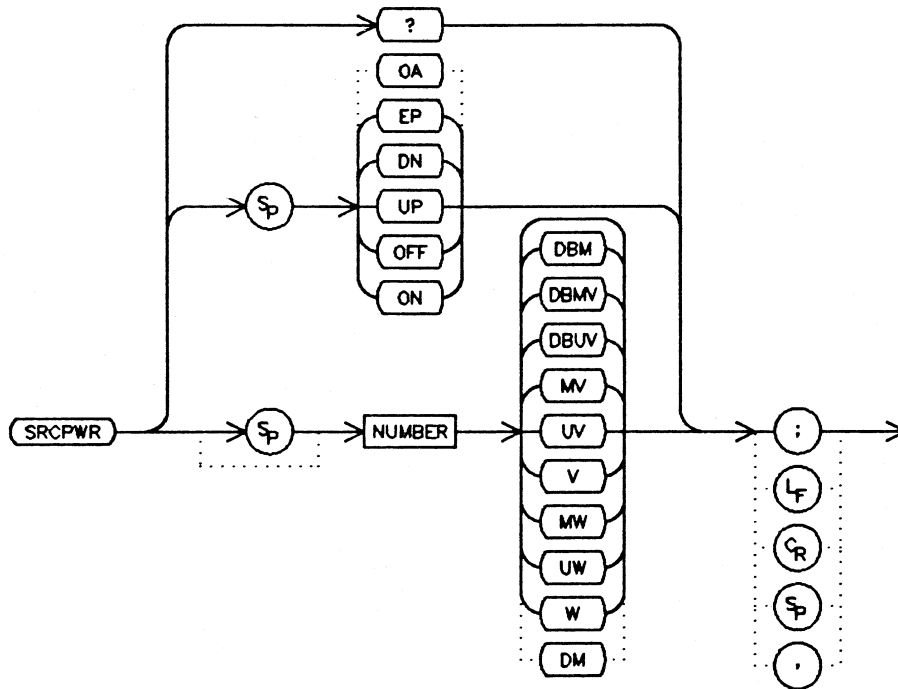
### QUERY RESPONSE:



# SRCPWR

## SOURCE POWER

### COMMAND SYNTAX:



### DESCRIPTION:

Source power level may be set and turned on or off. When the source power level is set with this command, it is automatically turned on.

Note: The sweep is not stopped immediately for this command unless the source attenuator is changing. The command will be guaranteed complete at the beginning of the next sweep.

### PRESET STATE:

-10 dBm, OFF

### PARAMETER RANGE:

+/- 300 dBm or Hardware determined limit.

### STEP INCREMENT:

Set by the *SOURCE POWER STEP (SRCPSTP)* command.

# SRCPWR

## SOURCE POWER

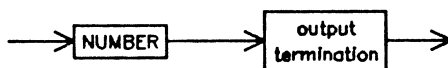
### FUNDAMENTAL UNIT:

Determined by *AUNITS*

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

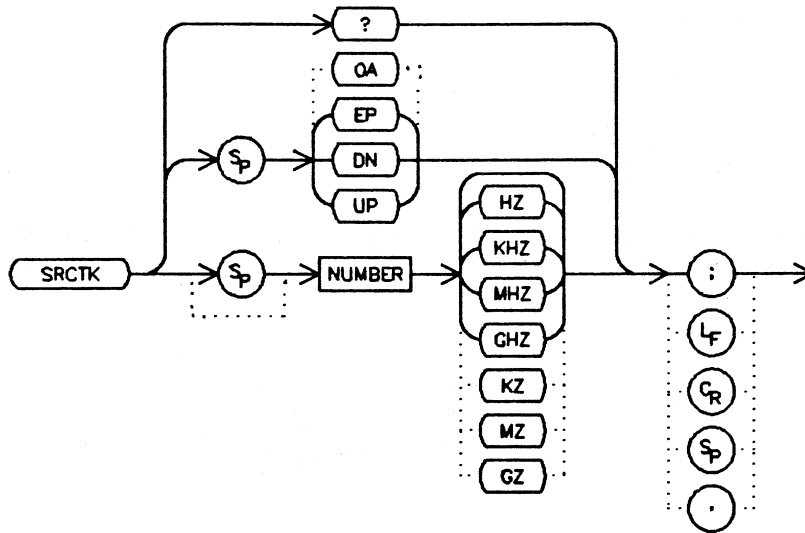
### QUERY RESPONSE:



# SRCTK

## SOURCE TRACKING

### COMMAND SYNTAX:



### DESCRIPTION:

The tracking adjustment can be set using this command.

**Special Note:** The sweep is not stopped immediately for the command to complete. The command will be guaranteed complete at the beginning of the next sweep.

### PRESET STATE:

0 Hz

### PARAMETER RANGE:

+/- 1000 GHz or Hardware determined limit.

### STEP INCREMENT:

10 Hz

### FUNDAMENTAL UNIT:

Hz

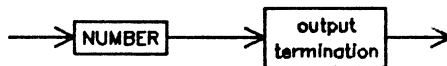


# SRCTK SOURCE TRACKING

## HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

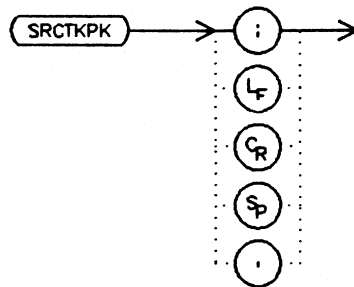
## QUERY RESPONSE:



# SRCTKPK

## SOURCE TRACKING PEAK

### COMMAND SYNTAX:



### DESCRIPTION:

The tracking offset of the source is adjusted to maximize the response at the point indicated by the active marker. If there is no active marker, marker #1 is activated and placed at center screen. The message "Automatic Tracking" appears while this operation is being performed. When finished, the message "Automatic Tracking Completed" appears. All markers are turned off after completion and all other instrument settings are restored.

If a peak value (a minimum on either side of the highest point) can not be found, the message "Automatic Tracking no peak found" is displayed. In this case the source tracking value is left unchanged.

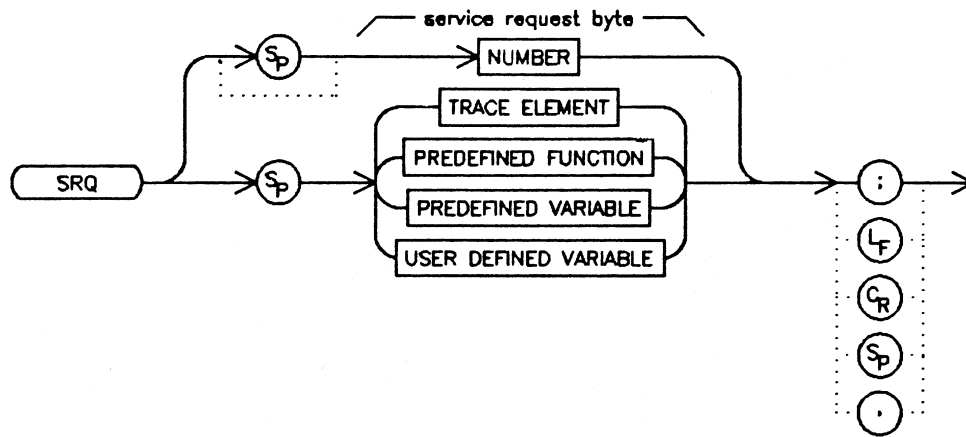
If the command is given when in a Resolution Bandwidth where tracking is not needed, an error message of "Tracking Not Required" is displayed.

### HARDWARE REQUIREMENTS:

This command can only be used when an HP70300A Tracking Generator Module is configured in the system.

# SRQ SERVICE REQUEST

## COMMAND SYNTAX:



## DESCRIPTION:

The service request byte is an ASCII decimal number representing the decimal weighting of the status byte bits to be set in the status byte. A service request is generated if the corresponding request mask bit is true. See *REQUEST SERVICE CONDITIONS (RQS)*.

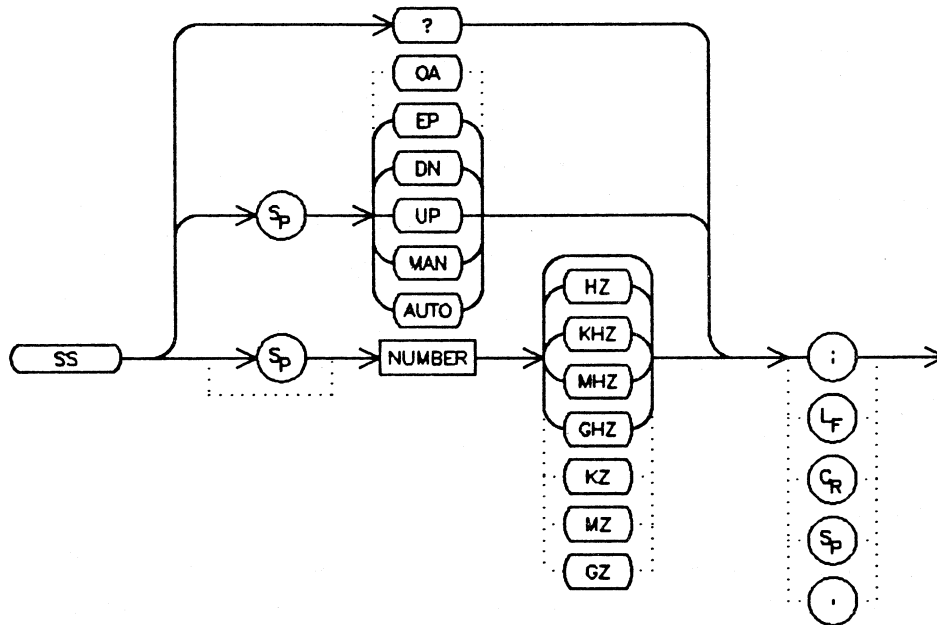
## PARAMETER RANGE:

Minimum: 0  
Maximum: 255

# SS

## CENTER FREQUENCY STEP

### COMMAND SYNTAX:



### DESCRIPTION:

The center frequency step function determines the step size for the step function in the control of center frequency. The center frequency step size is set to the entered value. The coupling is set to manual when a number value is input, an up or down step is received, an entry is terminated from enable parameter, or the MAN parameter is received.

### COUPLING:

Auto, Center Frequency Step =  $\text{Span}/10$  (i.e. number of horizontal divisions) (not Zero Span)

Center Frequency Step = Resolution Bandwidth (Zero Span)

### PRESET STATE:

Auto Coupled.

### PARAMETER RANGE:

+/- 1000 GHZ

# CENTER FREQUENCY STEP

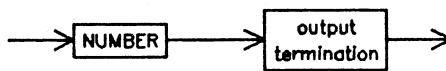
**STEP INCREMENT:**

1, 2, 5, 10 Sequence

**FUNDAMENTAL UNIT:**

Hz

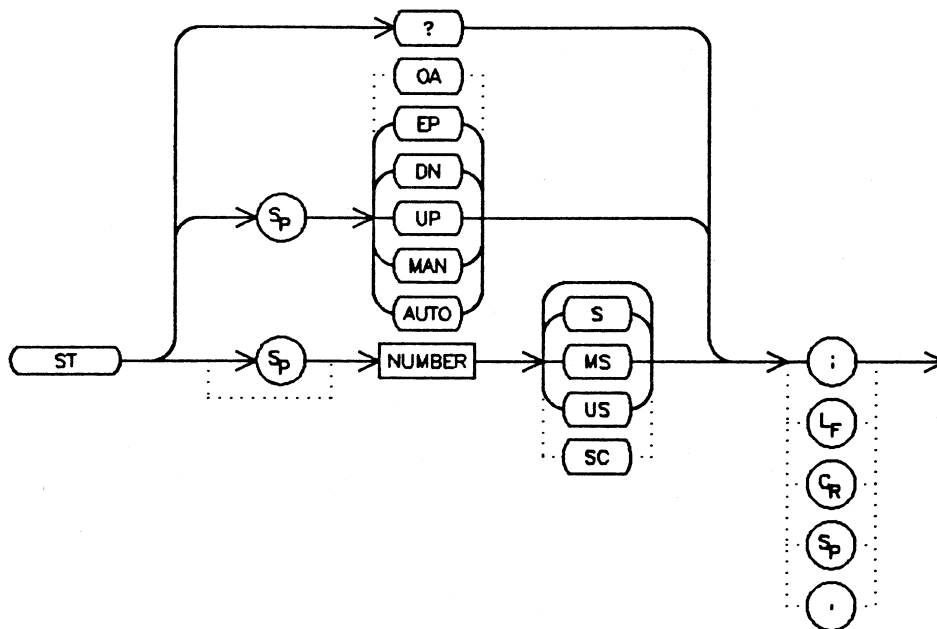
**QUERY RESPONSE:**



# ST

## SWEEP TIME

### COMMAND SYNTAX:



### DESCRIPTION:

This command will set the sweep time. If in AUTO mode, the sweep time is automatically set to the optimum value allowed by the current analyzer setup.

### COUPLING:

Determined by hardware constraints and Resolution and Video Bandwidth settings.

### PRESET STATE:

AUTO

### PARAMETER RANGE:

Minimum: 0 or Hardware determined limit.  
Maximum: 1000 Seconds

**ST**  
**SWEEP TIME**

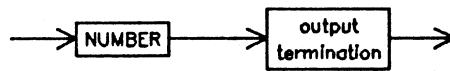
**STEP INCREMENT:**

1, 2, 5, 10 Sequence

**FUNDAMENTAL UNIT:**

Second

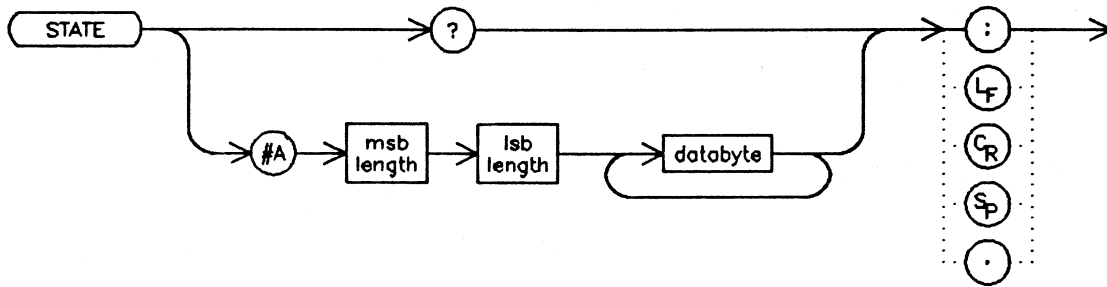
**QUERY RESPONSE:**



# STATE

## INSTRUMENT STATE

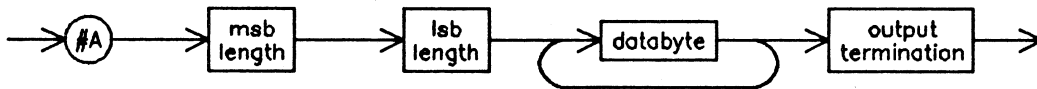
### COMMAND SYNTAX:



### DESCRIPTION:

The internal representation of the instrument state may be either input or output from the remote interface. This function is provided for the user to save the current instrument state in a computer so that the output data can be sent back at a later time to restore the original instrument state.

### QUERY RESPONSE:



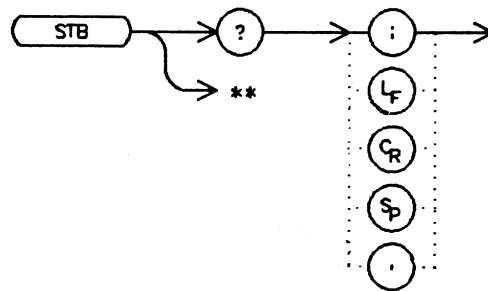
The data contained in the query response can be sent directly back to the instrument to execute the STATE function. The query response contains the proper "STATE" header and the #A format information.



# STB

## STATUS BYTE QUERY

### COMMAND SYNTAX:

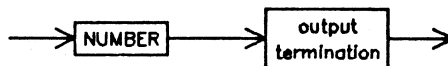


\*\* For use as a Predefined Function

### DESCRIPTION:

The status byte is queried. The number returned is the decimal equivalent of the bits set in the status byte. The resulting action is the same as a serial poll. The *RQS* and associated bits are cleared in the same way that a serial poll would clear them. See *REQUEST SERVICE CONDITIONS (RQS)* command for definition of status byte bits.

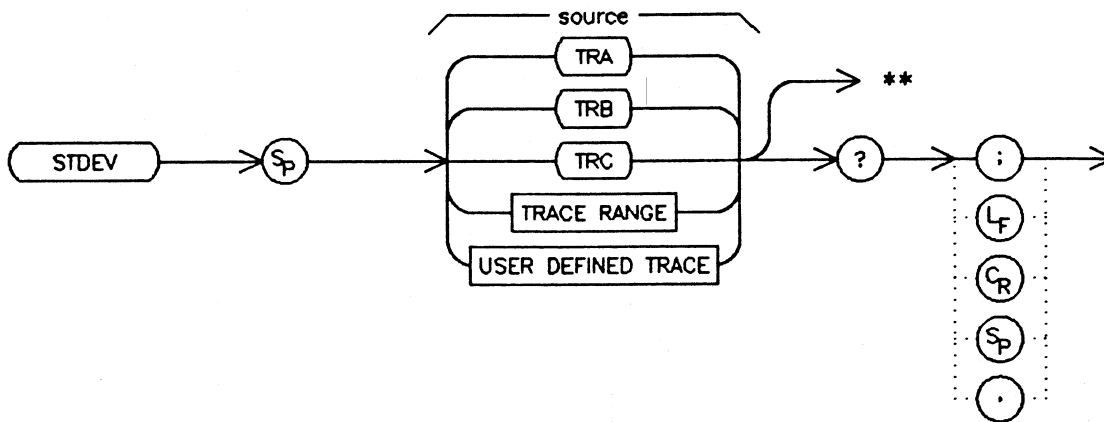
### QUERY RESPONSE:



# STDEV

## STANDARD DEVIATION OF TRACE AMPLITUDES

COMMAND SYNTAX:

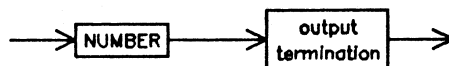


\*\* For use as a Predefined Function

### DESCRIPTION:

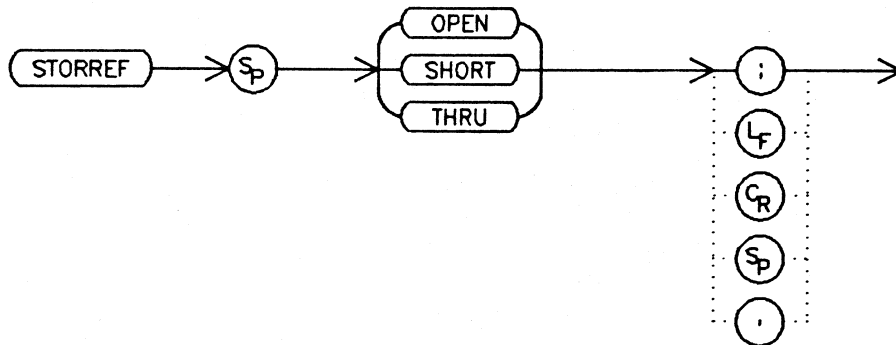
This command returns the standard deviation of the trace amplitude, in measurement units.

### QUERY RESPONSE:



# STORREF STORE REFERENCE

## COMMAND SYNTAX:



## DESCRIPTION:

### OPEN:

The data in Trace A is stored into Trace C, replacing previous data in Trace C. Data is no longer written to Trace C (writing status off). The message "Function Executed" appears on the display.

### SHORT:

The data in Trace A is averaged into the Trace C data, so that the normalization in Trace C is the average of the SHORT and OPEN responses. Data is no longer written to Trace C (writing status off). If SHORT is attempted before OPEN, the message "Not Stored, Open 1st" is displayed and the data in Trace C is not changed. The message "Function Executed" appears on the display.

### THRU:

The data in Trace A is stored into Trace B, replacing previous data in Trace B. Data is no longer written to Trace B (writing status off). The message "Function Executed" appears on the display.

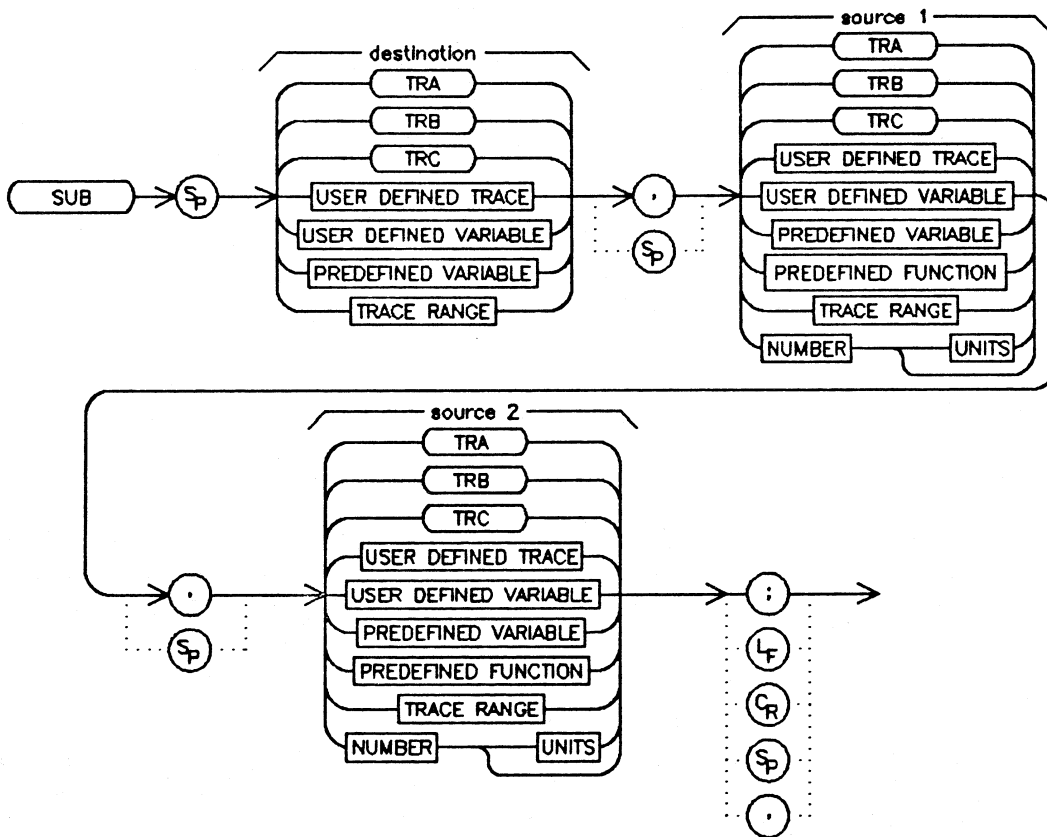
A *STORREF* will not be executed if either *TRACE A MINUS TRACE B (AMB)*, *TRACE A MINUS TRACE B PLUS DISPLAY LINE (AMBPL)*, or *TRACE A MINUS TRACE C (AMC)* is on. The message "Not Stored; A-X-->A on" is displayed.

Whenever *TRACE A MINUS TRACE B (AMB)* is turned on, subsequent to a *STORREF*, Trace A is normalized to THRU (Trace B). Whenever *TRACE A MINUS TRACE C (AMC)* is turned on, subsequent to a *STORREF*, Trace A is normalized to the average of the OPEN and SHORT (Trace C). The message "Function Executed" appears on the display.

# SUB

## SUBTRACT

COMMAND SYNTAX:



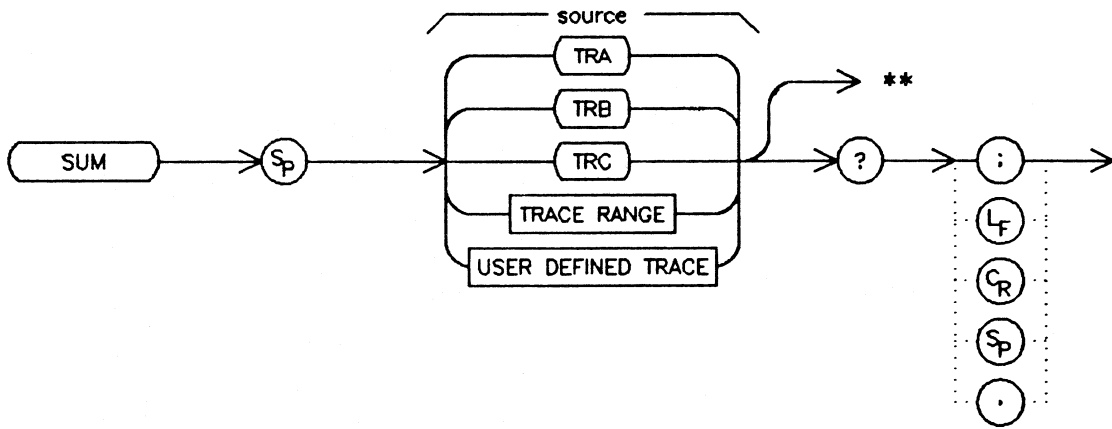
### DESCRIPTION:

The value of source 2 is subtracted from source 1 and the result is stored in the destination.

# SUM

## SUM OF TRACE AMPLITUDES

### COMMAND SYNTAX:

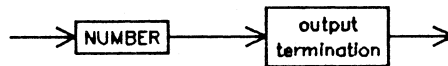


\*\* For use as a Predefined Function

### DESCRIPTION:

This command returns the sum of the amplitudes of the trace elements in measurement units.

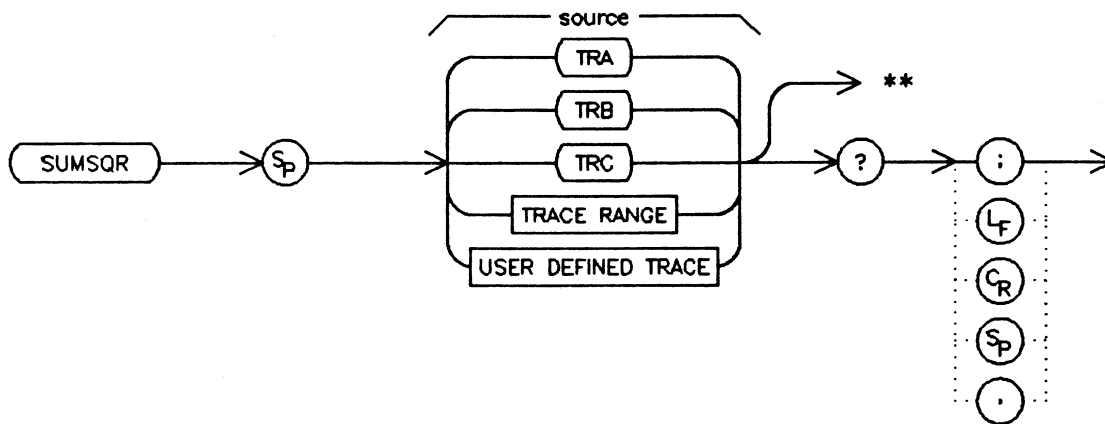
### QUERY RESPONSE:



# SUMSQR

## SUM OF SQUARED TRACE AMPLITUDES

COMMAND SYNTAX:

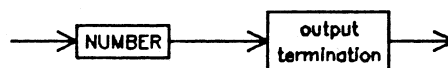


\*\* For use as a Predefined Function

### DESCRIPTION:

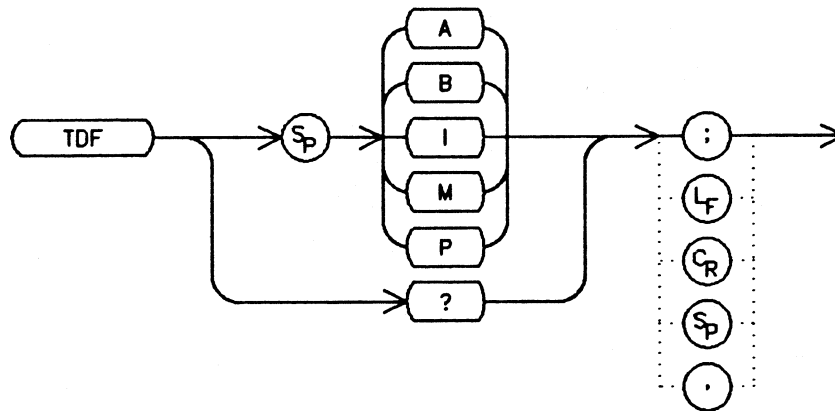
This command returns the sum of the squares of the amplitude of each trace element in measurement units.

### QUERY RESPONSE:



## TRACE DATA FORMAT

## COMMAND SYNTAX:

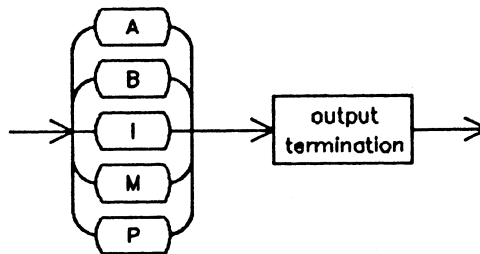


## DESCRIPTION:

This command is used to set the trace input and output format. The choices are A (Block #A), B (Binary), I (Block #I), M (Measurement Unit ASCII), and P (Parameter Unit ASCII). Refer to TRA/TRB/TRC description for the details of these output formats.

A, B, I, & M are in the analyzer's internal amplitude units (log: hundreds of dBm; linear: 10,000 = top of screen and 0 = bottom of screen). P is in the current parameter unit specified by *AUNITS*. *TDF* is set to P on powerup or device clear.

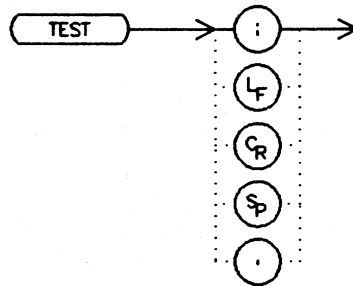
## QUERY RESPONSE:



# TEST

## SELF TEST

### COMMAND SYNTAX:



### DESCRIPTION:

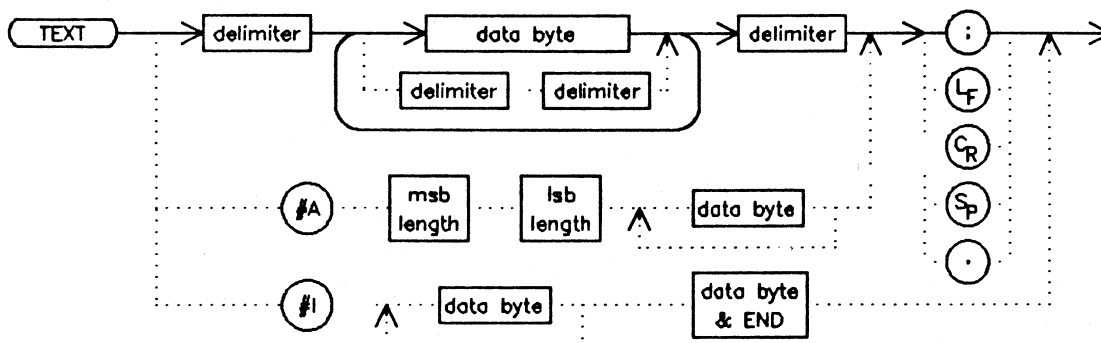
The test command can be used to initiate a self test of the instrument. Tests are performed automatically to determine if the instrument is working properly. Any errors are reported with the status byte. Errors can be interrogated with the error query command. Self test returns in its last measurement state. A device clear may be used to stop a self test.



TEXT

TEXT

**COMMAND SYNTAX:**

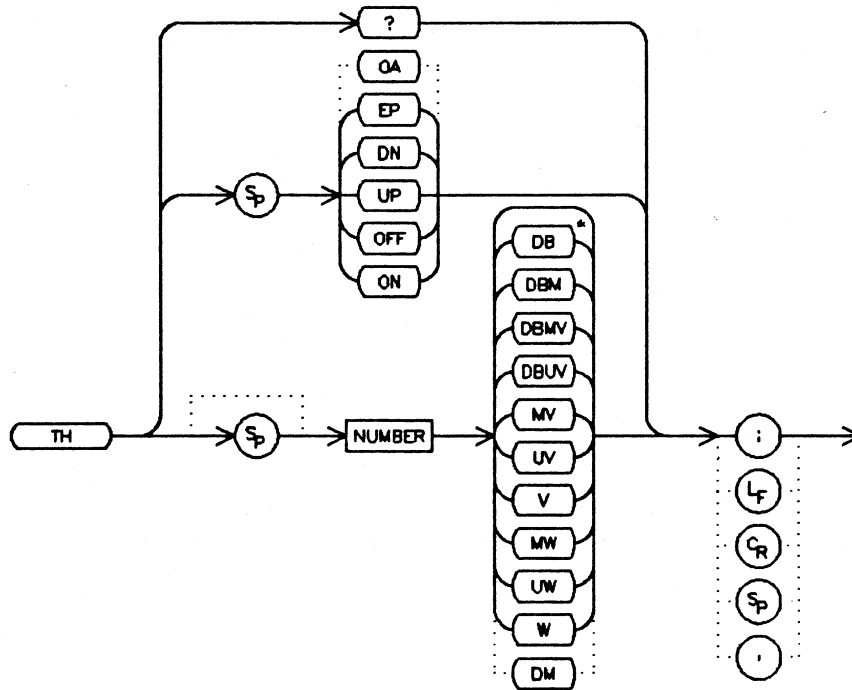


**DESCRIPTION:**

The text string specified will be written to the screen at the current location of the pen. *TEXT* can not be used when *DISPLAY WINDOW (DWINDOW)* is on.

# TH THRESHOLD

## COMMAND SYNTAX:



\*DB is used in relative amplitude mode (See *MEASURE SR*).

## DESCRIPTION:

This command is used to assign a value to the display threshold. The threshold function is enabled when a numeric data field is input, an up or down is entered, or an enable parameter is terminated. *THRESHOLD (TH)* affects the displayed trace and marker readouts, but it does not affect the actual data in the trace.

## PRESET STATE:

1 Division From Bottom of Screen

## PARAMETER RANGE:

+/- 300 dBm

## STEP INCREMENT:

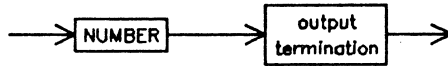
1 Vertical Scale Division

# TH THRESHOLD

## FUNDAMENTAL UNIT:

Set by *ABSOLUTE AMPLITUDE UNITS (AUNITS)* when in absolute amplitude mode. dB when in relative amplitude mode.

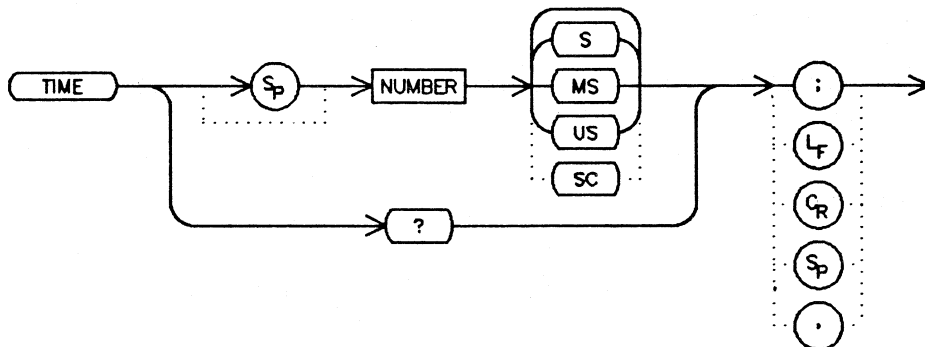
## QUERY RESPONSE:



# TIME

## TIME STAMP

### COMMAND SYNTAX:



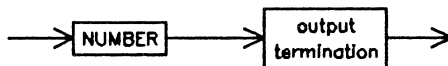
### DESCRIPTION:

This command will output the elapsed operating time (in seconds) since the time was last initialized. The time can be initialized by sending the number parameter.

### FUNDAMENTAL UNIT:

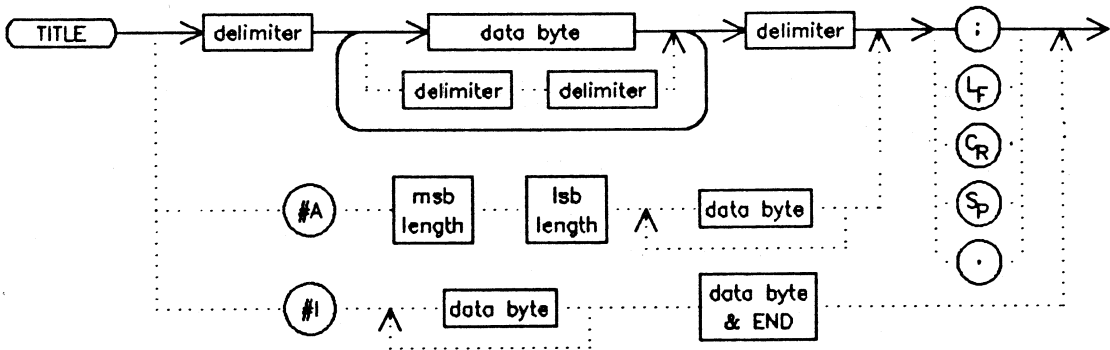
Second

### QUERY RESPONSE:



**TITLE**  
**TITLE ENTRY**

**COMMAND SYNTAX:**



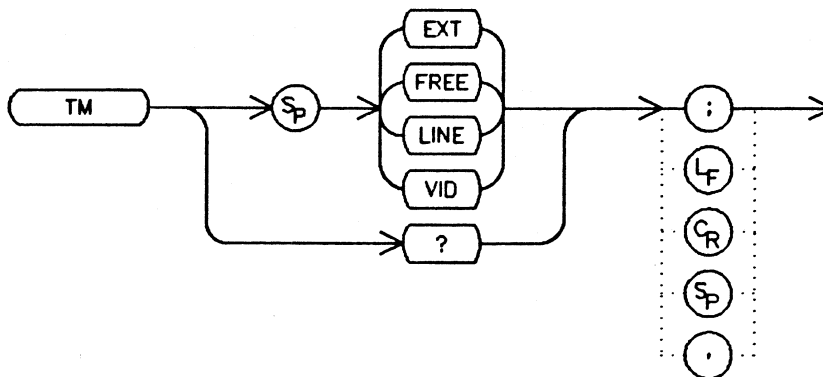
**DESCRIPTION:**

The character data is put in the title line.

# TM

## TRIGGER MODE

### COMMAND SYNTAX:



### DESCRIPTION:

The trigger condition which initiates a sweep may be specified for this function. When trigger mode is executed, the analyzer is tuned to the start frequency. The sweep is armed, waiting for the trigger to take sweep. The conditions which may be selected are:

#### Free Run (FREE)

The trigger condition is considered always satisfied.

#### Video Trigger (VID)

The trigger level is determined from the incoming video signal. The video level can be specified. See *VIDEO TRIGGER HYSTERESIS (VTH)* or *VIDEO TRIGGER LEVEL (VTL)* commands.

#### Line Trigger (LINE)

The trigger is taken from the same position on the line signal. The absolute phase of the trigger with respect to the external line is not guaranteed. The phase will be constant from trigger to trigger within the hardware limits of the instrument.

#### External Trigger (EXT)

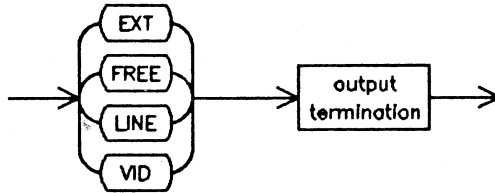
An external signal may be connected to the instrument which will cause a trigger on the rising edge of the signal. The trigger level is fixed by the triggering hardware.

**TM**  
**TRIGGER MODE**

**PRESET STATE:**

**FREE**

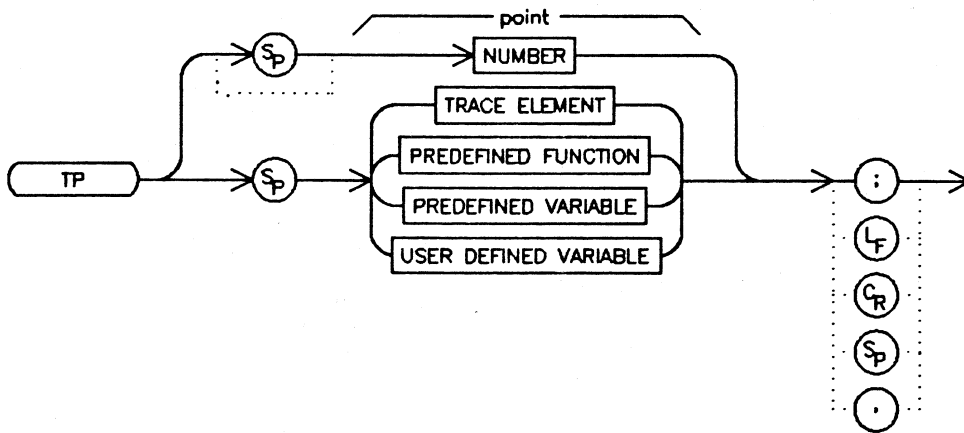
**QUERY RESPONSE:**



# TP

## TRACE POINTER

### COMMAND SYNTAX:



### DESCRIPTION:

The *TRACE POINTER* command selects the point of a graph or trace that is to be referenced next.

### PRESET STATE:

0

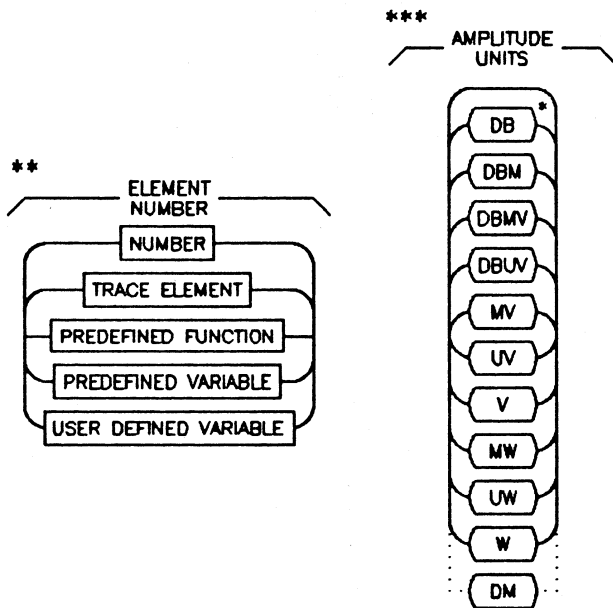
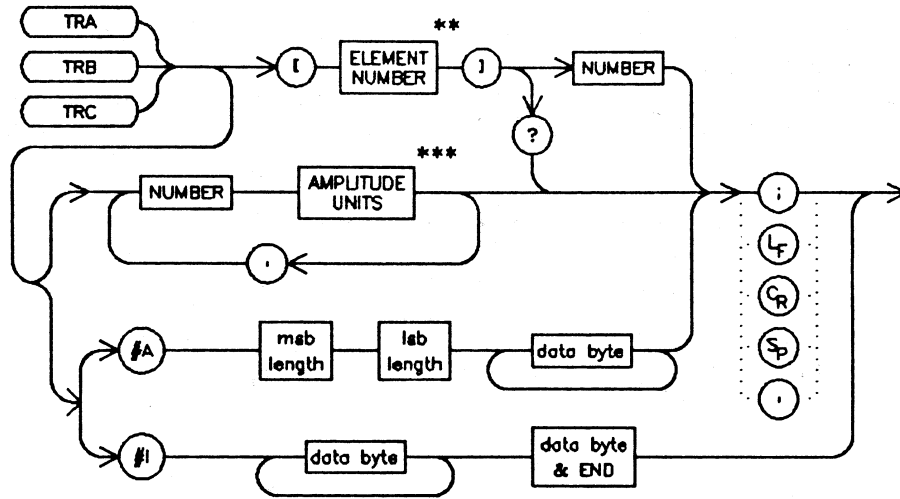
### PARAMETER RANGE:

Minimum: 0  
Maximum: 65535



# TRA/TRB/TRC TRACE DATA INPUT/OUTPUT

## COMMAND SYNTAX:



\* DB is used in relative amplitude mode (See MEASURE SR).

## DESCRIPTION:

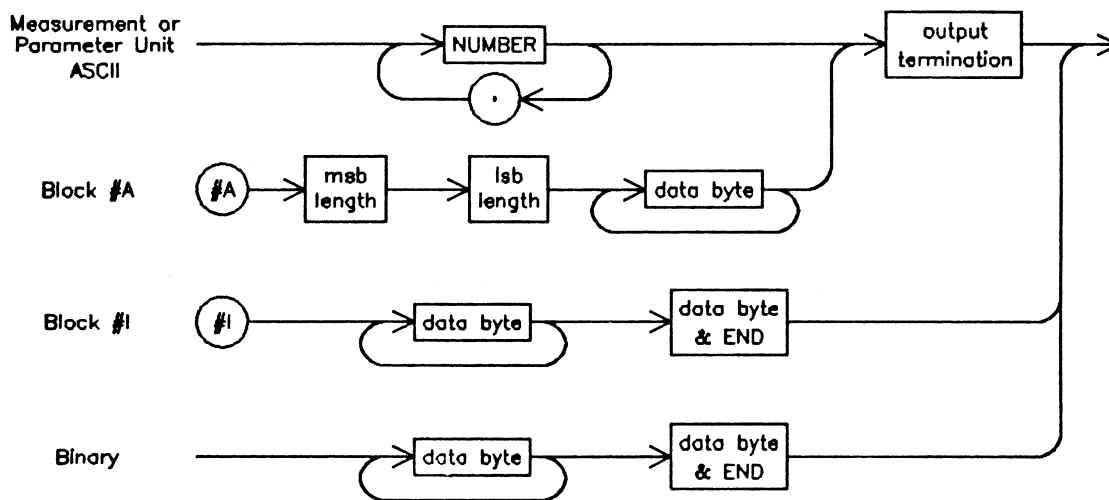
This command provides a method for reading or storing values into a trace. Input in #A or #I is considered as measurement units independent of TRACE DATA FORMAT (TDF). It is interpreted as bytes or words based on the MEASUREMENT DATA SIZE (MDS) command. If the TRACE DATA FORMAT (TDF) is P, ASCII number input is interpreted as the current ABSOLUTE AMPLITUDE UNITS (AUNITS) if the trace was taken in absolute amplitude mode, and as dB if it was taken in relative amplitude mode. If the TRACE DATA FORMAT (TDF) is anything other than P, ASCII data will be interpreted as measurement units.

# TRA/TRB/TRC

## TRACE DATA INPUT/OUTPUT

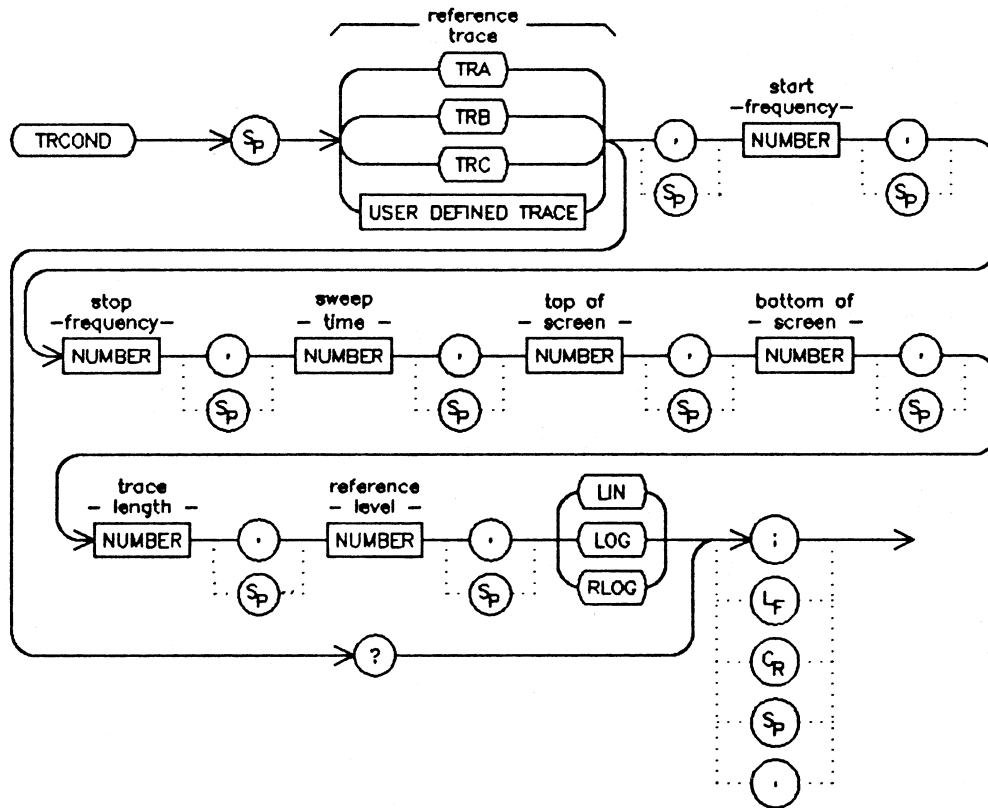
### QUERY RESPONSE

The form of the response is dependent upon the previously used *TRACE DATA FORMAT (TDF)* command. Parameter units are in *ABSOLUTE AMPLITUDE UNITS (AUNITS)* if the trace was taken in absolute amplitude mode and in dB when taken in relative amplitude mode.



# TRCOND TRACE CONDITIONS

## COMMAND SYNTAX:



## DESCRIPTION:

The trace conditions are entered for the reference trace. These conditions provide the information for proper display of trace data after a measurement has been made.

### Start Frequency:

Start frequency in Hz when trace data taken.

### Stop Frequency:

Stop frequency in Hz when trace data taken.

### Sweep Time:

Sweep time in seconds when trace data taken.

### Top of Screen:

Maximum value in measurement units corresponding to the upper clip limit (values greater than this will not be displayed).

# TRCOND

## TRACE CONDITIONS

### Bottom of Screen:

Minimum value in measurement units corresponding to the lower clip limit.

### Data Length:

Number of valid data points in the trace.

### Reference Level:

Reference level in dBm when trace data was taken.

### LIN:

Trace data to be interpreted in linear mode.

### LOG:

Trace data to be interpreted in absolute amplitude mode.

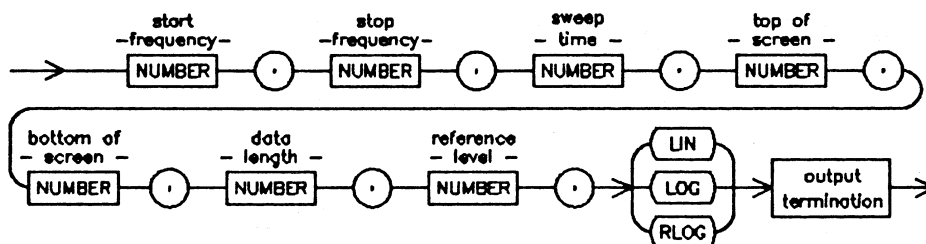
### RLOG:

Trace data to be interpreted in relative amplitude mode.

### PARAMETER RANGE:

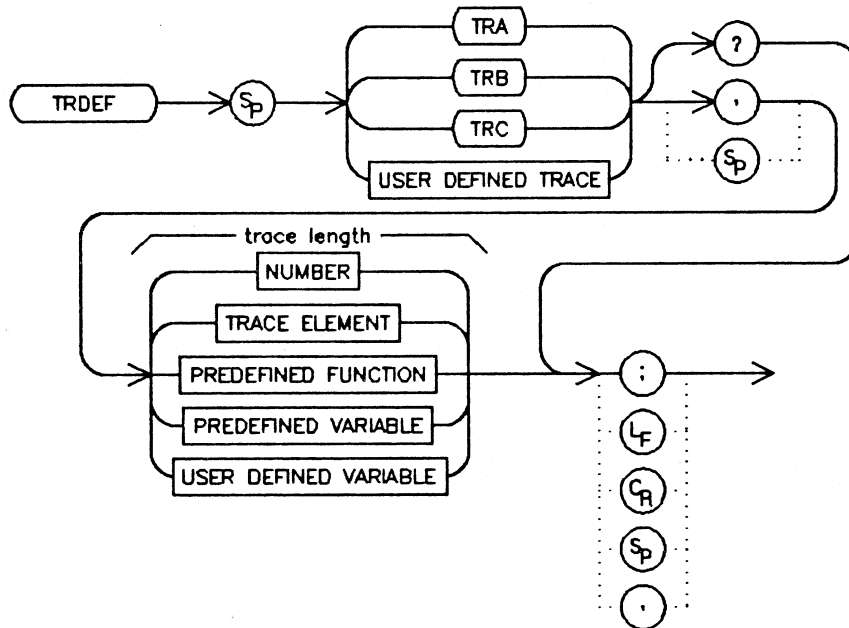
Start Frequency:	+/- 1000 GHz
Stop Frequency:	+/- 1000 GHz
Sweep Time:	0 to 1000 Seconds
Bottom/Top of Screen:	-37268 to 32767
Data Length:	3 to 1024
Reference Level:	+/- 300 dBm

### QUERY RESPONSE:



TRACE DEFINITION

COMMAND SYNTAX:



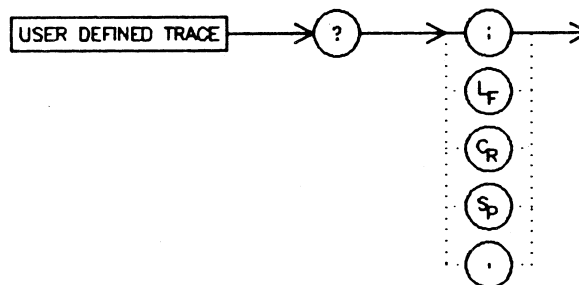
DESCRIPTION:

The number of points in a user defined trace or predefined trace can be defined with this command. Any number of points may be used for a trace length. By changing the length of the predefined traces, the number of data points acquired can be changed.

This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. Memory is allocated by executing this function and is returned to free user memory with the *DISPOSE* command. The *DISPOSE* command provides for the disposal of user defined traces.

Query of a User Defined Trace:

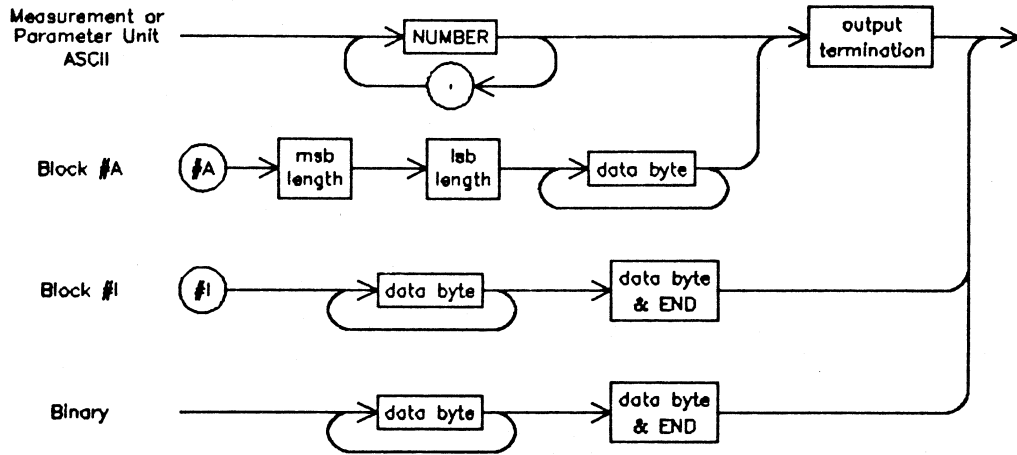
The values of a USER DEFINED TRACE may be queried.



# TRDEF

## TRACE DEFINITION

### User Defined Trace Query Response:



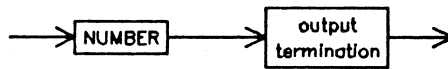
### PRESET VALUE:

TRA Length: 800  
 TRB Length: 800  
 TRC Length: 3

### PARAMETER RANGE:

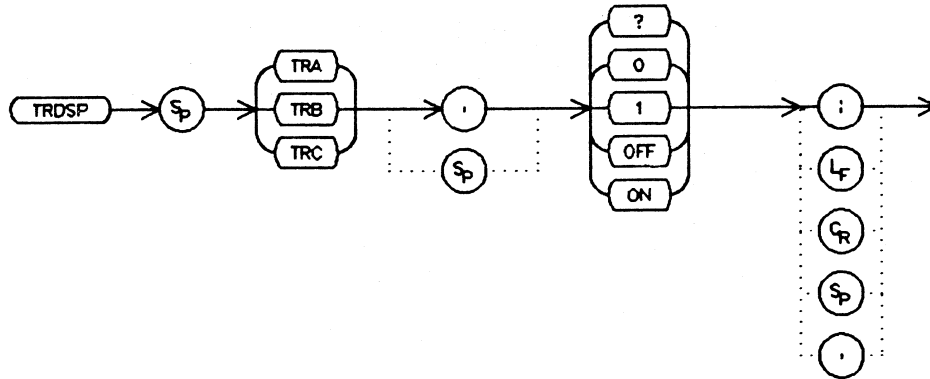
Minimum: 3  
 Maximum: 1024

### TRDEF QUERY RESPONSE



# TRDSP TRACE DISPLAY ON/OFF

**COMMAND SYNTAX:**



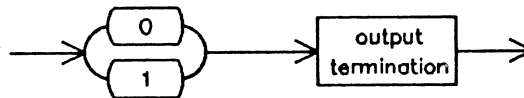
**DESCRIPTION:**

The trace indicated may be displayed or turned off with this command. When the trace displays are turned off, the total sweep to sweep time can be decreased. There is no other effect on the trace.

**PRESET STATE:**

TRA ON  
TRB OFF  
TRC OFF

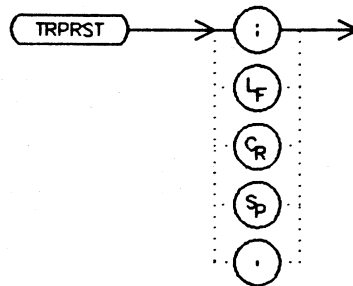
**QUERY RESPONSE:**



# TRPST

## TRACE PRESET

### COMMAND SYNTAX:



### DESCRIPTION:

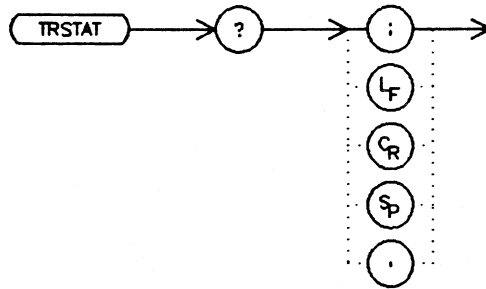
With this command, the trace functions can be preset. All trace functions are set to their preset values as follows:

1. CLRW TRA
2. BLANK TRB
3. BLANK TRC
4. DET AUTO
5. AMB OFF
6. AMBPL OFF
7. VAVG OFF
8. Trace Length set as follows:
  - Trace A: 800
  - Trace B: 800
  - Trace C: 3 (800 with Tracking Generator System)



# TRSTAT TRACE STATUS

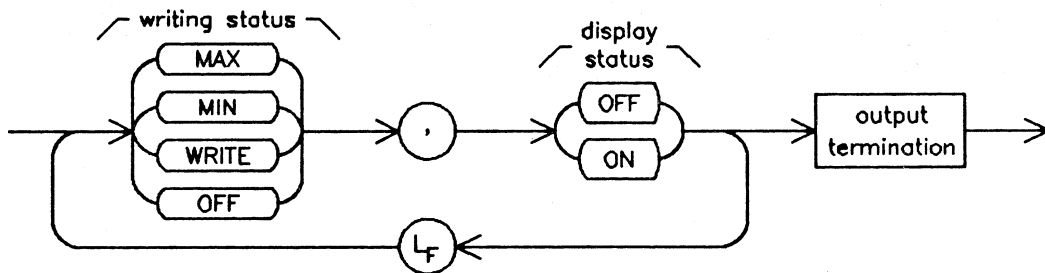
## COMMAND SYNTAX:



## DESCRIPTION:

The trace status, consisting of the writing status and the trace display status (displayed on screen) for each of the predefined traces will be returned in the order of TRA, TRB, TRC.

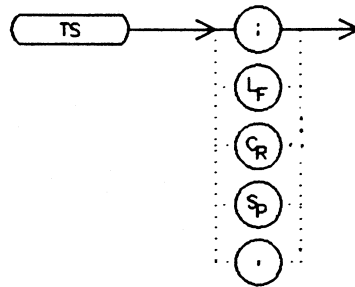
## QUERY RESPONSE:



# TS

## TAKE SWEEP

### COMMAND SYNTAX:

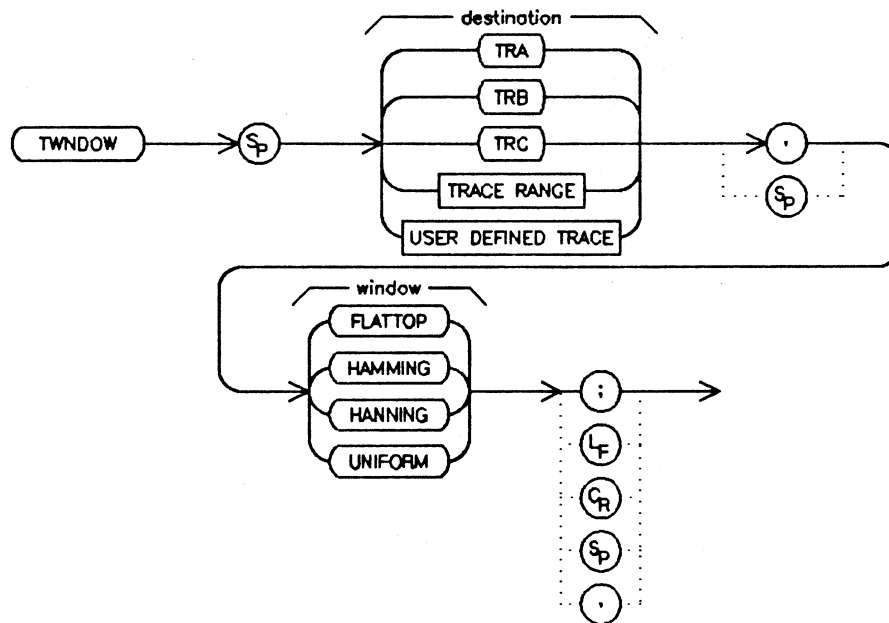


### DESCRIPTION:

Take Sweep is used to synchronize a measurement sweep with the sequence of commands sent to the instrument. When a command sequence is preceded by a *TS*, the user is assured the complete trace data has been taken and processed, the *ON END OF SWEEP (ONEOS)* function (if enabled) has completed, and the end of sweep status bit has been set before further commands are processed. Since there is an input buffer, additional commands may be stored in the input buffer, but they will not be executed until the trace is completed. To synchronize external events to the completion of the measurement, *TAKE SWEEP (TS)* followed by *DONE?* can be used.

# TWNDOW TRACE WINDOW

## COMMAND SYNTAX:



## DESCRIPTION:

The *TRACE WINDOW (TWNDOW)* function creates a real valued windowing trace for use with the *FAST FOURIER TRANSFORM (FFT)* command. The trace specified by the label is loaded with the function selected. For use with the *FFT* command, the destination trace should have the same number of points as the original data trace. Other windowing functions may be created by the user through the use of the trace load functions.

Windowing is used for the *FFT* to minimize one of the two effects caused by the non-continuous finite nature of the Discrete Fourier Transform. One of these effects, the appearance of aliasing, can only be handled by providing sufficiently rapid sampling and signal filtering. The other is that the signal is only sampled for a finite period. The transform then assumes that the sample being analyzed is one period of a periodic infinite sequence. Since this is seldom correct, spurious signals are assumed, leading to inaccurate results, including "side lobes". This can be minimized by weighting the various samples in the data set to reduce the generation of spurious results at the expense of loss of resolution of real signals. The compromise of how much to reduce side lobes at the expense of frequency resolution is the purpose of allowing a choice of windows.

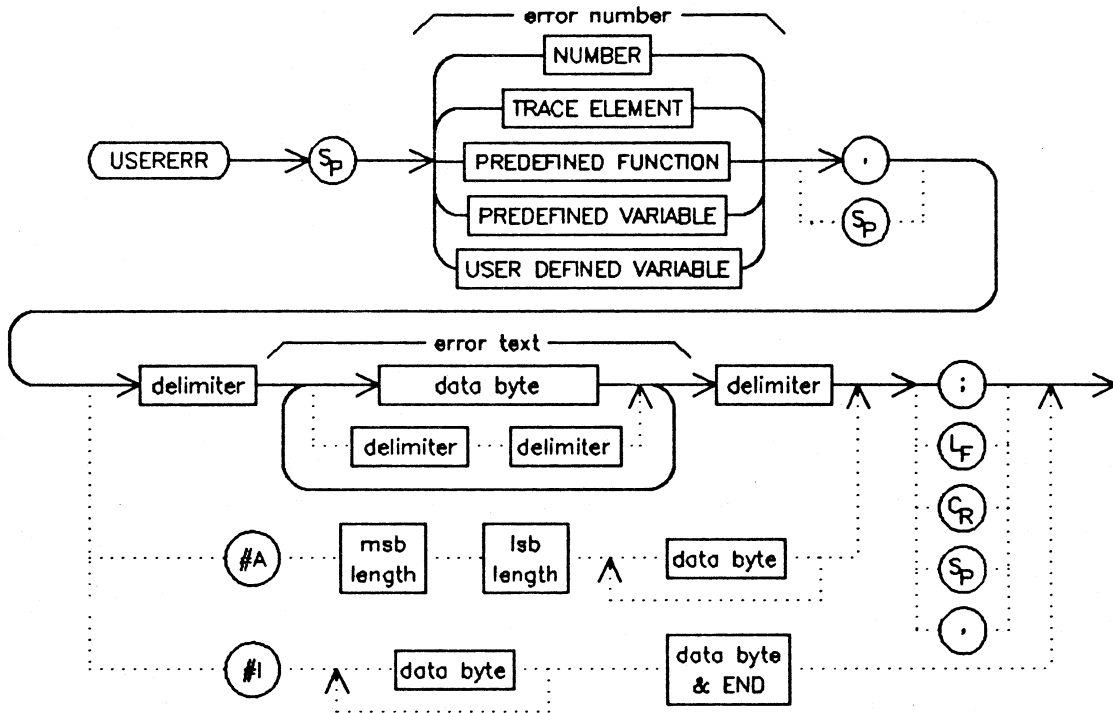
## TWINDOW

### TRACE WINDOW

The UNIFORM window leaves the data alone which is best for transient data or maximum frequency resolution, but results in the highest side lobe creation for periodic signals. The HANNING window is a standard compromise window for periodic or random data. The HAMMING window is similar, but suppresses all sidelobes uniformly. The FLATTOP window has the least frequency resolution but outstanding side lobe suppression and amplitude flatness.

# USERERR USER ERROR REPORT

## COMMAND SYNTAX:



## DESCRIPTION:

The *USERERR* command reports an error message through the analyzer's error reporting mechanism. This will be treated just like any other analyzer error, manually and remotely.

## PARAMETER RANGE:

### Error Number:

Minimum: 1  
Maximum: 9999

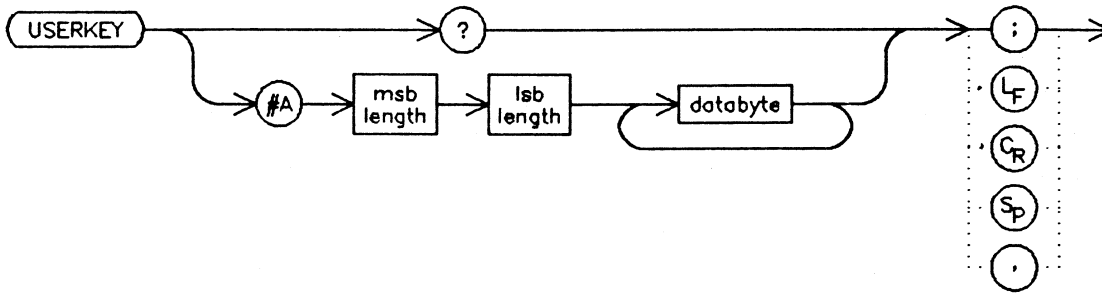
### Error Text:

Up to 20 Characters

# USERKEY

## USER DEFINED KEYS

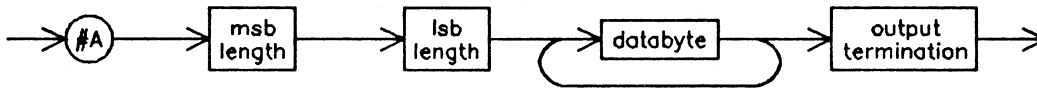
### COMMAND SYNTAX:



### DESCRIPTION:

The user defined keys, both manually defined and defined by *KEYDEF*, can be output and input using this function. The stored output of *USERKEY* can be sent back to the analyzer to restore the user key state.

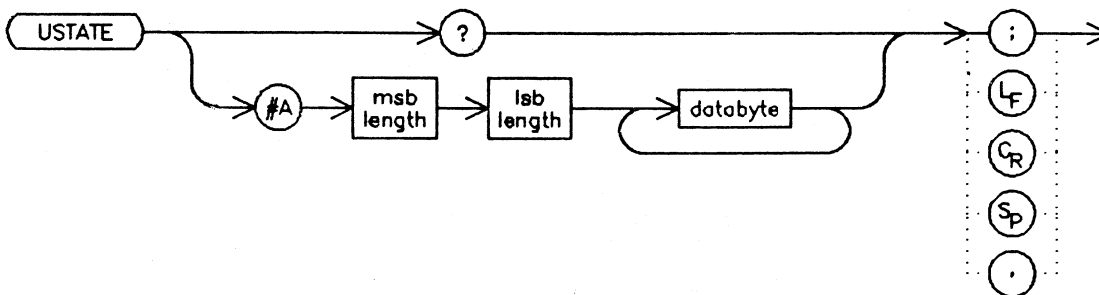
### QUERY RESPONSE



The data contained in the query response can be sent directly back to the instrument to execute the *USERKEY* function. The query response contains the proper "USERKEY" header and the #A format information.

# USTATE USER STATE INPUT/OUTPUT

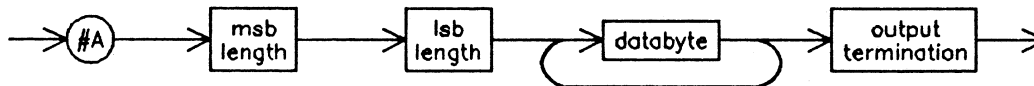
## COMMAND SYNTAX:



## DESCRIPTION:

The user functions can be output and input using this function. The user functions include those defined by *VARDEF*, *TRDEF*, *FUNCDEF*, *KEYDEF*, *ONEOS* and *AMPCOR*. The stored output of *USTATE* can be sent back to the analyzer to restore the user state.

## QUERY RESPONSE

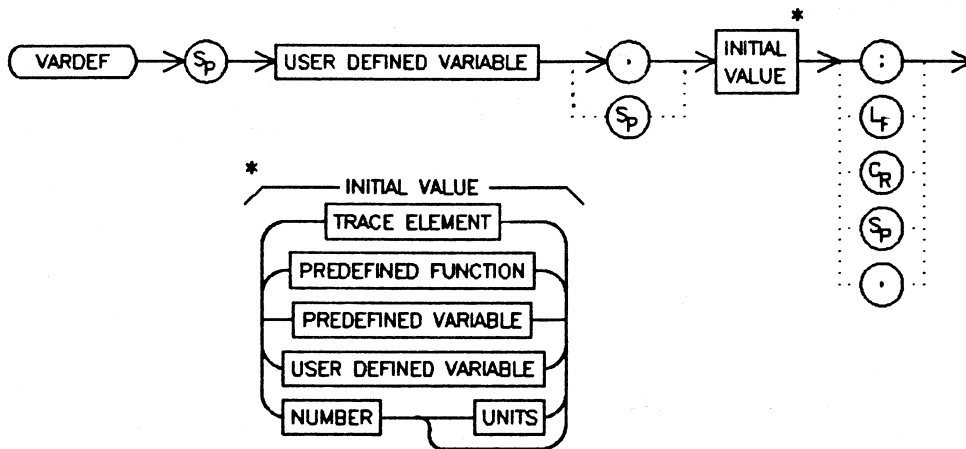


The data contained in the query response can be sent directly back to the instrument to execute the *USTATE* function. The query response contains the proper "USTATE" header and the #A format information.

# VARDEF

## VARIABLE DEFINITION

### COMMAND SYNTAX:



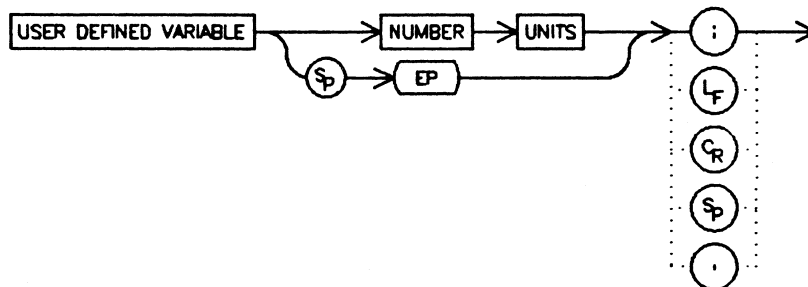
### DESCRIPTION:

The variable "USER DEFINED VARIABLE" is defined and is assigned its initial value. An error is generated and the command is ignored if the USER DEFINED VARIABLE label is the same as a command mnemonic. Once the label has been defined using VARDEF, then other commands can be used as follows:

This command requires user memory to execute. Memory is not permanently allocated so that the largest amount of memory is available for the functions that are used in a particular application. Memory is allocated by executing this function and is returned to free user memory with the DISPOSE command.

#### Entering a New Variable Value

A new value may be entered by executing the command with a number value. The EP parameter can be used to allow user entry in the active parameter area.

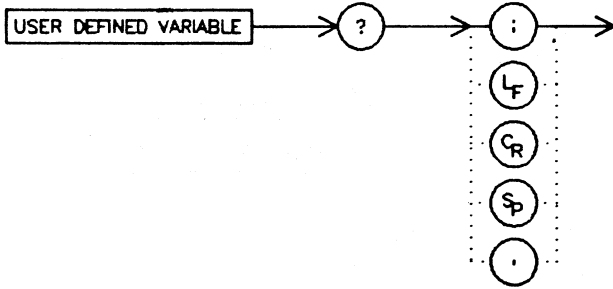




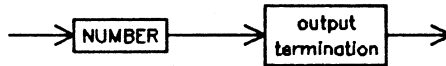
# VARDEF VARIABLE DEFINITION

## Query of Current Variable Value

The value of a variable may be queried. This is done by executing the command with a query.



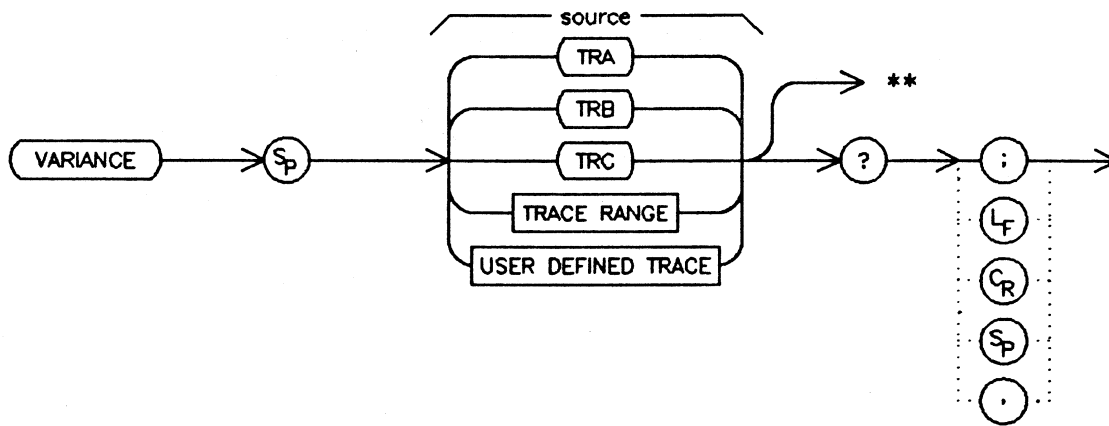
## Response to a USER DEFINED VARIABLE Query



# VARIANCE

## VARIANCE OF TRACE AMPLITUDES

COMMAND SYNTAX:

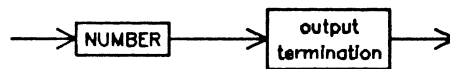


\*\* For use as a Predefined Function

### DESCRIPTION:

This command returns the amplitude variance of the specified trace, in measurement units.

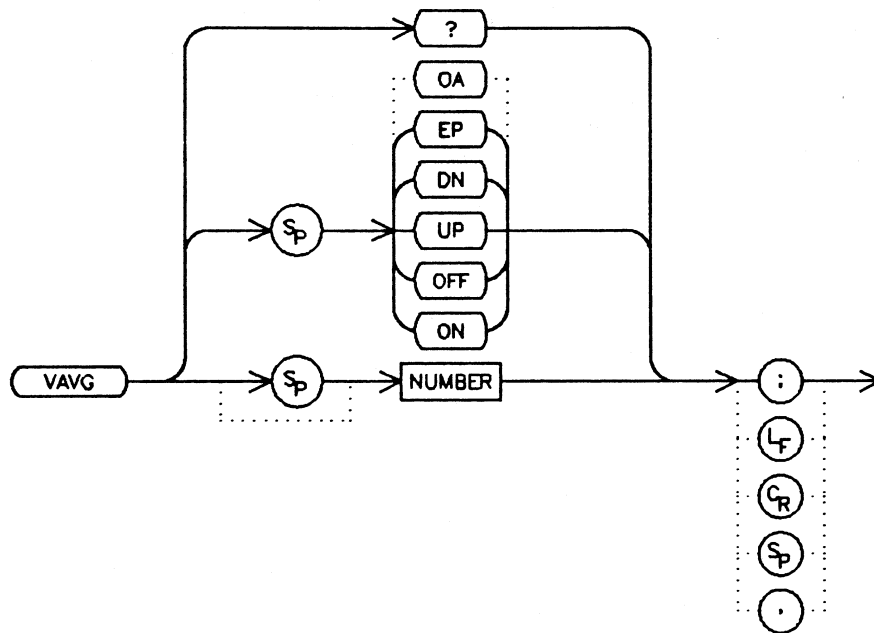
### QUERY RESPONSE:



# VAVG

## VIDEO AVERAGE

### COMMAND SYNTAX:



### DESCRIPTION:

The average counter is set to 1 and the system begins averaging trace A. The average length is set if the average length parameter is provided. The average count is reset to 1 whenever any command changes the measurement data. *VIDEO AVERAGE (VAVG)* only occurs when in *CLEAR WRITE (CLRW)* trace mode.

When video average is on, the *TAKE SWEEP (TS)* command will reset the average count and generate the sufficient number of sweeps to satisfy the average length. *VIDEO AVERAGE (VAVG)* can affect detector operation. See the *DETECTION MODE (DET)* command for further explanation.

### PRESET STATE:

OFF; LENGTH = 100

### PARAMETER RANGE:

Minimum: 1  
Maximum: 10,000

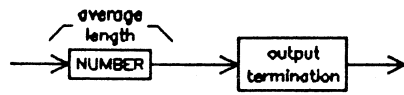
### STEP INCREMENT:

1, 2, 5, 10 Sequence

### QUERY RESPONSE

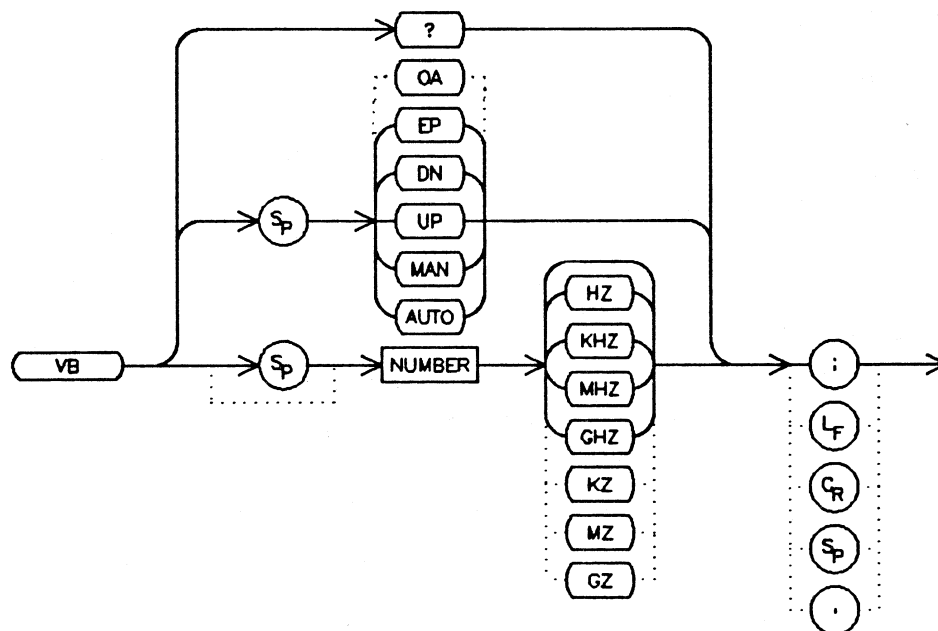
# VAVG

## VIDEO AVERAGE



## VIDEO BANDWIDTH

## COMMAND SYNTAX:



## DESCRIPTION:

The video bandwidth function sets the analyzer's post-detection filter bandwidth. Video bandwidth can be automatically coupled to the resolution bandwidth. The coupling is set to manual when a numeric value is input, an up or down step is received, an entry is terminated from enable parameter, or the MAN parameter is received.

## COUPLING:

Set by the *VBR* command

## PRESET STATE:

Auto Coupled.

## PARAMETER RANGE:

Minimum: 1 (or Hardware Limit)  
 Maximum: 1000 GHz (or Hardware Limit)

**VB**

**VIDEO BANDWIDTH**

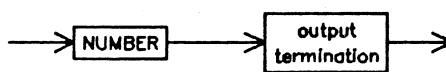
**STEP INCREMENT:**

1, 3, 10 Sequence

**FUNDAMENTAL UNIT:**

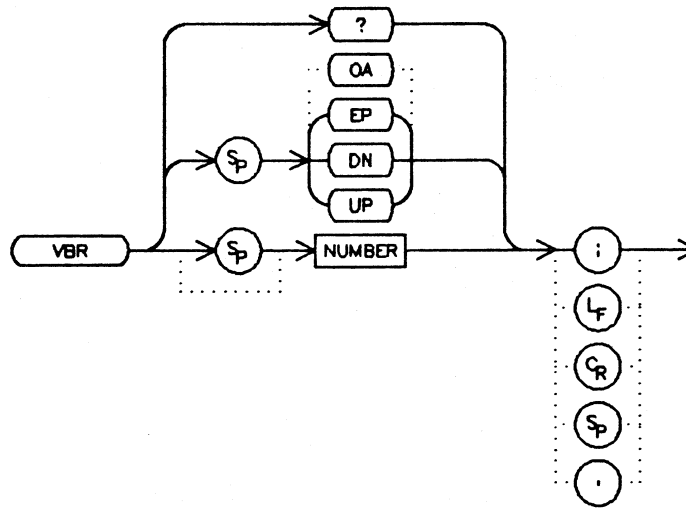
Hz

**QUERY RESPONSE:**



VIDEO BANDWIDTH RATIO

COMMAND SYNTAX:



DESCRIPTION:

Video Bandwidth Ratio determines the automatic calculation of video bandwidth according to the following equation:

$$\text{VIDEO BANDWIDTH} = \text{RESOLUTION BANDWIDTH} * \text{VBR}$$

PRESET STATE:

1

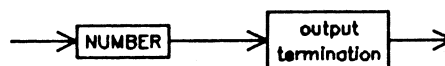
PARAMETER RANGE:

Minimum: 10<sup>-100</sup>  
Maximum: 10<sup>+100</sup>

STEP INCREMENT:

1, 3, 10 Sequence

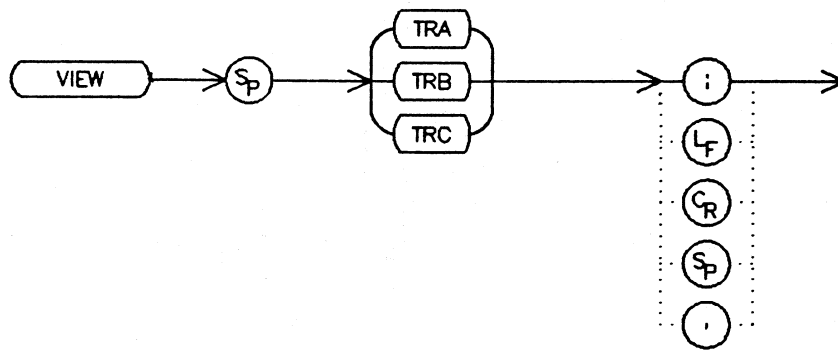
QUERY RESPONSE:



# VIEW

## VIEW TRACE

### COMMAND SYNTAX:



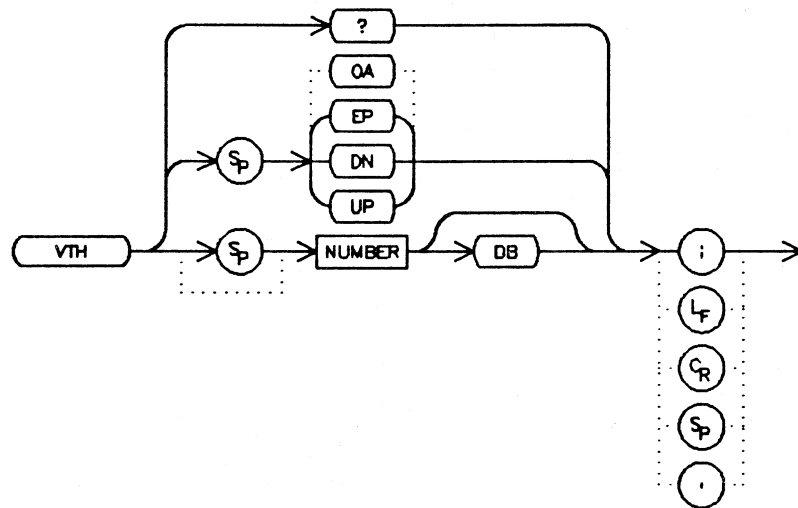
### DESCRIPTION:

The indicated trace is disconnected from the input data source and is displayed.



VIDEO TRIGGER HYSTERESIS

COMMAND SYNTAX:



DESCRIPTION:

The hysteresis and direction of the video trigger is specified by the *VIDEO TRIGGER HYSTERESIS (VTH)* command. If video trigger hysteresis is positive, the video trigger will be on the rising edge of the signal. The signal must come from below the trigger level set by the *VIDEO TRIGGER LEVEL (VTL)* by the magnitude specified by the *VTH* command. The opposite is true for negative video trigger hysteresis.

PRESET STATE:

3 dB

PARAMETER RANGE:

+/- 300 dB

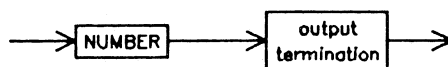
STEP INCREMENT:

Log: 1 Vertical Scale Division  
 Linear: 1 Vertical Scale Division at Top of Screen (.915 dB)

FUNDAMENTAL UNITS

dB

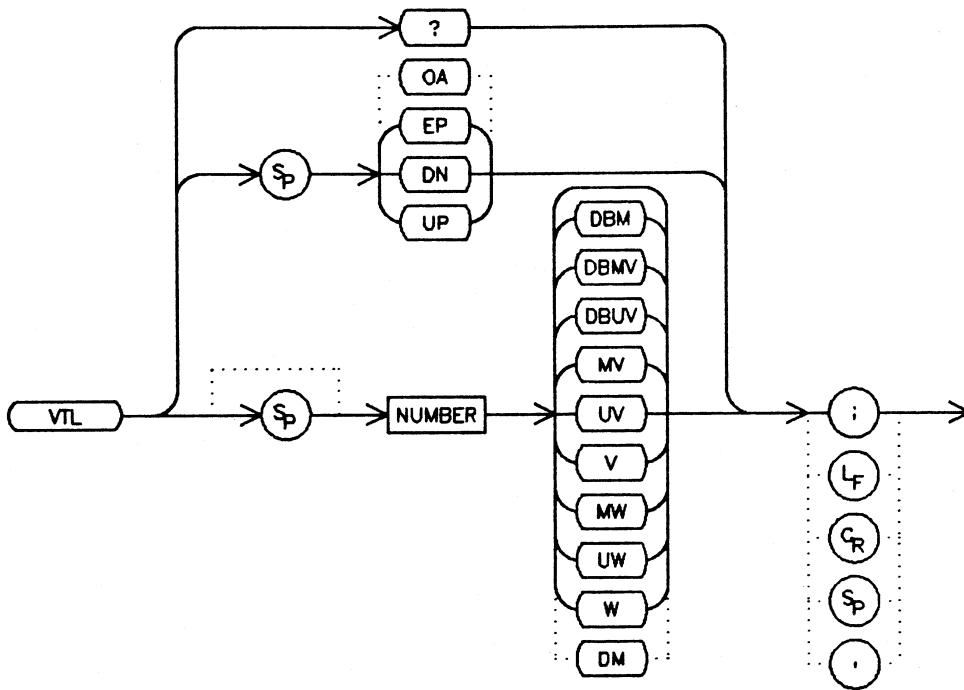
QUERY RESPONSE:



# VTL

## VIDEO TRIGGER LEVEL

### COMMAND SYNTAX:



### DESCRIPTION:

This command is used to set the video trigger level as described in the command *TRIGGER MODE (TM)*.

### PRESET STATE:

Bottom of Screen

### PARAMETER RANGE:

+/- 300 dB or Hardware determined limit.

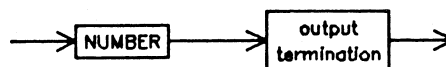
### STEP INCREMENT:

1 Vertical Scale Division

### FUNDAMENTAL UNIT:

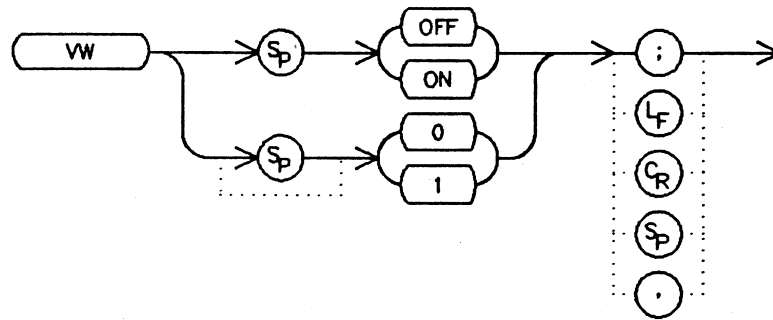
Determined by *AUNITS*

### QUERY RESPONSE:



VW  
VIEW ITEM

COMMAND SYNTAX:



DESCRIPTION:

Each item can be individually blanked (0 or OFF) or viewed (1 or ON) by sending the view item command.

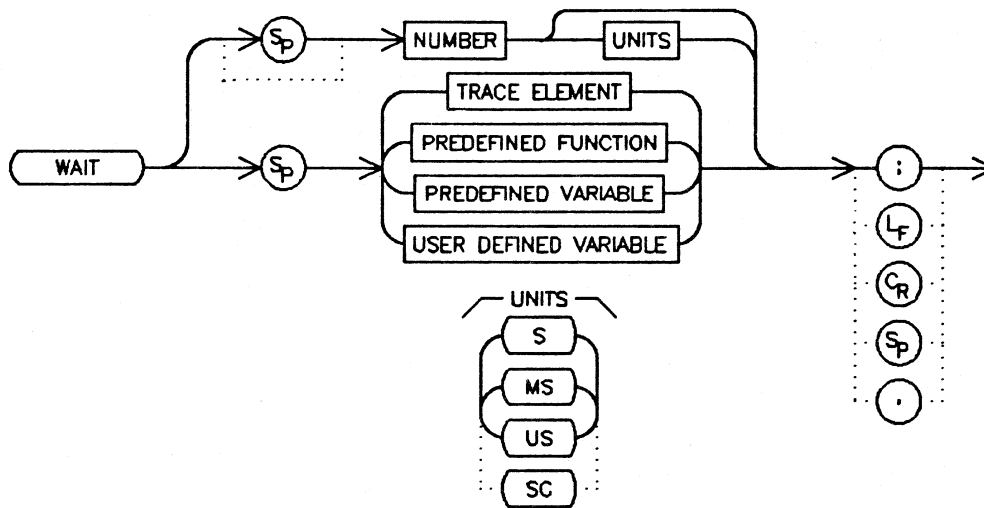
PRESET STATE:

ON

# WAIT

## WAIT A SPECIFIED TIME

### COMMAND SYNTAX:



### DESCRIPTION:

The command processor will stop executing input commands for the specified length of time.

### PARAMETER RANGE:

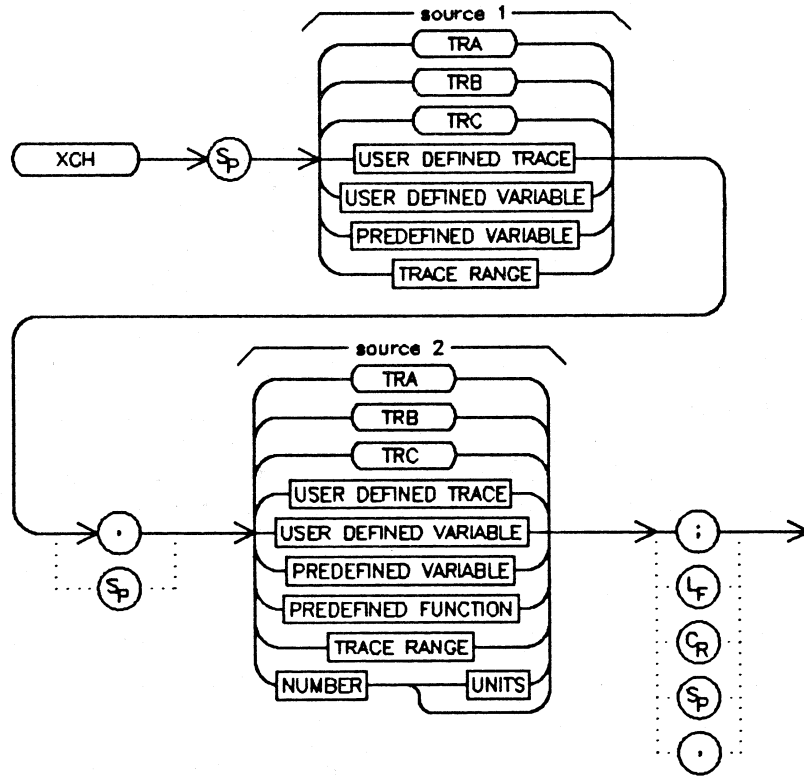
Minimum: 0  
Maximum: 1000 Seconds

### FUNDAMENTAL UNIT:

Second

# XCH EXCHANGE

## COMMAND SYNTAX:



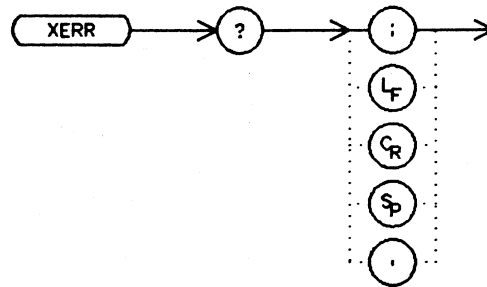
## DESCRIPTION:

The contents of the two operands are exchanged. If either operand is a trace (not a trace range), its trace conditions are updated accordingly.

# XERR

## EXTENDED ERROR QUERY

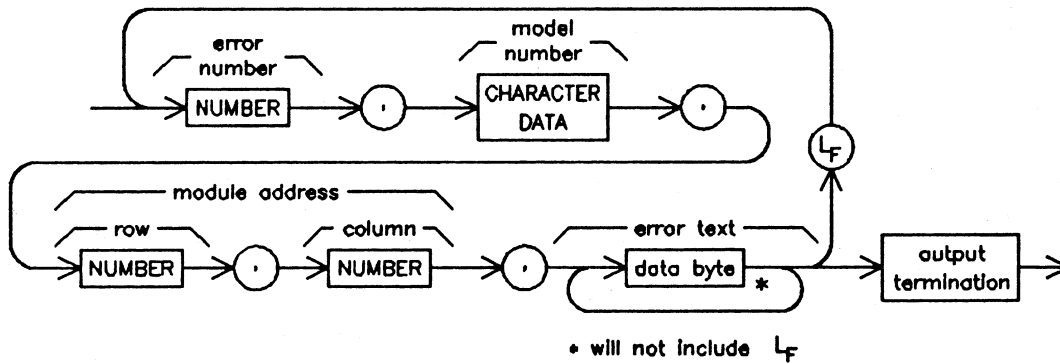
### COMMAND SYNTAX:



### DESCRIPTION:

The extended error query outputs a list of errors and extended error information. A system can consist of several combinations of modules, each having error detection and reporting capability. Therefore, the module's MSIB address provides module identification along with the error code of the module. Model number and error text are also included.

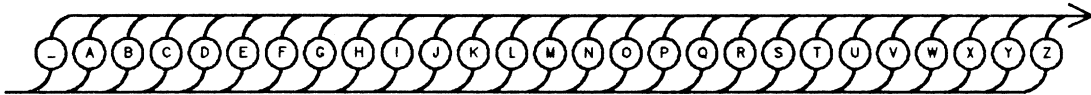
### QUERY RESPONSE



**APPENDIX A**

**GLOSSARY OF COMMON ELEMENTS**

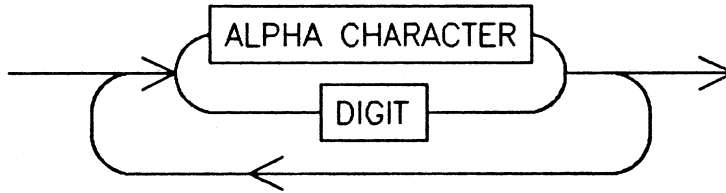
**ALPHA CHARACTER**



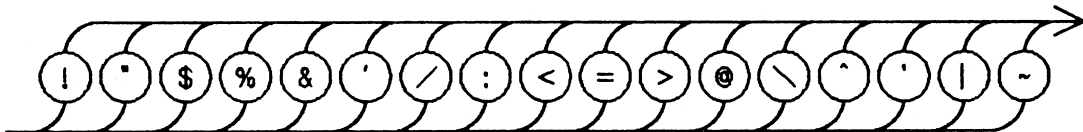
**ANALYZER COMMAND**

Any command to which this instrument will respond.

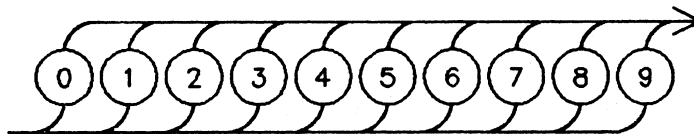
**CHARACTER DATA**



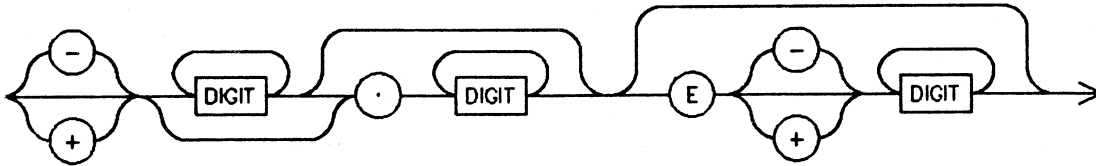
**DELIMITER**



**DIGIT**



**NUMBER**



Any unspecified number range has an allowed range of +/-10<sup>+</sup>/-10<sup>0</sup> and 0. This includes any alpha suffixes which are included in the number representation. A number is limited to 25 or less characters, not including spaces.

**OUTPUT TERMINATION**



**PREDEFINED FUNCTION**

The commands in this category are as follows. See command description for proper syntax.

AMPU	AMPLITUDE UNIT CONVERSION
IDFREQ	SIGNAL IDENTIFIED FREQUENCY
FREQU	FREQUENCY UNIT CONVERSION
MEASU	MEASUREMENT UNIT CONVERSION
MEM	MEMORY AVAILABLE
MKBW	MARKER BANDWIDTH
PEAKS	TRACE PEAKS
POSU	POSITION UNIT CONVERSION
PWRBW	TRACE POWER BANDWIDTH
RMS	TRACE ROOT MEAN SQUARE VALUE
STB	STATUS BYTE QUERY
STDEV	STANDARD DEVIATION OF TRACE AMPLITUDES
SUM	SUM OF TRACE AMPLITUDES
SUMSQR	SUM OF SQUARED TRACE AMPLITUDES
VARIANCE	VARIANCE OF TRACE AMPLITUDES



## PREDEFINED VARIABLE

The commands in this category are as follows.

AT	INPUT ATTENUATOR
CALFREQ	CALIBRATION FREQUENCY
CALPWR	CALIBRATION POWER
CF	CENTER FREQUENCY
CNVLOSS	CONVERSION LOSS
DL	DISPLAY LINE
FA	START FREQUENCY
FB	STOP FREQUENCY
FOFFSET	FREQUENCY OFFSET
HNLOCK	HARMONIC NUMBER LOCK
INPUT	SELECT INPUT
INZ	INPUT IMPEDANCE
LG	LOGARITHM SCALE
LOSTART	LOCAL OSCILLATOR START FREQUENCY
LOSTOP	LOCAL OSCILLATOR STOP FREQUENCY
MBIAS	MIXER BIAS
MBMAX	MIXER BIAS MAXIMUM
MBMIN	MIXER BIAS MINIMUM
MBRES	MIXER BIAS RESOLUTION
MKA	MARKER AMPLITUDE
MKACT	ACTIVE MARKER
MKAL	MARKER AMPLITUDE RELATIVE LEFT
MKAR	MARKER AMPLITUDE RELATIVE RIGHT
MKF	MARKER FREQUENCY
MKN	MARKER NORMAL
MKP	MARKER POSITION
MKPAUSE	PAUSE AT MARKER
MKPX	MARKER PEAK EXCURSION
MKT	MARKER TIME
MKTV	MARKER TRACKING VARIANCE
ML	MIXER LEVEL
NSTART	START HARMONIC NUMBER
NSTATE	NUMBER OF STATE REGISTERS
NSTOP	STOP HARMONIC NUMBER
PINPUT	PRESET INPUT
RB	RESOLUTION BANDWIDTH
RBR	RES BW TO SPAN RATIO
RL	REFERENCE LEVEL
RLPOS	REFERENCE LEVEL POSITION
ROFFSET	AMPLITUDE REFERENCE OFFSET

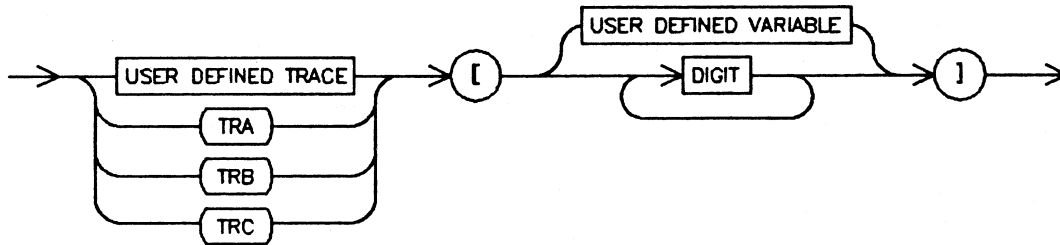
Appendix A

Glossary of Common Elements

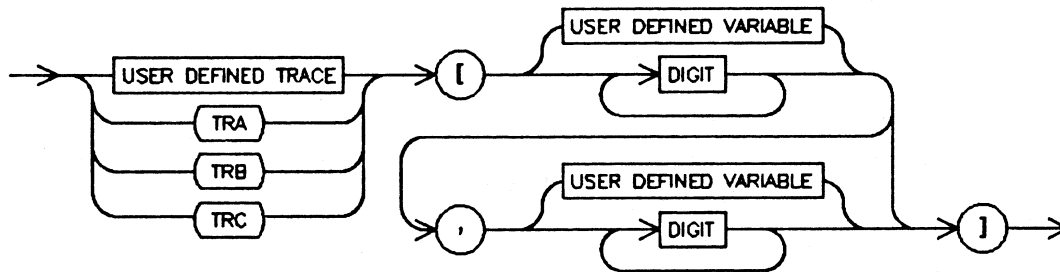
PREDEFINED VARIABLE (Cont'd)

SIGDEL	SIGNAL AMPLITUDE DELTA
SP	FREQUENCY SPAN
SS	CENTER FREQUENCY STEP
ST	SWEEP TIME
TH	THRESHOLD
VB	VIDEO BANDWIDTH
VER	VIDEO BANDWIDTH RATIO
VTL	VIDEO TRIGGER LEVEL

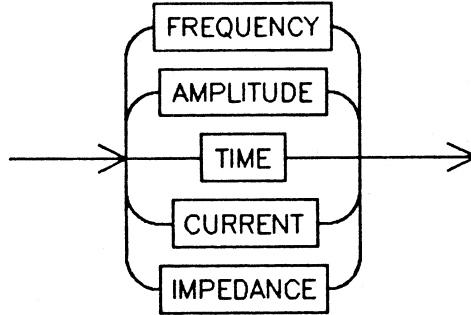
TRACE ELEMENT



TRACE RANGE



UNITS



FREQUENCY

- HZ
- KHZ
- MHZ
- GHZ
- KZ
- MZ
- GZ

AMPLITUDE

- DB
- DBM
- DBMV
- DBUV
- MV
- UV
- V
- MW
- UW
- W
- DM

TIME

- S
- MS
- US
- SC

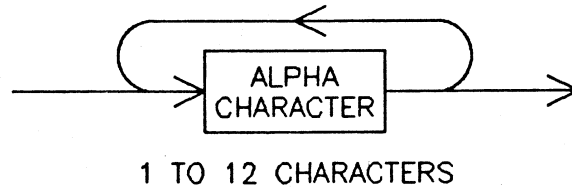
CURRENT

- A
- MA
- UA

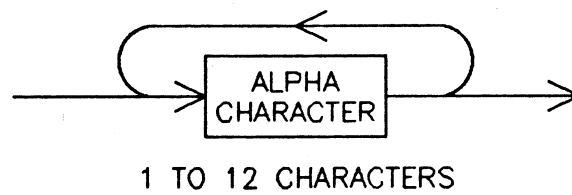
IMPEDANCE

- OHM

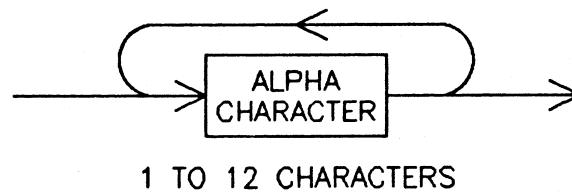
**USER DEFINED FUNCTION**



**USER DEFINED TRACE**



**USER DEFINED VARIABLE**



## APPENDIX B

### KEYWORD SUMMARY

#### AMPLITUDE COMMANDS

AT	INPUT ATTENUATOR
AUNITS	ABSOLUTE AMPLITUDE UNITS
INZ	INPUT IMPEDANCE
LG	LOGARITHM SCALE
LN	LINEAR SCALE
ML	MIXER LEVEL
RL	REFERENCE LEVEL
RLPOS	REFERENCE LEVEL POSITION
ROFFSET	AMPLITUDE REFERENCE OFFSET

#### BANDWIDTH COMMANDS

RB	RESOLUTION BANDWIDTH
RBR	RES BW TO SPAN RATIO
VB	VIDEO BANDWIDTH
VBR	VIDEO BANDWIDTH RATIO

#### CALIBRATION AND DIAGNOSTIC COMMANDS

AMPCOR	AMPLITUDE CORRECTION
CAL	CALIBRATE
CALCOR	CALIBRATION CORRECTION
CALFREQ	CALIBRATION FREQUENCY
CALPWR	CALIBRATION POWER
CALSRC	CALIBRATION SOURCE
DEBUG	DEBUG MODE
PAUSE	PAUSE COMMAND EXECUTION

CONFIGURATION COMMANDS

COUPLE	INPUT COUPLING
INPUT	SELECT INPUT
MODID	MODULE IDENTIFICATION
PATHLOCK	PATH LOCK

DISPLAY COMMANDS

ANNOT	ANNOTATION ON/OFF
CONFIG	CONFIGURATION QUERY
DL	DISPLAY LINE
DSPMODE	DISPLAY MODE
DSPTXT	OUTPUT DISPLAY TEXT
GRAT	GRATICULE ON/OFF
HD	HOLD
IWINDOW	INSTRUMENT WINDOW
TH	THRESHOLD

*ROM VERSIONS 851216 OR LATER*

EXTERNAL MIXER COMMANDS

CNVLOSS	CONVERSION LOSS
FULBAND	FULL BAND
HNLOCK	HARMONIC NUMBER LOCK
MBIAS	MIXER BIAS
MBIASPK	MIXER BIAS PEAK
MBMAX	MIXER BIAS MAXIMUM
MBMIN	MIXER BIAS MINIMUM
MBRES	MIXER BIAS RESOLUTION

FREQUENCY COMMANDS

CF	CENTER FREQUENCY
FA	START FREQUENCY
FB	STOP FREQUENCY
FOFFSET	FREQUENCY OFFSET
FS	FULL SPAN
LOSTART	LOCAL OSCILLATOR START FREQUENCY
LOSTOP	LOCAL OSCILLATOR STOP FREQUENCY
SP	FREQUENCY SPAN
SS	CENTER FREQUENCY STEP

## GRAPHICS COMMANDS

CLRDISP	CLEAR DISPLAY
DELETE	DELETE ITEM
DSPLY	DISPLAY VARIABLE
DWINDOW	DISPLAY WINDOW
GRAPH	GRAPH TRACE
GRID	DISPLAY GRID
IT	IDENTIFY ITEM
LINET	LINE TYPE
MK	MARKER DISPLAY
OP	OUTPUT DISPLAY PARAMETERS
OR	SET ORIGIN
PA	PLOT ABSOLUTE
PD	PEN DOWN
PEN	SELECT PEN
PR	PLOT RELATIVE
PU	PEN UP
SCALE	SCALE GRAPHICS
TEXT	TEXT
TITLE	TITLE ENTRY
TP	TRACE POINTER
VW	VIEW ITEM

## INFORMATION COMMANDS

ERR	ERROR
ID	OUTPUT IDENTIFICATION
MSG	MESSAGE
REV	OUTPUT REVISION NUMBER
SER	SERIAL NUMBER
TEST	SELF TEST
TIME	TIME STAMP <i>ROM VERSIONS 851216 OR LATER</i>
USERERR	USER ERROR REPORT
XERR	EXTENDED ERROR QUERY

## INPUT/OUTPUT COMMANDS

DONE	DONE
ENTER	ENTER FROM HP-IB
MDS	MEASUREMENT DATA SIZE
OUTPUT	OUTPUT TO HP-IB
RELHPIB	RELEASE HP-IB
RQS	REQUEST SERVICE CONDITIONS
SRQ	SERVICE REQUEST
STB	STATUS BYTE QUERY
TDF	TRACE DATA FORMAT
TS	TAKE SWEEP

Keyword Summary

INSTRUMENT STATE COMMANDS

ERASE	ERASE ALL MEMORY
IP	INSTRUMENT PRESET
NSTATE	NUMBER OF STATE REGISTERS
POWERON	POWER ON
PSTATE	PROTECT STATE
RCLS	RECALL STATE REGISTER
SAVES	SAVE STATE
STATE	INSTRUMENT STATE

MARKER COMMANDS

MKA	MARKER AMPLITUDE
MKACT	ACTIVE MARKER
MKAL	MARKER AMPLITUDE RELATIVE LEFT
MKAR	MARKER AMPLITUDE RELATIVE RIGHT
MKBW	MARKER BANDWIDTH
MKCF	MARKER TO CENTER FREQUENCY
MKD	MARKER DELTA
MKF	MARKER FREQUENCY
MKMIN	MARKER TO MINIMUM
MKN	MARKER NORMAL
MKNOISE	MARKER NOISE
MKOFF	MARKER OFF
MKP	MARKER POSITION
MKPAUSE	PAUSE AT MARKER
MKPK	MARKER PEAK SEARCH
MKPX	MARKER PEAK EXCURSION
MKREAD	MARKER READOUT
MKRL	MARKER TO REFERENCE LEVEL
MKSP	MARKER DELTA TO SPAN
MKSS	MARKER TO CENTER FREQUENCY STEP SIZE
MKT	MARKER TIME
MKTRACE	MARKER TRACE
MKTRACK	MARKER SIGNAL TRACK
MKTV	MARKER TRACKING VARIANCE
MKTYPE	MARKER TYPE



## SIGNAL IDENTIFICATION COMMANDS

IDCF	SIGNAL IDENTIFIED FREQUENCY TO CENTER FREQ
IDFREQ	SIGNAL IDENTIFIED FREQUENCY
IDMODE	SIGNAL IDENTIFICATION MODE
IDSTAT	SIGNAL IDENTIFICATION STATUS
NSTART	START HARMONIC NUMBER
NSTOP	STOP HARMONIC NUMBER
SIGDEL	SIGNAL AMPLITUDE DELTA
SIGID	SIGNAL IDENTIFY

## SWEEP AND TRIGGER COMMANDS

CONTS	CONTINUOUS SWEEP
SNGLS	SINGLE SWEEP
ST	SWEEP TIME
TM	TRIGGER MODE
VTH	VIDEO TRIGGER HYSTERESIS
VTL	VIDEO TRIGGER LEVEL

## TRACE COMMANDS

COMPRESS	COMPRESS TRACE
DET	DETECTION MODE
FFT	FAST FOURIER TRANSFORM
FFTKNL	FAST FOURIER TRANSFORM KERNAL
IFTKNL	SCALED FAST FOURIER TRANSFORM KERNAL
MEAN	TRACE MEAN
PDA	PROBABILITY DISTRIBUTION OF AMPLITUDE
PDF	PROBABILITY DISTRIBUTION OF FREQUENCY
PEAKS	TRACE PEAKS
PWRBW	TRACE POWER BANDWIDTH
RMS	TRACE ROOT MEAN SQUARE VALUE
SMOOTH	SMOOTH TRACE
STDEV	STANDARD DEVIATION OF TRACE AMPLITUDES
SUM	SUM OF TRACE AMPLITUDES
SUMSQR	SUM OF SQUARE TRACE AMPLITUDES
TRA/TRB/TRC	TRACE DATA INPUT/OUTPUT
TRCOND	TRACE CONDITIONS
TRPST	TRACE PRESET
TRSTAT	TRACE STATUS
TWNDOW	TRACE WINDOW
VARIANCE	VARIANCE OF TRACE AMPLITUDES

### TRACE MATH COMMANDS

AMB	TRACE A MINUS TRACE B
AMC	TRACE A MINUS TRACE C <i>ROM VERSIONS 851216 OR LATER</i>
AMBPL	TRACE A MINUS TRACE B PLUS DISPLAY LINE
APB	TRACE A PLUS TRACE B
AXB	TRACE A EXCHANGE TRACE B
BML	TRACE B MINUS DISPLAY LINE
BTC	MOVE TRACE B TO TRACE C
BXC	TRACE B EXCHANGE TRACE C
VAVG	VIDEO AVERAGE

### TRACE PROCESSING COMMANDS

BLANK	BLANK TRACE
CLRW	CLEAR WRITE
MINH	MINIMUM HOLD
MXMH	MAXIMUM HOLD
TRDSP	TRACE DISPLAY ON/OFF
VIEW	VIEW TRACE

### TRACKING GENERATOR SOURCE COMMANDS *ROM VERSIONS 851216 OR LATER*

MEASURE	MEASUREMENT MODE
MIL	MAXIMUM INPUT LEVEL
SRCALC	SOURCE AUTOMATIC LEVEL CONTROL MODE
SRCAM	SOURCE AMPLITUDE MODULATION
SRCAMF	SOURCE AMPLITUDE MODULATION FREQUENCY
SRCAT	SOURCE ATTENUATOR
SRCBLNK	SOURCE BLANKING
SRCMOD	SOURCE MODULATION INPUT
SRCOSC	SOURCE OSCILLATOR
SRCPOFS	SOURCE POWER OFFSET
SRCPSTP	SOURCE POWER STEP
SRCPSWP	SOURCE POWER SWEEP
SRCPWR	SOURCE POWER
SRCTK	SOURCE TRACKING
SRCTKPK	SOURCE TRACK PEAK
STORREF	STORE REFERENCE

### UNIT CONVERSION COMMANDS

AMPU	AMPLITUDE UNIT CONVERSION
FREQU	FREQUENCY UNIT CONVERSION
MEASU	MEASUREMENT UNIT CONVERSION
POSU	POSITION UNIT CONVERSION

## USER COMMAND FLOW COMMANDS

ABORT	ABORT USER FUNCTIONS
IF/THEN/ELSIF/ ELSE/ENDIF	CONDITIONALS
REPEAT/UNTIL	LOOPING
RETURN	RETURN FROM FUNCTION
WAIT	WAIT A SPECIFIED TIME

## USER DEFINITION COMMANDS

CATALOG	CATALOG QUERY
DISPOSE	DISPOSE
FUNCDDEF	FUNCTION DEFINITION
KEYCLR	CLEAR USER DEFINED KEYS
KEYDEF	USER DEFINED KEY DEFINITION
KEYPST	PRESET USER DEFINED KEYS
MEM	MEMORY AVAILABLE
ONEOS	ON END OF SWEEP
READMENU	READ MENU INPUT
TRDEF	TRACE DEFINITION
USERKEY	USER DEFINED KEYS
USTATE	USER STATE INPUT/OUTPUT
VARDEF	VARIABLE DEFINITION

## USER OPERATOR COMMANDS

ABS	ABSOLUTE
ADD	ADDITION
AVG	AVERAGE
BIT	BIT TEST
CONCAT	CONCATENATE
DIV	DIVIDE
EXP	EXPONENT
INT	INTEGER
LOG	LOGARITHM
MIN	MINIMUM
MOD	MODULO
MOV	MOVE
MPY	MULTIPLY
MXM	MAXIMUM
SQR	SQUARE ROOT
SUB	SUBTRACT
XCH	EXCHANGE



## APPENDIX C

### SUMMARY OF COMPATIBILITY COMMAND SET

The following commands have been provided to allow for backward compatibility with commands in the 8566 and 8568 A&B instruments. The equivalent 70900A spectrum analyzer primary commands are listed in parenthesis next to the compatibility command.

A1	clear write trace A	(CLRW TRA)
A2	max hold trace A	(MXMH TRA)
A3	store and view trace A	(VIEW TRA)
A4	store and blank trace A	(BLANK TRA)
BL	B - DL -> B	(BML)
B1	clear write trace B	(CLRW TRB)
B2	max hold trace B	(MXMH TRB)
B3	store and view trace B	(VIEW TRB)
B4	store and blank trace B	(BLANK TRB)
CA	coupled input attenuation	(AT AUTO)
CR	coupled resolution bandwidth	(RB AUTO)
CS	coupled step size	(SS AUTO)
CT	coupled sweep time	(ST AUTO)
CV	coupled video bandwidth	(VB AUTO)
C1	A-B off	(AMB OFF)
C2	A-B on	(AMB ON)
EX	exchange A and B	(AXB)
E1	peak search	(MKPK)
E2	enter marker into center frequency	(MKCF)
E3	enter marker delta into CF step size	(MKSS)
E4	enter marker amplitude into ref level	(MKRL)
HNUNLK	harmonic number unlock	(HNLOCK OFF)
L0	display line off	(DL OFF)
MA	marker amplitude	(MKA?)
MF	marker frequency	(MKF?)
MT0	marker track off	(MTRACK OFF)
MT1	marker track on	(MTRACK ON)
M1	marker off	(MKOFF ALL)
M2	marker normal	(MKN)
M3	marker delta	(MKD)

Appendix C

Summary of Compatibility Command Set

RC	recall	(RCLS)
SV	save state	(SAVES)
S1	sweep continuous	(CONTS)
S2	sweep single	(SNGLS)
T0	threshold off	(TH OFF)

The following commands have been provided to allow compatability with earlier 70900A firmware versions. The preferred 70900A spectrum analyzer primary commands are listed in parenthesis next to the compatability command.

CATALOG	catalog query	(DSPTEXT CAT)
CONFIG	configuration query	(DSPTEXT CONFIG)

## **HEWLETT-PACKARD SALES AND SERVICE OFFICES**

To obtain servicing information or to order replacement parts, contact the nearest Hewlett-Packard Sales and Service Office listed in the HP Catalog, or contact the nearest regional office listed below:

### **IN THE UNITED STATES**

**CALIFORNIA**  
P.O. Box 4230  
1421 South Manhattan Avenue  
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P.O. Box 105005  
2000 South Park Place  
Atlanta 30339

**ILLINOIS**  
5201 Tollview Drive  
Rolling Meadows 60008

**NEW JERSEY**  
W. 120 Century Road  
Paramus 07652

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