

# **HP 8922M/S GSM Test Set**

## **Programming Reference Guide**



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## **Command Guidelines**

Rules and guidelines for using Hewlett-Packard Interface Bus (HP-IB) programming are contained in this chapter. Chapters 3 and onwards outline each HP-IB command subsystem used with the HP 8922M/S.

Each subsystem chapter starts with a syntax diagram followed by a simple explanation of each command within that subsystem.

---

## Command Names

Generally all commands of greater than four characters have an alternate abbreviated form using only the upper case letters and number (if used).

Upper or lower case characters may be used for all commands.

For example, to set the amplitude of RF Generator 1, you could use any of the following commands:

```
RFGENERATOR:AMPLITUDE1 -10DBM or
RFGenerator:AMPLitude1 -10DBM
rfgenerator:amplitude1 -10DBM or
rfg:ampl1 -10DBM or
RFG:AMPL1 -10DBM
```

---

## Programming Format Conventions

Syntax commands and returned data descriptions use the following format conventions.

<b>Upper case letters</b>	Indicate the shortened acceptable form of a command.
<b>Square brackets</b>	[ ], indicate that enclosed command or command parameters are optional.
<b>Vertical bar</b>	, indicates that one-and-only-one item separated by the vertical bar can be used at any given time. The vertical bar is read as “or.” For example, ‘A’   ‘B’ indicates that either A or B can be chosen, but not both.
<b>Question mark</b>	?, indicates a query command. Most commands accept this command when it is entered immediately after the command name. The returned information (<value>) varies in format according to the type of the field.
<b>Quoted string</b>	Fields that accept quoted string parameters will return the active choice in quotes when queried. For example if the RF generator Output was set to the RF IN/OUT parameter (RFG:OUTP “RF IN/OUT”) and the queried (RFG:OUTP?), the return would be “RF IN/OUT”.
<b>Decimal numeric data</b>	Fields that accept decimal numeric data will return the current field value as an exponentiated decimal number.
<b>Floating numeric data</b>	Fields that accept floating point numeric data will return the current field value as a floating point number in the current HP-IB units.
<b>Character data</b>	Fields that accept character data (unquoted strings) will return the queried information without quotes.

**Quotation marks** “ ”, enclose command and string entries. Be sure to follow the correct syntax for using quotations that are specific to your basic language.

**Colons** :, are used to separate keywords and show hierarchical relationship.

```
"RFANalyzer:FREQuency 935 MHz"
```

**A Semicolon and a Colon** ;;, are used to separate two or more root level command statements on the same line.

```
"RFAN:INP 'RF IN/OUT';:RFAN:AMPL1 -20 dBm".
```

**Semicolons** ;, can also be used to condense command words on one line if the commands are equal, or of decreasing hierarchy under the keyword. (The following example is equivalent to the previous command statement, but the root level keyword :RFAN is removed by using semicolons.)

```
"RFAN:INP 'RF IN/OUT';AMPL1 -20 dBm"
```

**Commas** Are used to separate multiple parameter entries.

**Angle brackets** < >, enclose variable items that represent user choices (parameters) to be entered.

---

## Units of Measure

### Units for measurements

These are implemented such that a measurement query result will be returned in the current HP-IB unit.

**Units for settings** These are implemented such that if a unit is not sent along with the setting value, then a default HP-IB unit is used.

- For example, RFGenerator:AMPLitude1 assumes dBm and RFGenerator:FREQuency assumes Hz. If a unit is sent with the setting, then this unit will be used. The HP-IB unit may be changed using the units commands described later.
- Each measurement or setting description defines the allowable units for that field. When units are sent with a command, they should not be quoted.

The complete allowable set of HP-IB units that setting queries or measurement queries may be returned in are:

- DB (dB), DBM (dBm), DBUV (dB micro-volt),
- DEG (degree), DIV (division),
- HZ (Hz), OHM (ohm), PCT (percent), PPM (parts-per-million),
- S (second), T (bit periods),
- V (volt), W (watts)

The complete allowable set of units that can be sent with setting commands or units that can be displayed on the front panel are:

- DB (dB), DBM (dBm), DBMW (dB milli-watt), DBUV (dB micro-volt),
- HZ (Hz), KHZ (kHz), MHZ (MHz), GHZ (GHz),
- T (bit periods), S (second), MS (milli-second), US (microsecond),
- V (volt), MV (millivolt), UV (microvolt),
- W (watts), MW (milliwatt),
- PCT (percent), PPM (parts-per-million),
- DEG (degree) DIV (division), OHM (ohm)



---

## Measurement Subsystems

### Measure Subsystem

#### Commands

Measure commands are used to control measurements and get back the value of the displayed measurement. To get a valid measurement, the instrument must first be set up to access the desired measurement.

In most cases, this means that you must be on the screen (or set of screens) associated with the measurement. For example, to retrieve Output RF Spectrum measurement results, you must be on the Output RF Spectrum 'Main' screen or 'Trace' screen. (See the DISPLAY subsystem commands.) The Trigger commands are then used to cause a measurement to occur. Once a measurement result is available it may be queried.

---

## Syntax Diagrams

Each HP-IB Subsystem chapter starts with a syntax diagram. This diagram uses a graphical format to represent the hierarchical structure of a subsystem. The diagram also indicates possible options and references to other command sets.

The following describes two graphical conventions used in the syntax diagrams.



Means a space must be used as part of the command line. For example;

`AFAN:AIN<space>'GND'`



Represents a colon in the command line.

`AFAN:AIN 'GND'`

## Optional Commands

The following lists the optional command groups that are used with many of the HP-IB Command Subsystems. The list describes the abbreviation used for each optional set and its corresponding Appendix, that gives more details of the options available.

Optional Command Abbreviation	Reference Appendix	Description
[:INUM]	Appendix A	Increment integer numeric fields
[:FNUM]	Appendix B	Floating point numeric field
[:FNUM-MOD]	Appendix C	Floating point numeric field without INCR:MODE
[:MM]	Appendix D	Measurement fields
[:MM-MOD]	Appendix E	Measurement fields without units commands
[:AVG]	Appendix F	Measurement fields that use averaging
[:MET]	Appendix G	Measurement fields that use meters
[:MULTI-B]	Appendix H	Measurement fields that use Multi Burst measurements

Examples;

RFGenerator:AMPLitude1 <real> | [:FNUM]

When this command appears in a program it can be written as follows;

```
RFG:AMPL1:UNITs? .....or
RFG:AMPL1:INCRement UP .....or
RFG:AMPL1:INCR:MODE:LINear .....or
RFGENERATOR:AMPLITUDE1 -10DBM ...or
RFG:AMPL1:INCRement:DUNits -1DBM
```

---

## Command Descriptions

Each command in this guide is given a description, an example of its syntax and possible options. These commands are shown as follows;

### Command Name

- |                    |   |
|--------------------|---|
| <b>Description</b> | This gives a brief description of what the command can be used for. Some units that can be used with the command, are also listed.  |
| <b>Syntax</b>      | This gives the syntax for the command. Each command is listed in full, although the abbreviated version can also be used, as explained in “Command Names”.  |
| <b>Options</b>     | These are not strictly optional parts of the command. They also list necessary parts of the command. Refer to “Programming Format Conventions” for details on what is optional and what is necessary. |

HP-IB Tutorial and Examples  
**Example C - Making Measurements**

Select commands from section "HP-IB Commands Used in Exercises" to create the following program flow:

- Select single trigger mode for DSP measurements.
- Establish call as in exercise A.
- Perform TX peak power test on channels 1, 63, 124, levels 5 to 15 with code from exercise B and C.
- Display the DSP analyser phase and frequency error screen.
- Set up a loop to count through three TX Levels: 5, 10 and 15.
- Command the phone to the new TX Level.
- Set up a loop to count through three ARFCN: 1, 63, 124.
- Command the phone to the new ARFCN.
- Trigger a DSP measurement.
- Query the peak phase error and rms. phase error.
- Query the frequency error and TX peak power.
- Query the RF analyser expected input.
- Compare measured and expected power, loop to trigger DSP measurement if they are more than 1dB different. Loop a maximum of three times.
- Print the ARFCN, TX Level, Peak and Rms. Phase Error and Frequency Error.
- Repeat for the next ARFCN.
- Repeat for the next TX Level.
- Return to the Cell Control screen.
- End call as in exercise A.

**Tips:**

Placing the TX Level changing loop outside the ARFCN changing loop has several benefits. The process of changing ARFCN is faster, so the program will run more quickly. The delay associated with the first ARFCN change will go in parallel with the time taken for the mobile to respond to the SACCH and change TX Level. This increases the probability of the mobile being settled on the new TX Level when the DSP measurement is performed, reducing the number of times it will need to be repeated to get a TX peak power value close to the expected value. Look at the 'PERFORM DSP MEASUREMENTS' section of example program 1 for more help.

---

## **HP-IB Tutorial and Examples**

This Chapter introduces the user to automatic GSM mobile phone testing using the HP 8922M and HP 8922S GSM Test Set. HP-IB (IEEE 488.2) is used in conjunction with BASIC programming exercises and example programs to illustrate the most effective techniques for efficient and high speed phone tests.

## HP-IB Programming Exercises

### Before Starting

Power-up the HP 8922M/S and carry out the following checks before beginning the exercise:

- On the rear panel, the OPT 001 REF OUT should be connected with a short BNC cable to the REF IN connector.
- Use the front panel knob to select the CONFIG screen. Check the Compatible field is set to 8922M or 8922S.
- On the CONFIG screen, set the HP-IB address to 14 and check the HP-IB mode is set to talk&lstn.
- Connect the HP-IB cable from your computer to the HP 8922M/S.
- Load a Test SIM (Subscriber ID Module) in the mobile.
- Connect a GSM mobile to the HP 8922M/S front panel RF IN/OUT connector.

Carry out the following programming exercises, check your program works after each exercise.

## Exercise A - Establishing a Link

### Originate a Call

Begin the program by setting the HP-IB address variable Uut=714, then select commands from section “HP-IB Commands Used in Exercises” to carry out the following actions:

- Preset the HP 8922M/S and set up the paging IMSI and external cable loss, zero the power meter.
- Page the mobile.
- Establish a program loop to wait for the mobile to answer the call.
- End the loop when the mobile answers or when too much time has elapsed.

#### Tips:

The BASIC REPEAT UNTIL loop is useful in this application. The loop can be used to keep checking the HP 8922M/S call status until the returned variable becomes equal to “CONNECTED” or a time-out counter is exceeded. Place a WAIT 1 statement inside the loop so that the HP 8922M/S call status is checked once per second. For more help, look at the ‘PAGE THE MOBILE AND ESTABLISH A CALL’ section of example program 1 in section “Example Programs”.

### End the Call

Add additional lines to your program to end the call. Select the HP-IB commands from “HP-IB Commands Used in Exercises” and use the same structure as for call set up. This time, wait for the status to become equal to “INACTIVE”.

#### Tips:

For help, look at the “END THE CALL” section of example program 1 in section “Example Programs”.

## Example B - Controlling the Mobile

Mobiles need to be tested on a variety of frequency channels (ARFCN) and transmitter power levels (TX Level). The HP 8922M/S uses over-the-air signalling to command the mobile to any ARFCN or TX Level. ARFCN changes can be made using channel assignments, with the signalling taking place over the GSM Fast Associated Control Channel (FACCH). TX Level changes are signalled using the GSM Slow Associated Control Channel (SACCH). The choice of FACCH or SACCH has been made by the GSM specifications.

Before extending your program to control the mobile, press the LOCAL key on the HP 8922M/S and manually establish a call with the mobile. In the MOBILE PHONE section of the Cell Control screen, use the knob to select TX Level. Using the arrow keys, quickly change the TX Level from 15, to 14, to 13, to 12, to 10, to 9, to 8, to 7, to 6, to 5 and back down to 15. Notice the mobile's uplink SACCH reports of TX Level in the CELL STATUS area of the screen. Notice also the Peak Power measurement in the centre of the screen. Observe the sequence of events, first you command a new TX Level, about 1 second later, the mobile changes its output power, and shortly after, confirms the new TX Level on the uplink SACCH, to be displayed on the HP 8922M/S.

The sequence for ARFCN changes is similar. Because channel assignments use the FACCH, the process happens more quickly. There is still a perceptible delay from the channel change being commanded, by changing the Channel value under MOBILE PHONE, to the TRAFFIC Channel value being confirmed under CELL STATUS.

### TX Level Changing

Extend your program, selecting HP-IB commands from section "HP-IB Commands Used in Exercises", to cycle the mobile's TX Level from 5 to 15 with the following steps:

- Establish call as in exercise A.
- Set up a loop to count through the TX Levels.
- Command the phone to the new TX Level.
- Check the reported TX Level, loop until the reported value matches the programmed value, or too much time has elapsed.
- Repeat for the next TX Level.
- End call as in Exercise A.



**Tips:**

The BASIC FOR NEXT loop is ideal for controlling the TX Levels. For example, start the loop with FOR Txlevel = 5 TO 15 and end with NEXT Txlevel. Use a REPEAT UNTIL structure to check the reported TX Level. This time, use a delay of WAIT 0.4. For more help, look at the 'PERFORM FAST POWER MEASUREMENTS' section of example program 1 in section "Example Programs".

**ARFCN Changing**

Once your program is working, add another FOR NEXT loop outside the Txlevel loop to change ARFCN from 1, to 63, to 124. The new program will cycle the mobile from TX Level 5 to 15 at ARFCN 1, then from 5 to 15 on ARFCN 63, then from 5 to 15 on ARFCN 124. Add a PRINT statement to display the ARFCN and TX Level.

The flow of the mobile control part of the program will be as follows:

- Establish call as in exercise A.
- Set up a loop to count through three ARFCN.
- Command the phone to the new ARFCN.
- Check the reported ARFCN, loop until the reported value matches the programmed value, or too much time has elapsed.
- Set up a loop to count through the TX Levels.
- Command the phone to the new TX Level.
- Check the reported TX Level, loop until the reported value matches the programmed value, or too much time has elapsed.
- Print the ARFCN and TX Level.
- Repeat for the next TX Level.
- Repeat for the next ARFCN.
- End call as in Exercise A.

**Tips:**

Use a REPEAT UNTIL loop as before to check for confirmation of the mobile's channel change, this time use a WAIT 0.1 inside the loop. It may be helpful to use an array to hold the ARFCN. For example Arfcnar(1)=1, Arfcnar(2)=63, Arfcnar(3)=124, then FOR X=1 TO 3 and Arfcn=Arfcnar(X). For more help, look at the 'PERFORM FAST POWER MEASUREMENTS' section of example program 1 in section "Example Programs".

## Example C - Making Measurements

In this section we first add a TX Power measurement, then modulation accuracy and receiver sensitivity tests.

### TX Power Measurement

TX peak power is measured using the Fast TX Carrier Power measurement. This measurement can take place in parallel with GSM signalling operations such as ARFCN or TX Level changes. TX peak power is normally displayed on the Cell Control screen. The HP 8922M/S RF Analyser automatically adjusts its input attenuation and gain to match the power expected from the mobile. The Expected Input power is displayed at the bottom of the Cell Control screen. This expected power provides a convenient comparison with the measured power. For a perfect mobile, the expected and measured values are the same. Select HP-IB commands from section "HP-IB Commands Used in Exercises" to query the measured and expected power and insert them immediately before the PRINT statement in your program. Modify the PRINT statement to display ARFCN, TX Level, Expected Power and Measured Power. The program flow should be as follows:

- Establish call as in exercise A.
- Set up a loop to count through three ARFCN.
- Command the phone to the new ARFCN.
- Check the reported ARFCN, loop until the reported value matches the programmed value, or too much time has elapsed.
- Set up a loop to count through the TX Levels.
- Command the phone to the new TX Level.
- Check the reported TX Level, loop until the reported value matches the programmed value, or too much time has elapsed.
- Query the Fast TX Carrier Power (TX Peak Power).
- Query the RF Analyser Expected Input.
- Print the ARFCN, TX Level, Expected Power, Measured TX Peak Power.
- Repeat for the next TX Level.
- Repeat for the next ARFCN.
- End call as in Exercise A.

**Tips:**

For help, look at the “PERFORM FAST POWER MEASUREMENT” section of example program 1.

**DSP Measurements**

Modulation accuracy for GSM is determined by measuring the phase and frequency error. The HP 8922M/S uses its DSP analyser for making this measurement. When triggered, the DSP analyser samples a single GSM TDMA burst and performs several measurements in parallel namely: peak phase error, rms. phase error, frequency error, power versus time, data bit display, burst timing and TX peak power. The DSP analyser shares measurement hardware with the HP 8922M/S real-time demodulator. The hardware can be switched from one mode to another, either making measurements or demodulating. The demodulator is used to decode the traffic channel and control channel data being transmitted by the mobile on the up-link. This control information includes the FACCH and SACCH used for changing ARFCN and TX Level. For this reason, different techniques are used for ARFCN and TX Level changing while performing DSP measurements.

TX Level changes are signalled on the down-link SACCH. When the level change is complete, the mobile signals the new TX Level on the up-link SACCH. The HP 8922M/S does not need to decode this message for the level change to operate correctly. For TX Level changes, the DSP analyser can remain configured for measurements and does not need to re-configure for demodulation. However, the up-link SACCH reports, used in our program to confirm the TX Level change, are not being demodulated and so are not available to read.

ARFCN changes are signalled using the FACCH. In order for the channel assignment to work correctly, a two-way exchange of messages has to take place between the mobile and the HP 8922M/S. This requires the DSP analyser to be configured for demodulation. When an ARFCN change is requested during a DSP measurement, the DSP analyser is automatically re-configured for demodulation, the channel assignment is performed, once complete, the DSP analyser is configured for measurements once more.

Single trigger mode is most suitable for DSP measurements over HP-IB. ARFCN changes can be accomplished simply by programming the new ARFCN and triggering the DSP measurement. The measurement will begin only once the channel change has been completed. TX Level changes are accomplished by programming the new TX Level then triggering the DSP measurement. Since the DSP measurement takes 200 to 300 milliseconds to be initialised and sample a TDMA burst, there is a reasonable probability that in many cases the mobile will have changed level in time for the first measurement. Checking the measured TX power is close to the expected power provides confirmation that the TX Level change has been performed. If the measured power is different from the expected power, the DSP measurement can be performed up to two additional times. The time taken for three DSP measurements exceeds the time allowed for a mobile to make a TX Level change.

HP-IB Tutorial and Examples  
**Example C - Making Measurements**

Select commands from section “HP-IB Commands Used in Exercises” to create the following program flow:

- Select single trigger mode for DSP measurements.
- Establish call as in exercise A.
- Perform TX peak power test on channels 1, 63, 124, levels 5 to 15 with code from exercise B and C.
- Display the DSP analyser phase and frequency error screen.
- Set up a loop to count through three TX Levels: 5, 10 and 15.
- Command the phone to the new TX Level.
- Set up a loop to count through three ARFCN: 1, 63, 124.
- Command the phone to the new ARFCN.
- Trigger a DSP measurement.
- Query the peak phase error and rms. phase error.
- Query the frequency error and TX peak power.
- Query the RF analyser expected input.
- Compare measured and expected power, loop to trigger DSP measurement if they are more than 1dB different. Loop a maximum of three times.
- Print the ARFCN, TX Level, Peak and Rms. Phase Error and Frequency Error.
- Repeat for the next ARFCN.
- Repeat for the next TX Level.
- Return to the Cell Control screen.
- End call as in exercise A.

**Tips:**

Placing the TX Level changing loop outside the ARFCN changing loop has several benefits. The process of changing ARFCN is faster, so the program will run more quickly. The delay associated with the first ARFCN change will go in parallel with the time taken for the mobile to respond to the SACCH and change TX Level. This increases the probability of the mobile being settled on the new TX Level when the DSP measurement is performed, reducing the number of times it will need to be repeated to get a TX peak power value close to the expected value. Look at the ‘PERFORM DSP MEASUREMENTS’ section of example program 1 for more help.

### Receiver Sensitivity Test

Bit Error Ratio (BER) is the primary measure of GSM receiver sensitivity. For a hand-held mobile, the residual type II BER should be less than 2.4% at -102dBm. For most mobile testing, the downlink power will be maintained at a relatively high level of around -80dBm. This level is dropped to -102dBm to perform the BER test, then increased again to -80dBm once the test is complete. When the mobile's receiver input level drops from -80 to -102dBm, its receiver AGC compensates by increasing gain. The AGC time constant varies from mobile to mobile. It can take several seconds for the receiver to adjust to the new power level and be ready for BER testing. If the level change is large and followed by a channel assignment, the mobile will often drop the call because its receiver is not able to decode the FACCH while adjusting to the reduced input power.

Select HP-IB commands from "HP-IB Commands Used in Exercises" to extend your program as follows:

- Select single trigger mode for DSP measurements
- Select single trigger mode for BER measurements
- Establish call as in exercise A
- Perform TX peak power test on channels 1, 63, 124, levels 5 to 15 with code from exercise B and C
- Perform DSP measurements with code from exercise C
- Display the bit error test screen
- Reduce the RF Generator power to -102dBm
- Wait 2 seconds for the mobile's AGC to settle
- Set up a loop to count through three ARFCN: 1, 63, 124
- Command the phone to the new ARFCN
- Trigger a BER measurement
- Query the BER
- Repeat for the next ARFCN
- Increase the RF Generator power to -80dBm
- Return to the Cell Control screen
- End call as in exercise A

HP-IB Tutorial and Examples  
**Example C - Making Measurements**

**Tips:**

Experiment with shorter AGC settling times, notice the reported BER increase. Try increasing the RF Generator power to -40dBm at the start of the program and removing the wait statement. Does the phone drop the call? The required delay depends on the mobile and the size of the level change. Look at the mobile's SACCH reports of RXQual and RXLev. Consider modifying your program to use these reports to decide when the mobile's AGC has settled. Look at the "PERFORM BIT ERROR MEASUREMENTS" section of example program 1 for more help.

## Example D - Adding Robustness

There are several additions which can be made to your program to increase its robustness:

- Check input power falls within +/-3dB specified analyser range
- Check DSP measurement status
- Check for HP 8922M/S error logs
- Provide a time-out for any measurements which do not complete

These checks add little value to a program designed to test phones which are known to meet specification. In many cases the mobile being tested will be out of specification, the phone may fail to produce a burst at the correct power and frequency for the DSP analyser. If the measurement has been triggered, and no input signal is provided, an HP-IB time-out offers a convenient method for disarming the DSP trigger and continuing the program. If the mobile's TX power falls outside +/-3dB of the expected value, measurement results may not be valid. If the DSP analyser has not been able to find a good signal, or synchronise to the burst midamble, the status message will warn of the problem. Dropped calls and other problems are logged by the HP 8922M/S in an error message stack. The messages can be queried to provide an indication of where problems have occurred during test execution.

Read through example program 1 and look at the way the HP-IB commands in "HP-IB Commands Used in Exercises" have been used to add robustness. Look for the "ERROR AND TIMEOUT HANDLING" part of the program and the sections making DSP measurements.

## Example E - Faster Testing

Load and run example program 1, then program 2, then program 3, or look at the test times tabulated in section 4 for the HP 8922M. The three programs are configured to perform an identical list of tests, yet their test times are different. This is achieved using various techniques.

Example program 1 does use some techniques to improve speed:

- The complete set of DSP measurements are performed in parallel.
- TX peak power measurements are made in parallel with DSP measurements.
- Additional TX peak power measurements are made using the Fast TX Carrier Power measurement. Points covered during the DSP test are not repeated.
- Loops are chosen to minimise the number of mobile TX level changes.
- No fixed delays are used.
- RXQual, RXLev and TX Timing error are checked in parallel with bit error ratio.
- Results are printed after testing is complete.

Example program 2 adds some additional time saving techniques:

- A hopped call is used for TX measurements to reduce channel changing time.
- Measured power is used to determine when the mobile TX Level has settled rather than waiting for uplink SACCH report.



Example program 3 uses the HP 8922M/S Aux RF Out port to simulate a mobile operating in a test mode. Mobiles controlled in test modes react much faster to channel and TX Level change commands.

- Delays associated with the GSM SACCH and FACCH are removed.
- Measurements are made with no signalling overhead time.

The time savings made in programs 2 and 3 have been almost completely during the TX part of the test. Improving the RX bit error ratio test time would speed-up each of the programs. As TX test times reduce, RX tests appear to take up a larger percentage of the overall test time. Techniques for improving RX measurement times include:

- Take RXQual as a first indication of receiver performance. Perform bit error test only if RX Qual is poor.
- Reduce the number of bits being tested and reduce the signal level from -102dBm to a lower level. This will increase the number of bit errors in the reduced measurement period to maintain a statistically valid test.
- Look for zero bit errors at -102dBm over a reduced number of bits. Use a longer measurement only if bit errors are detected.

## HP-IB Commands Used in Exercises

### Commands used in exercise A:

Preset the instrument

```
OUTPUT Uut; "*RST"
```

Set the paging IMSI

```
OUTPUT Uut; "MSINFO:PAGING:IMSI '001012345678901'"
```

Enter an external cable loss offset of 1dB

```
OUTPUT Uut; "CONF:OFL:RFIN ";-1
```

Set external loss offset mode on

```
OUTPUT Uut; "CONF:OFL:MODE 'ON'"
```

Zero the power meter

```
OUTPUT Uut; "CW:PMZERO"
```

Page the mobile

```
OUTPUT Uut; "CELL:CALL:ORIGINATE"
```

Query the call status

```
OUTPUT Uut; "CELL:CALL:STATUS:STATE?"  
ENTER Uut;Status$
```

End the call

```
OUTPUT Uut; "CELL:CALL:END"
```

### Commands used in exercise B:

Program the mobile TX Level

```
OUTPUT Uut; "CELL:MS:TLEV";Txlevel
```

Query the mobile's reported TX Lev

```
OUTPUT Uut; "MEAS:CELL:SACCH:TLEV?"  
ENTER Uut;Sacctxlev
```

Program the mobile's Traffic Channel ARFCN

```
OUTPUT Uut; "CELL:CALL:TCH:ARFCN ";Arfcn
```

Query the reported ARFCN

```
OUTPUT Uut; "CELL:CALL:STAT:TCH:ARFCN?"  
ENTER Uut;Faccharfcn
```

**Commands used in exercise C:**

**Query Fast TX Carrier Power (TX Peak Power)**

```
OUTPUT Uut; "MEAS:FTCP:POW?"  
ENTER Uut;Txpkpwr
```

**Query RF Analyzer Expected Input Amplitude**

```
OUTPUT Uut; "RFAN:AMPL1?"  
ENTER Uut;Expkwr
```

**Set the DSP Analyzer to single trigger mode**

```
OUTPUT Uut; "TRIG:MODE 'SINGLE' "
```

**Display the DSP Analyzer (default sub-screen is phase and frequency error)**

```
OUTPUT Uut; "DISP DSP"
```

**Trigger a DSP measurement**

```
OUTPUT Uut; "TRIG:AST 'ARM' "
```

**Query the rms phase error**

```
OUTPUT Uut; "MEASURE:DSPANALYZER:PHASE:ERROR:RMS?"  
ENTER Uut;Rmsphase
```

**Query peak phase error**

```
OUTPUT Uut; "MEASURE:DSPANALYZER:PHASE:ERROR:PEAK?"  
ENTER Uut;Pkphase
```

**Query frequency error**

```
OUTPUT Uut; "MEASURE:DSPANALYZER:PHASE:ERROR:FREQUENCY?"  
ENTER Uut;Freqerr
```

**Query TX peak power**

```
OUTPUT Uut; "MEASURE:DSPANALYZER:PTCP?"  
ENTER Uut;Txpkpwr
```

**Display the Cell Control screen**

```
OUTPUT Uut; "DISP CELL1"
```

**Set single trigger mode for bit error measurements**

```
OUTPUT Uut; "TRIG:BET 'SINGLE' "
```

**Display the bit error test screen**

```
OUTPUT Uut; "DISP:SCR BER1"
```

**Program the RF Generator power**

```
OUTPUT Uut; "RFG:AMPL1 ";Berpower
```

**Trigger a bit error measurement**

```
OUTPUT Uut; "TRIG:BET:MODE 'RUN' "
```

## HP-IB Tutorial and Examples

### Example Programs

Query the completed bit error test result

```
OUTPUT Uut; "MEAS:BET:BERR:RATIO1?"  
ENTER Uut;Berppm
```

Reset the SACCH reports

```
OUTPUT Uut; "MEAS:CELL:SACCH:RESET"
```

Query the RXQual report (-1 returned if no report yet)

```
OUTPUT Uut; "MEAS:CELL:SACCH:PARTIAL:RQU?"  
ENTER Uut;Rxqual
```

**Commands used in exercise D:**

```
OUTPUT Uut; "MEASURE:DSPANALYZER:SSTATUS?"  
ENTER Uut;Sstatus$
```

Check for logged HP 8922M/S system errors

```
OUTPUT Uut; "SYSTEM:ERROR?"  
ENTER Uut;Systemerr$
```

---

## Example Programs

### Speed Comparison

Using the HP 8922M GSM MS Test Set			
	Program 1	Program 2	Program 3
Time for testing	85.5 sec.	42.7 sec.	64.6 sec. <sup>a</sup>
Time for call clear down	1.1 sec.	1.1 sec.	1.1 sec.

a. Some time overhead was incurred because the HP 8922M was being used to emulate a mobile in test mode. Reduced test times would be possible if the instrument was only performing measurements.

**Test List**

<b>Tx Tests</b>		
	<b>ARFCN</b>	<b>Tx Levels</b>
Tx Power	1, 65, 124	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
Peak and rms phase error	1, 65, 124	5, 10, 15
Frequency error	1, 65, 124	5, 10, 15
Power versus time	1, 65, 124	5, 10, 15
<b>Rx Tests</b>		
	<b>ARFCN</b>	<b>Downlink Power</b>
Residual Type II BER 10,000 bits <sup>a</sup>	1, 65, 124	-102 dBm
Rx Qual Rx Lev	1, 65, 124	-102 dBm
MS Timing	1, 65, 124	-102 dBm

a. Up to four BER measurements can be performed in parallel with no added test time.

HP-IB Tutorial and Examples  
Sample Output

---

## Sample Output

Answer call when mobile rings  
Results from Fast Power Measurement

ARFCN	TXLEV	POWER dBm
1	6	31.87
1	7	29.95
1	8	27.77
1	9	25.81
1	11	20.21
1	12	18.21
1	13	16.24
1	14	14.3
65	6	31.51
65	7	29.63
65	8	27.54
65	9	25.59
65	11	20.01
65	12	20.04
65	13	18.05
65	14	16.01
124	6	31.1
124	7	29.32
124	8	27.33
124	9	25.37
124	11	21.5
124	12	19.85
124	13	17.85
124	14	15.77

Results from Power, Power vs Time & Modulation Measurements

ARFCN	TXLEV	POWER dBm	Pk & RMS	PHASE	FREQ ERROR	MASK
1	5	33.69	10.89	4.554	1.8	"Passed"
1	10	23.76	10.14	4.362	36	"Passed"
1	15	14.27	11.84	4.636	.6	"Passed"
65	5	33.35	11.39	4.29	-2.4	"Passed"
65	10	23.57	11.3	4.444	18.3	"Passed"
65	15	14.12	14.22	4.741	-2.3	"Passed"
124	5	32.89	14.68	4.636	30.9	"Passed"
124	10	23.36	14.41	4.911	-18.1	"Passed"
124	15	13.81	11.95	4.905	-20	"Passed"

Results from BER Test

ARFCN	Downlink dBm	BER1%	RxQual	RxLev	TIMERR
1	-102	.03945	0	8	0
65	-102	.2251	0	8	0
124	-102	.1157	0	9	.25

Time for phone to camp and answer page: 11.21 Seconds.  
Time for testing : 46.52 Seconds.  
Time for call clear down : 2.05 Seconds.

No Errors  
Would you like to test again? (y or n)

---

## Program 1

```

10 !RE-STORE "PROG1"
20 !RE-SAVE "PROG1:,1404"
30 !=====
40 !
50 !Example program 1
60 !
70 !Introductory HP-IB techniques for measuring a GSM900 mobile using the HP 8922S
and M
80 !GSM MS Test Sets. The program measures Tx power, power vs time, phase and fre-
quency
90 !error, bit error ratio, timing error, Rx Lev and Rx Qual
100 !
110 !(c) HEWLETT-PACKARD 1996
120 !
130 !Rev 1.0
140 !I R HP QMD 7.9.94
150 !Slightly modified by C B 24.1.96 - Changed F/H to M/S throughout
160
!=====
170 !
180 DIM Berpwr(5) !Downlink power levels in dBm for bit error test
190 DIM Berarfcn(125) !ARFCN to perform bit error test on
200 DIM Dspwr(15) !Mobile Tx power levels for DSP test
210 DIM Dsparfcn(124) !ARFCN to perform DSP test on
220 DIM Fparfcn(124) !ARFCN to perform fast power test on
230 DIM Fppwr(15) !Mobile Tx power levels for fast power test
240 DIM Message$(30)[100] !Output strings
250 DIM Error$(50)[100] !Error message strings
260 DIM Err$(100) !Internally used temporary error string
270 DIM Rmspher(50,50) !Measurement results from rms phase error, dimen-
sions(ARFCN, TXLEVEL)
280 DIM Pkpher(50,50) !Measurement results from peak phase error
290 DIM Frer(50,50) !Measurement results from freq error
300 DIM Slpwr(50,50) !Measurement results from DSP analyzer power measure-
ment
310 DIM Txtim(50,50) !Tx timing error measurement results
320 DIM Fpwrmeas(50,50) !Measurement results from fast power
330 DIM Ber1(50,50) !Bit error test measurement results, dimen-
sions(ARFCN, Downlink Power)
340 DIM Clock(5) !Test Times
350 DIM Mask$(50,50)[10] !Power versus time limit mask specification
360 DIM Rxqual(50,50) !RxQual measurement results, dimensions(ARFCN, Down-
link Power)
370 DIM Rxlev(50,50) !RxLev measurement results
380 DIM Null(50,50) !Empty array
390 DIM Nullst$(50,50)[50] !Empty string array
400 !
410 !=====
420 !
430 !GENERAL MEASUREMENT SET UP SPECIFIED
440 !
450 Uut=714 !HP-IB address of HP 8922M/S
460 Extloss=-1 !Loss of cable linking 8922 to mobile (loss=-xdb)
470 Bchpwr=-80 !BCCH power level in dBm
480 Insi$="001012345678901" !Paging IMSI of mobile's test SIM
490 Timeouttime=20 !The HP-IB timeout in seconds
500 Leveltol=1 !Level threshold to indicate Tx Lev settling for DSP
measurement
510 !
520 !=====
530 !
540 !MEASUREMENT POINTS ARE DEFINED IN THIS SECTION

```

# HP-IB Tutorial and Examples

## Program 1

```
550 !
560 !Bit error ratio test
570 !
580 Numberpwr=1 !The number of downlink power levels for bit error
test
590 Berpwr(1)=-102 !The power level in dBm of the first downlink power.
Etc....
600 Bits1=10000 !The number of bits to test at each ARFCN/Power com-
bination
610 Numberarfcn=3 !The number of ARFCN for bit error test
620 Berarfcn(1)=1 !The value of the first ARFCN. Etc....
630 Berarfcn(2)=65
640 Berarfcn(3)=124
650 !
660 !DSP measurementmts
670 !
680 Numdspwr=3 !The number of mobile TX Levels for DSP test
690 Dspwr(1)=5 !The value of the first TX Level. Etc...
700 Dspwr(2)=10
710 Dspwr(3)=15
720 Numdsparfcn=3 !The number of ARFCN for DSP test
730 Dsparfcn(1)=1 !The value of the first ARFCN. Etc....
740 Dsparfcn(2)=65
750 Dsparfcn(3)=124
760 !
770 !Fast Power measurements
780 !
790 Numfppwr=8 !The number of mobile TX Levels for fast power test
800 Fppwr(1)=6 !The value of the first TX Level. Etc....
810 Fppwr(2)=7
820 Fppwr(3)=8
830 Fppwr(4)=9
840 Fppwr(5)=11
850 Fppwr(6)=12
860 Fppwr(7)=13
870 Fppwr(8)=14
880 Numfparfcn=3 !The number of ARFCN for fast power test
890 Fparfcn(1)=1 !The value of the first ARFCN. Etc...
900 Fparfcn(2)=65
910 Fparfcn(3)=124
920 !
930 !=====
940 !
950 !PRINT MESSAGES ARE DEFINED BELOW
960 !
970 Messages(1)="Answer call when mobile rings"
980 Messages(2)="Would you like to test again? (y or n)"
990 Messages(3)="Results from Fast Power Measurement"
1000 Messages(4)="ARFCN TXLEV POWER dBm"
1010 Messages(5)="Results from Power, Power vs Time & Modulation Measurements"
1020 Messages(6)="ARFCN TXLEV POWER dBm Pk & RMS PHASE FREQ ERROR MASK"
1030 Messages(7)="Results from BER Test"
1040 Messages(8)="ARFCN Downlink dBm BER1% RxQual RxLev TIMERR"
1050 Messages(9)=" Seconds."
1060 Messages(10)="Time for phone to camp and answer page: "
1070 Messages(11)="Time for testing : "
1080 Messages(12)="Time for call clear down : "
1090 !
1100 Emptyst$="@ "
1110 Empty=-999
1120 Nullst(1,1)=Emptyst$
1130 Null(1,1)=Empty
1140 !
1150 !=====
1160 !
1170 !ERROR AND TIMEOUT HANDLING
1180 !
```



HP-IB Tutorial and Examples  
**Program 1**

```

1190 Busport=INT(Uut/100)                !Get the HP-IB port code from Uut
address
1200 CLEAR Busport                      !Clear bus from any aborted previous
commands
1210 Timeinit$="yes"                    !Set a flag so timeout code is not
executed first pass
1220 ON TIMEOUT Busport,Timeouttime GOTO Timeflag          !Establish goto flag
for HPIB timeouts
1230 Timeflag:IF Timeinit$<>"yes" THEN          !After a timeout, execution comes
here
1240     OFF TIMEOUT Busport
1250     CLEAR Busport                    !Clear any half done commands
1260     OUTPUT Uut;"TRIG:AST 'disarm'"    !Dissarm the DSP trigger
1270     CALL Sub_syserror(Uut,Error$(*),Errcount) !Gather any error message from the
HP 8922M/S
1280     PRINT "Measurement Timed Out. Ending Test"
1290     IF Errcount=0 THEN
1300         Errcount=1
1310         Error$(1)="No errors recorded"
1320     END IF
1330     FOR X=1 TO Errcount                !Print error messages
1340         PRINT Error$(X)
1350     NEXT X
1360     STOP                              !Execution stops here after critical
errors
1370 ELSE
1380     Timeinit$="no"                    !Reset flag so next time, it must
be a real timeout
1390 END IF
1400 Errcount=0
1410 CALL Sub_syserror(Uut,Error$(*),Errcount) !Clear any old errors from
HP 8922M/S before the
1420 Errcount=0                          !test begins
1430 !
1440 !
!=====
1450 !
1460 !PRESET THE HP 8922M/S AND SET IT TO THE CORRECT COMPATIBILITY MODE (executed
once only)
1470 !
1480 !
1490 OUTPUT Uut;"*RST"                    !Preset the HP 8922M/S
1500 OUTPUT Uut;"CONF:COMP?"            !Check compatability mode and set
to F or H
1510 ENTER Uut;Product$
1520 IF Product$<>"8922S" AND Product$<>"8922M" THEN
1530     IF Product$="8922E" THEN OUTPUT Uut;"CONF:COMP '8922S'"
1540     IF Product$="8922G" THEN OUTPUT Uut;"CONF:COMP '8922M'"
1550     OUTPUT Uut;"*RST"                !A preset is needed after compat-
ability change
1560 END IF
1570 CALL Sub_syserror(Uut,Error$(*),Errcount) !Check for any errors logged by
HP 8922M/S
1580 !
1590 !=====
1600 !
1610 !SET THE HP 8922M/S INITIAL CONDITIONS (executed once only)
1620 !
1630 !
1640 OUTPUT Uut;"MSINFO:PAGING:IMSI "&Im$    !Set the paging IMSI
1650 OUTPUT Uut;"CONF:OFL:RFIN ";Extloss    !Set the external cable loss
1660 OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";D$parfcn(1) !Set the ARFCN to the first
expected test point
1670 OUTPUT Uut;"CELL:MS:TLEV ";D$ppwr(1)    !Set the mobile Tx Level to the
first test point
1680 OUTPUT Uut;"CONF:OFL:MODE 'ON'"        !Turn external offset mode ON to
use cable loss
1690 OUTPUT Uut;"CW:PMZERO"                !Zero the power meter

```

# HP-IB Tutorial and Examples

## Program 1

```
1700 OUTPUT Uut;"RFG:AMPL1 ";Bchpwr           !Set the downlink power for normal
signalling
1710 OUTPUT Uut;"TRIG:MODE 'SINGLE'"           !Set the DSP meas trigger to single
trig mode
1720 OUTPUT Uut;"TRIG:BET 'SINGLE'"           !Set bit error meas trigger to sin-
gle trig mode
1730 OUTPUT Uut;"BET:BITS1 ";Bits1           !Set the number of bits to be mea-
sured for bit error
1740 OUTPUT Uut;"DISP:SCR DSP"               !Display the DSP amplitude main
screen to enter limits
1750 OUTPUT Uut;"DISP:SCR:DSP:VIEW 'AMPL MAIN'" !for power versus time mask
1760 DATA -40,-28,-18,-10,0,180,360,542.769,547.769,552.769,560.769,570.769 !Mask
corner times in us
1770 DATA -36,-30,-6,4,1,1,1,1,1,-6,-30,-36           !Upper
limits in dB
1780 DATA -60,-60,-60,-60,-1,-1,-1,-1,-60,-60,-60,-60 !Lower lim-
its in dB
1790 FOR X=1 TO 12
1800 READ Masktim                               !Reas corner times
from DATA statement
1810 Masktim=Masktim/1.E+6                       !Convert seconds
1820 Nums=VAL$(X)                               !Convert index to
string for HPIB
1830 OUTPUT Uut;"DSP:AMPL:"&"time"&Nums&" ";Masktim !Output marker times
1840 NEXT X
1850 FOR X=1 TO 12
1860 READ Maskup                               !Read and output upper
limits
1870 Nums=VAL$(X)
1880 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&Nums&":HLIM ";Maskup
1890 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&Nums&":HLIM:STATE ON"
1900 NEXT X
1910 FOR X=1 TO 12
1920 READ Masklo                               !Read and output lower
limits
1930 Nums=VAL$(X)
1940 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&Nums&":LLIM ";Masklo
1950 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&Nums&":LLIM:STATE ON"
1960 NEXT X
1970 !
1980
!=====
1990 !
2000 !ESTABLISH A LOOP TO BE EXECUTED EACH TIME A MOBILE IS TESTED
2010 !
2020 !
2030 RunS="yes"                               !Flag for REPEAT loop
2040 REPEAT
2050 Clock(1)=TIMEDATE                         !Start a test time
clock for call set up
2060 !
2070 !=====
2080 !
2090 !PAGE THE MOBILE AND ESTABLISH A CALL
2100 !
2110 !
2120 OUTPUT Uut;"DISP:SCR CELL1"               !Display the cell
control screen
2130 PRINT MessageS(1)                         !Output answer call
message
2140 OUTPUT Uut;"CELL:CALL:ORIGINATE"         !Page mobile HP 8922M/
S org call
2150 Time=0                                   !Set counter for mobile
to answer
2160 Maxtime=100
2170 REPEAT
2180 Time=Time+1
2190 WAIT 1
```

```

2200     OUTPUT Uut;"CELL:CALL:STATUS:STATE?"           !Check the call status
For connected
2210     ENTER Uut;StatusS
2220     UNTIL StatusS=""CONNECTED"" OR Time>Maxtime
2230     IF Time>Maxtime THEN
2240         Errcount=Errcount+1
2250         Errors(Errcount)="Call could not be established"
2260         GOTO Timeflag                               !If wait too long,
goto timeout code
2270     END IF
2280     CALL Sub_syserror(Uut,Errors(*),Errcount)     !Check for any errors
logged
2290 !
2300
!=====
2310 !
2320     Clock(1)=TIMEDATE-Clock(1)                     !End call set up timer
2330     Clock(2)=TIMEDATE                             !Start measurement timer
2340 !
2350
!=====
=
2360 !
2370 !PERFORM DSP MEASUREMENTS
2380 !
2390     OUTPUT Uut;"DISP DSP"                         !Return to the DSP
amplitude main screen
2400     FOR Txcount=1 TO Numdspwr                     !Outer loop for Tx
levels
2410         Txlev=Dspwr(Txcount)                     !Get Tx level from array
2420         OUTPUT Uut;"CELL:MS:TLEV";Txlev           !Program mobile's Tx
level
2430         FOR Arcount=1 TO Numdsparfcn             !Inner loop for ARFCN
2440             Arfcn=Dsparfcn(Arcount)              !Get ARFCN from array
2450             OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Arfcn !Program link ARFCN
2460             Count=0                              !Establish counter
for repeat measurements
2470             REPEAT                               !May need to repeat
if mobile not settled
2480                 OUTPUT Uut;"TRIG:AST 'ARM'"       !Arm the DSP measure-
ment
2490                 OUTPUT Uut;"MEASURE:DSPANALYZER:PHASE:ERROR:RMS?" !Read all the DSP
results: rms phase error
2500                 ENTER Uut;Rmspher(Arcount,Txcount)
2510 !Note: program will stick here, waiting for input if mobile fails to provide a
valid signal to trigger
2520 !         the HP 8922M/S. The program will timeout. The timeout code disarms the
HP 8922M/S trigger.
2530                 OUTPUT Uut;"MEASURE:DSPANALYZER:PHASE:ERROR:PEAK?"
!                 peak phase error
2540                 ENTER Uut;Pkppher(Arcount,Txcount)
2550                 OUTPUT Uut;"MEASURE:DSPANALYZER:PHASE:ERROR:FRE-
QUENCY?!"
!                 frequency error
2560                 ENTER Uut;Frer(Arcount,Txcount)
2570                 OUTPUT Uut;"MEASURE:DSPANALYZER:MSUM?"
!                 power versus time mask
2580                 ENTER Uut;MaskS(Arcount,Txcount)
2590                 OUTPUT Uut;"MEASURE:DSPANALYZER:PTCP?"
!                 Tx power
2600                 ENTER Uut;Slpwr(Arcount,Txcount)
2610                 OUTPUT Uut;"RFAN:AMPL1?"         !Read expected power
level to compare with
2620                 ENTER Uut;Anlevel               !measured and +/-3dB
allowed range
2630                 OUTPUT Uut;"MEASURE:DSPANALYZER:SSTATUS?"     !Check for any DSP
measurement errors
2640                 ENTER Uut;SstatusS

```

## HP-IB Tutorial and Examples

### Program 1

```

2650          Threedb=ABS(Anlevel-Slpwr(Arcount,Txcount))           !Calculate difference
between measured and expected
2660          Count=Count+1
2670          UNTIL Count=3 OR Threedb<Leveltol                    !Re-do DSP once if
phone fails, the mobile
2680          IF Sstatus<>"No Error"" OR Threedb>3 THEN           !may still be settling
after Tx Level change
2690          Errs="DSP Measurement Problem "                      !Create an error mes-
sage string
2700          IF Sstatus<>"No Error"" THEN Errs=Errs&Sstatus
2710          IF Threedb>3 THEN Errs=Errs&" 3dB input range exceeded"
2720          Errcount=Errcount+1
2730          Error$(Errcount)=Errs
2740          END IF
2750          NEXT Arcount
2760          NEXT Txcount
2770          CALL Sub_syserror(Uut,Error$(*),Errcount)           !Check for logged
errors after DSP
2780          !
2790          !
!=====
2800          !
2810          !PERFORM FAST POWER MEASUREMENTS
2820          !
2830          OUTPUT Uut;"DISP:SCR CELL1"                          !Display cell control
screen
2840          FOR Txcount=1 TO Numfppwr                            !Outer loop for mobile
Tx levels
2850          Txlev=Fppwr(Txcount)                                !Get Tx level from array
2860          OUTPUT Uut;"CELL:MS:TLEV";Txlev                      !Program mobile's Tx
level
2870          Time=0                                              !Establish a loop to
wait for phone to
2880          Maxtime=10                                          !confirm over uplink
SACCH that it has
2890          REPEAT                                             !reached commanded Tx
level
2900          OUTPUT Uut;"MEAS:CELL:SACCH:TLEV?"                 !Read mobile's SACCH
report of Tx Level
2910          ENTER Uut;Sacchtxlev
2920          WAIT .4                                             !Pause, SACCH has low
bandwidth so reports
2930          Time=Time+1                                         !update slowly
2940          UNTIL Sacchtxlev=Txlev OR Time=Maxtime             !Check for mobile
reaching programmed Tx level
2950          IF Time=Maxtime THEN
2960             Errcount=Errcount+1
2970             Error$(Errcount)="Mobile failed to change Tx Level" !Error if mobile
doesn't reach programmed level
2980          END IF
2990          FOR Arcount=1 TO Numfparfcn                          !Inner loop for mea-
surement ARFCN
3000          Arfcn=Fparfcn(Arcount)                             !Get ARFCN from array
3010          OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Arfcn           !Request TCH channel
assignment to new ARFCN
3020          Time=0                                              !Establish a loop to
wait for channel
3030          Maxtime=10                                          !assignment to complete
3040          REPEAT
3050          OUTPUT Uut;"CELL:CALL:STAT:TCH:ARFCN?"             !Check call status
for HP 8922M/S to see if
3060          ENTER Uut;Reparfcn                                  !mobile has reached
new channel
3070          WAIT .1                                             !Short pause. Channel
changes use FACCH which
3080          Time=Time+1                                         !is faster than SACCH
for Tx level changes

```

```

3090          UNTIL Repairfcn=Arfcn OR Time=Maxtime          !If reported ARFCN
matches programmed ARFCN
3100          IF Time=Maxtime THEN                          !FACCH handshake is
complete and mobile is on
3110              Errcount=Errcount+1                      !new channel.
3120              ErrorS(Errcount)="Mobile failed channel assignment" !If mobile fails to
reach new channel, set an error
3130          END IF                                        !Now mobile is stable
on new Tx level and ARFCN
3140          OUTPUT Uut;"MEAS:FTCP:POW?"                  !read the peak power
meter
3150          ENTER Uut;Fpwrmeas(Arcount,Txcount)
3160          OUTPUT Uut;"RFAN:AMPL1?"                    !Read the HP 8922M/S
analyzer expected input level
3170          ENTER Uut;Anlevel                            !and compare with the
measured power to check that
3180          Threedb=ABS(Anlevel-Fpwrmeas(Arcount,Txcount)) !the result is within
the allowed +/-3dB window
3190          IF Threedb>3 THEN
3200              Errcount=Errcount+1
3210              ErrorS(Errcount)="Fast power meas 3dB input range exceeded"
3220          END IF
3230          NEXT Arcount
3240          NEXT Txcount
3250          CALL Sub_syserror(Uut,ErrorS(*),Errcount)    !Check HP 8922M/S
error log
3260          !
3270          !=====
====
3280          !
3290          !PERFORM BIT ERROR MEASUREMENTS
3300          !
3310          OUTPUT Uut;"DISP:SCR BER1"                    !Display single BER
test screen
3320          FOR Rxcount=1 TO Numberpwr                    !Outer loop for down-
link power levels
3330              Berpo=Berpwr(Rxcount)                    !Get downlink power
level from array
3340              OUTPUT Uut;"RFG:AMPL1 ";Berpo            !Program HP 8922M/S
Generator to downlink power
3350              Count=0                                  !Establish a loop to
wait for the mobile's receiver
3360              Instance=0                               !AGC to recover from
downlink level change.
3370              REPEAT                                   !The mobile's reported
RXQual will indicate when
3380                  OUTPUT Uut;"MEAS:CELL:SACCH:RESET"    !the AGC has recov-
ered. Start by clearing old SACCH
3390                  Count=Count+1                        !The inner REPEAT loop
is used to check and wait
3400                  Rxqualsettle=-1                      !for the next SACCH
report from mobile. When the
3410                  Time=0                                !HP 8922M/S is waiting
for a report, after a SACCH
3420                  REPEAT                               !reset it returns -1
3430                  WAIT .3                               !Pause. SACCH is a
low bandwidth channel.
3440                  Time=Time+1
3450                  OUTPUT Uut;"MEAS:CELL:SACCH:PARTIAL:RQU?" !Read the SACCH report
from the mobile
3460                  ENTER Uut;Rxqualsettle                !-1 is returned if
HP 8922M/S is still waiting
3470                  UNTIL Time>7 OR Rxqualsettle<>-1    !for the report
3480                  IF Rxqualsettle<=4 THEN              !If RxQual is less
than 4, it's good enough to
3490                  Instance=Instance+1                  !continue. The program
checks for more than

```

# HP-IB Tutorial and Examples

## Program 1

```

3500      ELSE                                     !3 consecutive reports
at RxQual 4 or less to
3510      Instance=0                               !be be sure the mobile
has stabilized. The
3520      END IF                                   !mobile may return up
to 2 reports at the old
3530      UNTIL Count>20 OR Instance>3           !level, before it
recognizes the input level
3540      IF Count>20 OR Rxqualsettle=-1 THEN     !change
3550      Errcount=Errcount+1                     !If RxQual does not
stabilize, report an error
3560      Error$(Errcount)="Mobile receiver AGC did not respond to downlink level
change"
3570      END IF
3580      FOR Arcount=1 TO Numberarfcn            !Inner loop for BER
test ARFCN
3590      Arfcn=Berarfcn(Arcount)                 !Get ARFCN from array
3600      OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Arfcn !Request channel
assignment. HP 8922M/S will hold
3610      OUTPUT Uut;"TRIG:BET:MODE 'RUN'"        !off BER test until
channel change is done. Run test.
3620      OUTPUT Uut;"MEAS:CELL:SACCH:RESET"      !While BER test is
running, test SACCH reports
3630      Rxlev(Arcount,Rxcount)=-1              !Clear old reports
3640      Time=0
3650      REPEAT                                  !Loop and wait for
SACCH report. -1 is returned
3660      WAIT .3                                 !when HP 8922M/S is
waiting for report
3670      Time=Time+1
3680      OUTPUT Uut;"MEAS:CELL:SACCH:PARTIAL:RLEV?" !Read RxLev
3690      ENTER Uut;Rxlev(Arcount,Rxcount)
3700      OUTPUT Uut;"MEAS:CELL:SACCH:PARTIAL:RQU?" !Read RxQual
3710      ENTER Uut;Rxqual(Arcount,Rxcount)
3720      OUTPUT Uut;"MEAS:CELL:MS:TERR?"        !Also read uplink
timing error
3730      ENTER Uut;Txtim(Arcount,Rxcount)
3740      UNTIL Time>7 OR Rxlev(Arcount,Rxcount)<>-1 !Try again if SACCH
report not ready
3750      OUTPUT Uut;"MEAS:BET:BERR:RATIO1?"     !Read bit error test
result
3760      ENTER Uut;Ber1(Arcount,Rxcount)
3770      Ber1(Arcount,Rxcount)=Ber1(Arcount,Rxcount)/10000 !Convert from ppm to
%
3780      NEXT Arcount
3790      NEXT Rxcount
3800      OUTPUT Uut;"RFG:AMPL1 ";Bchpwr         !Reset downlink to
normal power
3810      CALL Sub_syserror(Uut,Error$(*),Errcount) !Check for any logged
errors
3820      !
3830      !=====
3840      !
3850      Clock(2)=TIMEDATE-Clock(2)             !Stop measurement timer
3860      Clock(3)=TIMEDATE                       !Start call clearing
timer
3870      !
3880      !=====
3890      !
3900      !END THE CALL
3910      !
3920      OUTPUT Uut;"DISP CELL1"                !Display the cell
control screen
3930      OUTPUT Uut;"CELL:CALL:END"            !Request a call ter-
mination
3940      Time=0                                  !Establish a loop to
wait for the mobile

```

HP-IB Tutorial and Examples  
**Program 1**

```

3950 REPEAT                                     !to clear the call
3960     Time=Time+1
3970     WAIT 1
3980     OUTPUT Uut;"CELL:CALL:STATUS:STATE?"    !Check the call status
3990     ENTER Uut;StatusS
4000     UNTIL StatusS=""INACTIVE"" OR Time>30    !Call status will go
to inactive when the
4010     IF Time>30 THEN                          !mobile has cleared
4020         Errcount=Errcount-1
4030         Errors(Errcount)="Mobile failed to end call" !Log an error if the
mobile fails to clear
4040         GOTO Timeflag                          !and go to the timeout
code
4050         CALL Sub_syserror(Uut,ErrorS(*),Errcount) !Check for any
HP 8922M/S logged errors
4060     END IF
4070     OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Dsparfcn(1) !Reset the ARFCN and
mobile Tx level ready
4080     OUTPUT Uut;"CELL:MS:TLEV ";Dspppwr(1)    !to begin testing the
next phone
4090
!=====
4100 !
4110     Clock(3)=TIMEDATE-Clock(3)                !Stop the call clearing
timer
4120 !
4130
!=====
4140 !
4150 !PRINT MEASUREMENT RESULTS
4160 !
4170     CALL
Sub_printit (Fparfcn(*),Fppwr(*),Fpwrmeas(*),Null(*),Null(*),Null(*),Null(*),NullstS(*
),Numfparfcn,Numfppwr,MessageS(3),MessageS(4),EmptystS,Empty)
4180     CALL
Sub_printit (Dsparfcn(*),Dspppwr(*),Slpwr(*),Pkpher(*),Rmspher(*),Frer(*),Null(*),MaskS
(*),Numdsparfcn,Numdsppwr,MessageS(5),MessageS(6),EmptystS,Empty)
4190     CALL
Sub_printit (Berarfcn(*),Berppwr(*),Ber1(*),Rxqual(*),Rxlev(*),Ttxtim(*),Null(*),NullstS
(*),Numberarfcn,Numberppwr,MessageS(7),MessageS(8),EmptystS,Empty)
4200 !
4210
!=====
4220 !
4230 !PRINT TEST TIMES AND ERROR MESSAGES
4240 !
4250 !
4260     FOR X=1 TO 3
4270         PRINT MessageS(X+9);DROUND(Clock(X),4);MessageS(9)
4280     NEXT X
4290     PRINT
4300     PRINT
4310     IF Errcount=0 THEN
4320         Errcount=1
4330         ErrorS(1)="No Errors"
4340     END IF
4350     FOR X=1 TO Errcount
4360         PRINT ErrorS(X)
4370     NEXT X
4380     Errcount=0
4390 !
4400
!=====
4410 !
4420 !LOOP IF ANOTHER PHONE IS TO BE TESTED
4430 !
4440     PRINT MessageS(2)
4450     INPUT AnswerS

```

## HP-IB Tutorial and Examples

### Program 1

```
4460 RunS="no"
4470 IF AnswerS="Y" OR AnswerS="y" THEN RunS="yes"
4480 UNTIL RunS<>"yes"
4490 END
4500 !
4510
=====
4520 !SUBROUTINES BELOW
4530
=====
4540 !
4550 !RESULTS PRINTING SUBROUTINE
4560 !
4570 SUB
Sub_printit(Result1(*),Result2(*),Result3(*),Result4(*),Result5(*),Result6(*),Result7
(*),Result8S(*),Numarfcn,Numpwr,TitleS,HeadingS,EmptystS,Empty)
4580 PRINT Titles
4590 PRINT
4600 PRINT HeadingS
4610 FOR Arcount=1 TO Numarfcn
4620 FOR Txcount=1 TO Numpwr
4630 PRINT Result1(Arcount),
4640 PRINT Result2(Txcount),
4650 IF Result3(1,1)<>Empty THEN PRINT DROUND(Result3(Arcount,Txcount),4),
4660 IF Result4(1,1)<>Empty THEN PRINT DROUND(Result4(Arcount,Txcount),4),
4670 IF Result5(1,1)<>Empty THEN PRINT DROUND(Result5(Arcount,Txcount),4),
4680 IF Result6(1,1)<>Empty THEN PRINT DROUND(Result6(Arcount,Txcount),4),
4690 IF Result7(1,1)<>Empty THEN PRINT DROUND(Result7(Arcount,Txcount),4),
4700 IF Result8S(1,1)<>EmptystS THEN PRINT Result8S(Arcount,Txcount),
4710 PRINT
4720 NEXT Txcount
4730 NEXT Arcount
4740 PRINT
4750 SUBEND
4760 !
4770 !=====
4780 !
4790 !CHECK FOR HP 8922M/S SYSTEM ERRORS
4800 !
4810 SUB Sub_syserror(Uut,ErrorS(*),Errcount)
4820 DIM SystemerrorS[100]
4830 REPEAT !Set up a loop to drain the
HP 8922M/S error stack
4840 OUTPUT Uut;"SYSTEM:ERROR?" !Read the last error from the
stack
4850 ENTER Uut;SystemerrorS
4860 IF VAL(SystemerrorS)<>0 THEN !Code 0 indicates no error
4870 Errcount=Errcount+1 !If not zero, add the error to
the programs error array
4880 ErrorS(Errcount)=SystemerrorS
4890 END IF
4900 UNTIL VAL(SystemerrorS)=0 !End when all the errors have
been read
4910 SUBEND
4920 !
4930 !=====
4940 !end of program
```



---

## Program 2

```

10  !RE-STORE "PROG2"
20  !RE-SAVE "PROG2:,1404"
30  !=====
40  !
50  !Example program 2
60  !
70  !Advanced HP-IB techniques for measuring a GSM900 mobile using the HP 8922S and M
80  !GSM MS Test Sets. The program measures Tx power, power vs time, phase and fre-
    quency
90  !error, bit error ratio, timing error, Rx Lev and Rx Qual. A hopping TCH is used
100 !to minimize channel change time. Power measurements are used to indicate when
    the mobile
110 !has settled after a Tx Level change
120 !
130 !(c) HEWLETT-PACKARD 1996
140 !
150 !Rev 1.0
160 !I R HP QMD 7.9.94
170 !Slightly modified by C B 24.1.96 - Changed F/H to M/S throughout
180 !=====
190 !
200 DIM Berpwr(5)           !Downlink power levels in dBm for bit error test
210 DIM Berarfcn(125)      !ARFCN to perform bit error test on
220 DIM Dspwr(15)         !Mobile Tx power levels for DSP test
230 DIM Dsparfcn(124)     !ARFCN to perform DSP test on
240 DIM Fparfcn(124)      !ARFCN to perform fast power test on
250 DIM Fppwr(15)         !Mobile Tx power levels for fast power test
260 DIM Message$(30)[100] !Output strings
270 DIM Error$(50)[100]   !Error message strings
280 DIM Err$(100)         !Internally used temporary error string
290 DIM Rmspher(50,50)    !Measurement results from rms phase error, dimen-
    sions(ARFCN, TXLEVEL)
300 DIM Pkpher(50,50)     !Measurement results from peak phase error
310 DIM Frer(50,50)       !Measurement results from freq error
320 DIM Slpwr(50,50)      !Measurement results from DSP analyzer power measure-
    ment
330 DIM Txtim(50,50)      !Tx timing error measurement results
340 DIM Fpwrmeas(50,50)   !Measurement results from fast power
350 DIM Ber1(50,50)       !Bit error test measurement results, dimen-
    sions(ARFCN, Downlink Power)
360 DIM Clock(5)          !Test Times
370 DIM Mask$(50,50)[10] !Power versus time limit mask specification
380 DIM Rxqual(50,50)     !RxQual measurement results, dimensions(ARFCN, Down-
    link Power)
390 DIM Rxlev(50,50)      !RxLev measurement results
400 DIM Null(50,50)       !Empty array
410 DIM Nullst$(50,50)[50] !Empty string array
420 DIM Ca$(124)          !String for CA (Cell Allocation) table, used for hop-
    ping call
430 DIM Ma$(63)           !String for MA (Mobile Allocation) table, used for
    hopping call
440 !
450 !=====
460 !
470 !GENERAL MEASUREMENT SET UP SPECIFIED
480 !
490 Uut=714                !HP-IB address of HP 8922M/S
500 Extloss=-1             !Loss of cable linking 8922 to mobile (loss=-xdB)
510 Bchpwr=-80             !BCCH power level in dBm
520 Imsis=""001012345678901"" !Paging IMSI of mobile's test SIM
530 Timeouttime=30        !The HP-IB timeout in seconds

```

## HP-IB Tutorial and Examples

### Program 2

```

540 Leveltol=1                !Power tolerance to indicate TX Level has settled
    after change (dB)
550 Fpthreshold=.3           !Power tolerance for fast power measurement after ana-
    lyzer channel change (dB)
560 !
570 !=====
580 !
590 !MEASUREMENT POINTS ARE DEFINED IN THIS SECTION
600 !
610 !Bit error ratio test
620 !
630 Numberpwr=1              !The number of downlink power levels for bit error
    test
640 Berpwr(1)=-102           !The power level in dBm of the first downlink power.
    Etc....
650 Bits1=10000              !The number of bits to test at each ARFCN/Power com-
    bination
660 Numberarfcn=3            !The number of ARFCN for bit error test
670 Berarfcn(1)=1            !The value of the first ARFCN. Etc....
680 Berarfcn(2)=65
690 Berarfcn(3)=124
700 !
710 !
720 !NOTE: with hopping call method used in this program, no two ARFCN in either DSP
    or Fast Power
730 !      should be placed too close together.  Closely spaced ARFCN will allow
    unwanted energy to
740 !      to fall within the HP 8922M/S IF bandwidth and RF rise trigger on the
    wrong timeslot.
750 !      Expect DSP FM Errors if this happens.
760 !
770 !DSP measurementnts
780 !
790 Numdspwr=3                !The number of mobile TX Levels for DSP test
800 Dspwr(1)=5                !The value of the first TX Level. Etc...
810 Dspwr(2)=10
820 Dspwr(3)=15
830 Numdsparfcn=3            !The number of ARFCN for DSP test
840 Dsparfcn(1)=1            !The value of the first ARFCN. Etc....
850 Dsparfcn(2)=65
860 Dsparfcn(3)=124
870 !
880 !Fast Power measurements
890 !
900 Numfppwr=8                !The number of mobile TX Levels for fast power test
910 Fppwr(1)=6                !The value of the first TX Level. Etc....
920 Fppwr(2)=7
930 Fppwr(3)=8
940 Fppwr(4)=9
950 Fppwr(5)=11
960 Fppwr(6)=12
970 Fppwr(7)=13
980 Fppwr(8)=14
990 Numfparfcn=3            !The number of ARFCN for fast power test
1000 Fparfcn(1)=1            !The value of the first ARFCN. Etc...
1010 Fparfcn(2)=65
1020 Fparfcn(3)=124
1030 !
1040 !=====
1050 !
1060 !PRINT MESSAGES ARE DEFINED BELOW
1070 !
1080 MessageS(1)="Answer call when mobile rings"
1090 MessageS(2)="Would you like to test again? (y or n)"
1100 MessageS(3)="Results from Fast Power Measurement"
1110 MessageS(4)="ARFCN    TXLEV    POWER dBm"
1120 MessageS(5)="Results from Power, Power vs Time & Modulation Measurements"
1130 MessageS(6)="ARFCN    TXLEV    POWER dBm    Pk & RMS PHASE    FREQ ERROR    MASK"

```

```

1140 MessageS(7)="Results from BER Test"
1150 MessageS(8)="ARFCN      Downlink dBm  BER1%  RxQual  RxLev      TIMERR"
1160 MessageS(9)=" Seconds."
1170 MessageS(10)="Time for phone to camp and answer page: "
1180 MessageS(11)="Time for testing                : "
1190 MessageS(12)="Time for call clear down        : "
1200 !
1210 EmptystS="@ "
1220 Empty=-999
1230 NullstS(1,1)=EmptystS
1240 Null(1,1)=Empty
1250 !
1260 !=====
1270 !
1280 !ERROR AND TIMEOUT HANDLING
1290 !
1300 Busport=INT(Uut/100)                !Get the HP-IB port code from Uut
address
1310 CLEAR Busport                      !Clear bus from any aborted previous
commands
1320 TimeinitS="yes"                    !Set a flag so timeout code is not
executed first pass
1330 ON TIMEOUT Busport,Timeouttime GOTO Timeflag          !Establish goto flag
for HPIB timeouts
1340 Timeflag;IF TimeinitS<>"yes" THEN          !After a timeout, execution comes
here
1350   OFF TIMEOUT Busport
1360   CLEAR Busport                      !Clear any half done commands
1370   OUTPUT Uut;"TRIG:AST 'disarm'"      !Disarm the DSP trigger
1380   CALL Sub_syserror(Uut,ErrorS(*),Errcount) !Gather any error message from the
HP 8922M/S
1390   PRINT "Measurement Timed Out. Ending Test"
1400   IF Errcount=0 THEN
1410     Errcount=1
1420     Errors(1)="No errors recorded"
1430   END IF
1440   FOR X=1 TO Errcount                  !Print error messages
1450     PRINT ErrorS(X)
1460   NEXT X
1470   STOP                                !Execution stops here after critical
errors
1480 ELSE
1490   TimeinitS="no"                      !Reset flag so next time, it must
be a real timeout
1500 END IF
1510 Errcount=0
1520 CALL Sub_syserror(Uut,ErrorS(*),Errcount) !Clear any old errors from
HP 8922M/S before the
1530 Errcount=0                            !test begins
1540 !
1550 !=====
1560 !
1570 !PRESET THE HP 8922M/S AND SET IT TO THE CORRECT COMPATIBILITY MODE (executed
once only)
1580 !
1590 !
1600 OUTPUT Uut;"*RST"                    !Preset the HP 8922M/S
1610 OUTPUT Uut;"CONF:COMP?"              !Check compatability mode and set
to M or S
1620 ENTER Uut;ProductS
1630 IF ProductS<>"8922S" AND ProductS<>"8922M" THEN
1640   IF ProductS="8922E" THEN OUTPUT Uut;"CONF:COMP '8922S'"
1650   IF ProductS="8922G" THEN OUTPUT Uut;"CONF:COMP '8922M'"
1660   OUTPUT Uut;"*RST"                    !A preset is needed after compat-
ability change
1670 END IF
1680 CALL Sub_syserror(Uut,ErrorS(*),Errcount) !Check for any errors logged by
HP 8922M/S

```

## HP-IB Tutorial and Examples

### Program 2

```

1690 !
1700
!=====
1710 !
1720 !CREATE CA AND MA TABLES FOR HOPPED TCH (executed once only)
1730 !
1740 !
1750 OUTPUT Uut;"DISP:SCR CCON" !Display the cell config screen
1760 OUTPUT Uut;"CCON:STATE 'settable'" !Take the cell down to edit CA and
MA tables
1770 Mano=0 !Count for number of MA entries
1780 CaS="" !String will be used for CA table
1790 FOR X=1 TO 124 !Count through 124 possible ARFCN
1800 BitS="0" !Set CA table entry initially to zero
1810 FOR Y=1 TO Numfparfcn !Check all fast power ARFCN for
ARFCN X
1820 IF Fparfcn(Y)=X THEN BitS="1" !If ARFCN = X make this CA entry
a one
1830 NEXT Y
1840 FOR Y=1 TO Numdsparfcn !Similarly check DSP ARFCN
1850 IF Dsparfcn(Y)=X THEN BitS="1"
1860 NEXT Y
1870 CaS=CaS&BitS !Add this digit to CA string
1880 IF BitS="1" THEN Mano=Mano+1 !If the entry is one, there will
need to be an MA entry
1890 NEXT X
1900 FOR X=1 TO 63 !Count through the MA table
1910 BitS="0" !Initial value for MA digit X
1920 IF Mano>0 THEN BitS="1" !Place the same number of 1s in
the MA as in the CA
1930 Mano=Mano-1
1940 MaS=MaS&BitS
1950 NEXT X
1960 OUTPUT Uut;"CCON:CA "&" "&CaS&"'" !Output the CA and MA tables
1970 OUTPUT Uut;"CCON:MA1 "&" "&MaS&"'"
1980 OUTPUT Uut;"CCON:MA2 "&" "&MaS&"'"
1990 OUTPUT Uut;"DISP:SCR CELL1" !Display the cell control screen,
and select +
2000 OUTPUT Uut;"CELL:MODE 'ACTIVE CELL +' !mode for hopped call. Mode change
activates cell
2010 !
2020 !
2030 !=====
2040 !
2050 !SET THE HP 8922M/S INITIAL CONDITIONS (executed once only)
2060 !
2070 !
2080 OUTPUT Uut;"MSINFO:PAGING:IMSI "&imsi$ !Set the paging IMSI
2090 OUTPUT Uut;"CONF:OFL:RFIN ";Extloss !Set the external cable loss
2100 OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Dsparfcn(1) !Set the ARFCN to the first
expected test point
2110 OUTPUT Uut;"CELL:MS:TLEV ";Dspppwr(1) !Set the mobile Tx Level to the
first test point
2120 OUTPUT Uut;"CONF:OFL:MODE 'ON'" !Turn external offset mode ON to
use cable loss
2130 OUTPUT Uut;"CW:PMZERO" !Zero the power meter
2140 OUTPUT Uut;"RFG:AMPL1 ";Bchpwr !Set the downlink power for normal
signalling
2150 OUTPUT Uut;"TRIG:MODE 'SINGLE'" !Set the DSP meas trigger to single
trig mode
2160 OUTPUT Uut;"TRIG:BET 'SINGLE'" !Set bit error meas trigger to sin-
gle trig mode
2170 OUTPUT Uut;"BET:BITS1 ";Bits1 !Set the number of bits to be mea-
sured for bit error
2180 OUTPUT Uut;"DISP:SCR DSP" !Display the DSP amplitude main
screen to enter limits
2190 OUTPUT Uut;"DISP:SCR:DSP:VIEW 'AMPL MAIN'" !for power versus time mask

```

HP-IB Tutorial and Examples  
**Program 2**

```

2200 DATA -40,-28,-18,-10,0,180,360,542.769,547.769,552.769,560.769,570.769 !Mask
corner times in us
2210 DATA -36,-30,-6,4,1,1,1,1,-6,-30,-36 !Upper
limits in dB
2220 DATA -60,-60,-60,-60,-1,-1,-1,-1,-60,-60,-60,-60 !Lower lim-
its in dB
2230 FOR X=1 TO 12
2240 READ Masktim !Reas corner times
from DATA statement
2250 Masktim=Masktim/1.E+6 !Convert seconds
2260 NumS=VALS(X) !Convert index to
string for HPIB
2270 OUTPUT Uut;"DSP:AMPL:"&"time"&NumS&" ";Masktim !Output marker times
2280 NEXT X
2290 FOR X=1 TO 12
2300 READ Maskup !Read and output upper
limits
2310 NumS=VALS(X)
2320 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :HLIM ";Maskup
2330 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :HLIM:STATE ON"
2340 NEXT X
2350 FOR X=1 TO 12
2360 READ Masklo !Read and output lower
limits
2370 NumS=VALS(X)
2380 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :LLIM ";Masklo
2390 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :LLIM:STATE ON"
2400 NEXT X
2410 !
2420
=====
2430 !
2440 !ESTABLISH A LOOP TO BE EXECUTED EACH TIME A MOBILE IS TESTED
2450 !
2460 !
2470 RunS="yes" !Flag for REPEAT loop
2480 REPEAT
2490 Clock(1)=TIMEDATE !Start a test time
clock for call set up
2500 !
2510
=====
2520 !
2530 !PAGE THE MOBILE AND ESTABLISH A CALL
2540 !
2550 !
2560 OUTPUT Uut;"DISP:SCR CELL1" !Display the cell
control screen
2570 PRINT Messages(1) !Output answer call
message
2580 OUTPUT Uut;"CELL:TCH1:MODE 'hopped'" !Set the TCH to hop
mode
2590 OUTPUT Uut;"CELL:CALL:ORIGINATE" !Page mobile HP 8922M/
S org call
2600 Time=0 !Set counter for mobile
to answer
2610 Maxtime=100
2620 REPEAT
2630 Time=Time+1
2640 WAIT 1
2650 OUTPUT Uut;"CELL:CALL:STATUS:STATE?" !Check the call status
for connected
2660 ENTER Uut;Status$
2670 UNTIL Status$=""CONNECTED"" OR Time>Maxtime
2680 IF Time>Maxtime THEN
2690 Errcount=Errcount+1
2700 Errors(Errcount)="Call could not be established"

```

## HP-IB Tutorial and Examples

### Program 2

```

2710      GOTO Timeflag                      !If wait too long,
goto timeout code
2720      END IF
2730      !
2740
!=====
2750      !
2760      Clock(1)=TIMEDATE-Clock(1)          !End call set up timer
2770      Clock(2)=TIMEDATE                  !Start measurement timer
2780      !
2790
!=====
2800      !
2810      !UNCOUPLE HP 8922M/S RF ANALYZER FROM GSM BASE STATION EMULATOR
2820      !
2830      OUTPUT Uut;"CELL:MS:TADV:MODE 'manual'"          !Fix timing advance
at 0 so 8922 doesn't auto adjust
2840      OUTPUT Uut;"TRIG:DDEM:AST 'disarm'"          !Disable the uplink
demodulator
2850      OUTPUT Uut;"HOPC:RFAN:AST 'disarm'"          !Stop the RF Analyzer
from hopping
2860      OUTPUT Uut;"HOPC:RFAN:MODE 'non-hop'"
2870      OUTPUT Uut;"TRIG:SOUR 'rf rise'"          !Trigger measurements
from RF rise, when the
2880      OUTPUT Uut;"TRIG:DEL 0"          !signal falls within
the IF bandwidth
2890      !
2900
!=====
2910      !
2920      !PERFORM DSP MEASUREMENTS
2930      !
2940      OUTPUT Uut;"DISP DSP"          !Return to the DSP
amplitude main screen
2950      FOR Txcount=1 TO Numdspwr          !Outer loop for Tx
levels
2960          Txlev=Dspwr(Txcount)          !Get Tx level from array
2970          OUTPUT Uut;"CELL:MS:TLEV";Txlev          !Program mobile's Tx
level
2980          Txlevchanges="true"
2990          FOR Arcount=1 TO Numdsparfcn          !Inner loop for ARFCN
3000              Arfcn=Dsparfcn(Arcount)          !Get ARFCN from array
3010              Freq=(890+Arfcn*.2)*1000000          !Calculate ARFCN fre-
quency
3020              OUTPUT Uut;"RFAN:FREQ ";Freq          !Tune the RF Analyzer
to select individual ARFCN
3030              Count=0          !Establish counter
for repeat measurements
3040              REPEAT          !May need to repeat
if mobile not settled
3050                  OUTPUT Uut;"TRIG:AST 'ARM'"          !Arm the DSP measure-
ment
3060                  OUTPUT Uut;"MEASURE:DSPANALYZER:PHASE:ERROR:RMS?"          !Read all the DSP
results: rms phase error
3070                  ENTER Uut;Rmspher(Arcount,Txcount)
3080      !Note: program will stick here, waiting for input if mobile fails to provide a
valid signal to trigger
3090      ! the HP 8922M/S. The program will timeout. The timeout code disarms the
HP 8922M/S trigger.
3100      OUTPUT Uut;"MEASURE:DSPANALYZER:PHASE:ERROR:PEAK?"
!
! peak phase error
3110      ENTER Uut;Pkppher(Arcount,Txcount)
3120      OUTPUT Uut;"MEASURE:DSPANALYZER:PHASE:ERROR:FRE-
QUENCY?"!
! frequency error
3130      ENTER Uut;Frer(Arcount,Txcount)
3140      OUTPUT Uut;"MEASURE:DSPANALYZER:MSUM?"
!
! power versus time mask
3150      ENTER Uut;MaskS(Arcount,Txcount)

```

HP-IB Tutorial and Examples  
**Program 2**

```

3160      OUTPUT Uut;"MEASURE:DSPANALYZER:PTCP?"
!
! Tx power
3170      ENTER Uut;Slpwr(Arcount,Txcount)
3180      OUTPUT Uut;"RFAN:AMPL1?"
!Read expected power
level to compare with
3190      ENTER Uut;Anlevel
!measured and +/-3dB
allowed range
3200      OUTPUT Uut;"MEASURE:DSPANALYZER:SSTATUS?"
!Check for any DSP
measurement errors
3210      ENTER Uut;Sstatus$
3220      Threedb=ABS(Anlevel-Slpwr(Arcount,Txcount))
!Calculate difference
between measured and expected
3230      Count=Count+1
3240      UNTIL Count=3 OR Threedb<Leveltol OR Txlevchange$="false" !Re-do DSP once
if phone fails, the mobile
3250      IF Sstatus$<>"No Error"" OR Threedb>3 THEN
!may still be settling
after Tx Level change
3260      Err$="DSP Measurement Problem "
!Create an error mes-
sage string
3270      IF Sstatus$<>"No Error"" THEN Err$=Err$&Sstatus$
3280      IF Threedb>3 THEN Err$=Err$&" 3dB input range exceeded"
3290      Errcount=Errcount+1
3300      Error$(Errcount)=Err$
3310      END IF
3320      Txlevchange$="false"
3330      NEXT Arcount
3340      NEXT Txcount
3350      !
3360
!=====
3370      !
3380      !PERFORM FAST POWER MEASUREMENTS
3390      !
3400      OUTPUT Uut;"DISP:SCR CELL1"
!Display cell control
screen
3410      FOR Txcount=Numfppwr TO 1 STEP -1
!Outer loop for mobile
Tx levels
3420      Txlev=Fppwr(Txcount)
!Get Tx level from array
3430      OUTPUT Uut;"CELL:MS:TLEV";Txlev
!Program mobile's Tx
level
3440      Txlevchange$="true"
3450      FOR Arcount=1 TO Numfparfcn
!Inner loop for ARFCN
3460      Arfcn=Fparfcn(Arcount)
!Get ARFCN from array
3470      Freq=(890+Arfcn*.2)*1000000
!Calculate frequency
from ARFCN
3480      OUTPUT Uut;"RFAN:FREQ ";Freq
!Tune analyzer fre-
quency
3490      Txlevcount=0
!Count for Tx Level
settling
3500      REPEAT
!Loop while mobile Tx
Level settles
3510      Count=0
!Count for inner loop
3520      Fastpower1=0
!Swap variable for
fast power measurement
3530      REPEAT
!Loop untill value
stabalizes after analyzer
3540      Fastpower2=Fastpower1
!tuning.
3550      OUTPUT Uut;"MEAS:FTCP:POW?"
!read the peak power
meter
3560      ENTER Uut;Fastpower1
3570      Deltapower=ABS(Fastpower1-Fastpower2)
!Look for change since
last measurement
3580      Count=Count+1
!Though away 4 old
readings (in HP 8922M/S
3590      UNTIL (Count>4 AND Deltapower<Fpthreshold) OR Count>10 !measurement
pipeline) then look for settled
3600      IF Count>10 THEN
!value on new mea-
surement ARFCN. If it never

```

## HP-IB Tutorial and Examples

### Program 2

```
3610          Errcount=Errcount+1                                !settles note an error
3620          Errors(Errcount)="Mobile's output power did not settle within
'Fpthreshold' limits"
3630          END IF
3640          Fpwrmeas(Arcount,Txcount)=(Fastpower1-Fastpower2)/2 !Average last two
good readings
3650          OUTPUT Uut;"RFAN:AMPL1?"                            !Read the HP 8922M/S
analyzer expected input level
3660          ENTER Uut;Anlevel                                  !and compare with the
measured power to check that
3670          Threedb=ABS(Anlevel-Fpwrmeas(Arcount,Txcount))    !the result is within
the allowed +/-3dB window
3680          Txlevcount=Txlevcount+1
3690          UNTIL Threedb<Leveltol OR Txlevcount>10 OR TxlevchangeS="false"
3700          IF Threedb>3 THEN
3710              Errcount=Errcount+1
3720              ErrorS(Errcount)="Fast power meas 3dB input range exceeded"
3730          END IF
3740          TxlevchangeS="false"
3750          NEXT Arcount
3760      NEXT Txcount
3770      !
3780      !=====
3790      !
3800      !RE-COUPLE HP 8922M/S RF ANALYZER TO BASE STATION EMULATOR
3810      !
3820      OUTPUT Uut;"TRIG:DEL 473.4T"                            !Set approx three
timeslot delay for internal
3830      OUTPUT Uut;"TRIG:SOUR 'ext demod'"                      !downlink trigger,
and select downlink trigger
3840      OUTPUT Uut;"HOPC:RFAN:MODE 'hop'"                      !Set analyzer back to
hopping mode
3850      OUTPUT Uut;"HOPC:RFAN:AST 'arm'"                       !Re-enable hopping
3860      OUTPUT Uut;"TRIG:DDEM:AST 'arm'"                       !Re-enable the uplink
demodulator
3870      OUTPUT Uut;"CELL:MS:TADV:MODE 'auto'"                 !Return to default
timing advance mode
3880      !
3890      !=====
3900      !
3910      !PERFORM BIT ERROR MEASUREMENTS
3920      !                                                    !Note: 4 BER measurements
can be made in parallel
3930      OUTPUT Uut;"DISP:SCR BER1"                              !Display single BER
test screen
3940      OUTPUT Uut;"CELL:TCH1:MODE 'single'"                  !Return to non-hop
TCH. Next channel change executes FACCH
3950      FOR Rxcount=1 TO Numberpwr                            !Outer loop for down-
link power levels
3960          Berpo=Berpwr(Rxcount)                              !Get downlink power
level from array
3970          OUTPUT Uut;"RFG:AMPL1 ";Berpo                      !Program HP 8922M/S
Generator to downlink power
3980          Count=0                                           !Establish a loop to
wait for the mobile's receiver
3990          Instance=0                                         !AGC to recover from
downlink level change.
4000          REPEAT                                           !The mobile's reported
RXQual will indicate when
4010              OUTPUT Uut;"MEAS:CELL:SACCH:RESET"           !the AGC has recov-
ered. Start by clearing old SACCH
4020              Count=Count+1                                  !The inner REPEAT loop
is used to check and wait
4030              Rxqualsettle=-1                                !for the next SACCH
report from mobile. When the
```



HP-IB Tutorial and Examples  
**Program 2**

```

4040      Time=0                                !HP 8922M/S is waiting
for a report, after a SACCH
4050      REPEAT                                !reset it returns -1
4060      WAIT .3                               !Pause. SACCH is a
low bandwidth channel.
4070      Time=Time+1
4080      OUTPUT Uut;"MEAS:CELL:SACCH:PARTIAL:RQU?" !Read the SACCH report
from the mobile
4090      ENTER Uut;Rxqualsettle                !-1 is returned if
HP 8922M/S is still waiting
4100      UNTIL Time>7 OR Rxqualsettle<>-1      !for the report
4110      IF Rxqualsettle<=4 THEN              !If RxQual is less
than 4, it's good enough to
4120      Instance=Instance+1                  !continuc. The program
checks for more than
4130      ELSE                                  !3 consecutive reports
at RxQual 4 or less to
4140      Instance=0                            !be be sure the mobile
has stabalized. The
4150      END IF                                !mobile may return up
to 2 reports at the old
4160      UNTIL Count>20 OR Instance>3         !level, before it
recognizes the input level
4170      IF Count>20 OR Rxqualsettle=-1 THEN  !change
4180      Errcount=Errcount+1                  !If RxQual does not
stabalize, report an error
4190      ErrorS(Errcount)="Mobile receiver AGC did not respond to downlink level
change"
4200      END IF
4210      FOR Arcount=1 TO Numberarfcn         !Inner loop for BER
test ARFCN
4220      Arfcn=Berarfcn(Arcount)              !Get ARFCN from array
4230      OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Arfcn !Request channel
assignment. HP 8922M/S will hold
4240      OUTPUT Uut;"TRIG:BET:MODE 'RUN'"      !off BER test until
channel change is done. Run test.
4250      OUTPUT Uut;"MEAS:CELL:SACCH:RESET"    !While BER test is
running, test SACCH reports
4260      Rxlev(Arcount,Rxcount)=-1            !Clear old reports
4270      Time=0
4280      REPEAT                                !Loop and wait for
SACCH report. -1 is returned
4290      WAIT .3                               !when HP 8922M/S is
waiting for report
4300      Time=Time+1
4310      OUTPUT Uut;"MEAS:CELL:SACCH:PARTIAL:RLEV?" !Read RxLev
4320      ENTER Uut;Rxlev(Arcount,Rxcount)
4330      OUTPUT Uut;"MEAS:CELL:SACCH:PARTIAL:RQU?" !Read RxQual
4340      ENTER Uut;Rxqual(Arcount,Rxcount)
4350      OUTPUT Uut;"MEAS:CELL:MS:TERR?"       !Also read uplink
timing error
4360      ENTER Uut;Ttxtim(Arcount,Rxcount)
4370      UNTIL Time>7 OR Rxlev(Arcount,Rxcount)<>-1 !Try again if SACCH
report not ready
4380      OUTPUT Uut;"MEAS:BET:BERR:RATIO1?"    !Read bit error test
result
4390      ENTER Uut;Ber1(Arcount,Rxcount)
4400      Ber1(Arcount,Rxcount)=Ber1(Arcount,Rxcount)/10000 !Convert from ppm to
%
4410      NEXT Arcount
4420      NEXT Rxcount
4430      OUTPUT Uut;"RFG:AMPL1 ";Bchpwr       !Reset downlink to
normal power
4440      !
4450
!=====
4460      !
4470      Clock(2)=TIMEDATE-Clock(2)           !Stop measurement timer

```

## HP-IB Tutorial and Examples

### Program 2

```
4480      Clock(3)=TIMEDATE                      !Start call clearing
timer
4490      !
4500
=====
4510      !
4520      !END THE CALL
4530      !
4540      OUTPUT Uut;"DISP CELL1"                !Display the cell
control screen
4550      OUTPUT Uut;"CELL:CALL:END"            !Request a call ter-
mination
4560      Time=0                                !Establish a loop to
wait for the mobile
4570      REPEAT                                !to clear the call
4580      Time=Time+1
4590      WAIT 1
4600      OUTPUT Uut;"CELL:CALL:STATUS:STATE?" !Check the call status
4610      ENTER Uut;StatusS
4620      UNTIL StatusS=""INACTIVE"" OR Time>30 !Call status will go
to inactive when the
4630      IF Time>30 THEN                        !mobile has cleared
4640      Errcount=Errcount+1
4650      Error$(Errcount)="Mobile failed to end call" !Log an error if the
mobile fails to clear
4660      GOTO Timeflag                          !and go to the timeout
code
4670      CALL Sub_syserror(Uut,Error$(*),Errcount) !Check for any
HP 8922M/S logged errors
4680      END IF
4690      OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Dsparfcn(1) !Reset the ARFCN and
mobile Tx level ready
4700      OUTPUT Uut;"CELL:MS:TLEV ";Dspwr(1)      !to begin testing the
next phone
4710
=====
4720      !
4730      Clock(3)=TIMEDATE-Clock(3)            !Stop the call clearing
timer
4740      !
4750
=====
4760      !
4770      !PRINT MEASUREMENT RESULTS
4780      !
4790      CALL
Sub_printit(Fparfcn(*),Fppwr(*),Fpwrmeas(*),Null(*),Null(*),Null(*),Null(*),Nullst$(*)
),Numfparfcn,Numfppwr,Message$(3),Message$(4),Emptyst$,Empty)
4800      CALL
Sub_printit(Dsparfcn(*),Dspwr(*),Slpwr(*),Pkppher(*),Rmspher(*),Frer(*),Null(*),Mask$(*)
),Numdsparfcn,Numdspwr,Message$(5),Message$(6),Emptyst$,Empty)
4810      CALL
Sub_printit(Berparfcn(*),Berpwr(*),Berl(*),Rxqual(*),Rxlev(*),Ttxtim(*),Null(*),Nullst$(*)
),Numberarfcn,Numberpwr,Message$(7),Message$(8),Emptyst$,Empty)
4820      !
4830
=====
4840      !
4850      !PRINT TEST TIMES AND ERROR MESSAGES
4860      !
4870      !
4880      FOR X=1 TO 3
4890      PRINT Message$(X+9);DROUND(Clock(X),4);Message$(9)
4900      NEXT X
4910      PRINT
4920      PRINT
4930      IF Errcount=0 THEN
4940      Errcount=1
```

```

4950     ErrorS(1)="No Errors"
4960     END IF
4970     FOR X=1 TO Errcount
4980         PRINT ErrorS(X)
4990     NEXT X
5000     Errcount=0
5010     !
5020
!=====
5030     !
5040     !LOOP IF ANOTHER PHONE IS TO BE TESTED
5050     !
5060         PRINT MessageS(2)
5070         INPUT AnswerS
5080         RunS="no"
5090         IF AnswerS="Y" OR AnswerS="y" THEN RunS="yes"
5100     UNTIL RunS<>"yes"
5110     END
5120     !
5130
!=====
5140     !SUBROUTINES BELOW
5150
!=====
5160     !
5170     !RESULTS PRINTING SUBROUTINE
5180     !
5190     SUB
Sub_printit(Result1(*),Result2(*),Result3(*),Result4(*),Result5(*),Result6(*),Result7
(*),Result8$(*),Numarfcn,Numpwr,Title$,Heading$,Emptyst$,Empty)
5200     PRINT Title$
5210     PRINT
5220     PRINT Heading$
5230     FOR Arcount=1 TO Numarfcn
5240         FOR Txcount=1 TO Numpwr
5250             PRINT Result1(Arcount),
5260             PRINT Result2(Txcount),
5270             IF Result3(1,1)<>Empty THEN PRINT DROUND(Result3(Arcount,Txcount),4),
5280             IF Result4(1,1)<>Empty THEN PRINT DROUND(Result4(Arcount,Txcount),4),
5290             IF Result5(1,1)<>Empty THEN PRINT DROUND(Result5(Arcount,Txcount),4),
5300             IF Result6(1,1)<>Empty THEN PRINT DROUND(Result6(Arcount,Txcount),4),
5310             IF Result7(1,1)<>Empty THEN PRINT DROUND(Result7(Arcount,Txcount),4),
5320             IF Result8$(1,1)<>Emptyst$ THEN PRINT Result8$(Arcount,Txcount),
5330             PRINT
5340         NEXT Txcount
5350     NEXT Arcount
5360     PRINT
5370     SUBEND
5380     !
5390     !=====
5400     !
5410     !CHECK FOR HP 8922M/S SYSTEM ERRORS
5420     !
5430     SUB Sub_syserror(Uut,ErrorS(*),Errcount)
5440         DIM Systemerrors[100]
5450         REPEAT                                     !Set up a loop to drain the
HP 8922M/S error stack
5460             OUTPUT Uut;"SYSTEM:ERROR?"           !Read the last error from the
stack
5470             ENTER Uut;Systemerrors
5480             IF VAL(Systemerrors)<>0 THEN
5490                 Errcount=Errcount+1           !Code 0 indicates no error
!If not zero, add the error to
the programs error array
5500                 ErrorS(Errcount)=Systemerrors
5510             END IF
5520             UNTIL VAL(Systemerrors)=0           !End when all the errors have
been read
5530     SUBEND

```

# HP-IB Tutorial and Examples

## Program 3

```
5540 !
5550 !=====
5560 !end of program
```

---

## Program 3

```
0 !RE-STORE "PROG3"
20 !RE-SAVE "PROG3:,1404"
30 !=====
40 !
50 !Example program 3
60 !
70 !HP-IB program to demonstrate techniques for measuring a GSM mobile operating in
test mode using
80 !the HP 8922M and S GSM MS Test Sets. The program uses the HP 8922M/S Aux RF Out
port to simulate
90 !the test mode mobile. In all other respects, the HP 8922M/S is configured to
measure a mobile
100 !without the use of over-the-air signalling. The program measures: Tx power,
power versus time,
110 !phase and frequency error and bit error ratio.
120 !
130 !(c) HEWLETT-PACKARD 1996
140 !
150 !Rev 1.0
160 !I R HP QMD 7.9.94
170 !Slightly modified by C B 24.1.96 - Changed F/H to M/S throughout
180 !=====
190 !
200 DIM Berpwr(5) !Downlink power levels in dBm for bit error test
210 DIM Berarfcn(125) !ARFCN to perform bit error test on
220 DIM Dspwr(15) !Mobile Tx power levels for DSP test
230 DIM Dsparfcn(124) !ARFCN to perform DSP test on
240 DIM Fparfcn(124) !ARFCN to perform fast power test on
250 DIM Fpwr(15) !Mobile Tx power levels for fast power test
260 DIM Message$(30)[100] !Output strings
270 DIM Errors(50)[100] !Error message strings
280 DIM Err$(100) !Internally used temporary error string
290 DIM Rmspher(50,50) !Measurement results from rms phase error, dimen-
sions(ARFCN, TXLEVEL)
300 DIM Pkpher(50,50) !Measurement results from peak phase error
310 DIM Frer(50,50) !Measurement results from freq error
320 DIM Slpwr(50,50) !Measurement results from DSP analyzer power measure-
ment
330 DIM Txtim(50,50) !Tx timing error measurement results
340 DIM Fpwrmeas(50,50) !Measurement results from fast power
350 DIM Ber1(50,50) !Bit error test measurement results, dimen-
sions(ARFCN, Downlink Power)
360 DIM Clock(5) !Test Times
370 DIM Mask$(50,50)[10] !Power versus time limit mask specification
380 DIM Rxqual(50,50) !RxQual measurement results, dimensions(ARFCN, Down-
link Power)
390 DIM Rxlev(50,50) !RxLev measurement results
400 DIM Null(50,50) !Empty array
410 DIM Nullst$(50,50)[50] !Empty string array
420 DIM Cas[124] !String for CA (Cell Allocation) table, used for hop-
ping call
430 DIM Mas[63] !String for MA (Mobile Allocation) table, used for
hopping call
440 !
450 !=====
460 !
```

```

470 !GENERAL MEASUREMENT SET UP SPECIFIED
480 !
490 Uut=714 !HP-IB address of HP 8922M/S
500 Extloss=-.5 !Loss of cable linking 8922 to mobile (loss=-xdb)
510 Bchpwr=-80 !BCCH power level in dBm
520 Timeouttime=20 !The HP-IB timeout in seconds
530 Leveltol=1 !Power tolerance to indicate TX Level has settled
after change (dB)
540 Fpthreshold=.3 !Power tolerance for fast power measurement after ana-
lyzer channel change (dB)
550 !
560 !=====
570 !
580 !MEASUREMENT POINTS ARE DEFINED IN THIS SECTION
590 !
600 !Bit error ratio test
610 !
620 Numberpwr=1 !The number of downlink power levels for bit error
test
630 Berpwr(1)=-102 !The power level in dBm of the first downlink power.
Etc...
640 Bits1=10000 !The number of bits to test at each ARFCN/Power com-
bination
650 Numberarfcn=3 !The number of ARFCN for bit error test
660 Berarfcn(1)=1 !The value of the first ARFCN. Etc...
670 Berarfcn(2)=65
680 Berarfcn(3)=124
690 !
700 !
710 !DSP measuremmts
720 !
730 Numdspwr=3 !The number of mobile TX Levels for DSP test
740 Dspwr(1)=5 !The value of the first TX Level. Etc...
750 Dspwr(2)=10
760 Dspwr(3)=15
770 Numdsparfcn=3 !The number of ARFCN for DSP test
780 Dsparfcn(1)=1 !The value of the first ARFCN. Etc...
790 Dsparfcn(2)=65
800 Dsparfcn(3)=124
810 !
820 !Fast Power measurements
830 !
840 Numfppwr=8 !The number of mobile TX Levels for fast power test
850 Fppwr(1)=6 !The value of the first TX Level. Etc...
860 Fppwr(2)=7
870 Fppwr(3)=8
880 Fppwr(4)=9
890 Fppwr(5)=11
900 Fppwr(6)=12
910 Fppwr(7)=13
920 Fppwr(8)=14
930 Numfparfcn=3 !The number of ARFCN for fast power test
940 Fparfcn(1)=1 !The value of the first ARFCN. Etc...
950 Fparfcn(2)=65
960 Fparfcn(3)=124
970 !
980 !=====
990 !
1000 !PRINT MESSAGES ARE DEFINED BELOW
1010 !
1020 Message$(1)="Answer call when mobile rings"
1030 Message$(2)="Would you like to test again? (y or n)"
1040 Message$(3)="Results from Fast Power Measurement"
1050 Message$(4)="ARFCN TXLEV POWER dBm"
1060 Message$(5)="Results from Power, Power vs Time & Modulation Measurements"
1070 Message$(6)="ARFCN TXLEV POWER dBm Pk & RMS PHASE FREQ ERROR MASK"
1080 Message$(7)="Results from BER Test"
1090 Message$(8)="ARFCN Downlink dBm BER1% RxQual RxLev TIMERR"

```

## HP-IB Tutorial and Examples

### Program 3

```
1100 MessageS(9)=" Seconds."
1110 MessageS(10)="Time for phone to camp and answer page: "
1120 MessageS(11)="Time for testing : "
1130 MessageS(12)="Time for call clear down : "
1140 !
1150 EmptystS="@ "
1160 Empty=-999
1170 NullstS(1,1)=EmptystS
1180 Null(1,1)=Empty
1190 !
1200 !=====
1210 !
1220 !ERROR AND TIMEOUT HANDLING
1230 !
1240 Busport=INT(Uut/100) !Get the HP-IB port code from Uut
address
1250 CLEAR Busport !Clear bus from any aborted previous
commands
1260 TimeinitS="yes" !Set a flag so timeout code is not
executed first pass
1270 ON TIMEOUT Busport,Timeouttime GOTO Timeflag !Establish goto flag
for HPIB timeouts
1280 Timeflag:IF TimeinitS<>"yes" THEN !After a timeout, execution comes
here
1290 OFF TIMEOUT Busport
1300 CLEAR Busport !Clear any half done commands
1310 OUTPUT Uut;"TRIG:AST 'disarm'" !Dissarm the DSP trigger
1320 CALL Sub_syserror(Uut,Error$(*),Errcount) !Gather any error message from the
HP 8922M/S
1330 PRINT "Measurement Timed Out. Ending Test"
1340 IF Errcount=0 THEN
1350 Errcount=1
1360 ErrorS(1)="No errors recorded"
1370 END IF
1380 FOR X=1 TO Errcount !Print error messages
1390 PRINT ErrorS(X)
1400 NEXT X
1410 STOP !Execution stops here after critical
errors
1420 ELSE
1430 TimeinitS="no" !Reset flag so next time, it must
be a real timeout
1440 END IF
1450 Errcount=0
1460 CALL Sub_syserror(Uut,Error$(*),Errcount) !Clear any old errors from
HP 8922M/S before the
1470 Errcount=0 !test begins
1480 !
1490 !=====
1500 !
1510 !PRESET THE HP 8922M/S AND SET IT TO THE CORRECT COMPATIBILITY MODE (executed
once only)
1520 !
1530 !
1540 OUTPUT Uut;"*RST" !Preset the HP 8922M/S
1550 OUTPUT Uut;"CONF:COMP?" !Check compatability mode and set
to F or H
1560 ENTER Uut;ProductS
1570 IF ProductS<>"8922S" AND ProductS<>"8922M" THEN
1580 IF ProductS="8922E" THEN OUTPUT Uut;"CONF:COMP '8922S'"
1590 IF ProductS="8922G" THEN OUTPUT Uut;"CONF:COMP '8922M'"
1600 OUTPUT Uut;"*RST" !A preset is needed after compat-
ability change
1610 END IF
1620 CALL Sub_syserror(Uut,Error$(*),Errcount) !Check for any errors logged by
HP 8922M/S
1630 !
```

HP-IB Tutorial and Examples  
**Program 3**

```

1640
!=====
1650 !
1660 !SELECT HP 8922M/S OPERATING MODE TO SUITE MOBILES IN TEST MODE (executed once
only)
1670 !
1680 OUTPUT Uut;"CELL:MODE 'TEST MODE'"           !Select Test Mode operation
1690 !
1700 !
1710 !=====
1720 !
1730 !SET THE HP 8922M/S INITIAL CONDITIONS (executed once only)
1740 !
1750 !
1760 OUTPUT Uut;"CONF:OFL:RFIN ";Extloss           !Set the external cable loss
1770 OUTPUT Uut;"CONF:OFL:MODE 'ON'"               !Turn external offset mode ON to
use cable loss
1780 OUTPUT Uut;"CW:PMZERO"                       !Zero the power meter
1790 OUTPUT Uut;"RFG:AMPL1 ";Bchpwr               !Set the downlink power for normal
signalling
1800 OUTPUT Uut;"TRIG:MODE 'SINGLE'"               !Set the DSP meas trigger to single
trig mode
1810 OUTPUT Uut;"TRIG:BET 'SINGLE'"               !Set bit error meas trigger to sin-
gle trig mode
1820 OUTPUT Uut;"BET:BITS1 ";Bits1               !Set the number of bits to be mea-
sured for bit error
1830 OUTPUT Uut;"DISP:SCR DSP"                   !Display the DSP amplitude main
screen to enter limits
1840 OUTPUT Uut;"DISP:SCR:DSP:VIEW 'AMPL MAIN'"   !for power versus time mask
1850 DATA -40,-28,-18,-10,0,180,360,542.769,547.769,552.769,560.769,570.769 !Mask
corner times in us
1860 DATA -36,-30,-6,4,1,1,1,1,-6,-30,-36           !Upper
limits in dB
1870 DATA -60,-60,-60,-60,-1,-1,-1,-1,-60,-60,-60,-60 !Lower lim-
its in dB
1880 FOR X=1 TO 12
1890 READ Masktim                                 !Reas corner times
from DATA statement
1900 Masktim=Masktim/1.E+6                         !Convert seconds
1910 NumS=VALS(X)                                  !Convert index to
string for HPIB
1920 OUTPUT Uut;"DSP:AMPL:"&"time"&NumS&" ";Masktim !Output marker times
1930 NEXT X
1940 FOR X=1 TO 12
1950 READ Maskup                                  !Read and output upper
limits
1960 NumS=VALS(X)
1970 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :HLIM ";Maskup
1980 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :HLIM:STATE ON"
1990 NEXT X
2000 FOR X=1 TO 12
2010 READ Masklo                                  !Read and output lower
limits
2020 NumS=VALS(X)
2030 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :LLIM ";Masklo
2040 OUTPUT Uut;"MEAS:DSP:AMPL:"&"AMPL"&NumS&" :LLIM:STATE ON"
2050 NEXT X
2060 !
2070
!=====
2080 !
2090 !CALL SUBROUTINE ASKING USER TO MAKE APROPRIATE CABLE CONNECTIONS
2100 !
2110 CALL Sub_trickmobile(Uut,"CABLE",0,0,Trickfreq,0) !Ask user to connect
HP 8922M/S ports to
2120 !                                           !emulate a mobile in
test mode
2130 !

```

## HP-IB Tutorial and Examples

### Program 3

```

2140
!=====
2150 !
2160 !ESTABLISH A LOOP TO BE EXECUTED EACH TIME A MOBILE IS TESTED
2170 !
2180 !
2190 RunS="yes" !Flag for REPEAT loop
2200 REPEAT
2210 Clock(1)=TIMEDATE !Start a test time
clock for call set up
2220 !
2230
!=====
2240 !
2250 !ACTIVATE THE MOBILE IN TEST MODE
2260 !
2270 CALL Sub_trickmobile(Uut,"TXON",Dsparfcn(1),Dsppwr(1),Trickfreq,Extloss)
!Activate the test mode mobile
2280 !
2290
!=====
2300 !
2310 Clock(1)=TIMEDATE-Clock(1) !End call set up timer
2320 Clock(2)=TIMEDATE !Start measurement timer
2330 !
2340
!=====
2350 !
2360 !PERFORM DSP MEASUREMENTS
2370 !
2380 OUTPUT Uut;"DISP DSP" !Return to the DSP
amplitude main screen
2390 FOR Txcount=1 TO Numdsppwr !Outer loop for Tx
levels
2400 Txlev=Dsppwr(Txcount) !Get Tx level from array
2410 OUTPUT Uut;"CELL:MS:TLEV";Txlev !Adjust Analyzer to
correct power for mobile
2420 CALL Sub_trickmobile(Uut,"TXLEV",0,Txlev,Trickfreq,Extloss) !Command test
mode mobile to new Tx Level
2430 Txlevchange$="true"
2440 FOR Arccount=1 TO Numdsparfcn !Inner loop for ARFCN
2450 Arfcn=Dsparfcn(Arccount) !Get ARFCN from array
2460 Freq=(890+Arfcn*.2)*1000000 !Calculate ARFCN fre-
quency
2470 CALL Sub_trickmobile(Uut,"ARFCN",Arfcn,0,Freq,Extloss) !Command test mode
mobile to new ARFCN
2480 OUTPUT Uut;"RFAN:FREQ ";Freq !Tune Analyzer to
correct frequency
2490 Count=0 !Establish counter
for repeat measurements
2500 REPEAT !May need to repeat
if mobile not settled
2510 OUTPUT Uut;"TRIG:AST 'ARM'" !Arm the DSP measure-
ment
2520 OUTPUT Uut;"MEASURE:DS PANALYZER:PHASE:ERROR:RMS?" !Read all the DSP
results: rms phase error
2530 ENTER Uut;Rmspher(Arccount,Txcount)
2540 !Note: program will stick here, waiting for input if mobile fails to provide a
valid signal to trigger
2550 ! the HP 8922M/S. The program will timeout. The timeout code disarms the
HP 8922M/S trigger.
2560 OUTPUT Uut;"MEASURE:DS PANALYZER:PHASE:ERROR:PEAK?"
!
peak phase error
2570 ENTER Uut;Pkpher(Arccount,Txcount)
2580 OUTPUT Uut;"MEASURE:DS PANALYZER:PHASE:ERROR:FRE-
QUENCY?!"
frequency error
2590 ENTER Uut;Frer(Arccount,Txcount)

```



HP-IB Tutorial and Examples  
**Program 3**

```

2600      OUTPUT Uut;"MEASURE:DSPANALYZER:MSUM?"
!
!           power versus time mask
2610      ENTER Uut;Mask$(Arcount,Txcount)
2620      OUTPUT Uut;"MEASURE:DSPANALYZER:PTCP?"
!
!           Tx power
2630      ENTER Uut;Slpwr(Arcount,Txcount)
2640      OUTPUT Uut;"RFAN:AMPL1?"
level to compare with
!Read expected power
2650      ENTER Uut;Anlevel
!measured and +/-3dB
allowed range
2660      OUTPUT Uut;"MEASURE:DSPANALYZER:SSTATUS?"
measurement errors
!Check for any DSP
2670      ENTER Uut;Sstatus
2680      Threedb=ABS(Anlevel-Slpwr(Arcount,Txcount))
!Calculate difference
between measured and expected
2690      Count=Count+1
2700      UNTIL Count=3 OR Threedb<Leveltol OR Txlevchanges="false" !Re-do DSP once
if phone fails, the mobile
2710      IF Sstatus$<>"No Error"" OR Threedb>3 THEN
after Tx Level change
!may still be settling
2720      Err$="DSP Measurement Problem "
!Create an error mes-
sage string
2730      IF Sstatus$<>"No Error"" THEN Err$=Err$&Sstatus$
2740      IF Threedb>3 THEN Err$=Err$&" 3dB input range exceeded"
2750      Errcount=Errcount+1
2760      Error$(Errcount)=Err$
2770      END IF
2780      Txlevchange$="false"
2790      NEXT Arcount
2800      NEXT Txcount
2810      !
2820      !
!=====
2830      !
2840      !PERFORM FAST POWER MEASUREMENTS
2850      !
2860      OUTPUT Uut;"DISP:SCR CELL1"
screen
!Display cell control
2870      FOR Txcount=Numfppwr TO 1 STEP -1
Tx levels@@@
!Outer loop for mobile
2880      Txlev=Fppwr(Txcount)
!Get Tx level from array
2890      OUTPUT Uut;"CELL:MS:TLEV";Txlev
!Adjust analyzer to
correct expected power
2900      CALL Sub_trickmobile(Uut,"TXLEV",0,Txlev,Trickfreq,Extloss) !Command test
mode mobile to new T Level
2910      Txlevchanges="true"
2920      FOR Arcount=1 TO Numfparfcn
!Inner loop for ARFCN
2930      Arfcn=Fparfcn(Arcount)
!Get ARFCN from array
2940      Freq=(890+Arfcn*.2)*1000000
!Calculate frequency
from ARFCN
2950      CALL Sub_trickmobile(Uut,"ARFCN",Arfcn,0,Freq,Extloss) !Command test mode
mobile to new ARFCN
2960      OUTPUT Uut;"RFAN:FREQ ";Freq
!Tune analyzer fre-
quency
2970      Txlevcount=0
!Count for Tx Level
settling
2980      REPEAT
!Loop while mobile Tx
Level settles
2990      Count=0
!Count for inner loop
3000      Fastpower1=0
!Swap variable for
fast power measurement
3010      REPEAT
!Loop untill value
stabalizes after analyzer
3020      Fastpower2=Fastpower1
!tuning.
3030      OUTPUT Uut;"MEAS:FTCP:POW?"
!read the peak power
meter
3040      ENTER Uut;Fastpower1

```

## HP-IB Tutorial and Examples

### Program 3

```

3050      Deltapower=ABS(Fastpower1-Fastpower2)           !Look for change since
last measurement
3060      Count=Count+1                                   !Though away 4 old
readings (in HP 8922M/S
3070      UNTIL (Count>4 AND Deltapower<Fpthreshold) OR Count>10 !measurement
pipeline) then look for settled
3080      IF Count>10 THEN                               !value on new mea-
surement ARFCN. If it never
3090      Errcount=Errcount+1                           !settles note an error
3100      Error$(Errcount)="Mobile's output power did not settle within
'Fpthreshold' limits"
3110      END IF
3120      Fpwrmeas(Arcount,Txcount)=(Fastpower1+Fastpower2)/2 !Average last two
good readings
3130      OUTPUT Uut;"RFAN:AMPL1?"                       !Read the HP 8922M/S
analyzer expected input level
3140      ENTER Uut;Anlevel                               !and compare with the
measured power to check that
3150      Threedb=ABS(Anlevel-Fpwrmeas(Arcount,Txcount)) !the result is within
the allowed +/-3dB window
3160      Txlevcount=Txlevcount+1
3170      UNTIL Threedb<Leveltol OR Txlevcount>10 OR Txlevchange$="false"
3180      IF Threedb>3 THEN
3190      Errcount=Errcount+1
3200      Error$(Errcount)="Fast power meas 3dB input range exceeded"
3210      END IF
3220      Txlevchange$="false"
3230      NEXT Arcount
3240      NEXT Txcount
3250      !
3260      !
=====
3270      !
3280      !PERFORM BIT ERROR MEASUREMENTS
3290      !                                           !Note: 4 BER measurements
can be made in parallel
3300      OUTPUT Uut;"DISP:SCR BER1"                     !Display single BER
test screen
3310      FOR Rxcount=1 TO Numberpwr                     !Outer loop for down-
link power levels
3320      Berpo=Berpwr(Rxcount)                          !Get downlink power
level from array
3330      OUTPUT Uut;"RFG:AMPL1 ";Berpo                 !Program HP 8922M/S
Generator to downlink power
3340      FOR Arcount=1 TO Numberarfcn                   !Inner loop for BER
test ARFCN
3350      Arfcn=Berarfcn(Arcount)                       !Get ARFCN from array
3360      Freq=(890+Arfcn*.2)*1000000                   !Calculate frequency
from ARFCN
3370      CALL Sub_trickmobile(Uut,"ARFCN",Arfcn,0,Freq,Extloss) !Command test mode
mobile to new ARFCN
3380      OUTPUT Uut;"RFAN:FREQ ";Freq                  !Tune analyzer fre-
quency
3390      OUTPUT Uut;"TRIG:BET:MODE 'RUN'"              !off BER test until
channel change is done. Run test.
3400      OUTPUT Uut;"MEAS:BET:BERR:RATIO1?"            !Read bit error test
result
3410      ENTER Uut;Ber1(Arcount,Rxcount)
3420      Ber1(Arcount,Rxcount)=Ber1(Arcount,Rxcount)/10000 !Convert from ppm to
%
3430      NEXT Arcount
3440      NEXT Rxcount
3450      OUTPUT Uut;"RFG:AMPL1 ";Bchpwr                 !Reset downlink to
normal power
3460      !
3470      !
=====
3480      !

```

HP-IB Tutorial and Examples  
**Program 3**

```

3490   Clock(2)=TIMEDATE-Clock(2)                               !Stop measurement timer
3500   Clock(3)=TIMEDATE                                       !Start call clearing
timer
3510   !
3520
!=====
3530   !
3540   !END THE CALL
3550   !
3560   CALL Sub_trickmobile(Uut,"TXOFF",0,0,Trickfreq,0)       !Dissable the test
mode mobile
3570   CALL Sub_syserror(Uut,ErrorS(*),Errcount)             !Check for any
HP 8922M/S logged errors
3580   !
3590   !
3600
!=====
3610   !
3620   Clock(3)=TIMEDATE-Clock(3)                             !Stop the call clearing
timer
3630   !
3640
!=====
3650   !
3660   !PRINT MEASUREMENT RESULTS
3670   !
3680   CALL
Sub_printit(Fparfcn(*),Fppwr(*),Fpwrmeas(*),Null(*),Null(*),Null(*),Null(*),NullstS(*
),Numfparfcn,Numfppwr,MessageS(3),MessageS(4),EmptystS,Empty)
3690   CALL
Sub_printit(Dsparfcn(*),Dppwr(*),Slpwr(*),Pkpher(*),Rmspher(*),Frer(*),Null(*),MaskS
(*),Numdsparfcn,Numdspwr,MessageS(5),MessageS(6),EmptystS,Empty)
3700   CALL
Sub_printit(Berarfcn(*),Berpwr(*),Ber1(*),Rxqual(*),Rxlev(*),Ttxtim(*),Null(*),NullstS
(*),Numberarfcn,Numberpwr,MessageS(7),MessageS(8),EmptystS,Empty)
3710   !
3720
!=====
3730   !
3740   !PRINT TEST TIMES AND ERROR MESSAGES
3750   !
3760   !
3770   FOR X=1 TO 3
3780     PRINT Message$(X+9);DROUND(Clock(X),4);Message$(9)
3790   NEXT X
3800   PRINT
3810   PRINT
3820   IF Errcount=0 THEN
3830     Errcount=1
3840     ErrorS(1)="No Errors"
3850   END IF
3860   FOR X=1 TO Errcount
3870     PRINT Error$(X)
3880   NEXT X
3890   Errcount=0
3900   !
3910
!=====
3920   !
3930   !LOOP IF ANOTHER PHONE IS TO BE TESTED
3940   !
3950   PRINT Message$(2)
3960   INPUT Answer$
3970   RunS="no"
3980   IF AnswerS="Y" OR AnswerS="y" THEN RunS="yes"
3990   UNTIL RunS<>"yes"
4000   END
4010   !

```

## HP-IB Tutorial and Examples

### Program 3

```
4020
!=====
4030 !SUBROUTINES BELOW
4040
!=====
4050 !
4060 !RESULTS PRINTING SUBROUTINE
4070 !
4080 SUB
Sub_printit(Result1(*),Result2(*),Result3(*),Result4(*),Result5(*),Result6(*),Result7
(*),Result8S(*),Numarfcn,Numpwr,TitleS,HeadingS,EmptystS,Empty)
4090 PRINT TitleS
4100 PRINT
4110 PRINT HeadingS
4120 FOR Arcount=1 TO Numarfcn
4130 FOR Txcount=1 TO Numpwr
4140 PRINT Result1(Arcount),
4150 PRINT Result2(Txcount),
4160 IF Result3(1,1)<>Empty THEN PRINT DROUND(Result3(Arcount,Txcount),4),
4170 IF Result4(1,1)<>Empty THEN PRINT DROUND(Result4(Arcount,Txcount),4),
4180 IF Result5(1,1)<>Empty THEN PRINT DROUND(Result5(Arcount,Txcount),4),
4190 IF Result6(1,1)<>Empty THEN PRINT DROUND(Result6(Arcount,Txcount),4),
4200 IF Result7(1,1)<>Empty THEN PRINT DROUND(Result7(Arcount,Txcount),4),
4210 IF Result8S(1,1)<>EmptystS THEN PRINT Result8S(Arcount,Txcount),
4220 PRINT
4230 NEXT Txcount
4240 NEXT Arcount
4250 PRINT
4260 SUBEND
4270 !
4280 !=====
4290 !
4300 !CHECK FOR HP 8922M/S SYSTEM ERRORS
4310 !
4320 SUB Sub_syserror(Uut,Error$(*),Errcount)
4330 DIM SystemerrorS[100]
4340 REPEAT
HP 8922M/S error stack
4350 OUTPUT Uut;"SYSTEM:ERROR?"
stack
4360 ENTER Uut;SystemerrorS
4370 IF VAL(SystemerrorS)<>0 THEN
4380 Errcount=Errcount+1
the programs error array
4390 Error$(Errcount)=SystemerrorS
4400 END IF
4410 UNTIL VAL(Systemerror$)=0
4420 SUBEND
4430 !
4440 !=====
4450 !
4460 !CONFIGURE THE HP 8922M/S AUX RF OUT PORT TO EMULATE A MOBILE IN TEST MODE
4470 !
4480 !This subroutine uses unsupported HP-IB commands to 'trick' the HP 8922M/S into
operating as if
4490 !a test mode mobile was connected. The Aux RF Out port is configured to emulate
the mobile.
4500 !Replacing this subroutine with one to control a real GSM mobile would allow the
program to be
4510 !used in a real application
4520 !
4530 SUB Sub_trickmobile(Uut,FuncS,Arfcn,Txlev,Trickfreq,Extloss)
4540 Trickfreq=(935+Arfcn*.2)*1000000
4550 Trickloss=Extloss+(2*Txlev)-43+7
```

HP-IB Tutorial and Examples  
Program 3

```
4560     IF FuncS="TXON" THEN                                !These commands configure the
generator to begin                                         !emulating the mobile
4570     OUTPUT Uut;"RFG:AMPL2 7DBM"
4580     OUTPUT Uut;"RFG:OUTP 'AUX RFOUT'"
4590     OUTPUT Uut;"CONF:OFL:RFIN ";Trickloss
4600     OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Arfcn
4610     OUTPUT Uut;"CELL:CALL:TCH:TSL 2"
4620     OUTPUT Uut;"CELL:CALL:ORIGINATE"
4630     OUTPUT Uut;"SERV:LATCH:SEL 'g_pulse_start_trig'"
4640     OUTPUT Uut;"SERV:LATCH:VALUE 1431"
4650     OUTPUT Uut;"SERV:LATCH:SEL 'g_pulse_stop_trig'"
4660     OUTPUT Uut;"SERV:LATCH:VALUE 1281"
4670     OUTPUT Uut;"SERV:LATCH:SEL 'g_tx_slot'"
4680     OUTPUT Uut;"SERV:LATCH:VALUE 5"
4690     OUTPUT Uut;"SERV:LATCH:SEL 'g_mux_a_cntl'"
4700     OUTPUT Uut;"SERV:LATCH:VALUE 75"
4710     OUTPUT Uut;"SERV:LATCH:SEL 'g_hop_to_bch'"
4720     OUTPUT Uut;"SERV:LATCH:VALUE 1536"
4730     OUTPUT Uut;"RFG:MOD:PULS 'EXT'"
4740     END IF
4750     IF FuncS="ARFCN" THEN                                !These commands simulate a chan-
nel change by                                             !re-tuning the generator
4760     OUTPUT Uut;"CELL:CALL:TCH:ARFCN ";Arfcn
4770     OUTPUT Uut;"SERV:LATCH:SEL 'g_tx_slot'"
4780     OUTPUT Uut;"SERV:LATCH:VALUE 5"
4790     OUTPUT Uut;"SERV:LATCH:SEL 'g_mux_a_cntl'"
4800     OUTPUT Uut;"SERV:LATCH:VALUE 75"
4810     OUTPUT Uut;"SERV:LATCH:SEL 'g_hop_to_bch'"
4820     OUTPUT Uut;"SERV:LATCH:VALUE 1536"
4830     END IF
4840     IF FuncS="TXLEV" THEN                                !These commands simulate a Tx
Level Change                                              !mobile off
4850     OUTPUT Uut;"CONF:OFL:RFIN ";Trickloss
4860     END IF
4870     IF FuncS="TXOFF" THEN                                !Dissable the TCH to simulate
turning the
4880     OUTPUT Uut;"CELL:CALL:END"
4890     END IF
4900     IF FuncS="CABLE" THEN
4910     PRINT
4920     PRINT "Connect a short cable from the HP 8922M/S AUX RF OUT"
4930     PRINT "to the RF IN/OUT port"
4940     PRINT
4950     PRINT "Cycle instrument power when testing is complete"
4960     PRINT
4970     PRINT "Press Return when ready"
4980     PRINT
4990     INPUT Dummies
5000     END IF
5010 SUBEND
5020 !
5030 !=====
5040 !end of program
```

---

## Transient Settling Times

The following transient settling (wait times) should be considered when executing HP-IB programs from an external controller or using the built-in IBASIC controller to execute programs.

---

### NOTE

During query loops (especially for IBASIC applications), it is recommended to use a WAIT statement like WAIT Delta\_t, where Delta\_t is user defined (i.e. WAIT 0.5 ! wait 0.5 seconds).

**1** Each of the following operations requires checking that a certain state has been reached before continuing with other HP-IB commands:

- a)** Ending a Call. Wait for CELL CONTROL Call Status to be 'INACTIVE' and then check for Call Status RR to be 'BCCH'.

```
OUTPUT 714;"CELL:CALL:END"  
REPEAT  
  WAIT Delta_t  
  OUTPUT 714;"CELL:CALL:STATUS:STATE?" ! Query the Call Status  
  ENTER 714;QueryS  
  UNTIL QueryS=""INACTIVE""  
  IF (QueryS=""INACTIVE"")  
    REPEAT  
      WAIT Delta_t  
      OUTPUT 714;"CELL:CALL:STAT:RR?" ! Query the RR Call Status  
      ENTER 714;QueryS  
      UNTIL QueryS=""BCCH""  
    END IF
```

- b)** Originating a Call. Must wait for CELL CONTROL Call Status to be 'CONNECTED':

```
OUTPUT 714;"CELL:CALL:ORIG"  
! Answer call when the mobile rings  
REPEAT  
  WAIT Delta_t  
  OUTPUT 714;"CELL:CALL:STATUS:STATE?" ! Query the Call Status  
  ENTER 714;QueryS  
  UNTIL QueryS=""CONNECTED""
```

- c) Setting the HP 8922M/S to an Activated state. Must wait for the CELL CONTROL Signaling (RR) Call Status to be 'BCCH'.

```
OUTPUT 714;"DISP CCON"  
OUTPUT 714;"CCON:STAT 'ACTIVATED'"  
DISP "Waiting for HP 8922M/S to provide BCCH. . ."  
REPEAT  
  WAIT Delta_t  
  OUTPUT 714;"CELL:CALL:STAT:RR?"      ! Query the RR Call Status  
  ENTER 714;QueryS  
UNTIL QueryS="" "BCCH""
```

- d) Setting the HP 8922M/S back to a Settable state. Must wait for the field to change its state.

```
OUTPUT 714;"CCON:STAT 'SETTABLE'"  
REPEAT  
  WAIT Delta_t  
  OUTPUT 714;"CCON:STAT?"      ! Query the Cell Configure state  
  ENTER 714;QueryS  
UNTIL QueryS="" "SETTABLE""
```

- e) Doing a PRESET (\*RST). Must make sure the call is ended (See (a)).
- f) Running a Bit Error Test measurement. Must wait for STOP after a RUN is executed to query any measurement results.

```
OUTPUT 714;"DISP BET"  
OUTPUT 714;"TRIG:BET:MODE 'RUN'"  
REPEAT  
  WAIT Delta_t  
  OUTPUT 714;"TRIG:BET:MODE?"      ! Query the Bit Error Test  
Trigger mode  
  ENTER 714;QueryS  
UNTIL QueryS="" "STOP""
```

- g) Querying measurements in SINGLE or CONT (continuous) mode. Refer to the section for querying measurements through HP-IB.

HP-IB Tutorial and Examples  
**Transient Settling Times**

2. The following operations may affect how much wait time is needed between HP-IB or IBASIC commands.

- a) IBASIC operation - especially tight query loops
- b) Continuous measurements
  - i. DSP Analyzer - Phase, Amplitude and Data Bits measurements
  - ii. Output RF Spectrum measurements Option 006 only
  - iii. Pulse On/Off Ratio measurements Option 006 only
  - iv. Spectrum Analyzer measurements Option 006 only
  - v. Oscilloscope measurements
  - vi. CW measurements
  - vii. AF Analyzer measurements
- c) Signaling operations:
  - i. SACCH measurements
  - ii. Intercell Handovers
  - iii. Intracell Handovers
  - iv. Trace views are active

3. When performing the following operations, include a wait statement for a maximum of the period of time given, before issuing the next command.

a) Executing Loopback functions - loopback on and off: 1 second

```
OUTPUT 714,"CELL:AUD:LOOP:OFF" ! loopback off  
WAIT 1
```

```
OUTPUT 714,"CELL:AUD:LOOP:FE" ! on with frame erasure  
WAIT 1
```

```
OUTPUT 714,"CELL:AUD:LOOP:NOFE" ! on without frame erasure  
WAIT 1
```

b) Changing Audio Speech Configurations to 'ECHO': 0.5 second

```
OUTPUT 714,"CELL:AUD:SPE:CONF 'ECHO'  
WAIT 0.5
```

c) Changing Audio Speech Configurations to 'PRBS': 2 seconds

```
OUTPUT 714,"CELL:AUD:SPE:CONF 'PRBS'  
WAIT 2
```

d) Setting the MS TX power Level: 1 second

```
OUTPUT 714,"CELL:MS:TLEV 7"  
WAIT 1
```



- e) Arming DSP Analyzer, Output RF Spectrum or Pulse On/Off measurements in Single mode from IBASIC - after sending the Arm command wait approximately 5 seconds.

```
OUTPUT 714, "TRIG:AState 'ARM'"  
WAIT 5
```

- f) IMEI Request: 10 seconds

```
OUTPUT 714, "MSIN:MS:IMEI:REQ"  
- WAIT 10
```

- g) TMSI Reallocation: Query TMSI value (should change within 10 seconds)

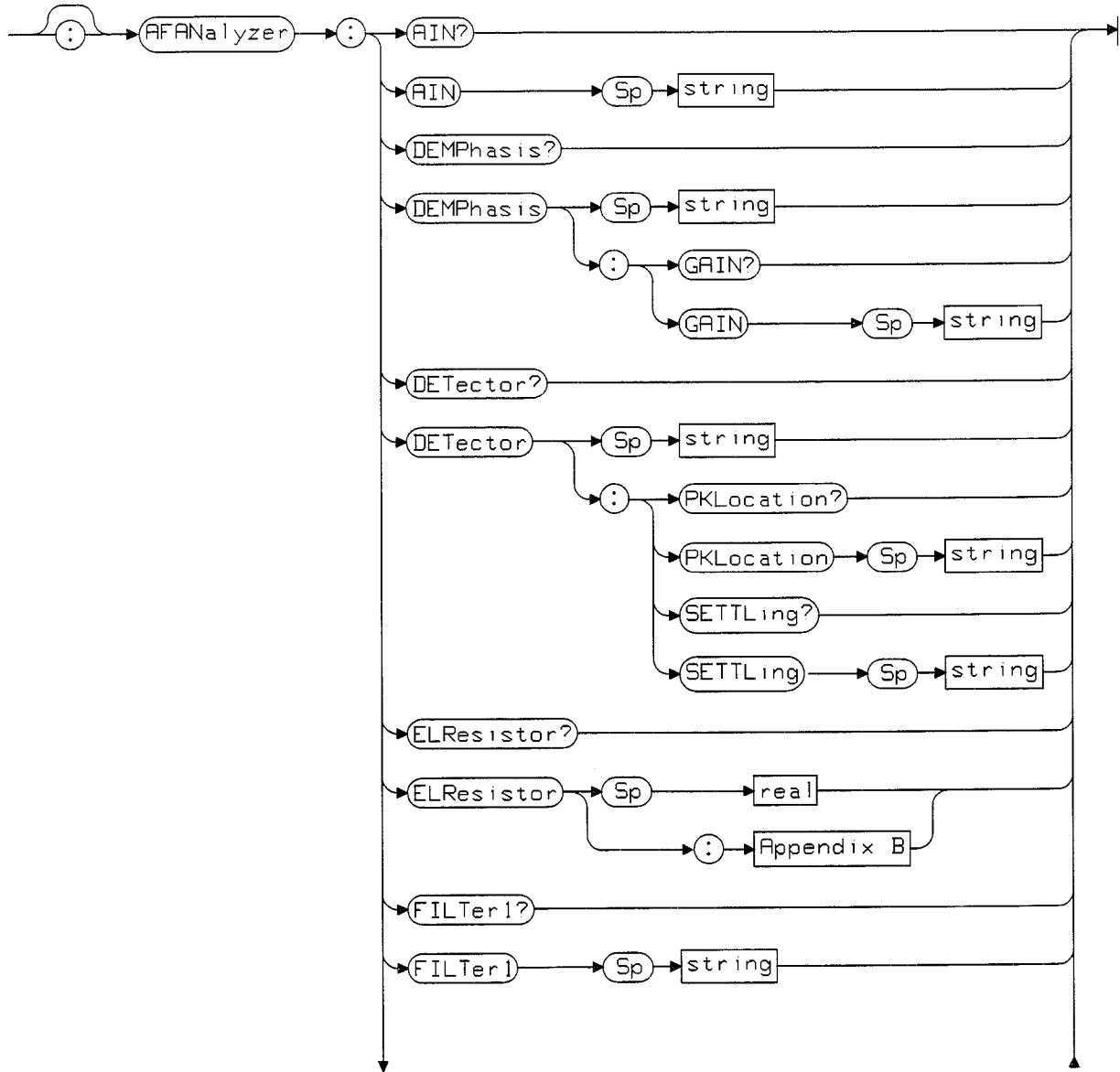
- i. Read TMSI string **OUTPUT 714, "MSIN:PAG:TMSI?"**
- ii. Send TMSI Reallocation command **OUTPUT 714, "MSIN:PAG:TMSI:REAL"**
- iii. Wait until **OUTPUT 714, "MSIN:PAG:TMSI?"** returns a new string  
**1 10 seconds maximum**

We expect users, operating remotely, to make measurements in single mode, mainly for speed reasons. However, if you operate in continuous (CONT) measurement mode and you change a parameter that affects the measurement result, then (at a maximum) the third measurement result queried will be an outcome of the new setup and not the previous setup.

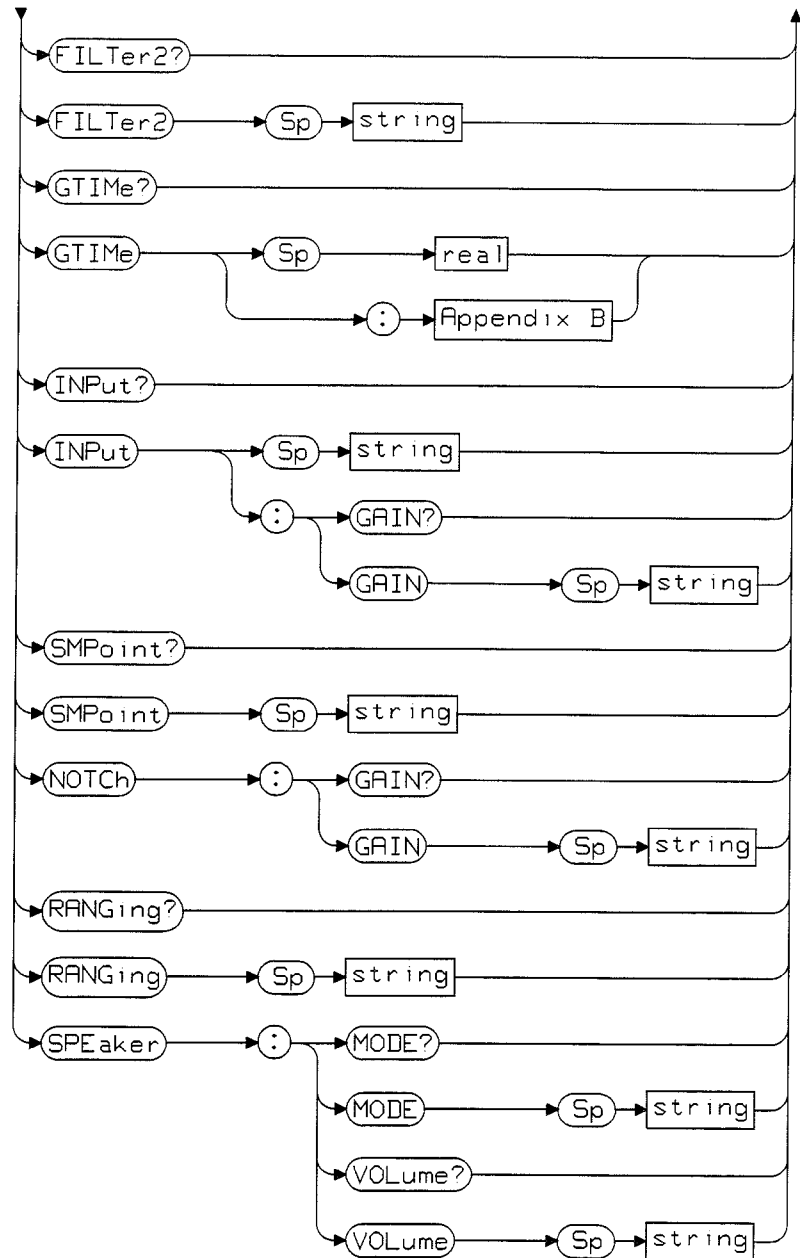


---

**AF Analyzer Subsystem**



Continued Over



---

## AIN

<b>Description</b>	Selects/queries the state of the front panel AUDIO IN LO BNC connector. FLOAT means AUDIO IN LO will be used to generate floating input signal (that is NOT referenced to a common ground signal). GND means AUDIO IN LO will be connected to a common ground signal
<b>Syntax</b>	AFANalyzer:AIN? AFANalyzer:AIN <string>
<b>Options</b>	'FLOAT'   'GND'

---

## DEMPHasis

<b>Description</b>	Selects/queries the AF ANalyzer DE-EMPhasis state.
<b>Syntax</b>	AFANalyzer:DEMPHasis? AFANalyzer:DEMPHasis <string>
<b>Options</b>	'750 US'   'OFF'

---

## DEMPHasis:GAIN

<b>Description</b>	Selects/queries the DE-EMPhasis GAIN selection. Typically, this is selected automatically, based on audio level.
<b>Syntax</b>	AFANalyzer:DEMPHasis:GAIN? AFANalyzer:DEMPHasis:GAIN <string>
<b>Options</b>	'0 DB'   '10 DB'   '20 DB'   '30 DB'

---

## DETEctor

<b>Description</b>	Selects/queries the AF Analyzer Detector which is used for all AF Analyzer measurements.
<b>Syntax</b>	AFANalyzer:DETEctor? AFANalyzer:DETEctor <string>
<b>Options</b>	'RMS'   'PK+'   'PK-'   'PK+/-2'   'PK+-MAX'   'PK+ HOLD'   'PK- HOLD'   'PK+/-2 HD'   'PK+-MX HD'

---

## DETECTOR:PKLOCATION

<b>Description</b>	Selects/queries the Peak DETECTOR Location.
<b>Syntax</b>	AFANalyzer:DETECTOR:PKLOCATION? AFANalyzer:DETECTOR:PKLOCATION <string>
<b>Options</b>	'FILTERS'   'DE-EMP'

---

## DETECTOR:SETTLING

<b>Description</b>	Selects/queries the DETECTOR SETTLING mode.
<b>Syntax</b>	AFANalyzer:DETECTOR:SETTLING? AFANalyzer:DETECTOR:SETTLING <string>
<b>Options</b>	'SLOW'   'FAST' Where; <ul style="list-style-type: none"><li>• SLOW is useful for low frequency audio measurements.</li><li>• FAST is useful for higher frequency audio measurements.</li></ul>

---

## ELRESISTOR

<b>Description</b>	Sets/queries the External Load Resistor assumed for measuring watts of power into an external load resistor. Default HP-IB and display unit is Ohms.
<b>Syntax</b>	AFANalyzer:ELRESISTOR? AFANalyzer:ELRESISTOR <real [units]>   [:FNUM]
<b>Options</b>	Refer Appendix B.

---

## FILTer1

<b>Description</b>	Selects/queries the AF Analyzer Filter 1.
<b>Syntax</b>	AFANalyzer:FILTer1? AFAN:FILT1? AFANalyzer:FILTer1 <string> AFAN:FILT1 <string>
<b>Options</b>	'20HZ HPF'   '50HZ HPF'   '300HZ HPF'

---

## FILTer2

<b>Description</b>	Selects/queries the AF Analyzer Filter 2.
<b>Syntax</b>	AFANalyzer:FILTer2? AFAN:FILT2? AFAN:FILT2 <string> AFANalyzer:FILTer2 <string>
<b>Options</b>	'300HZ LPF'   '3KHZ LPF'   '15KHZ LPF'   '>99KHZ LP'

---

## GTIMe

<b>Description</b>	Sets/queries the AF ANalyzer Gate TIMe (AF Cnt Gate). Default HP-IB unit is seconds (S). Default display unit is milli-seconds (MS).
<b>Syntax</b>	AFANalyzer:GTIMe? AFANalyzer:GTIMe <real [units]>   [:FNUM]
<b>Options</b>	Refer Appendix B.



---

## INPut

<b>Description</b>	Selects/queries the AF ANalyzer INPut. This selection determines what signal is to be measured by the AF ANalyzer as well as for the oscilloscope.
<b>Syntax</b>	AFANalyzer:INPut? AFANalyzer:INPut <string>
<b>Options</b>	'SCOPE IN'   'FM DEMOD'   'PLS DEMOD'   'AUDIO IN'   'AUDIO OUT'   'AM MOD IN'   'SPEECH IN'   'SPEECHOUT'

---

## INPut:GAIN

<b>Description</b>	Selects/queries the INPut GAIN. This is typically selected automatically based on audio level.
<b>Syntax</b>	AFANalyzer:INPut:GAIN? AFANalyzer:INPut:GAIN <string>
<b>Options</b>	'0 DB'   '20 DB'   '40 DB'

---

## SMPoint

<b>Description</b>	Selects/queries the Scope Measurement Point. This selection determines where in the hardware block diagram the oscilloscope is making the desired measurement.
<b>Syntax</b>	AFANalyzer:SMPoint? AFANalyzer:SMPoint <string>
<b>Options</b>	'DE-EMP'   'FILTERS'   'INPUT'   'NOTCH'

---

## NOTCh:GAIN

<b>Description</b>	Selects/queries the NOTCh GAIN. This is typically selected automatically based on audio level.
<b>Syntax</b>	AFANalyzer:NOTCh:GAIN? AFANalyzer:NOTCh:GAIN <string>
<b>Options</b>	'0 DB'   '10 DB'   '20 DB'   '30 DB'   '40 DB'

---

---

## **RANGing**

<b>Description</b>	Selects/queries the RANGing (Gain Cntl) STAtE.
<b>Syntax</b>	AFANalyzer:RANGing? AFANalyzer:RANGing <string>
<b>Options</b>	'AUTO'   'HOLD' Where; <ul style="list-style-type: none"><li>• AUTO results in gain selections being made automatically based on audio level.</li><li>• HOLD causes all gain selections to maintain their present state for either manual selection or until AUTO is selected.</li></ul>

---

## **SPEaker:MODE**

<b>Description</b>	Selects/queries the SPEaker ALC MODE.
<b>Syntax</b>	AFANalyzer:SPEaker:MODE? AFANalyzer:SPEaker:MODE <string>
<b>Options</b>	'ON'   'OFF'

---

**NOTE** This command is not available for the HP 8922S.

---

---

## **SPEaker:VOLume**

<b>Description</b>	Selects/queries the SPEaker VOLume.
<b>Syntax</b>	AFANalyzer:SPEaker:VOLume? AFANalyzer:SPEaker:VOLume <string>
<b>Options</b>	'POT'   'OFF' Where; <ul style="list-style-type: none"><li>• POT means the SPEaker VOLume is controlled via the front panel VOLUME control.</li><li>• OFF means the SPEaker VOLume is turned off, independent of the front panel VOLUME control.</li></ul>

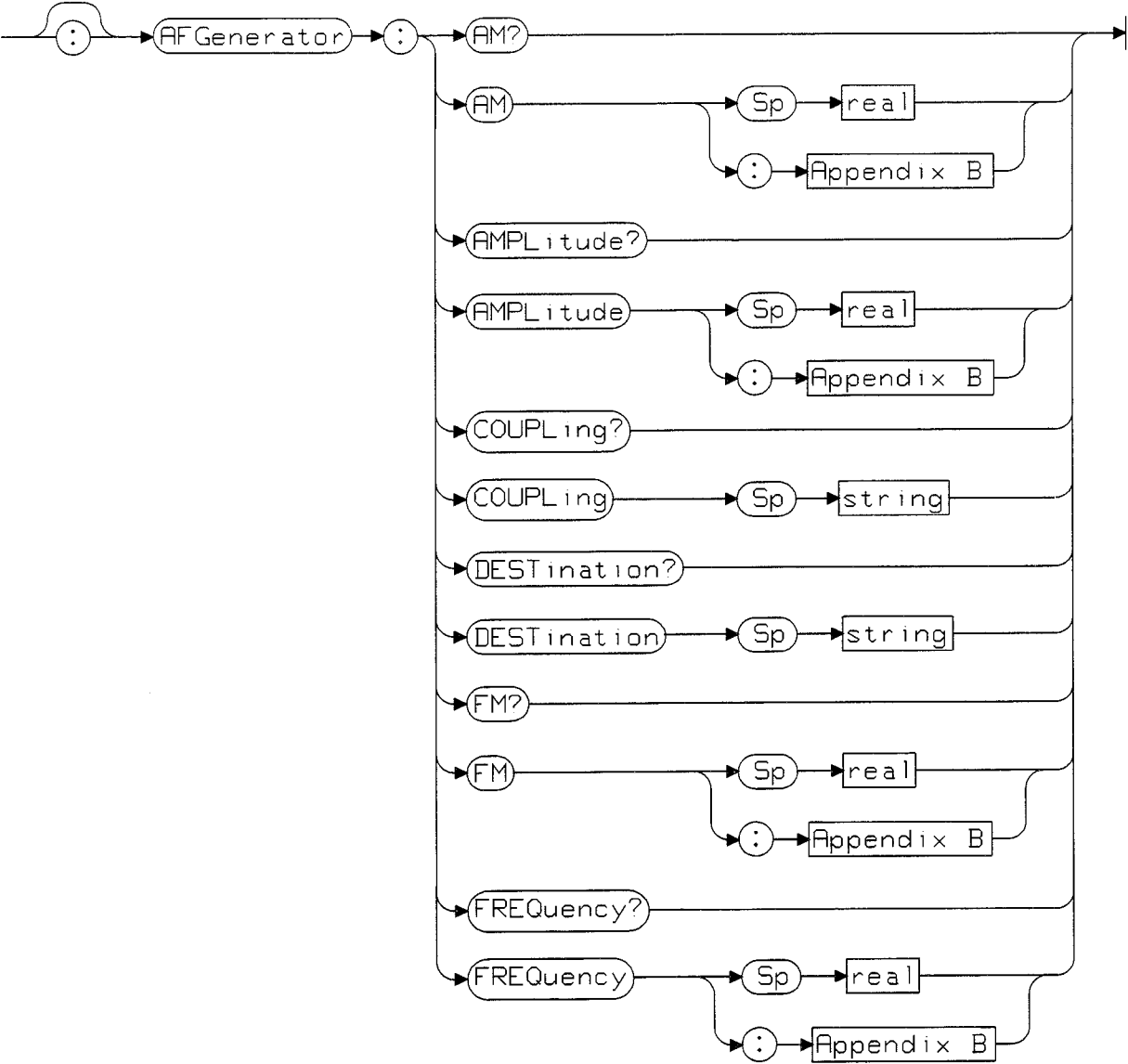
---

**NOTE** This command is not available for the HP 8922S.

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---

**AF Generator Subsystem**



---

## **AMPLitude**

<b>Description</b>	Sets/queries the AF Generator Audio Output AMPLitude, which will be present at the front panel AUDIO OUT connector. HP-IB unit is Volts. Display units are V and mV. Default display unit is mV.
<b>Syntax</b>	AFGenerator:AMPLitude? AFGenerator:AMPLitude <integer [units]>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## **COUPling**

<b>Description</b>	Selects/queries the AF Generator Audio Output COUPling
<b>Syntax</b>	AFGenerator:COUPling? AFGenerator:COUPling <string>
<b>Options</b>	'AC'   'DC'

---

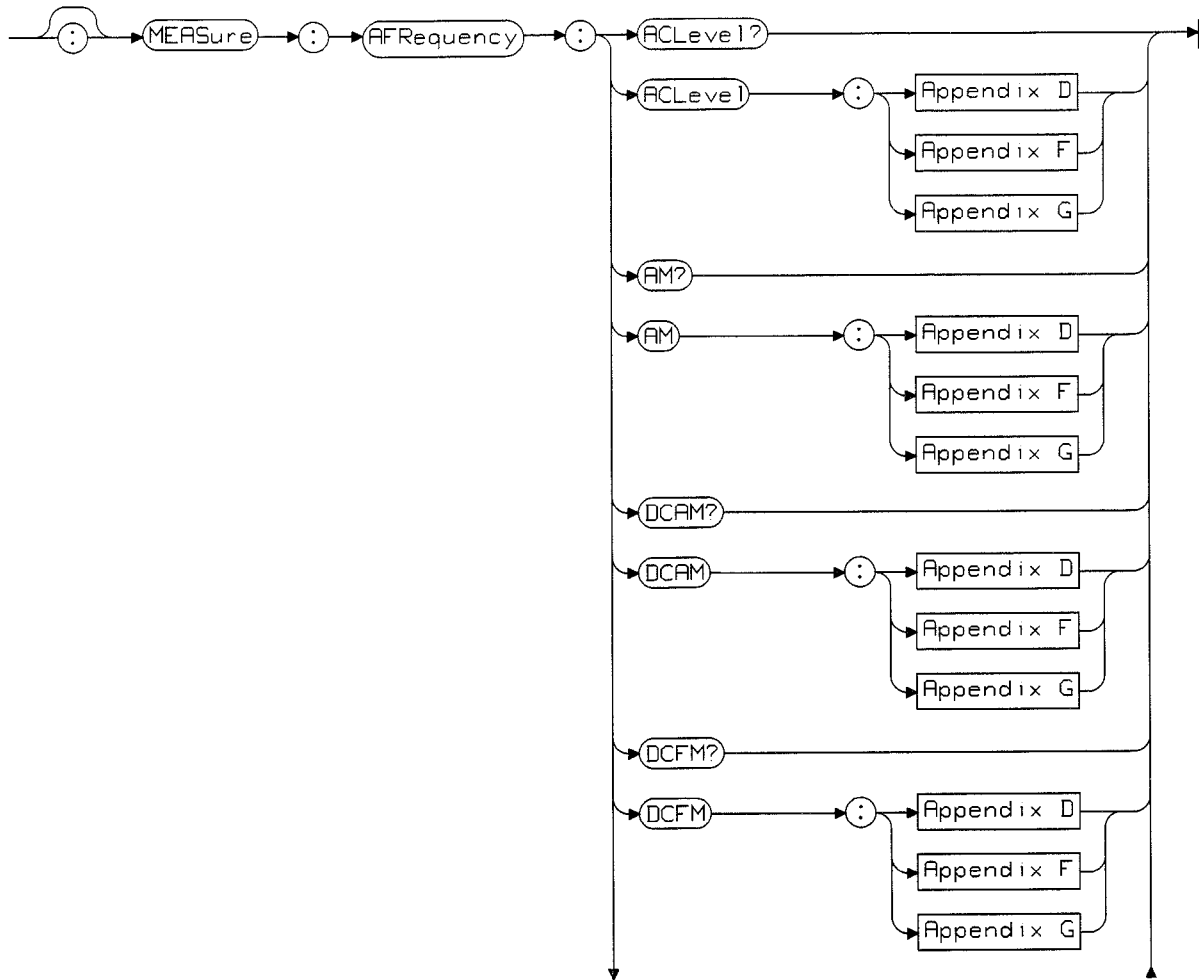
## **FREQuency**

<b>Description</b>	Sets/queries the AF Generator Audio Output, which will be present at the front panel AUDIO OUT connector. Default HP-IB unit is HZ. Default display unit is KHZ.
<b>Syntax</b>	AFGenerator:FREQuency? AFGenerator:FREQuency <integer [units]>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

AF Generator Subsystem  
**FREQUENCY**

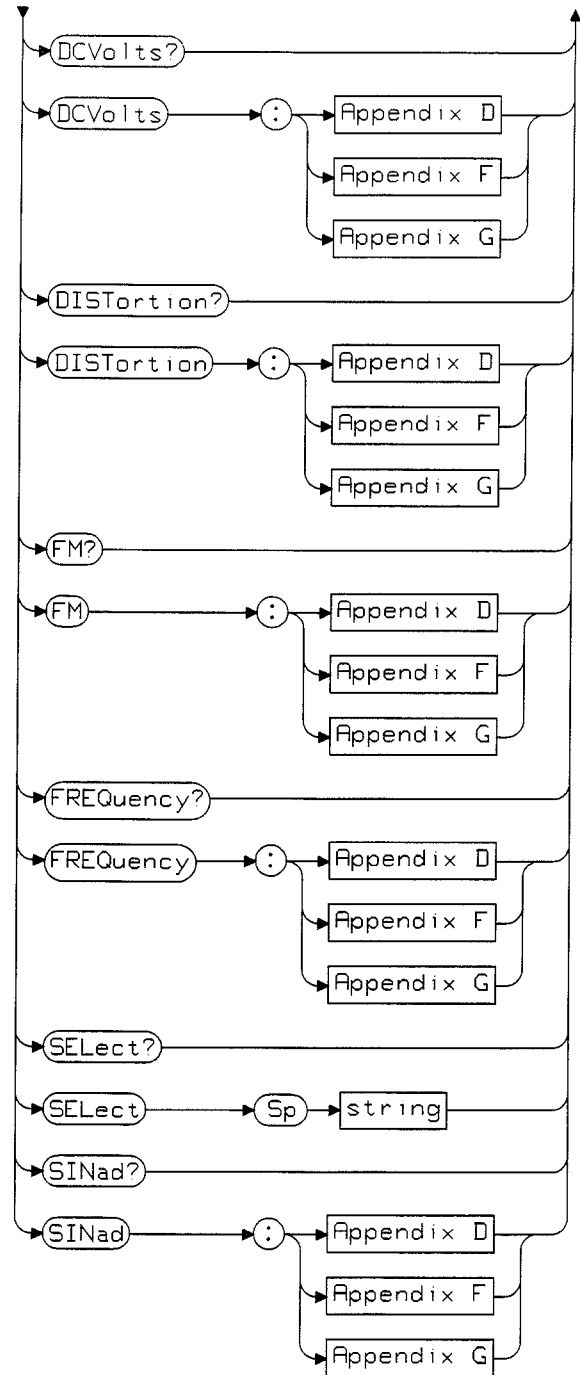
---

**Audio Frequency Commands  
(Measure Subsystem)**



Continued Over





**ACLevel**

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**ACLevel**

<b>Description</b>	Sets the AC Level MEASurement attributes. HP-IB unit is V. Display units are dBm, V, mV, uV, dBuV, W; default unit is V. Queries the AC Level MEASurement result for AF Analyzer inputs. (AFAN:INP) that are in units of AC level.
<b>Syntax</b>	MEASure:AFRequency:ACLevel? MEASure:AFRequency:ACLevel[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

**AM**

<b>Description</b>	Sets the AM Depth MEASurement attributes. Queries the AM Depth MEASurement result for AF Analyzer inputs (AFAN:INP) that are units of percent. HP-IB unit is %(PCT). Display units are %(PCT).
<b>Syntax</b>	MEASure:AFRequency:AM? MEASure:AFRequency:AM[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

**DCAM**

<b>Description</b>	Sets the DC AM Level MEASurement attributes. Queries the DC Level MEASurement result for AF Analyzer inputs (AFAN:INP) that are units of percent. HP-IB unit is %(PCT). Display units are %(PCT).
<b>Syntax</b>	MEASure:AFRequency:DCAM? MEASure:AFRequency:DCAM[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

## DCFM

<b>Description</b>	Sets the DC FM Level MEASurement attributes. Queries the DC Level MEASurement result for AF Analyzer inputs (AFAN:INP) that are units of Hertz. HP-IB unit is HZ. Display units are KHZ, HZ; default unit is HZ.
<b>Syntax</b>	MEASure:AFRequency:DCFM? MEASure:AFRequency:DCFM[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

## DCVolts

<b>Description</b>	Sets the DC Volts MEASurement attributes. Queries the DC Volts MEASurement result for AF Analyzer inputs (AFAN:INP) that are units of DC Volts. HP-IB unit is V. Display units are dBm, V, mV, uV, dBuV, W; default unit is V.
<b>Syntax</b>	MEASure:AFRequency:DCVolts? MEASure:AFRequency:DCVolts[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

## DISTortion

<b>Description</b>	Sets the DISTortion MEASurement attributes. Queries the DISTortion MEASurement result. HP-IB and Display units are dB and percent (PCT). Default HP-IB and display unit is PCT.
<b>Syntax</b>	MEASure:AFRequency:DISTortion? MEASure:AFRequency:DISTortion[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

**FM**

**FM**

<b>Description</b>	Sets the FM deviation MEASurement attributes. Queries the FM deviation MEASurement result for FM DEMOD AF Analyzer.  HP-IB unit is HZ.  Display units are KHZ, HZ; default unit is HZ.
<b>Syntax</b>	MEASure:AFRequency:FM?  MEASure:AFRequency:FM[:MM]   [:AVG]   [:MET]
<b>Options.</b>	Refer to Appendices D, F and G

**FREQuency**

<b>Description</b>	Sets the Audio FREQuency MEASurement attributes. Queries the Audio FREQuency MEASurement result.  HP-IB unit is HZ.  Display units are KHZ, HZ; default unit is HZ.
<b>Syntax</b>	MEASure:AFRequency:FREQuency?  MEASure:AFRequency:FREQuency[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

**SElect**

<b>Description</b>	Selects/queries the Audio FREquency SElectEd measurement. NOTE: to get valid measurements for DC AM, DC FM and DC Volts, this filed must be set to 'DC LEVEL' and the AF Analyzer Input (AFAN:INP) is set to look at an AM, FM, or voltage source (respectively).
<b>Syntax</b>	MEASure:AFRequency:SElect?  MEASure:AFRequency:SElect <string>
<b>Options</b>	'AF FREQ'   'DC LEVEL'   'DISTN'   'SINAD'

---

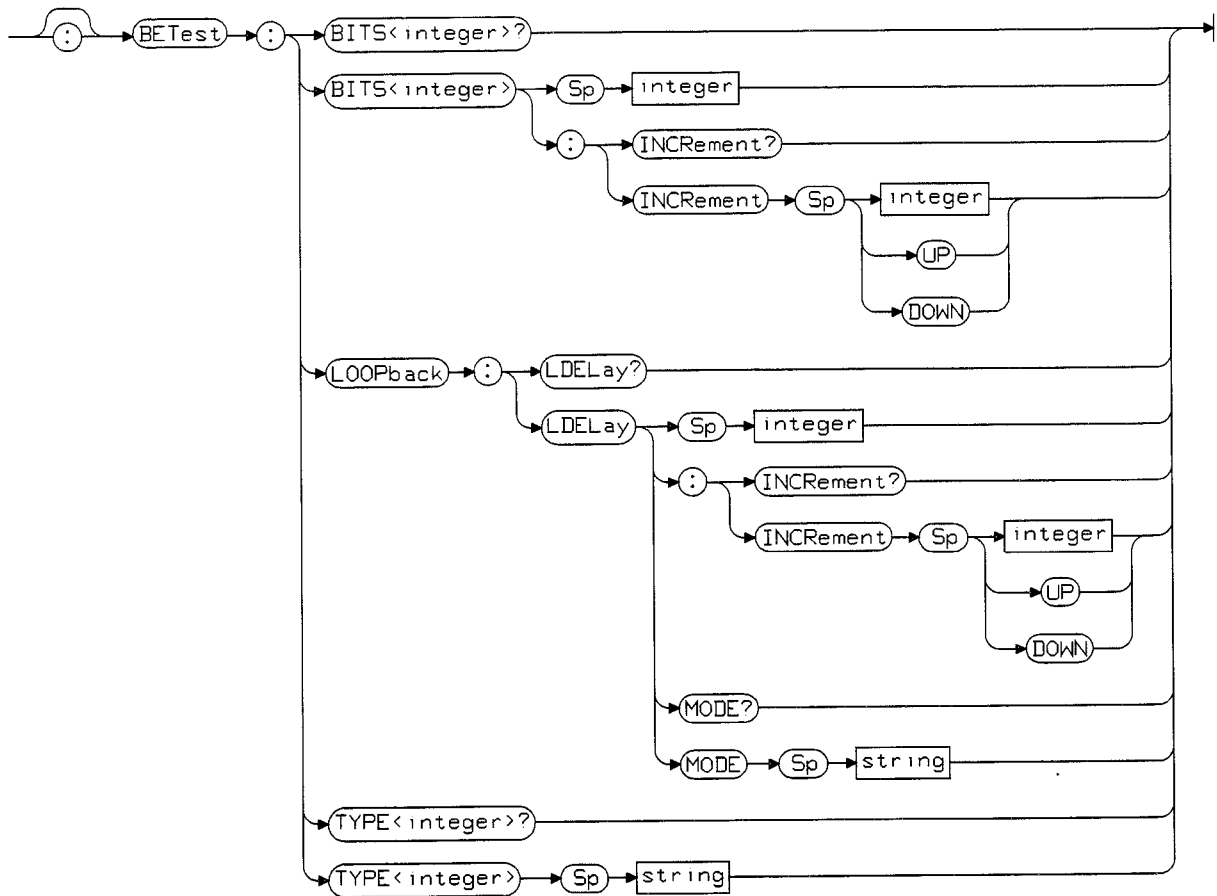
## **SINad**

- Description** Sets the SINad MEASurement attributes. Queries the SINad MEASurement result.  
HP-IB and Display units are dB and percent (PCT)  
Default HP-IB and Display unit is dB
- Syntax** MEASure:AFRequency:SINad?  
MEASure:AFRequency:SINad[:MM] | [:AVG] | [:MET]
- Options** Refer to Appendices D, F and G.

Audio Frequency Commands (Measure Subsystem)  
**SINad**

---

**Bit Error Test Subsystem**





---

## BITS

<b>Description</b>	Sets/queries the number of BITS to test to make this Bit Error Test measurement complete.
<b>Syntax</b>	BETest:BITS<n>? BETest:BITS<n> <integer>   [:INUM]
<b>Options</b>	Where <n>= 1 through 4. Refer to Appendix A.

---

## LOOPback:LDELay

<b>Description</b>	Sets/queries the Loop DELay. This is the number of speech frames to be assumed for loopback. delay. This affects how and when bit error test measurement bit patterns are compared.
<b>Syntax</b>	BETest:LOOPback:LDELay? BETest:LOOPback:LDELay <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## LOOPback:LDELay:MODE

<b>Description</b>	Sets/queries the Loop DELay MODE.
<b>Syntax</b>	BETest:LOOPback:LDELay:MODE? BETest:LOOPback:LDELay:MODE <string>
<b>Options</b>	'AUTO'   'MANUAL' Where; <ul style="list-style-type: none"> <li>AUTO automatically sets LDELay (above) once when the measurement is started. This is a timing calibration action.</li> <li>MANUAL means the Loop DELay is controlled manually via the :LDELay command.</li> </ul>

---

**TYPE**

---

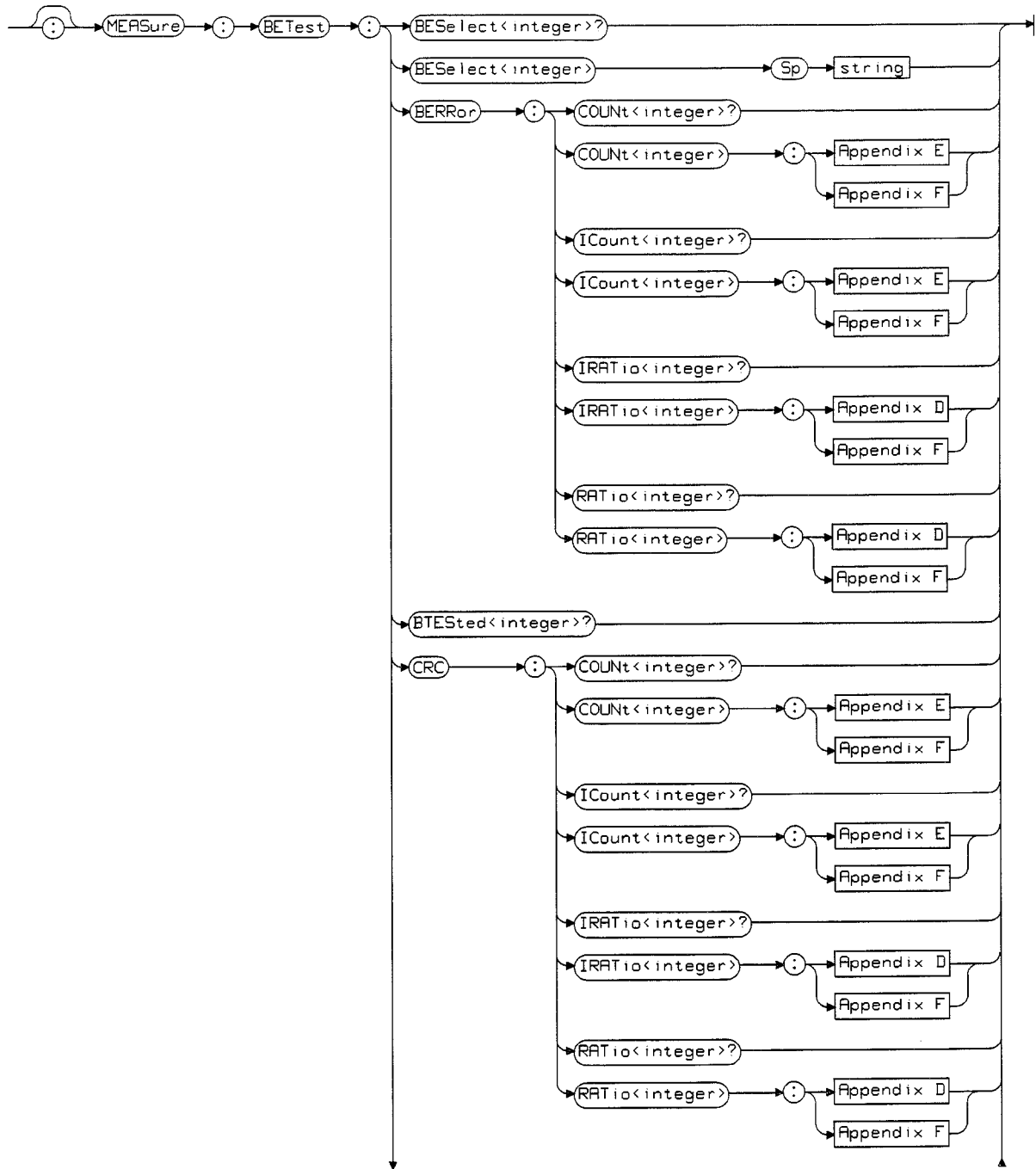
**TYPE**

- Description**      Selects/queries the Bit Error Test measurement TYPE. This defines the Bit Error Test measurement TYPE for each of the four available Bit Error Test measurements.
- Syntax**            BCTest:TYPE<n>?  
                      BCTest:TYPE<n> <string>
- Options**            'TYPEI' | 'RESTYPEI' | 'TYPEIA' | 'RESTYPEIA' |  
                      'TYPEII' | 'RESTYPEII' | 'TYPEIB' | 'RESTYPEIB' |  
                      'ALLFS' | 'RESALLFS' | 'OFF'  
                      Where <n>= 1 through 4.

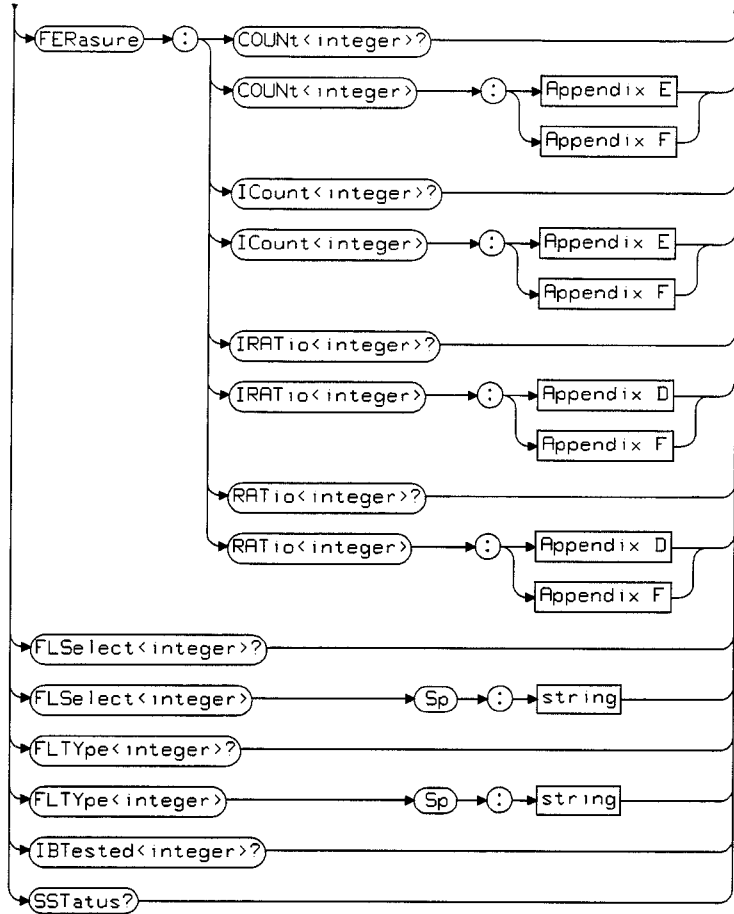
---

**Bit Error Test Commands  
(Measure Subsystem)**

# Bit Error Test Commands (Measure Subsystem)



Continued Over



**BESelect**

---

**BESelect**

<b>Description</b>	Selects/queries the Bit Error SElected Bit Error Test measurement to display (BE Ratio, BE Count) for the given measurement number n,
<b>Syntax</b>	MEASure:BEtest:BESelect<n>? MEASure:BEtest:BESelect<n> <string>
<b>Options</b>	'BE COUNT'   'BE RATIO' where <n> = 1..4.

---

**BERRor:COUNT**

<b>Description</b>	Sets the Bit ERRor COUNT MEASurement attributes. Queries the Bit ERRor COUNT (completed),
<b>Syntax</b>	MEASure:BEtest:BERRor:COUNT<n>? MEASure:BEtest:BERRor:COUNT<n>[:MM_MOD]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices E and F.

---

**BERRor:ICount**

<b>Description</b>	Sets the Bit ERRor Intermediate COunt MEASurement attributes. Queries the Bit ERRor COunt (completed).  NOTE: This can only be queried when in the state TRIGger:BEtest:MODE 'RUN'
<b>Syntax</b>	MEASure:BEtest:BERRor:ICOUNT<n>? MEASure:BEtest:BERRor:ICOUNT<n>[:MM-MOD]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices E and F.

---

**BERRor:IRATio**

<b>Description</b>	Sets CRC Intermediate RATio MEASurement attributes. Queries the CRC Intermediate RATio HP-IB units are % (PCT), PPM; default unit is PPM. Display units are % (PCT), PPM; default unit is PPM. NOTE: This can only be queried when in the state TRIGger:BEtest:MODE 'RUN'
<b>Syntax</b>	MEASure:BEtest:BERRor:IRATio<n>? MEASure:BEtest:BERRor:IRATio<n>[:MM]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices D and F.

---

**BERRor:RATio**

<b>Description</b>	Sets Bit Error RATio MEASurement attributes. Queries the Bit ERRor RATio HP-IB units are % (PCT), PPM; default unit is PPM. Display units are % (PCT), PPM; default unit is PPM.
<b>Syntax</b>	MEASure:BEtest:BERRor:RATio<n>? MEASure:BEtest:BERRor:RATio<n>[:MM]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices D and F.

---

**BTESted**

<b>Description</b>	Queries the number of Bits TESted for the completed Bit ERRor Test measurements
<b>Syntax</b>	MEASure:BEtest:BTESted<n>?
<b>Options</b>	where <n> = 1..4.

---

**CRC:COUNT**

---

**CRC:COUNT**

<b>Description</b>	Sets the CRC COUNT MEASurement attributes. Queries the CRC COUNT (completed),
<b>Syntax</b>	MEASure:BEtest:CRc:COUNT<n>? MEASure:BEtest:CRc:COUNT<n>[:MM-MOD]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices E and F.

---

**CRC:ICOUNT**

<b>Description</b>	Sets the CRC Intermediate COunt MEASurement attributes. Queries the CRC Intermediate COunt (completed).  NOTE: This can only be queried when in the state TRIGger:BEtest:MODE 'RUN'
<b>Syntax</b>	MEASure:BEtest:CRc:ICOUNT<n>? MEASure:BEtest:CRc:ICOUNT<n>[:MM-MOD]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices E and F.

---

**CRC:IRATIO**

<b>Description</b>	Sets CRC Intermediate RATio MEASurement attributes. Queries the CRC Intermediate RATio  HP-IB units are % (PCT), PPM; default unit is PPM. Display units are % (PCT), PPM; default unit is PPM. NOTE: This can only be queried when in the state TRIGger:BEtest:MODE 'RUN'
<b>Syntax</b>	MEASure:BEtest:CRc:IRATIO<n>? MEASure:BEtest:CRc:IRATIO<n>[:MM]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices D and F.



---

## CRC:RATio

<b>Description</b>	Sets CRC RATio MEASurement attributes. Queries the CRC RATio (completed).
<b>Syntax</b>	MEASure:BEtest:CRC:RATio<n>? MEASure:BEtest:CRC:RATio<n>[:MM]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices D and F.

---

## FERasure:COUNT

<b>Description</b>	Sets the Frame ERasure COUNT MEASurement attributes. Queries the CRC COUNT (completed),
<b>Syntax</b>	MEASure:BEtest:FERasure:COUNT<n>? MEASure:BEtest:FERasure:COUNT<n>[:MM-MOD]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices E and F.

---

## FERasure:ICount

<b>Description</b>	Sets the Frame ERasure Intermediate COunt MEASurement attributes. Queries the Frame ERasure Intermediate COunt.  NOTE: This can only be queried when in the state TRIGger:BEtest:MODE 'RUN'
<b>Syntax</b>	MEASure:BEtest:FERasure:ICount<n>? MEASure:BEtest:FERasure:ICount<n>[:MM-MOD]   [:AVG]
<b>Options</b>	where <n> = 1..4. Refer to Appendices E and F.

---

**FERasure:IRATio**

**FERasure:IRATio**

**Description** Sets Frame ERasure Intermediate RATio MEASurement attributes. Queries the Frame ERasure Intermediate RATio

HP-IB units are % (PCT), PPM; default unit is PPM.

Display units are % (PCT), PPM; default unit is PPM.

**NOTE** This can only be queried when in the state: TRIGger:BEtTest:MODE 'RUN'

**Syntax** MEASure:BEtTest:FERasure:IRATio<n>?  
 MEASure:BEtTest:FERasure:IRATio<n>[:MM] | [:AVG]

**Options** where <n> = 1..4.  
 Refer to Appendices D and F.

**FERasure:RATio**

**Description** Sets Frame ERasure RATio MEASurement attributes. Queries the Frame ERasure RATio(completed).

HP-IB units are % (PCT), PPM; default unit is PPM.

Display units are % (PCT), PPM; default unit is PPM.

**NOTE** This can only be queried when in the state: TRIGger:BEtTest:MODE 'RUN'

**Syntax** MEASure:BEtTest:FERasure:RATio<n>?  
 MEASure:BEtTest:FERasure:RATio<n>[:MM] | [:AVG]

**Options** where <n> = 1..4.  
 Refer to Appendices D and F.

**FLSelect**

**Description** Selects/queries the Frame Loss Selected Bit Error Test measurement to display (Count or Ratio) for the given Frame Loss TYpe (FE or CRC).

**Syntax** MEASure:BEtTest:FLSelect<n>?  
 MEASure:BEtTest:FLSelect<n> <string>

**Options** 'COUNT' | 'RATIO'  
 where <n> = 1..4.

---

## FLTYpe

<b>Description</b>	Selects/queries the Frame Loss Selected Bit Error Test measurement to display (Count or Ratio) for the given Frame Loss Select (Count or Ration) for the given measurement number.
<b>Syntax</b>	MEASure:BEtest:FLTYpe<n>? MEASure:BEtest:FLTYpe<n> <string>
<b>Options</b>	'FE'   'CRC' where <n> = 1..4.

---

## IBTested

<b>Description</b>	Queries the number of Bits Tested for the Intermediate Bit Error Test measurements.
<b>NOTE</b>	This can only be queried when in the state: TRIGger:BEtest:MODE 'RUN'
<b>Syntax</b>	MEASure:BEtest:IBTested<n>?
<b>Options</b>	where <n> = 1..4.

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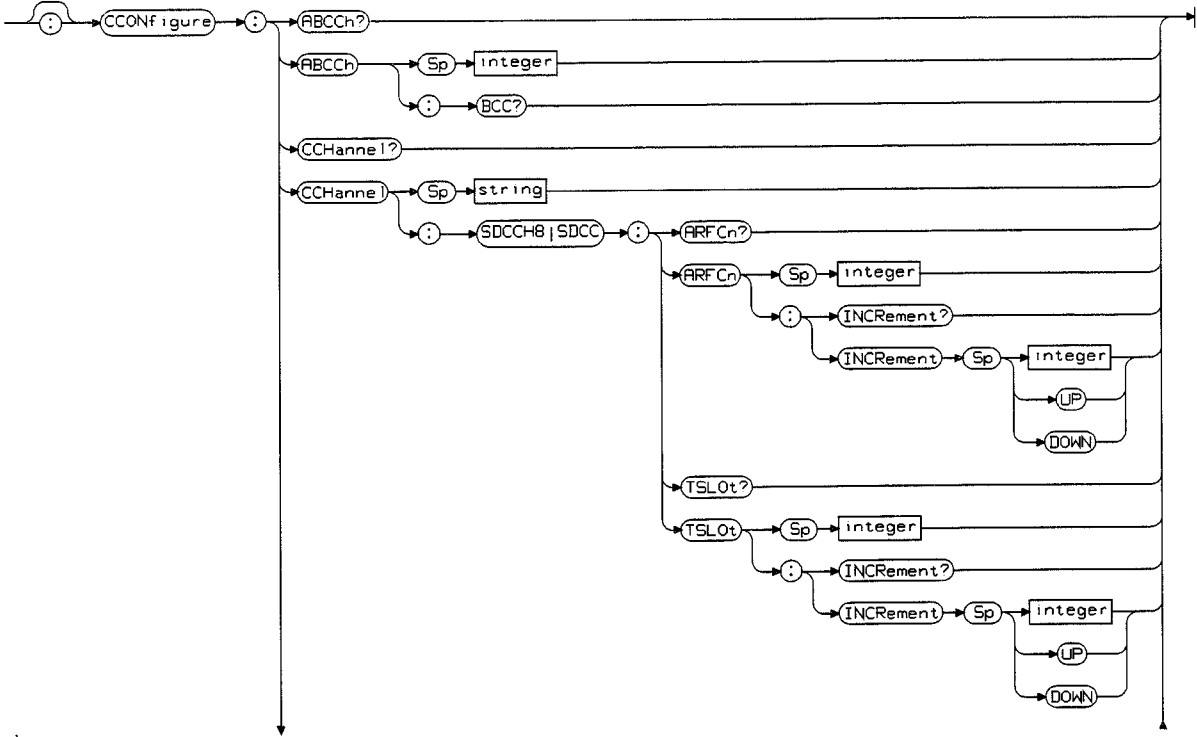
## SStatus

<b>Description</b>	Queries the Bit Error Test SYNC SStatus. Will return 'NO ERROR' or 'BAD SYNC'. This field will only be updated when the demod arm state goes from "DISARM" to "ARM." This is the same as DDEMod:SYNC:SStatus.
<b>Syntax</b>	MEASure:BEtest:SStatus?
<b>Options</b>	Not Applicable

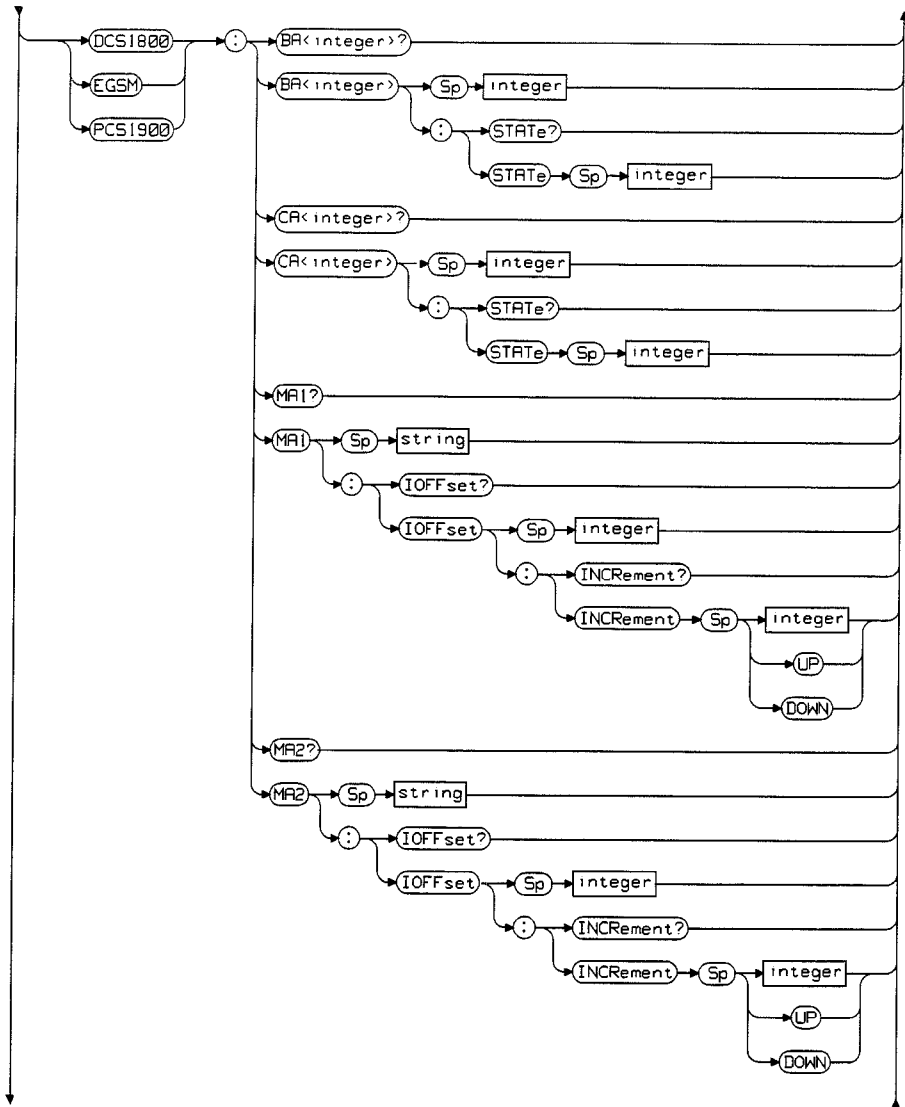
**SStatus**

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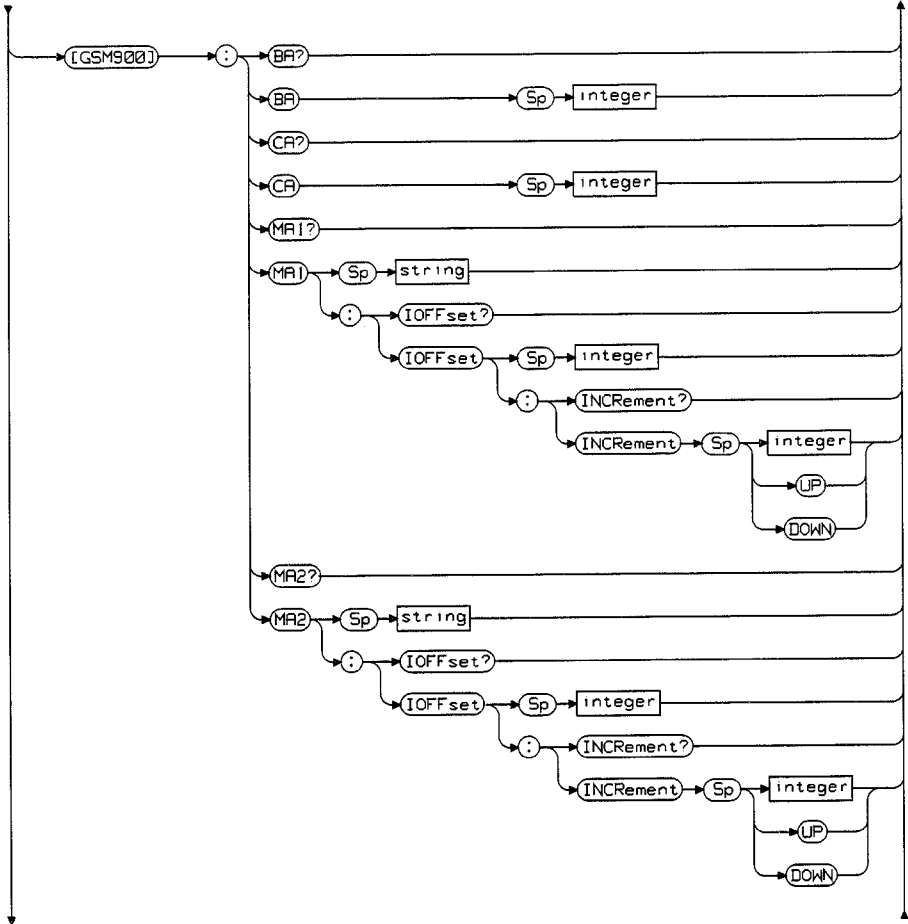
**Cell Configuration Subsystem**



Continued Over

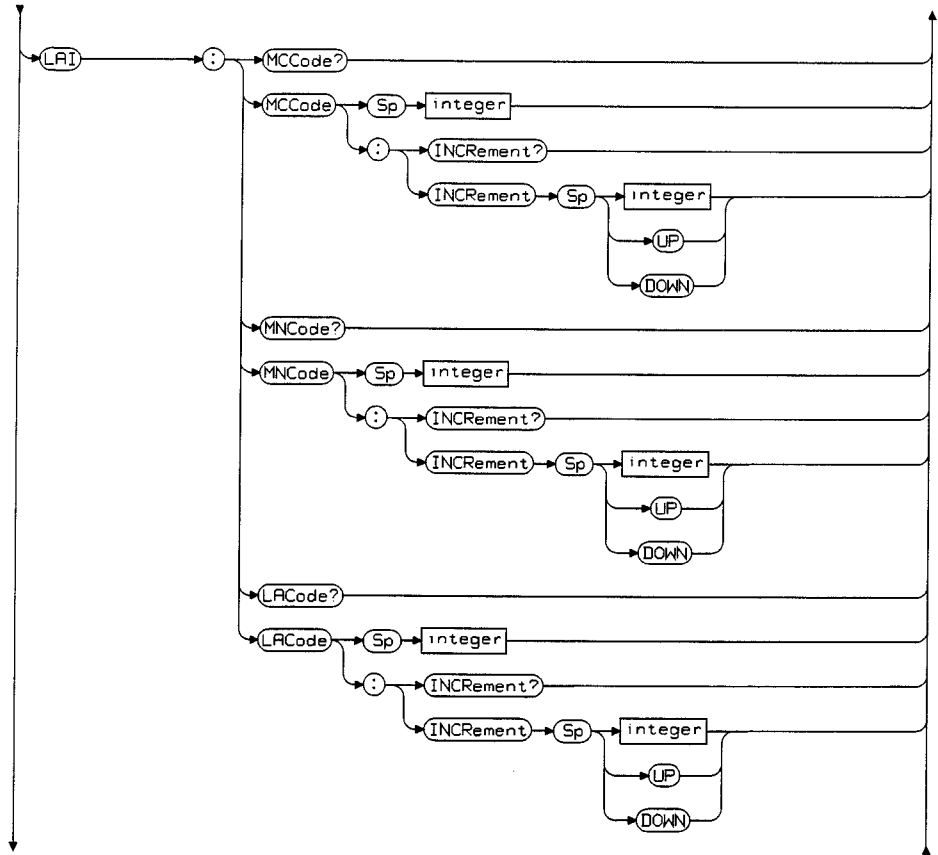


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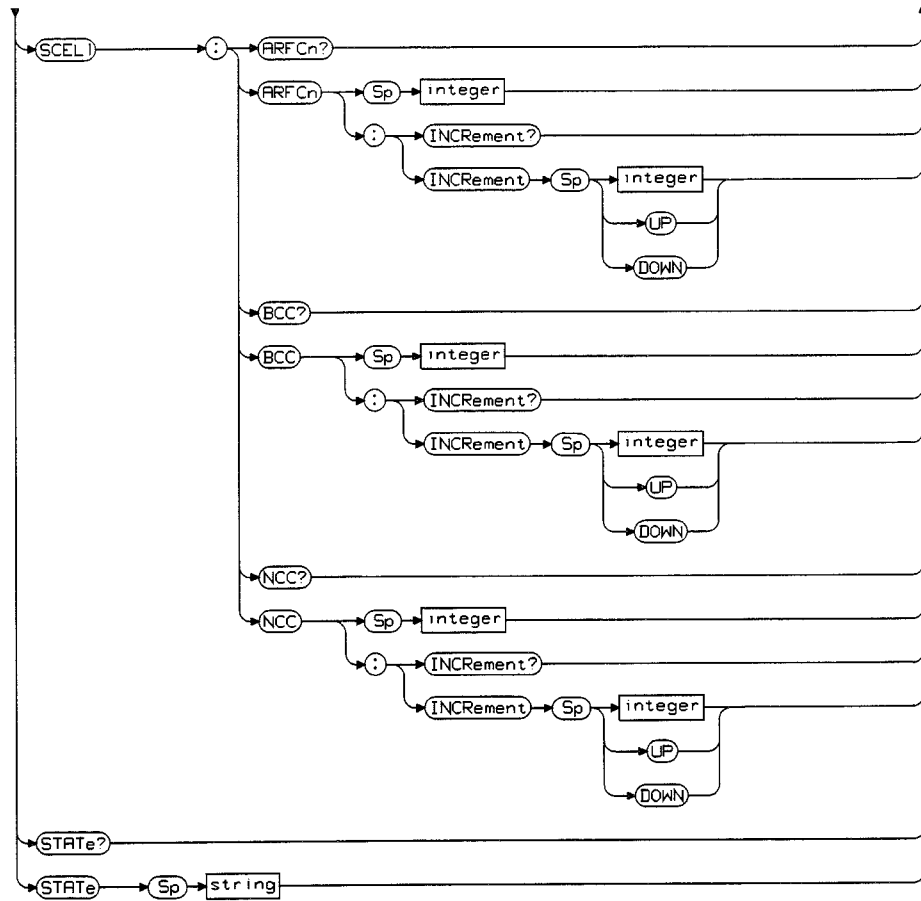


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Continued Over



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## ABCCh

<b>Description</b>	Selects/queries the Auxiliary BCCH. This defines the state of the auxiliary BCCH data and clock outputs.
<b>Syntax</b>	CCONfigure:ABCCh? CCONfigure:ABCCh <string>
<b>Options</b>	'OFF'   'ADJACENT' Where; <ul style="list-style-type: none"> <li>• OFF means the auxiliary BCCH is deactivated.</li> <li>• ADJACENT means the auxiliary BCCH outputs are intended to be used to generate an adjacent cell BCCH (using an external 0.3 GMSK RF Generator).</li> </ul>

---

## ABCCh:BCC

<b>Description</b>	Queries the Auxiliary Base station Colour Code
<b>Syntax</b>	CCONfigure:ABCCh:BCC?
<b>Options</b>	Not Applicable.

---

## CCHannel

<b>Description</b>	Selects/queries the type of Control CHannel to be used.
<b>Syntax</b>	CCONfigure:CCHannel? CCONfigure:CCHannel <string>
<b>Options</b>	'SD/4'   'SD/8'   'FA'   'SD/4+FA' Where; <ul style="list-style-type: none"> <li>• SD/4 means the SDCCH shares the same physical channel as the BCCH.</li> <li>• SD/8 means the SDCCH is separate from the BCCH and is on a physical channel specified by the user.</li> <li>• FA is the same as SD/8, except the TCH1 configuration is used in 'signaling only' mode instead of using the SDCCH channel.</li> <li>• SD/4 + FA is the same as SD/4, except the TCH1 configuration is used in 'signaling only' mode instead of using the SDCCH channel.</li> </ul>

---

## CCHannel:SDCCH8:ARFCn

<b>Description</b>	Sets/queries the Control CHannel ARFCN (Absolute Radio Frequency Channel Number) for the SDCCH/8.  This is used only when CCON:CCH is 'SD/8'.
<b>Syntax</b>	CCONfigure:CCHannel:SDCCH8:ARFCn? CCONfigure:CCHannel:SDCCH8:ARFCn <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## CCHannel:SDCCH8:TSLot

<b>Description</b>	Sets/queries the Control CHannel ARFCN (Absolute Radio Frequency Channel Number) for the SDCCH8.
<b>Syntax</b>	CCONfigure:CCHannel:SDCCH8:TSLot? CCONfigure:CCHannel:SDCCH8:TSLot <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## BA

<b>Description</b>	Sets/queries the Broadcast control channel Allocation. Entries in BA table must be in contiguous ascending order. The allocation must begin at BA1 and continue through BA<n>. Unallocated entries are turned off.  Where <n> = the highest number allocated in the range 1 to 16.
<b>Syntax</b>	CCONfigure:DCS1800   PCS1900   EGSM:BA<n>? CCONfigure:DCS1800   PCS1900   EGSM:BA<n> <integer>
<b>Options</b>	512 to 885 for DCS1800 0 to 124   975 to 1023 for EGSM 512 to 810 for PCS1900 Where <n> = 1 to 16

---

## CA

<b>Description</b>	Sets/queries the Cell Allocation.  Entries in CA table must be in contiguous ascending order. The allocation must begin at CA1 and continue through CA<m>. Unallocated entries are turned off.  Where <m> = the highest number allocated in the range 1 to 16.
<b>Syntax</b>	CConfigure:DCS1800   PCS1900   EGSM:CA<n>? CConfigure:DCS1800   PCS1900   EGSM:CA<n> <integer>
<b>Options</b>	512 to 885 for DCS1800 0 to 124   975 to 1023 for EGSM 512 to 810 for PCS1900 Where <n> = 1 to 16

---

## MA1

<b>Description</b>	Sets/queries the Mobile Allocation 1.  This is a binary string representing which CA ARFCNs will be in Mobile Allocation number 1. This defines which of the first 16 entries in the CA will be part of the sequential hop sequence for MA1.
<b>Syntax</b>	CConfigure:DCS1800   PCS1900   EGSM:MA1? CConfigure:DCS1800   PCS1900   EGSM:MA1 <quoted string>
<b>Options</b>	Not Applicable.

---

**NOTE** All 16 entries must be input.

---



---

## MA1:IOFFset

<b>Description</b>	Sets/queries the Mobile Allocation 1 Index Offset. This defines where the hop sequence starts for MA1.
<b>Syntax</b>	CConfigure:DCS1800   PCS1900   EGSM:MA1:IOFFset? CConfigure:DCS1800   PCS1900   EGSM:MA1:IOFFset <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

---

## MA2

<b>Description</b>	Sets/queries the Mobile Allocation 2.  This is a binary string representing which CA ARFCNs will be in Mobile Allocation number 2. This defines which of the first 16 entries in the CA will be part of the sequential hop sequence for MA2.
<b>Syntax</b>	CCONfigure:DCS1800   PCS1900   EGSM:MA2? CCONfigure:DCS1800   PCS1900   EGSM:MA2 <quoted string>
<b>Options</b>	Not Applicable.

---

**NOTE** All 16 entries must be input.

---

---

## MA2:IOFFset

<b>Description</b>	Sets/queries the Mobile Allocation 2 Index Offset. This defines where the hop sequence starts for MA2.
<b>Syntax</b>	CCONfigure:DCS1800   PCS1900   EGSM:MA1:IOFFset? CCONfigure:DCS1800   PCS1900   EGSM:MA1:IOFFset <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## [:GSM900]:BA

<b>Description</b>	Sets/queries the Broadcast control channel Allocation. This is a binary string representing which ARFCNs are in the BCCH Allocation. A '1' in the first entry represents the existence of ARFCN 1.
<b>Syntax</b>	CCONfigure[:GSM900]:BA? CCONfigure[:GSM900]:BA <integer>
<b>Options</b>	Quoted string.

---

**NOTE** All 124 entries must be input.

---

---

### **[:GSM900]:CA**

- Description** Sets/queries the Cell Allocation.  
This is a binary string representing which ARFCNs are in the Cell Allocation. A '1' in the first entry represents the existence of ARFCN 1.
- Syntax** CCONfigure[:GSM900]:CA?  
CCONfigure[:GSM900]:CA <integer>
- Options** Quoted string.

---

**NOTE** All 124 entries must be input.

---

### **[:GSM900]:MA1**

- Description** Sets/queries the Mobile Allocation 1.  
This is a binary string representing which CA ARFCNs will be in Mobile Allocation number 1. This defines which of the first 64 entries of 1's in the CA will be part of the sequential hop sequence for MA1.
- Syntax** CCONfigure[:GSM900]:MA1?  
CCONfigure[:GSM900]:MA1 <quoted string>
- Options** Not Applicable.

---

**NOTE** All 64 entries must be input.

---

### **[:GSM900]:MA1:IOFFset**

- Description** Sets/queries the Mobile Allocation 1 Index Offset. This defines where the hop sequence starts for MA1.
- Syntax** CCONfigure[:GSM900]:MA1:IOFFset?  
CCONfigure[:GSM900]:MA1:IOFFset <integer> | [:INUM]
- Options** Refer to Appendix A.

---

## **[:GSM900]:MA2**

<b>Description</b>	Sets/queries the Mobile Allocation 2.  This is a binary string representing which CA ARFCNs will be in Mobile Allocation number 2. This defines which of the first 64 entries of 1's in the CA will be part of the sequential hop sequence for MA2.
<b>Syntax</b>	CCONfigure[:GSM900]:MA2? CCONfigure[:GSM900]:MA2 <quoted string>
<b>Options</b>	Not Applicable.

---

**NOTE** All 64 entries must be input.

---

---

## **[:GSM900]:MA2:IOFFset**

<b>Description</b>	Sets/queries the Mobile Allocation 2 Index Offset. This defines where the hop sequence starts for MA1.
<b>Syntax</b>	CCONfigure[:GSM900]:MA2:IOFFset? CCONfigure[:GSM900]:MA2:IOFFset <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

**NOTE** All 64 entries must be input.

---

---

## **LAI:MCCCode**

<b>Description</b>	Sets/queries the Mobile Country Code (3 decimal digits).
<b>Syntax</b>	CCONfigure:LAI:MCCCode? CCONfigure:LAI:MCCCode <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.



---

### LAI:MNCCode

<b>Description</b>	Sets/queries the Mobile Area Code (2 decimal digits).
<b>Syntax</b>	CCONfigure:LAI:MNCCode? CCONfigure:LAI:MNCCode <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### LAI:LACode

<b>Description</b>	Sets/queries the Mobile Area Code.
<b>Syntax</b>	CCONfigure:LAI:LACode? CCONfigure:LAI:LACode <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### SCELI:ARFCn

<b>Description</b>	Sets/queries the Serving Cell ARFCn.
<b>Syntax</b>	CCONfigure:SCELI:ARFCn? CCONfigure:SCELI:ARFCn <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### SCELI:BCC

<b>Description</b>	Sets/queries the Serving Cell Base Station Colour.
<b>Syntax</b>	CCONfigure:SCELI:BCC? CCONfigure:SCELI:BCC <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## **SCELI:NCC**

<b>Description</b>	Sets/queries the Serving Cell Network Colour Code.
<b>Syntax</b>	CCONfigure:SCELI:NCC? CCONfigure:SCELI:NCC <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

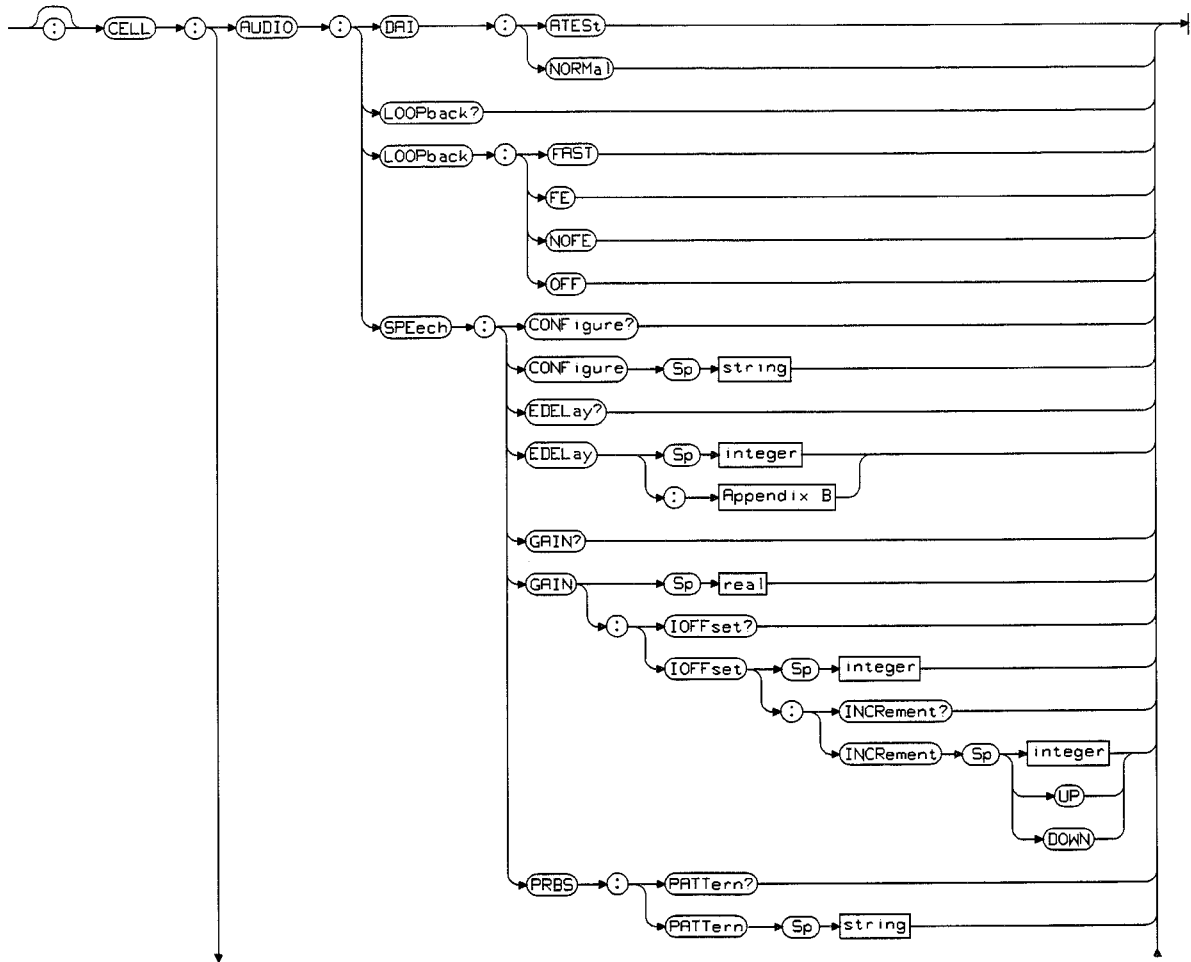
---

## **STATe**

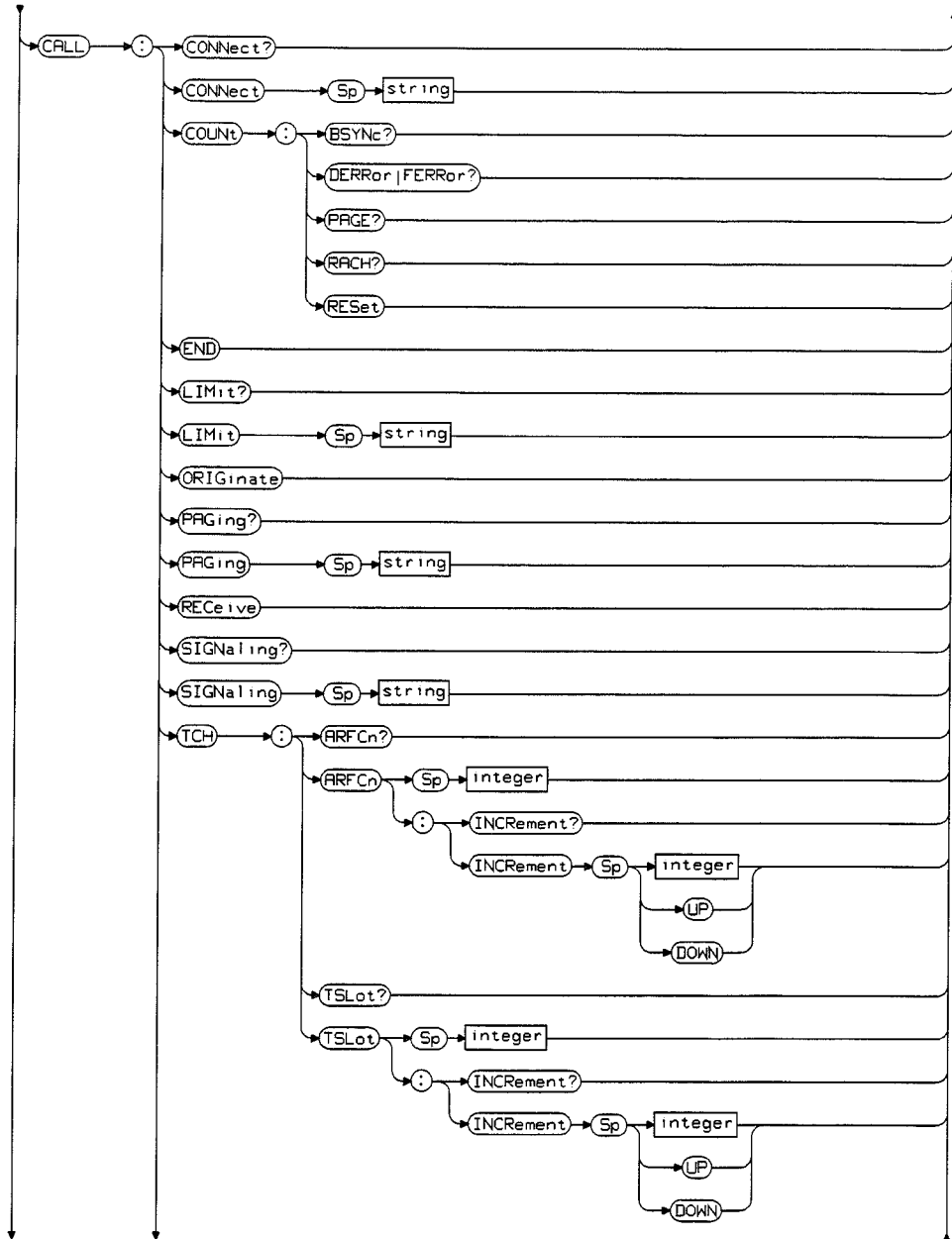
<b>Description</b>	Selects/queries the Cell CONfiguration STATe.
<b>Syntax</b>	CCONfigure:STATe? CCONfigure:STATe <string>
<b>Options</b>	'SETTABLE'   'ACTIVATED' Where; <ul style="list-style-type: none"><li>• <b>SETTABLE</b> means that all Cell Configuration settings can be changed and that the signaling state will be "None". An active call will be automatically terminated in this state.</li><li>• <b>ACTIVATED</b> means that all Cell Configuration settings are "frozen" and the signaling state will be at least "BCCH". This state will not be allowed if the settings on the CCON (Cell Config) screen are not compatible.</li></ul>

---

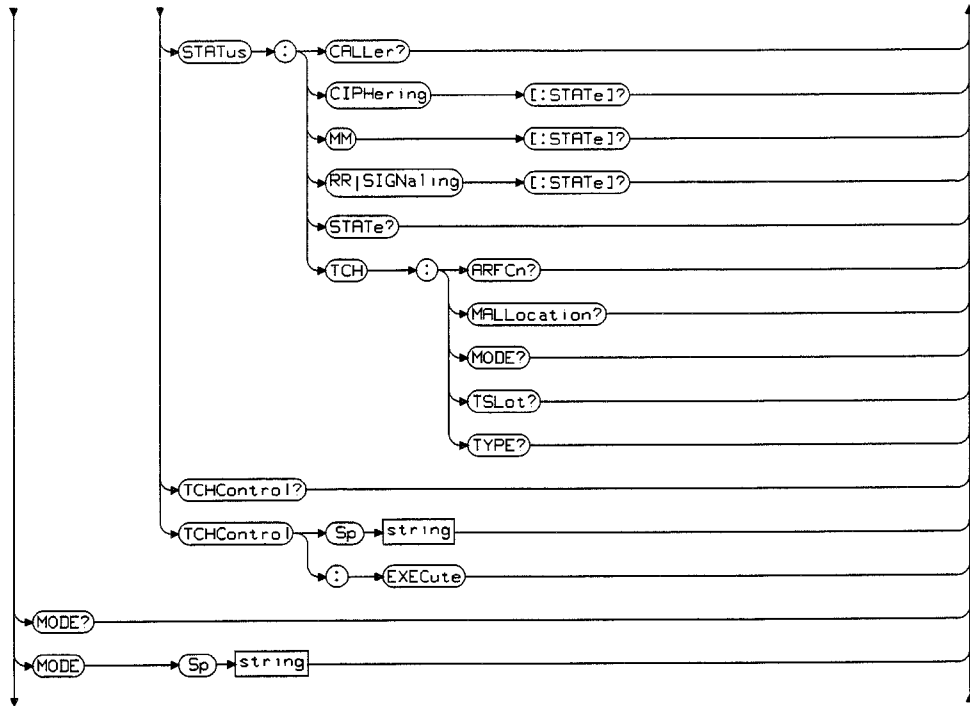
**Cell Control Subsystem**



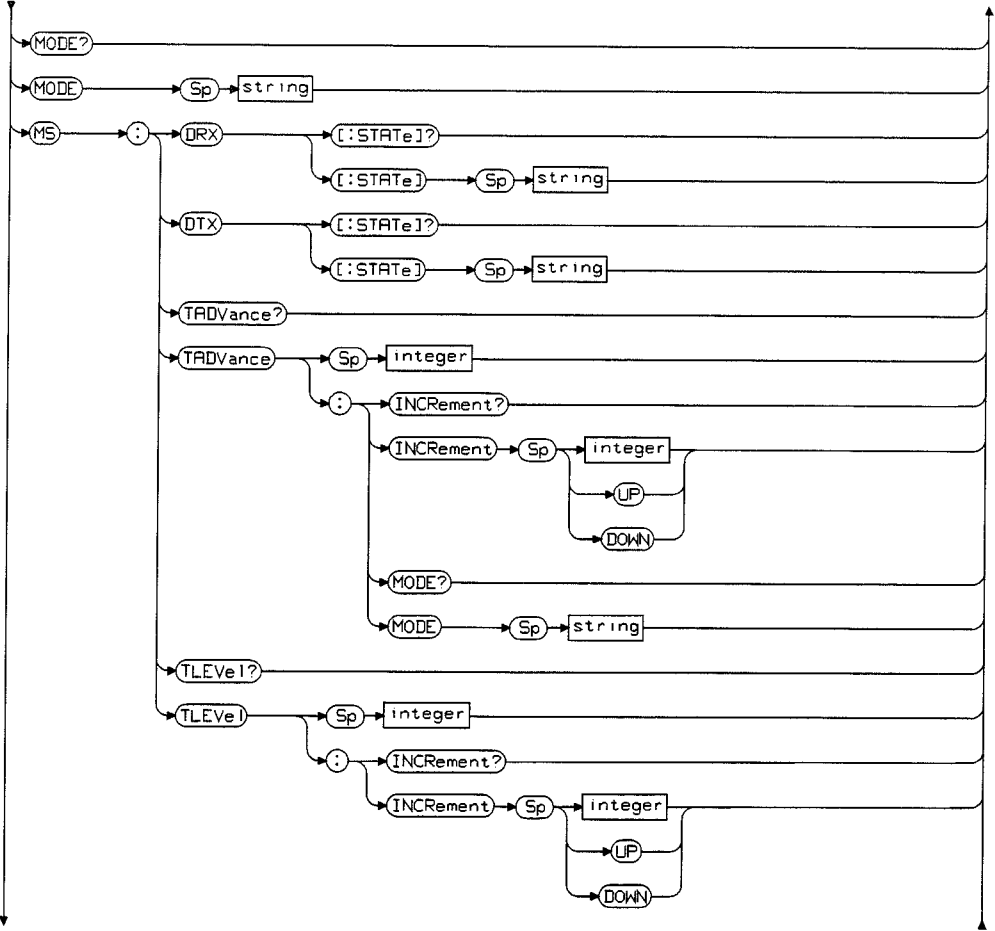
Continued Over



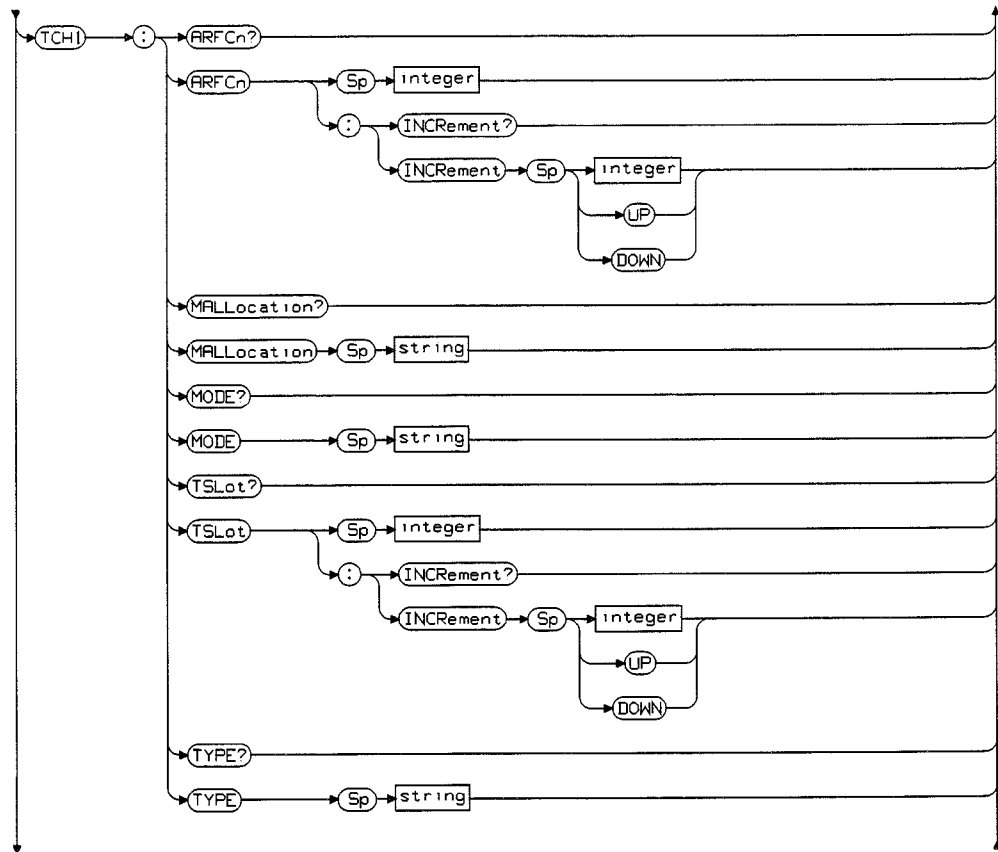
Continued Over



Continued Over

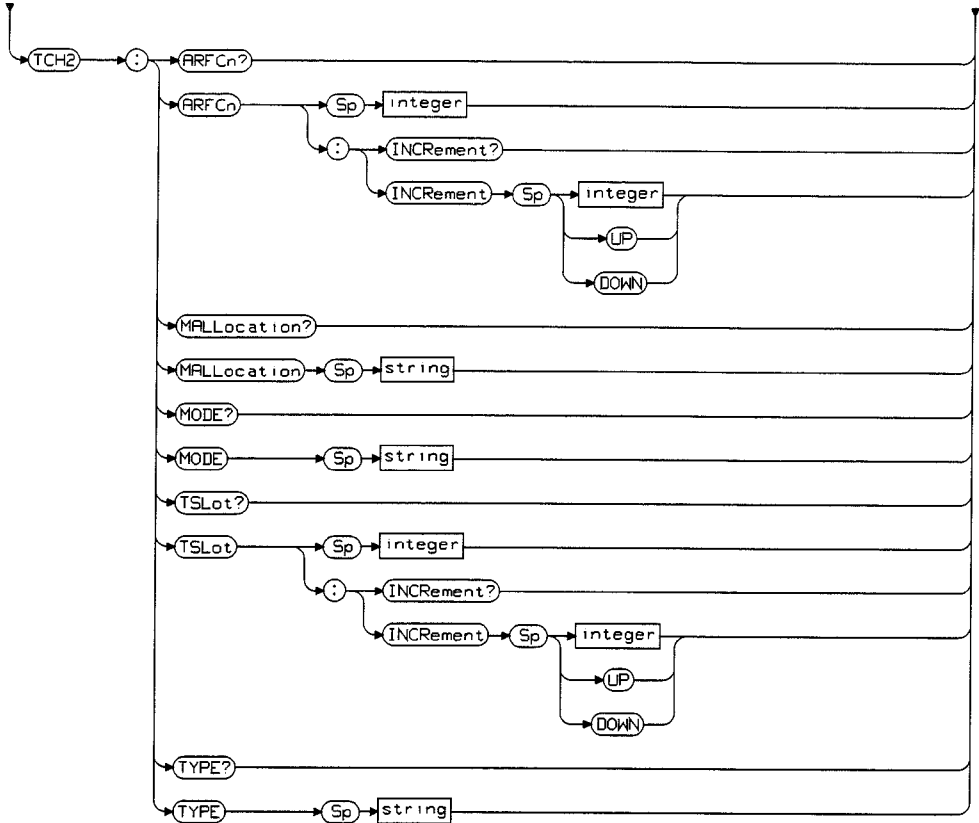


Continued Over



Continued Over





---

**AUDio:DAI:ATEST**

<b>Description</b>	This selects the DAI (Digital Audio Interface) Audio Test mode.
<b>Syntax</b>	CELL:AUDio:DAI:ATEST
<b>Options</b>	Not Applicable.

---

**AUDio:DAI:NORMAL**

<b>Description</b>	This selects the DAI (Digital Audio Interface) Normal mode.
<b>Syntax</b>	CELL:AUDio:DAI:NORMAL
<b>Options</b>	Not Applicable.

---

**AUDio:LOOPback**

<b>Description</b>	Queries the Audio Loopback Commands.
<b>Syntax</b>	CELL:AUDio:LOOPback?
<b>Options</b>	Not Applicable.

---

**AUDio:LOOPback:FAST**

<b>Description</b>	Tells the Mobile to go into Fast Loopback mode.
<b>Syntax</b>	CELL:AUDio:LOOPback:FAST
<b>Options</b>	Not Applicable.

---

**AUDio:LOOPback:FE**

<b>Description</b>	Turns MS Loopback on with Frame Erasure.
<b>Syntax</b>	CELL:AUDio:LOOPback:FE
<b>Options</b>	Not Applicable.

---

### AUDio:LOOPback:OFF

<b>Description</b>	Turns MS Loopback OFF.
<b>Syntax</b>	CELL:AUDio:LOOPback:OFF
<b>Options</b>	Not Applicable.

---

### AUDio:LOOPback:NOFE

<b>Description</b>	Turns MS Loopback on with NO Frame Erasure.
<b>Syntax</b>	CELL:AUDio:LOOPback:NOFE
<b>Options</b>	Not Applicable

---

### AUDio:SPEech:CONFigure

<b>Description</b>	Selects/queries the speech configuration.
--------------------	---

---

**NOTE** This has couplings with DC AM.

<b>Syntax</b>	CELL:AUDio:SPEech:CONFigure? CELL:AUDio:SPEech:CONFigure <string>
---------------	--

<b>Options</b>	'NONE'   'UNCOND'   'COND'   'ECHO'   'PRBS'
----------------	--

Where;

- NONE means that speech (hardware) is deactivated.
- UNCOND means that speech will be unconditioned (that is not amplifiable).
- COND means that speech will be conditioned (i.e., amplifiable).
- ECHO means that speech (hardware) will be put into an "echo" mode, where we will echo back to the MS whatever we received, with a settable echo delay (time).
- PRBS means that speech (hardware) is outputting a pseudo random binary sequence.

---

**NOTE** NONE, UNCOND, COND are not available in the HP 8922S.

---

## **AUDio:SPEech:EDELay**

<b>Description</b>	Selects/queries the speech Echo delay.  This is the delay time for the ECHO speech mode. This only applies when CELL:AUD:SPE:CONF is ECHO.  Default HP-IB and display unit is seconds (S).
<b>Syntax</b>	CELL:AUDio:SPEech:EDELay?  CELL:AUDio:SPEech:EDELay <integer [units]>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## **AUDio:SPEech:GAIN**

<b>Description</b>	Sets/queries the speech GAIN (unitless).  This is the speech gain for the conditioned speech mode. This only applies when CELL:AUD:SPE:CONF is CONDitioned.
<b>Syntax</b>	CELL:AUDio:SPEech:GAIN?  CELL:AUDio:SPEech:GAIN <real [units]>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

**NOTE** This feature is not available in the HP 8922S.

---

---

## **AUDio:SPEech:PRBS:PATtern**

<b>Description</b>	Sets/queries the speech PRBS pattern.  This is the pattern for the PRBS speech. This only applies when CELL:AUD:SPE:CONF is PRBS.
<b>Syntax</b>	CELL:AUDio:SPEech:PRBS:PATtern?  CELL:AUDio:SPEech:PRBS:PATtern <string>
<b>Options</b>	'CCITT-15'   'CCITT-23'   '0'   '1'   '01'   '10'

---

## **CALL:CONNeT**

<b>Description</b>	Selects/queries the connect (mode).
<b>Syntax</b>	CELL:CALL:CONNeT? CELL:CALL:CONNeT <string>
<b>Options</b>	'AUTO'   'MANUAL' Where; <ul style="list-style-type: none"><li>• AUTO means that we will automatically attempt to connect to an MS-initiated call.</li><li>• MANUAL means that you must use CELL:CALL:RECeive to receive an MS-initiated call.</li></ul>

---

## **CALL:COUNt:BSYNc**

<b>Description</b>	Count of Bad synes detected during this call or since COUNT:RESet.
--------------------	--

---

**NOTE** It is normal to detect Bad SYNes during call setup.

---

<b>Syntax</b>	CELL:CALL:COUNt:BSYNc?
<b>Options</b>	Not Applicable.

---

## **CALL:COUNt:DERRor | FERRor**

<b>Description</b>	COUNt of Decoding ERRors detected during this call or since COUNT:RESet.
--------------------	--

---

**NOTE** It is normal to detect Decode ERRors during call setup.

---

<b>Syntax</b>	CELL:CALL:COUNt:DERRor   FERRor?
<b>Options</b>	Not Applicable.

---

## **CALL:COUNt:PAGE**

<b>Description</b>	COUNt of PAGEs made during this call or since COUNT:RESet.
<b>Syntax</b>	CELL:CALL:COUNt:PAGE?
<b>Options</b>	Not Applicable.

---

### CALL:COUNT:RACH

<b>Description</b>	COUNT of RACHs received during this call or since COUNT:RESet.
<b>Syntax</b>	CELL:CALL:COUNT:RACH?
<b>Options</b>	Not Applicable.

---

### CALL:COUNT:RESet

<b>Description</b>	RESets all CALL COUNTs to zero.
<b>Syntax</b>	CELL:CALL:COUNT:RESet
<b>Options</b>	Not Applicable.

---

### CALL:END

<b>Description</b>	Executes an END (i.e., terminate) CALL.  This terminates a call in progress and is the same as selecting the END CALL front panel hardkey.
<b>Syntax</b>	CELL:CALL:END
<b>Options</b>	Not Applicable.

---

### CALL:LIMit

<b>Description</b>	Selects/queries the CALL control LIMit.  This affects how far a call will be allowed to get, which is useful when making measurements on transient states while setting up a call.
<b>Syntax</b>	CELL:CALL:LIMit? CELL:CALL:LIMit <string>
<b>Options</b>	'BCCH'   'DCCH'   'TCH'

---

## **CALL:ORIGinate**

<b>Description</b>	Executes an ORIGinate (i.e., make) a CALL.  This attempts a BS originated (MS terminated) call and is the same as selecting the ORG CALL front-panel hardkey.
<b>Syntax</b>	CELL:CALL:ORIGinate
<b>Options</b>	Not Applicable.

---

## **CALL:PAGing**

<b>Description</b>	Selects/queries the PAGing Mode.
<b>Syntax</b>	CELL:CALL:PAGing? CELL:CALL:PAGing <string>
<b>Options</b>	'CONT'   'SINGLE'  Where; <ul style="list-style-type: none"><li>• CONT means continuous pages will occur when attempting to make a BS-originated call.</li><li>• SINGLE means that just one page will occur when attempting to make a BS-originated call.</li></ul>

---

## **CALL:RECeive**

<b>Description</b>	Executes RECeive (i.e., connect to) a CALL.  This connects the call ('answers the phone') and is the same as selecting the RCV CALL front-panel hardkey.
<b>Syntax</b>	CELL:CALL:RECeive
<b>Options</b>	Not Applicable.

---

## CALL:SIGNaling

<b>Description</b>	Selects / queries the amount of signaling performed by the HP 8922M/S.
<b>Syntax</b>	CELL:CALL:SIGNaling? CELL:CALL:SIGNaling <string>
<b>Options</b>	'NORMAL'   'LIMITED' Where; <ul style="list-style-type: none"><li>• NORMAL signaling mode uses all the normal GSM messages to change the channel configuration.</li><li>• LIMITED specifies that the HP 8922M/S should perform an operation with a limited amount of signaling. The user can therefore achieve the 'force TCH' capability by merely pressing the ORG CALL front-panel hardkey.</li></ul>

---

## CALL:TCH:ARFCn

<b>Description</b>	Selects/queries the current traffic channel ARFCn for the current call.
<b>Syntax</b>	CELL:CALL:TCH:ARFCn? CELL:CALL:TCH:ARFCn <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## CALL:TCH:TSLot

<b>Description</b>	Selects/queries the current traffic channel timeslot for the current call.
<b>Syntax</b>	CELL:CALL:TCH:TSLot? CELL:CALL:TCH:TSLot <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## CALL:STATus:CALLer

<b>Description</b>	Returns 'BS', 'MS', or '--'. Indicates who originated the call in progress. '--' indicates that the Call STATus is inactive.
<b>Syntax</b>	CELL:CALL:STATus:CALLer?
<b>Options</b>	Not Applicable.



---

### CALL:STATus:CIPHering[:STATe]

<b>Description</b>	Queries the CIPHering STATe.
<b>Syntax</b>	CELL:CALL:STATus:CIPHering[:STATe]?
<b>Options</b>	Returned as 'ON' or 'OFF'

---

### CALL:STATus:MM[:STATe]

<b>Description</b>	Queries the Mobility Management (layer) STATe.
<b>Syntax</b>	CELL:CALL:STATus:MM[:STATe]?
<b>Options</b>	Returns state of the Mobility Management protocol layer as; 'LOC UPD'   'IDENT'   'AUTH'   'TMSI'   'INACTIVE'   'ACTIVE' Where; <ul style="list-style-type: none"><li>• LOC UPD means the MM sub-layer has received a Location Update Request from the MS.</li><li>• IDENT means the MM sub-layer has initiated the Identification common procedure and is waiting for the MS to respond.</li><li>• AUTH means the MM sub-layer has initiated the Authentication common procedure and is waiting for the MS to respond.</li><li>• TMSI means the MM sub-layer has initiated the TMSI reallocation common procedure and is waiting for the MS to respond.</li><li>• INACTIVE means there are no MM-connections between the HP 8922M/S and the MS.</li><li>• ACTIVE means an MM-connection exists between the HP 8922M/S and the MS, and may be used to transfer CC messages.</li></ul>

---

### CALL:STATUS:RR[:STATE]

<b>Description</b>	Queries the Radio Source STATE.
<b>Syntax</b>	CELL:CALL:STATUS:RR[:STATE]?
<b>Options</b>	Returns state of signaling as; 'BCCH'   'DCCH'   'TCH1'   'TCH2'   'NONE' Where; <ul style="list-style-type: none"><li>• BCCH means idle on a Broadcast Control CHannel.</li><li>• DCCH means on a Dedicated Control CHannel.</li><li>• TCH1 means on a Traffic CHannel as defined by TCH1 settings.</li><li>• TCH2 means on a Traffic CHannel as defined by TCH2 settings.</li><li>• NONE means that the signaling state is totally undefined.</li></ul>

---

### CALL:STATUS:STATE

<b>Description</b>	Queries the CALL Status STATE.
<b>Syntax</b>	CELL:CALL:STATUS:STATE?
<b>Options</b>	Returns state of the CALL as; 'SETUP REQUEST'   'PROCEEDING'   'ALERTING'   'SETUP CONFIRM'   'CONNECTED'   'INACTIVE'

---

### CALL:STATUS:TCH:ARFCn

<b>Description</b>	Queries the current Traffic CHannel ARFCn. This applies if TCH:MODE is 'SINGLE'.
<b>Syntax</b>	CELL:CALL:STATUS:TCH:ARFCn?
<b>Options</b>	Not Applicable.

---

### CALL:STATus:TCH:MALLocation

<b>Description</b>	Queries the current Traffic CHannel Mobile ALLocation as 'MA1' or 'MA2'. This applies if TCH:MODE is 'HOPPED'.
<b>Syntax</b>	CELL:CALL:STATus:TCH:MALLocation?
<b>Options</b>	Not Applicable.

---

### CALL:STATus:TCH:MODE

<b>Description</b>	Queries the current Traffic CHannel Mode as 'HOPPED' or 'SINGLE'.
<b>Syntax</b>	CELL:CALL:STATus:TCH:MODE?
<b>Options</b>	Returns state as; 'HOPPED'   'SINGLE' Where; <ul style="list-style-type: none"><li>• HOPPED means that the current Traffic CHannel is a hopped traffic channel.</li><li>• SINGLE means that the current Traffic CHannel is a non-hopped traffic channel (i.e., a single ARFCN).</li></ul>

---

### CALL:STATus:TCH:TSLot

<b>Description</b>	Queries the current Traffic CHannel Timeslot.
<b>Syntax</b>	CELL:CALL:STATus:TCH:TSLot?
<b>Options</b>	Not Applicable.

---

### CALL:STATus:TCH:TYPE

<b>Description</b>	Queries the current Traffic CHannel TYPE.
<b>Syntax</b>	CELL:CALL:STATus:TCH:TYPE?
<b>Options</b>	Not Applicable.

---

## **CALL:TCHControl**

<b>Description</b>	Sets/queries the TCH Control selection.
<b>Syntax</b>	CELL:CALL:TCHControl? CELL:CALL:TCHControl <string>
<b>Options</b>	'TCH1 HO'   'TCH2 HO'   'TCH1 ASGN'   'TCH2 ASGN' Where; <ul style="list-style-type: none"><li>• TCH1 HO means upon execution, cause an intracell HandOver to TCH1 based on the CELL:TCH1 selections.</li><li>• TCH2 HO means upon execution, cause an intracell HandOver to TCH2. based on the CELL:TCH2 selections.</li><li>• TCH1 ASGN means upon execution, do a traffic channel assignment based on the CELL:TCH1 selections.</li><li>• TCH2 ASGN means upon execution, do a traffic channel assignment based on the CELL:TCH2 selections.</li></ul>

---

## **CALL:TCHControl:EXECute**

<b>Description</b>	EXECutes the TCH Control selection.
<b>Syntax</b>	CELL:CALL:TCHControl:EXECute
<b>Options</b>	Not Applicable.

---

## **MODE**

<b>Description</b>	Selects/queries the Operating Mode of HP 8922M/S.
<b>Syntax</b>	CELL:MODE? CELL:MODE <string>
<b>Options</b>	'ACTIVE CELL'   'TEST MODE'   'CW GENERATOR'   'ACTIVE CELL +'   'TEST MODE +'   'CW GENERATOR +'

---

### MS:DRX[:STATe]

<b>Description</b>	Selects/queries the Discontinuous RX (receiver) STATe.
<b>Syntax</b>	CELL:MS:DRX[:STATe]? CELL:MS:DRX[:STATe] <string>
<b>Options</b>	'ON'   'OFF'

---

### MS:DTX[:STATe]

<b>Description</b>	Selects/queries the Discontinuous TX (transmission) STATe.
<b>Syntax</b>	CELL:MS:DTX[:STATe]? CELL:MS:DTX[:STATe] <string>
<b>Options</b>	'ON'   'OFF'

---

### MS:TADVance

<b>Description</b>	Selects/queries the MS's Timing ADVance (setting).
<b>Syntax</b>	CELL:MS:TADVance? CELL:MS:TADVance <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### MS:TADVance:MODE

<b>Description</b>	Selects/queries the MS's Timing ADVance (setting) MODE.
<b>Syntax</b>	CELL:MS:TADVanceMODE? CELL:MS:TADVance:MODE <string>
<b>Options</b>	'AUTO'   'MANUAL' Where; <ul style="list-style-type: none"><li>• AUTO means we will automatically adjust the MS's timing advance setting in real time to keep bit zero aligned.</li><li>• MANUAL means the TADVance setting will directly set the MS's timing advance setting.</li></ul>

---

**MS:TLEVel**

<b>Description</b>	Selects/queries the MS's TX (transmitter) power LEVel.
<b>Syntax</b>	CELL:MS:TLEVel? CELL:MS:TLEVel <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

**TCH1 or TCH2:ARFCn**

<b>Description</b>	Selects/queries the Traffic CHannel 1 or 2 ARFCn. This applies if TCH1:MODE or TCH2:MODE is 'SINGLE'.
<b>Syntax</b>	CELL:TCH1   TCH2:ARFCn? CELL:TCH1   TCH2:ARFCn <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

**TCH1 or TCH2:MALLocation**

<b>Description</b>	Queries the Traffic CHannel 1 or 2 Mobile ALLocation. This applies if TCH1:MODE or TCH2:MODE is 'HOPPED'.
<b>Syntax</b>	CELL:TCH1   TCH2:MALLocation? CELL:TCH1   TCH2:MALLocation <string>
<b>Options</b>	'MA1'   'MA2'

---

**TCH1 or TCH2:MODE**

<b>Description</b>	Selects/queries the Traffic CHannel 1 or 2 Mode.
<b>Syntax</b>	CELL:TCH1   TCH2:MODE? CELL:TCH1   TCH2:MODE <string>
<b>Options</b>	'HOPPED'   'SINGLE' Where; <ul style="list-style-type: none"> <li>• HOPPED means that TCH1 will be hopped traffic channel.</li> <li>• SINGLE means that TCH1 will be a non-hopped traffic channel (i.e., a single ARFCN).</li> </ul>

---

### TCH1 or TCH2:TSLot

<b>Description</b>	Sets/queries the Traffic CHannel Timeslot.
<b>Syntax</b>	CELL:TCH1   TCH2:TSLot? CELL:TCH1   TCH2:TSLot <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### TCH1 or TCH2:TYPE

<b>Description</b>	Selects/queries the Traffic CHannel 1 or 2 TYPE.
<b>Syntax</b>	CELL:TCH1   TCH2:TYPE? CELL:TCH1   TCH2:TYPE <string>
<b>Options</b>	'FS'

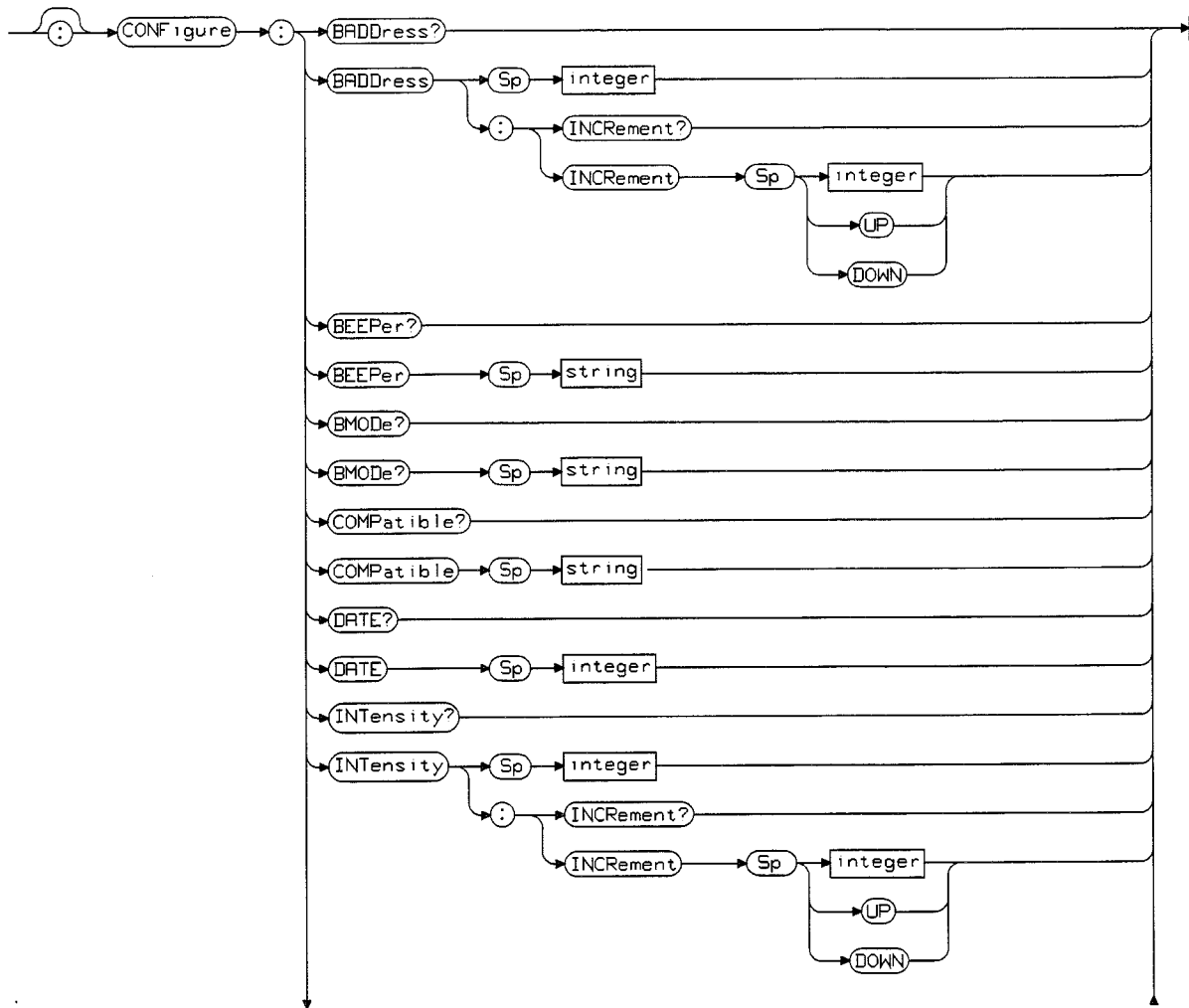
Cell Control Subsystem  
TCH1 or TCH2:TYPE



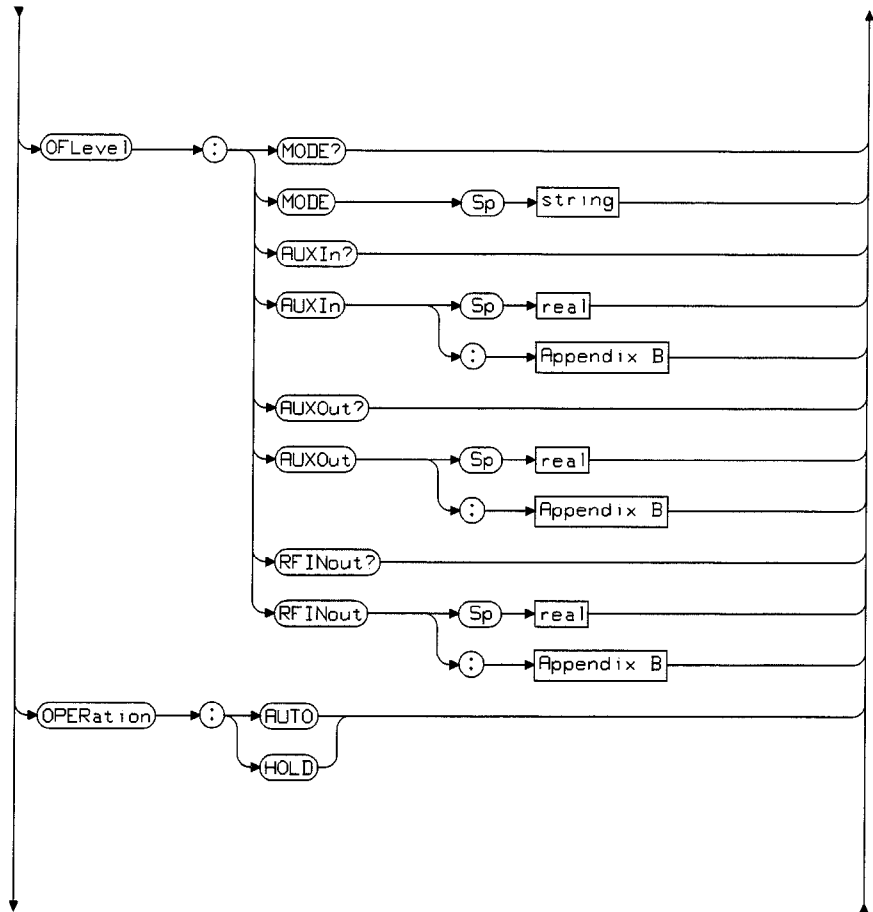
---

**Configure Subsystem**

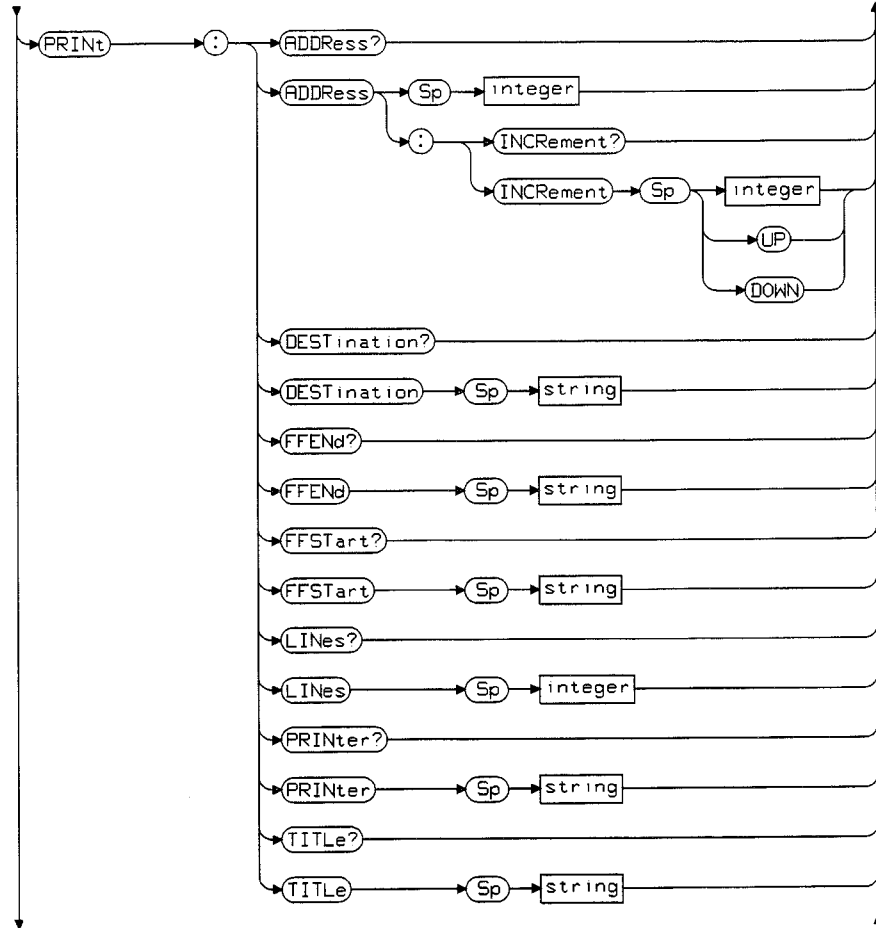
Configure Subsystem



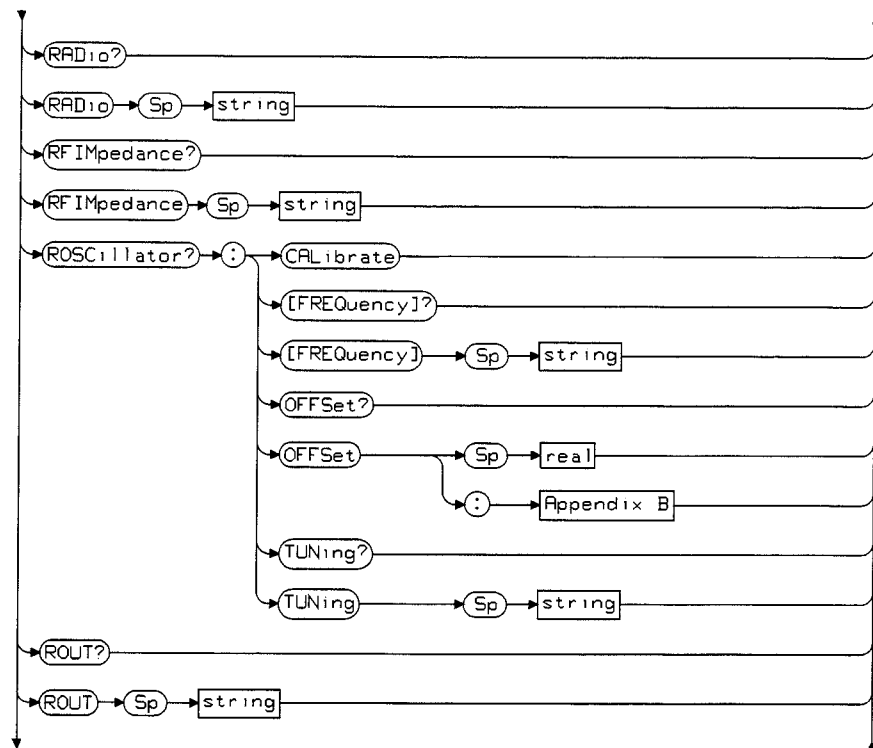
Continued Over



Continued Over

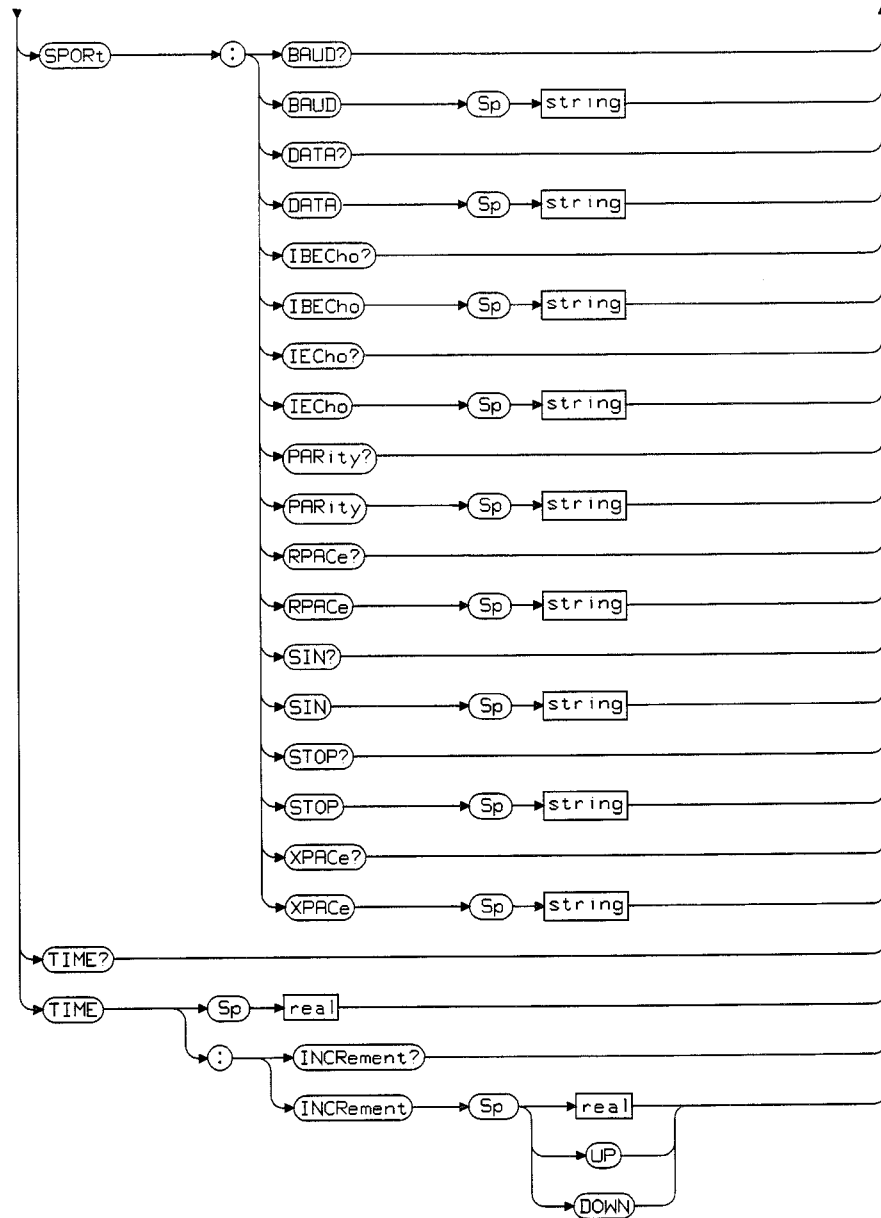


Continued Over



Continued Over

Configure Subsystem



---

## **BADdress**

<b>Description</b>	Sets/queries the HP-IB Bus Address.
<b>Syntax</b>	CONFigure:BADdress? CONFigure:BADdress <integer>   [:INUM]
<b>Options</b>	Where <integer>=0 through 30 Refer to Appendix A.

---

## **BEEPer**

<b>Description</b>	Selects/Queries the audio BEEPer volume
<b>Syntax</b>	CONFigure:BEEPer? CONFigure:BEEPer <string>
<b>Options</b>	'OFF'   'QUIET'   'LOUD'

---

## **BMODe**

<b>Description</b>	Selects/Queries the HP-IB operating MODe.
<b>Syntax</b>	CONFigure:BMODe? CONFigure:BMODe <string>
<b>Options</b>	'CONTROL'   'TALK&LSTN' Where; <ul style="list-style-type: none"><li>• CONTROL is used to control external instruments using the HP 8922M/S.</li><li>• TALK&amp;LSTN is used for "normal" HP-IB operation.</li></ul>

---

## **COMPAtible**

<b>Description</b>	This command toggles the HP 8922M/S to an HP 8922G/E emulation. This enables backward compatibility of programs and instrument functionality.
<b>Syntax</b>	CONFigure:COMPAtible? CONFigure:COMPAtible <string>
<b>Options</b>	'8922E'   '8922S' (HP 8922S only) or '8922G'   '8922M' (HP 8922M only)

---

## **DATE**

<b>Description</b>	Sets/queries the current DATE for the internal clock
<b>Syntax</b>	CONFigure:DATE? CONFigure:DATE <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A. Format = yymmdd

---

## **INTensity**

<b>Description</b>	Sets/queries the screen INTensity
<b>Syntax</b>	CONFigure:INTensity? CONFigure:INTensity <integer>   [:INUM]
<b>Options</b>	Where <integer>=1 (very dim) through to 8 (bright) Refer to Appendix A.

---

## **OFLevel:MODE**

<b>Description</b>	Selects/queries the RF Offset level MODE
<b>Syntax</b>	CONFigure:OFLevel:MODE? CONFigure:OFLevel:MODE <string>
<b>Options</b>	'ON'   'OFF'



---

### OFLevel:AUXin

<b>Description</b>	Sets/queries the RF Offset Level at the AUX RF In port. In effect when OFLevel:MODE 'ON' is selected. Valid unit is dB.
<b>Syntax</b>	CONFigure:OFLevel:AUXin? CONFigure:OFLevel:AUXin <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B. Maximum 100

---

### OFLevel:AUXout

<b>Description</b>	Sets/queries the RF Offset Level at the AUX RF Out port. In effect when OFLevel:MODE 'ON' is selected. Valid unit is dB.
<b>Syntax</b>	CONFigure:OFLevel:AUXout? CONFigure:OFLevel:AUXout <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B. Maximum 100

---

### OFLevel:RFINout

<b>Description</b>	Sets/queries the RF Offset Level at the RF IN/out port. In effect when OFLevel:MODE 'ON' is selected. Valid unit is dB.
<b>Syntax</b>	CONFigure:OFLevel:AUXout? CONFigure:OFLevel:AUXout <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B. Maximum 100

---

## **OPERation:AUTO**

<b>Description</b>	Enables several auto-ranging routines, providing automatic adjustment of the affected settings. Turns the RF Analyzer attenuator hold setting to AUTO.  (SANalyzer:ATTenuator:MODE 'AUTO')  Turns the AF Analyzer gain cntl to AUTO.  (AFANalyzer:RANGing 'AUTO')
<b>Syntax</b>	CONFigure:OPERation:AUTO
<b>Options</b>	Not applicable.

---

## **OPERation:HOLD**

<b>Description</b>	Disables several auto-ranging routines, requiring manual adjustment of the affected settings.  Turns the RF Analyzer attenuator hold setting to HOLD.  (SANalyzer:ATTenuator:MODE 'HOLD')  Turns the AF Analyzer gain cntl to HOLD.  (AFANalyzer:RANGing 'HOLD')
<b>Syntax</b>	CONFigure:OPERation:HOLD
<b>Options</b>	Not applicable.

---

## **PRINT:ADDRESS**

<b>Description</b>	Sets/queries the HP-IB ADDRESS of the PRINter connected.
<b>Syntax</b>	CONFigure:PRINT:ADDRESS?  CONFigure:PRINT:ADDRESS <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## **PRINT:DESTINATION**

<b>Description</b>	Selects/queries the PRINter DESTination (port).
<b>Syntax</b>	CONFigure:PRINT:DESTINATION? CONFigure:PRINT:DESTINATION <string>
<b>Options</b>	'SERIAL'   'HPIB'   'PARALLEL'

---

## **PRINT:FFEND**

<b>Description</b>	Selects/queries a form feed at the end of the print out.
<b>Syntax</b>	CONFigure:PRINT:FFEND? CONFigure:PRINT:FFEND <string>
<b>Options</b>	'YES'   'NO'

---

## **PRINT:FFSTART**

<b>Description</b>	Selects/queries a form feed at the start of the print out.
<b>Syntax</b>	CONFigure:PRINT:FFSTART? CONFigure:PRINT:FFSTART <string>
<b>Options</b>	'YES'   'NO'

---

## **PRINT:LINES**

<b>Description</b>	Selects/queries the number of lines to be printed per page.
<b>Syntax</b>	CONFigure:PRINT:LINES? CONFigure:PRINT:LINES <integer>
<b>Options</b>	Not applicable.

---

## **PRINT:PRINter**

<b>Description</b>	Selects/queries the printer type connected
<b>Syntax</b>	CONFigure:PRINT:PRINter? CONFigure:PRINT:PRINter <string>
<b>Options</b>	'DESKJET'   'EPSON FX-80'   'EPSON LQ-850'   'LASERJET'   'PAINTJET'   'QUIETJET'   'THINKJET'

---

## **PRINT:TITLe**

<b>Description</b>	Enters/queries a string to be printed at the top of all screen printouts.
<b>Syntax</b>	CONFigure:PRINT:TITLe? CONFigure:PRINT:TITLe <quoted string>
<b>Options</b>	Not applicable.

---

## **RADio**

<b>Description</b>	Selects/queries the RADio type mode of operation.
<b>Syntax</b>	CONFigure:RADio? CONFigure:RADio <string>
<b>Options</b>	'GSM900'   'DCS1800'   'E-GSM'   'PCS1900'

---

## **RFIMPedance**

<b>Description</b>	Selects/queries whether RF voltages should be expressed as the voltage across a 50 OHM load or the open circuit voltage (EMF).
<b>Syntax</b>	CONFigure:RFIMPedance? CONFigure:RFIMPedance <string>
<b>Options</b>	'50 OHM'   'EMF'

---

## ROSCillator:CALibrate

<b>Description</b>	Executes a calibration cycle for the reference.
<b>Syntax</b>	CONFigure:ROSCillator:CALibrate
<b>Options</b>	Not applicable.

---

## ROSCillator[:FREQUENCY]

<b>Description</b>	Selects/queries the expected external Reference OSCillator FREQUENCY. This frequency will be locked to when an external reference is connected.
<b>Syntax</b>	CONFigure:ROSCillator[:FREQUENCY]? CONFigure:ROSCillator[:FREQUENCY] <string>
<b>Options</b>	'13 MHZ'   '10 MHZ'   '5 MHZ'   '2 MHZ'   '1 MHZ'

---

## ROSCillator:OFFset

<b>Description</b>	Sets/queries the Reference OSCillator tuning OFFset. In affect when ROSC:TUN 'TUNABLE' is selected. Default HP-IB and display unit is PPM.
<b>Syntax</b>	CONFigure:ROSCillator:OFFset? CONFigure:ROSCillator:OFFset <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## ROSCillator:TUNing

<b>Description</b>	Selects/queries the Reference OSCillator tuning MODE.
<b>Syntax</b>	CONFigure:ROSCillator:TUNing? CONFigure:ROSCillator:TUNing <string>
<b>Options</b>	'TUNABLE'   'NORMAL' Where; <ul style="list-style-type: none"><li>• TUNABLE means the reference can be tuned by the value given for ROSC:OFFset.</li><li>• NORMAL means the reference can lock to an external reference selected by :ROSC[:FREQ] or if no external reference is connected then the reference will be free-running.</li></ul>

---

**ROUT**

<b>Description</b>	Selects/queries the OPT 001 REF OUT that appears on the rear panel.
<b>Syntax</b>	CONFigure:ROUT? CONFigure:ROUT <string>
<b>Options</b>	'ON'   'OFF' Where <ul style="list-style-type: none"> <li>• ON means turn on the reference.</li> <li>• OFF means turn off the reference (timebase oven still kept warm).</li> </ul>

---

**SPORT:BAUD**

<b>Description</b>	Selects/queries the BAUD rate for serial communication when using the rear panel Serial PORT.
<b>Syntax</b>	CONFigure:SPORT:BAUD? CONFigure:SPORT:BAUD <string>
<b>Options</b>	'300'   '600'   '1200'   '2400'   '4800'   '9600'   '19200'

---

**SPORT:DATA**

<b>Description</b>	Selects/queries the DATA length - the number of bits used for each word of serial data when using the Serial PORT.
<b>Syntax</b>	CONFigure:SPORT:DATA? CONFigure:SPORT:DATA <string>
<b>Options</b>	'7 BITS'   '8 BITS'

---

**SPORT:IBEcho**

<b>Description</b>	Selects/queries the Serial PORT RS-232 input IBasic. ECHO state as On or Off - enable/disable screen and error message echoing from IBASIC.
<b>Syntax</b>	CONFigure:SPORT:IBEcho? CONFigure:SPORT:IBEcho <string>
<b>Options</b>	'ON'   'OFF'

---

## SPORT:PARity

<b>Description</b>	Selects/queries the Serial PORT PARity bits setting.
<b>Syntax</b>	CONFigure:SPORT:PARity? CONFigure:SPORT:PARity <string>
<b>Options</b>	'NONE'   'ODD'   'EVEN'   'ALWAYS 1'   'ALWAYS 0'

---

## SPORT:RPACe

<b>Description</b>	Selects/queries the Serial PORT PACe when Receiving serial data.
<b>Syntax</b>	CONFigure:SPORT:RPACe? CONFigure:SPORT:RPACe <string>
<b>Options</b>	'XON/XOFF'   'NONE'

Where;

- XON/XOFF lets the instrument 'talk' to the transmitting device to alter the rate of the data being sent.
- NONE disable the XON/XOFF function.

---

## SPORT:SIN

<b>Description</b>	Selects/queries the Serial PORT RS-232 Serial INput.
<b>Syntax</b>	CONFigure:SPORT:SIN? CONFigure:SPORT:SIN <string>
<b>Options</b>	'INST'   'IBASIC'

Where;

- INST configures the serial port to connect to an external RS-232 terminal or computer.
- IBASIC is used to allow the IBASIC controller to read the serial port.

---

## SPORT:STOP

<b>Description</b>	Selects/queries the STOP length - the number of stop bits used when using the Serial PORT.
<b>Syntax</b>	CONFigure:SPORT:STOP CONFigure:SPORT:STOP <string>
<b>Options</b>	'1 BIT'   '2 BITS'

---

## SPORT:XPACe

<b>Description</b>	Selects/queries the Serial PORT PACe when transmitting (TX) serial data.
<b>Syntax</b>	CONFigure:SPORT:XPACe? CONFigure:SPORT:XPACe <string>
<b>Options</b>	'XON/XOFF'   'NONE' Where; <ul style="list-style-type: none"><li>• XON/XOFF lets the receiving device 'talk' to the instrument to alter the rate of the data being sent.</li><li>• NONE disable the XON/XOFF function.</li></ul>

---

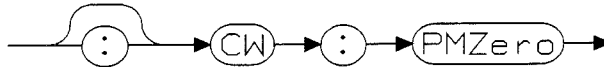
## TIME

<b>Description</b>	Sets/queries the TIME of day for the instruments clock.
<b>Syntax</b>	CONFigure:TIME? CONFigure:TIME <real>   [:INUM]
<b>Options</b>	Refer to Appendix A. Format = HH.MM in 24 Hour format.



---

**CW Subsystem**



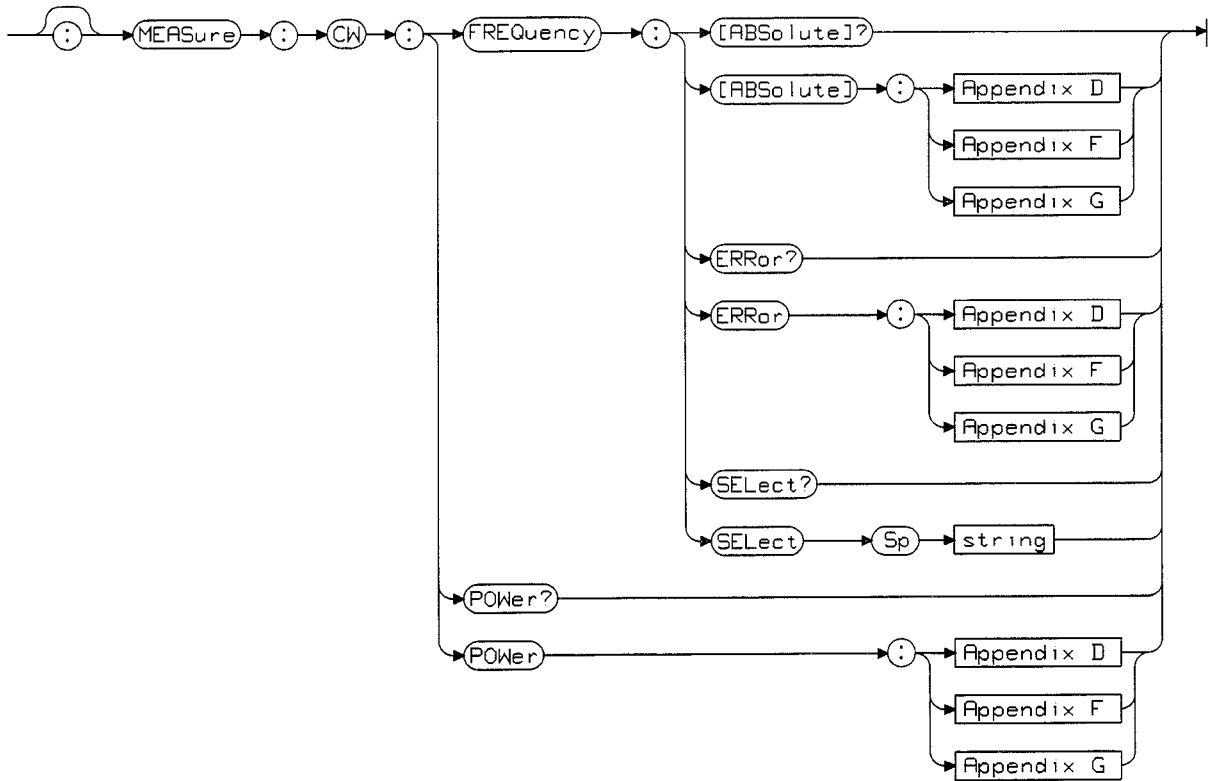
---

## PMZero

- Description** Zeroes the Power Meter in order to make calibrated CW Power measurements. Note: The user should disconnect the input signal when selecting this. This command is the same as DSP:AMPL:PMZero.
- Syntax** CW:PMZero
- Options** Not Applicable.

---

**CW Commands (Measure Subsystem)**



---

## FREQuency[:ABSolute]

<b>Description</b>	Sets the CW ABSolute FREQuency MEASurement attributes. Queries the CW ABSolute FREQuency MEASurement result. HP-IB unit is HZ. Display units are GHZ, MHZ, KHZ, HZ; default unit is MHZ.
<b>Syntax</b>	MEASure: CW: FREQuency[:ABSolute]? MEASure: CW: FREQuency[:ABSolute][:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

## FREQuency:ERRor

<b>Description</b>	Sets/queries the CW FREQuency ERRor MEASurement attributes. HP-IB unit is HZ. Display units are GHZ, MHZ, KHZ, HZ; default unit is MHZ.
<b>Syntax</b>	MEASure: CW: FREQuency: ERRor? MEASure: CW: FREQuency: ERRor[:MM]   [:AVG]   [:MET]
<b>Options</b>	Refer to Appendices D, F and G.

---

## FREQuency:SElect

<b>Description</b>	Selects/queries the CW FREQ SElect measurement to display.
<b>Syntax</b>	MEASure: CW: FREQuency: SElect? MEASure: CW: FREQuency: SElect <string>
<b>Options</b>	'CW FREQ'   'CWFREQERR'

---

**POWer**

---

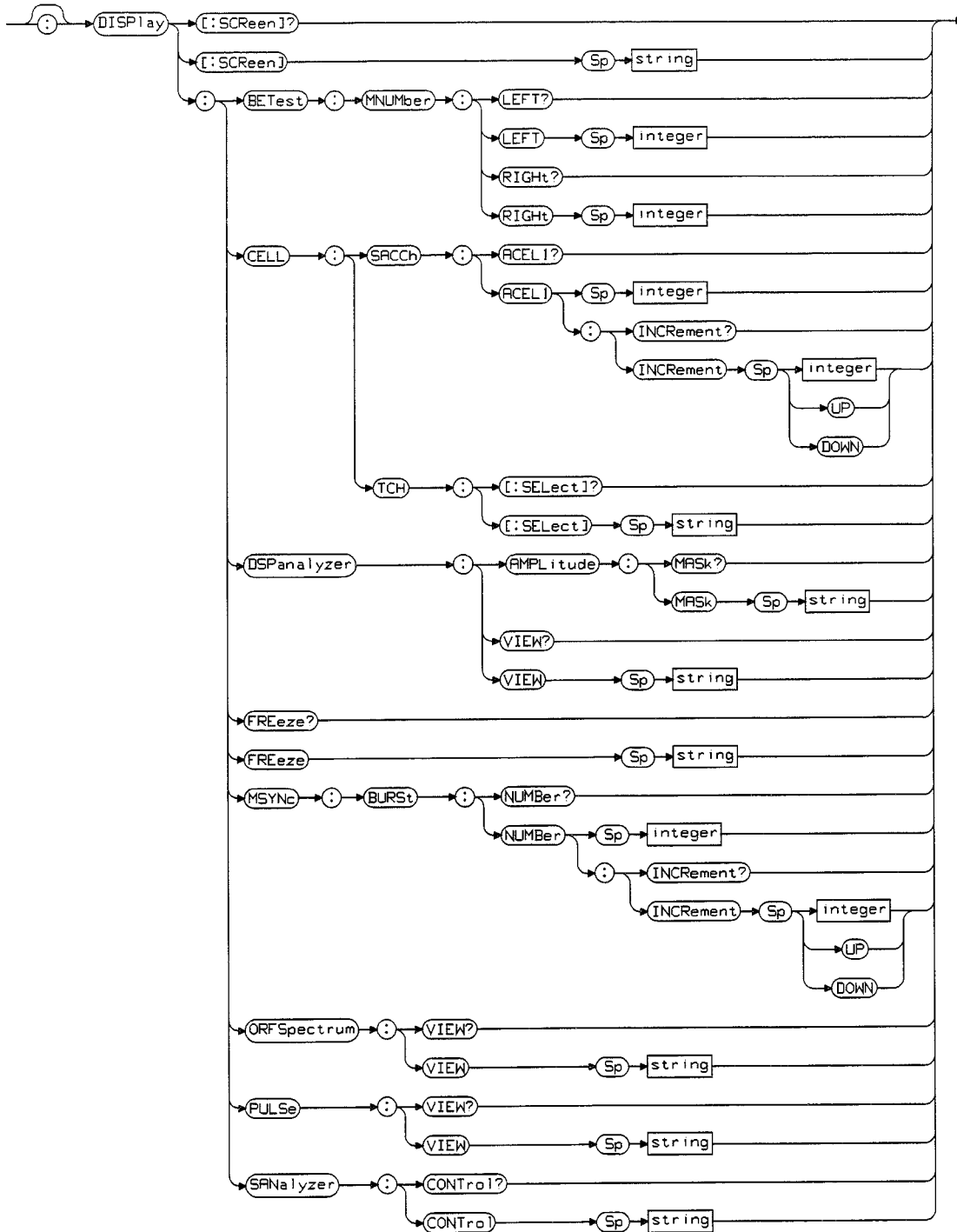
**POWer**

<b>Description</b>	<p>Sets the CW POWer MEASurement attributes. Queries the CW POWer MEASurement result.</p> <p>NOTE: This is only valid for RFAN:INP of 'RF IN/OUT'.</p> <p>HP-IB unit is V.</p> <p>Display units are dBm, V, mv, uv, dBuv, W; default unit is dBm.</p>
<b>Syntax</b>	<p>MEASure:CW:POWer?</p> <p>MEASure:CW:POWer[:MM]   [:AVG]   [:MET]</p>
<b>Options</b>	<p>Refer to Appendices D, F and G.</p>

---

**DISPlay Subsystem**

# DISPlay Subsystem





---

### **[:SCReen]**

<b>Description</b>	Selects/queries the screen to activate, display and perform any necessary screen transitional functionality.
<b>Syntax</b>	DISPlay[:SCReen]? DISPlay[:SCReen] <enumerated type / string>
<b>Options</b>	AFANalyzer   BER   BER1   BER2   CELL   CELL1   CELL2   CCONfigure   CONFigure   CWAfanalyzer   CWANalyzer   DDEMod   DSPanalyzer   IOConfigure   FBER   FTCPower   HELP   HOPControl   LOGGing   MESSages   MSYNc   MSINfo   ORFSpectrum   OSCilloscope   PULSe   RFANalyzer   RFGenerator   SANalyzer   SERVICE   SMSCb   TCONfigure   TESTs   TFReq   TSPEC   TSEQ   TPAR   TIB

---

### **BETest:MNUMber:LEFT**

<b>Description</b>	Selects/queries the Bit Error Test Measurement NUMber to DISplay on the LEFT side of the screen.
<b>Syntax</b>	DISPlay:BETest:MNUMber:LEFT? DISPlay:BETest:MNUMber:LEFT <string>
<b>Options</b>	'1'   '3'

---

### **BETest:MNUMber:RIGHT**

<b>Description</b>	Selects/queries the Bit Error Test Measurement NUMber to DISplay on the RIGHT side of the screen.
<b>Syntax</b>	DISPlay:BETest:MNUMber:RIGHT? DISPlay:BETest:MNUMber:RIGHT <string>
<b>Options</b>	'2'   '4'

---

### **CELL:SACCh:ACEL1**

<b>Description</b>	Selects/queries the SACCH Adjacent Cell measurements to DISPlay.
<b>Syntax</b>	DISPlay:CELL:SACCh:ACEL1? DISPlay:CELL:SACCh:ACEL1 <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### **CELL:TCH[:SElect]**

<b>Description</b>	Selects/queries which TCH parameters to display on the Cell Control screen.
<b>Syntax</b>	DISPlay:CELL:TCH[:SElect]? DISPlay:CELL:TCH[:SElect] <string>
<b>Options</b>	'TCH1'   'TCH2'

---

### **DSPanalyzer:AMPLitude:MASK**

<b>Description</b>	Selects/queries whether the DSP analyzer AMPLitude MASK should be DISPlayed on the 'AMPL MID', 'AMPL RISE' and 'AMPL FALL' screen VIEWs.
<b>Syntax</b>	DISPlay:DSPanalyzer:AMPLitude:MASK? DISPlay:DSPanalyzer:AMPLitude:MASK <string>
<b>Options</b>	'ON'   'OFF'

---

### **DSPanalyzer:VIEW**

<b>Description</b>	Selects/queries the VIEW to be selected when DISPlay:SCReen DSPanalyzer is selected.
<b>Syntax</b>	DISPlay:DSPanalyzer:VIEW? DISPlay:DSPanalyzer:VIEW <string>
<b>Options</b>	'PHASEMAIN'   'PHASE ERR'   'AMPL MAIN'   'AMPL MID'   'AMPL RISE'   'AMPL FALL'   'DATA BITS'

---

## **FREeze**

<b>Description</b>	Screen freezing prevents the HP 8922M/S from updating the display when running tests. The measurement mode changes as before. This will enable tests to run more quickly.  When screen freezing is turned off, the display reverts to the last screen selected by the test code. This is true for both manual and remote operation.
<b>Syntax</b>	DISPlay:FREeze? DISPlay:FREeze <string>
<b>Options</b>	'ON'   'OFF'

---

**NOTE** It is recommended that you select 'ON' from the Configure screen.  
That is; DISPlay:SCReen 'CONF'

---



---

## **MSYNc:BURSt:NUMBer**

<b>Description</b>	Sets/queries the MSYNc BURSt NUMBer to be displayed when the MEAS SYNC screen is displayed.
<b>Syntax</b>	DISPlay:MSYNc:BURSt:NUMBer? DISPlay:MSYNc:BURSt:NUMBer <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## **ORFSpectrum:VIEW**

<b>Description</b>	Selects/queries the Output RF Spectrum VIEW to be selected when DISPlay:SCReen ORFSpectrum is selected.
<b>Syntax</b>	DISPlay:ORFSpectrum:VIEW? DISPlay:ORFSpectrum:VIEW <string>
<b>Options</b>	'TRACE'   'MAIN'

---

## **PULSe:VIEW**

<b>Description</b>	Selects/queries the PULSe On/Off VIEW to be selected when DISPlay:SCReen PULSe is selected.
<b>Syntax</b>	DISPlay:PULSe:VIEW? DISPlay:PULSe:VIEW <string>
<b>Options</b>	'FALL'   'MAIN'   'RISE'

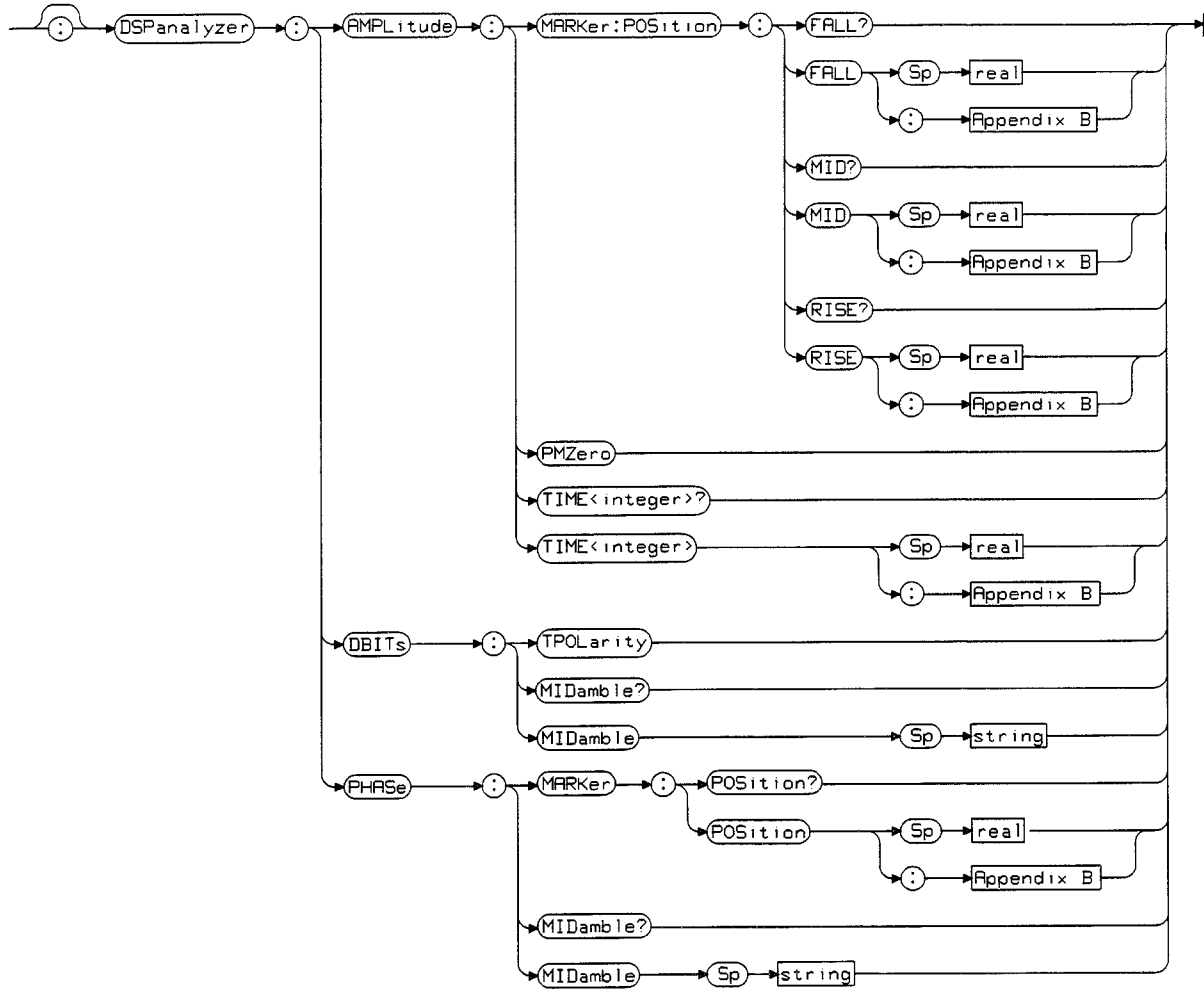
---

## **SANalyzer:CONTRol**

<b>Description</b>	CONTRols the Spectrum ANalyzer views - various fields will appear on the trace screen based on the CONTRol selection.
<b>Syntax</b>	DISPlay:SANalyzer:CONTRol? DISPlay:SANalyzer:CONTRol <string>
<b>Options</b>	'MAIN'   'RF GEN'   'MARKER'   'AUXILIARY'

---

**DSP Analyzer Subsystem**



---

## AMPLitude:MARKer:POSition:FALL

<b>Description</b>	Sets/queries the AMPLitude MARKer FALL trace position setting. The value is given in units of divisions from the left side of the FALL trace (144 Bit Periods (T) to 156 Bit Periods (T) = 6 divisions).
<b>Syntax</b>	DSPanalyzer:AMPLitude:MARKer:POSition:FALL? DSPanalyzer:AMPLitude:MARKer:POSition:FALL <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## AMPLitude:MARKer:POSition:MID

<b>Description</b>	Sets/queries the AMPLitude MARKer MID trace position setting. The value is given in units of divisions from the left side of the MID trace (-10 Bit Periods (T) to 160 Bit Periods (T) = 8.5 divisions).
<b>Syntax</b>	DSPanalyzer:AMPLitude:MARKer:POSition:MID? DSPanalyzer:AMPLitude:MARKer:POSition:MID <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## AMPLitude:MARKer:POSition:RISE

<b>Description</b>	Sets/queries the AMPLitude MARKer RISE trace position setting. The value is given in units of divisions from the left side of the RISE trace (-8 Bit Periods (T) to 4 Bit Periods (T) = 6 divisions).
<b>Syntax</b>	DSPanalyzer:AMPLitude:MARKer:POSition:RISE? DSPanalyzer:AMPLitude:MARKer:POSition:RISE <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## AMPLitude:PMZero

<b>Description</b>	Zeroes the Power Meter in order to make calibrated Average TX Power measurements. Note: The user should disconnect the input signal when selecting this. This field is the same as CW:PMZero.
<b>Syntax</b>	DSPanalyzer:AMPLitude:PMZero
<b>Options</b>	Not Applicable.

---

---

## AMPLitude:TIME

- Description** Sets/queries the TIME to make amplitude measurements.  
HP-IB units are seconds (S), bit periods (T).  
Default HP-IB unit is seconds (S).  
Default display unit is micro-seconds (US).
- Syntax** DSPAnalyzer:AMPLitude:TIME<n>?  
DSPAnalyzer:AMPLitude:TIME<n> <real>
- Options** Refer Appendix B.  
n=1 through 12

---

## DBITs:TPOLarity

- Description** Toggles the POLarity of the Data BITs for the current measurement.
- Syntax** DSPAnalyzer:DBITs:TPOLarity
- Options** Not Applicable.

---

## PHASe:MARKer:POSition

- Description** Sets/queries the PHASe MARKer POSition setting. The value is given in units of divisions from the left side of the trace (0 to 14.7 divisions).
- Syntax** DSPAnalyzer:PHASe:MARKer:POSition?  
DSPAnalyzer:PHASe:MARKer:POSition <real> | [:FNUM]
- Options** Refer appendix B.

---

## PHASe:MIDamble

- Description** Selects/queries the MIDamble to use for DSP analyzer phase displays as the actual measured midamble or the midamble that the user expects to use.
- Syntax** DSPAnalyzer:PHASe:MIDamble?  
DSPAnalyzer:PHASe:MIDamble <string>
- Options** 'MEASURED' | 'EXPECTED'



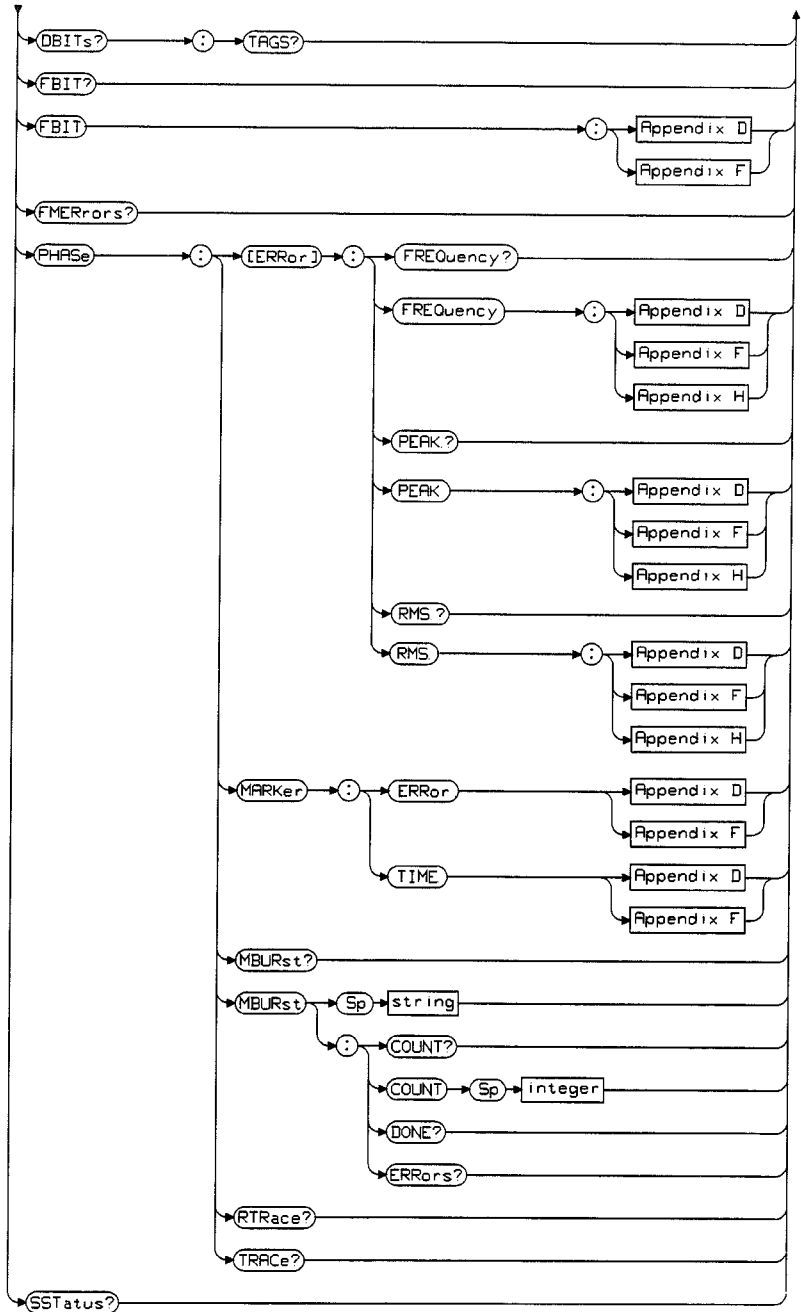
---

**DSP Analyzer Commands  
(Measure Subsystem)**

# DSP Analyzer Commands (Measure Subsystem)



Continued Over



**[:AMPLitude]:AMPLitude**

---

**[:AMPLitude]:AMPLitude**

<b>Description</b>	Sets the AMPLitude measurement attributes. Queries the AMPLitude measurement result based on the DSP:AMPL:TIME<n> setting.
<b>Syntax</b>	MEASure:DSPanalyzer[:AMPLitude]:AMPLitude<n>? MEASure:DSPanalyzer[:AMPLitude]:AMPLitude<n>[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F. Where n= 1 through 12

---

**[:AMPLitude]:MARKer:LEVEL:FALL**

<b>Description</b>	Sets/queries the AMPLitude MARKer FALL trace attributes.  Queries the AMPLitude MARKer FALL trace level which is relative amplitude data. This value is a function of the fall trace marker position set/queried by DSP:AMPL:MARK:POS:FALL. This is only valid when on IMPORTANT: The user MUST be on the Amplitude Fall screen to query this result (DISP:DSP:VIEW 'AMPL FALL').  HP-IB unit is dB.  Display unit is dB.
<b>Syntax</b>	MEASure:DSPanalyzer[:AMPLitude]:MARKer:LEVEL:FALL? MEASure:DSPanalyzer[:AMPLitude]:MARKer:LEVEL:FALL[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

## [:AMPLitude]:MARKer:LEVEL:MID

<b>Description</b>	<p>Sets/queries the AMPLitude MARKer MID trace attributes.</p> <p>Queries the AMPLitude MARKer MID trace level which is relative amplitude data. This value is a function of the mid trace marker position set/queried by DSP:AMPL:MARK:POS:MID. This is only valid when on IMPORTANT: The user MUST be on the Amplitude MID screen to query this result (DISP:DSP:VIEW 'AMPL MID').</p> <p>HP-IB unit is dB.</p> <p>Display unit is dB.</p>
<b>Syntax</b>	<p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:LEVel:MID?</p> <p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:LEVel:MID[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

## [:AMPLitude]:MARKer:LEVEL:RISE

<b>Description</b>	<p>Sets/queries the AMPLitude MARKer RISE trace attributes.</p> <p>Queries the AMPLitude MARKer RISE trace level which is relative amplitude data. This value is a function of the rise trace marker position set/queried by DSP:AMPL:MARK:POS:RISE. This is only valid when on IMPORTANT: The user MUST be on the Amplitude RISE screen to query this result (DISP:DSP:VIEW 'AMPL RISE').</p> <p>HP-IB unit is dB.</p> <p>Display unit is dB.</p>
<b>Syntax</b>	<p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:LEVel:RISE?</p> <p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:LEVel:RISE[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

---

## **[:AMPLitude]:MARKer:TIME:FALL**

<b>Description</b>	<p>Sets/queries the MARKer FALL trace TIME attributes.</p> <p>Queries the MARKer FALL trace TIME which is the marker's position relative to the last bit in the measured burst. This value is a function of the fall trace marker position set or queried by DSP:AMPL:MARK:POS:FALL.</p> <p>IMPORTANT: The user MUST be on the Amplitude Fall screen to query this result (DISP:DSP:VIEW 'AMPL FALL').</p> <p>HP-IB units are seconds (S), bit periods (T); default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods); default unit is US (micro-second).</p>
<b>Syntax</b>	<p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:TIME:FALL?</p> <p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:TIME:FALL[:MM]   [:AVG]</p>
<b>Options</b>	<p>Refer to Appendices D and F.</p>

---

## **[:AMPLitude]:MARKer:TIME:MID**

<b>Description</b>	<p>Sets/queries the MARKer MID trace TIME attributes.</p> <p>Queries the MARKer MID trace TIME which is the marker's position relative to bit zero in the measured burst. This value is a function of the mid trace marker position set or queried by DSP:AMPL:MARK:POS:RISE.</p> <p>IMPORTANT: The user MUST be on the Amplitude MID screen to query this result (DISP:DSP:VIEW 'AMPL MID').</p> <p>HP-IB units are seconds (S), bit periods (T); default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods); default unit is US (micro-second).</p>
<b>Syntax</b>	<p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:TIME:MID?</p> <p>MEASure:DSpanalyzer[:AMPLitude]:MARKer:TIME:MID[:MM]   [:AVG]</p>
<b>Options</b>	<p>Refer to Appendices D and F.</p>

---

## [:AMPLitude]:MARKer:TIME:RISE

<b>Description</b>	<p>Sets/queries the MARKer RISE trace TIME attributes.</p> <p>Queries the MARKer RISE trace TIME which is the marker's position relative to bit zero in the measured burst. This value is a function of the rise trace marker position set or queried by DSP:AMPL:MARK:POS:RISE.</p> <p>IMPORTANT: The user MUST be on the Amplitude RISE screen to query this result (DISP:DSP:VIEW 'AMPL RISE').</p> <p>HP-IB units are seconds (S), bit periods (T); default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods); default unit is US (micro-second).</p>
<b>Syntax</b>	<p>MEASure:DSPanalyzer[:AMPLitude]:MARKer:TIME:RISE?</p> <p>MEASure:DSPanalyzer[:AMPLitude]:MARKer:TIME:RISE[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

## [:AMPLitude]:MSUMmary

<b>Description</b>	<p>Queries the AMPLitude Measurement SUMmary.</p> <p>IMPORTANT: The user MUST be on the Amplitude Summary (Ampl Main) screen to query this result (DISP:DSP:VIEW 'AMPL MAIN').</p>
<b>Syntax</b>	MEASure:DSPanalyzer[:AMPLitude]:MSUMmary?
<b>Options</b>	<p>Query returns; 'PASSED', 'FAILED' or '- - - -'.</p> <p>Where;</p> <ul style="list-style-type: none"> <li>• '- - - -' means that the MSUMmary results are currently indeterminate.</li> <li>• 'PASSED' means that all of the following are true after an amplitude measurement completes:             <ol style="list-style-type: none"> <li>a) Each AMPLitude measurement (AMPL&lt;1&gt; through AMPL&lt;12&gt;), does NOT exceed its HI LO limits OR is OFF.</li> <li>b) Pk+ Flatness does NOT exceed its HI LO limits OR Pk+ Flatness measurement is OFF. (PPFlatness).</li> <li>c) Pk- Flatness does NOT exceed its HI LO limits OR Pk- Flatness measurement is OFF. (NPFlatness) AND for each of the above (a-c) that is ON it must have a valid measurement result (i.e. not '- - - -').</li> </ol> </li> </ul>

**[[:AMPLitude]:NPFLatness**

---

**[[:AMPLitude]:NPFLatness**

<b>Description</b>	Queries the Negative Peak FLatness measurement result. This is the most negative amplitude in dB relative to the average power over the useful bits in the measured burst.  HP-IB unit is dB.  Display unit is dB.
<b>Syntax</b>	MEASure:DSpanalyzer[:AMPLitude]:NPFLatness?  MEASure:DSpanalyzer[:AMPLitude]:NPFLatness[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**[[:AMPLitude]:PPFLatness**

<b>Description</b>	Queries the Positive Peak FLatness measurement result. This is the most positive amplitude in dB relative to the average power over the useful bits in the measured burst.  HP-IB unit is dB.  Display unit is dB.
<b>Syntax</b>	MEASure:DSpanalyzer[:AMPLitude]:PPFLatness?  MEASure:DSpanalyzer[:AMPLitude]:PPFLatness[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**[[:AMPLitude]:PTCPower**

<b>Description</b>	Queries the Peak Transmitter Carrier Power measurement result. This is the average power over the useful bits in the measured burst.  HP-IB unit is dBm, W;  default unit is dBm.  Display unit is dBm, V, mV, uV, dBuV, W;  default unit is dBm.
<b>Syntax</b>	MEASure:DSpanalyzer[:AMPLitude]:PTCPower?  MEASure:DSpanalyzer[:AMPLitude]:PTCPower[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.



---

### **[:AMPLitude]:TRACe**

<b>Description</b>	Returns the DSP Analyzer AMPLitude TRACe measured data length (integer), time reference (floating point), and the floating point TRACe AMPLitude data array for the given length separated by commas.
<b>Syntax</b>	MEASure:DSPanalyzer[:AMPLitude]:TRACe?
<b>Options</b>	Not Applicable.

---

### **DBITs**

<b>Description</b>	Queries the demodulated Data BITs returned for the current measurements made.
<b>Syntax</b>	MEASure:DSPanalyzer:DBITs?
<b>Options</b>	Not Applicable.

---

### **DBITs:TAGS**

<b>Description</b>	Queries the TAGS for each of the Data BITs.
<b>Syntax</b>	MEASure:DSPanalyzer:DBITs:TAGS?
<b>Options</b>	Returns 'M' or '-' Where; <ul style="list-style-type: none"><li>• 'M' = Midamble bit.</li><li>• '-' = RF level error.</li></ul>

**FBIT**

**FBIT**

<b>Description</b>	<p>Sets/queries the position of the First (useful) BIT attributes.</p> <p>Queries the position of the First (useful) BIT in time relative to when the DSP measurement trigger occurred.</p> <p>HP-IB units are seconds (S), bit periods (T); default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods); default unit is US (micro-second).</p>
<b>Syntax</b>	<p>MEASure:DSPanalyzer:FBIT?</p> <p>MEASure:DSPanalyzer:FBIT[:MM]   [:AVG]</p>
<b>Options</b>	<p>Refer to Appendices D and F.</p>

**FMERrors**

<b>Description</b>	<p>A query of number of FM ERrors returns the number of FM demodulated bits different from the best bit match (of the demodulated burst bits) to the selected midamble before differential decoding for the current DSP measurement. This is only valid for MSYN:SYNC:MODE 'MIDAMBLE'.</p>
<b>Syntax</b>	<p>MEASure:DSPanalyzer:FMERrors?</p>
<b>Options</b>	<p>Not Applicable.</p>

**PHASe[:ERRor]:FREQuency**

<b>Description</b>	<p>Queries the FREQuency ERRor MEASurement result. This is the slope of the average phase over the useful bits in the measured burst.</p> <p>HP-IB unit is HZ.</p> <p>Display units are HZ, kHz; default unit is HZ.</p>
<b>Syntax</b>	<p>MEASure:DSPanalyzer:PHASe[:ERRor]:FREQuency?</p> <p>MEASure:DSPanalyzer:PHASe[:ERRor]:FREQuency[:MM]   [:AVG]   [:MULTI-B]</p>
<b>Options</b>	<p>Refer to Appendices D, F and H.</p>

---

## PHASe[:ERRor]:PEAK

<b>Description</b>	Queries the PEAK PHASe ERRor MEASurement result over the useful bits in the measured burst. HP-IB unit is degrees.
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe[:ERRor]:PEAK? MEASure:DSPanalyzer:PHASe[:ERRor]:PEAK:MM? MEASure:DSPanalyzer:PHASe[:ERRor]:PEAK:AVG? MEASure:DSPanalyzer:PHASe[:ERRor]:PEAK:MULTI-B?
<b>Options</b>	Refer to Appendices D, F and H.

---

## PHASe[:ERRor]:RMS

<b>Description</b>	Queries the RMS PHASe ERRor MEASurement result over the useful bits in the measured burst. HP-IB unit is degrees. Display unit is degrees.
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe[:ERRor]:RMS? MEASure:DSPanalyzer:PHASe[:ERRor]:RMS:MM? MEASure:DSPanalyzer:PHASe[:ERRor]:RMS::AVG? MEASure:DSPanalyzer:PHASe[:ERRor]:RMS::MULTI-B?
<b>Options</b>	Refer to Appendices D, F and H.

---

## PHASe:MARKer:ERRor

<b>Description</b>	<p>Queries the PHASe ERRor measurement result. This is the y-axis MARKer position of the phase error. This value is a function of the marker position set or queried by DSP:PHAS:MARK:POS.</p> <p>IMPORTANT: The user MUST be on the Phase Err screen to query this result (DISP:DSP:VIEW 'PHASE ERR').</p> <p>HP-IB unit is degrees.</p> <p>Display unit is degrees.</p>
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe:MARKer:ERRor[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

## PHASe:MARKer:TIME

<b>Description</b>	<p>Queries the MARKer TIME which is the marker's position relative to bit zero in the measured burst. This value is a function of the marker position set or queried by DSP:PHAS:MARK:POS.</p> <p>HP-IB units are seconds (S), bit periods (T);</p> <p>default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods);</p> <p>default unit is US (micro-second).</p> <p>IMPORTANT: The user MUST be on the Phase Err screen to query this result (DISP:DSP:VIEW 'PHASE ERR').</p>
<b>Syntax</b>	<p>MEASure:DSPanalyzer:PHASe:MARKer:TIME?</p> <p>MEASure:DSPanalyzer:PHASe:MARKer:TIME[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

## PHASe:MBURst

<b>Description</b>	Selects/queries state of multi-burst measurement.
<b>Syntax</b>	<p>PHASe:MBURst?</p> <p>MEASure:DSPanalyzer:PHASe:MBURst &lt;string&gt;</p>
<b>Options</b>	'ON'   'OFF'

---

### PHASe:MBURst:COUNT

<b>Description</b>	Sets the number of bursts to be measured. Queries the number of bursts being measured. If multi-burst is OFF, the returned value is undefined.
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe:MBURst:COUNT? MEASure:DSPanalyzer:PHASe:MBURst:COUNT <integer>
<b>Options</b>	Where the integer number is 1 to 999, with a default value of 10.

---

### PHASe:MBURst:DONE

<b>Description</b>	Queries the number of bursts measured so far. If no measurement is in progress, the number of bursts measured in the previous measurement, is returned.
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe:MBURst:DONE?
<b>Options</b>	Not Applicable.

---

### PHASe:MBURst:ERRors

<b>Description</b>	Queries the number of errors during the burst measurement. If no measurement is in progress, the number of errors in the previous measurement, is returned.
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe:MBURst:ERRors?
<b>Options</b>	Not Applicable.

---

### PHASe:TRACe

<b>Description</b>	Returns the DSP Analyzer PHASe TRACe measured data length(integer), and the floating point PHASe AMPLitude data array for the given length separated by commas.
<b>Syntax</b>	MEASure:DSPanalyzer:PHASe:TRACe?
<b>Options</b>	Not Applicable.

## SStatus

---

### SStatus

**Description** Queries the Sync SStatus for the current DSP measurement.

**Syntax** MEASure:DSPanalyzer:SStatus?

**Options** Returns one of the following states;

'No Error' | 'ShortBurst' | 'Level Late' | 'LevelShort' |

'FM Error' | 'Low Level' | 'Math Error' | 'RF Ovrload'.

The message return priority (highest to lowest) is as follows:

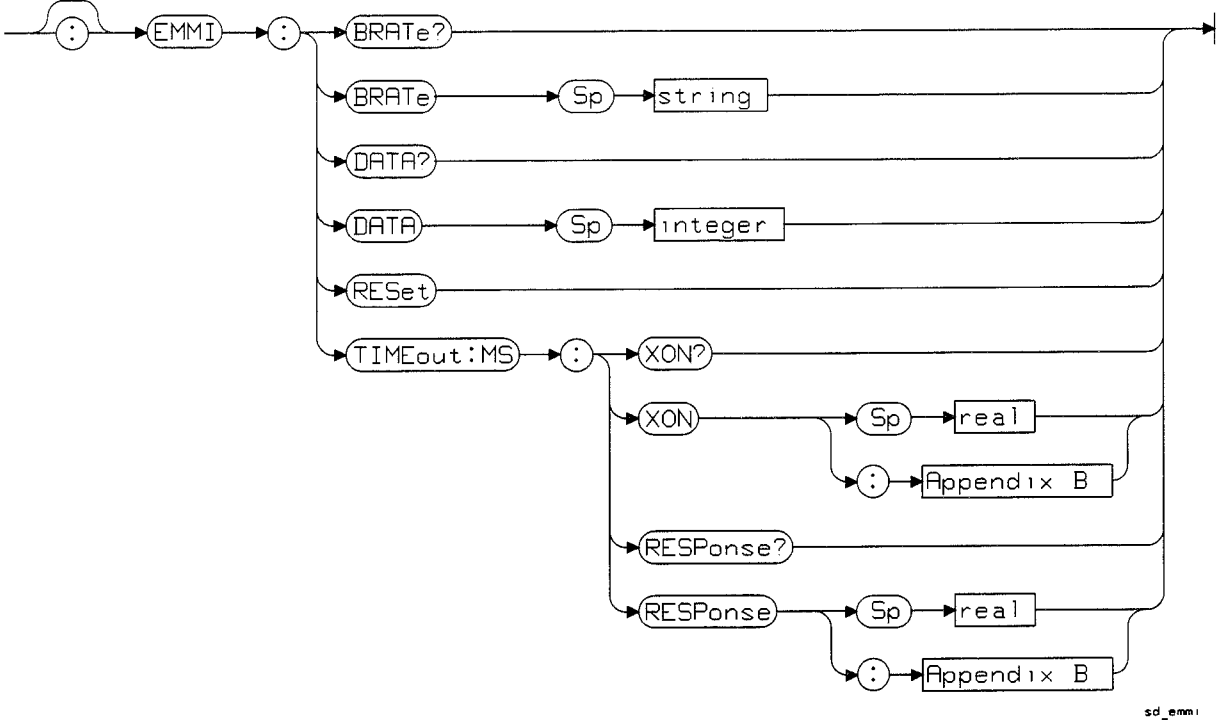
- Math Error
- RF Ovrload | Low Level
- FM Error
- ShortBurst | Level Late | LevelShort
- No Error

The above defined as;

- ShortBurst - amplitude envelope not long enough for the selected burst length.
- RF Ovrload - the DSP Analyzer sampler hardware overloaded during sampling.
- FM Error - at least one FM error was detected during the Midamble (or User Defined Sync Pattern) portion of the selected burst (only possible for MSYN:SYNC:MODE 'MIDAMBLE')
- Level Late - amplitude of the burst did not rise until after the first few bits were received.
- Level Short - amplitude of the burst fell before the last few bits were received.
- Low Level - DSP Analyzer RF level never got high enough to make a valid measurement.
- Math Error - DSP Analyzer math-related error occurred.
- No Error - no error occurred in synchronizing to the selected burst.

---

**EMMI Subsystem (HP 8922M Only)**





---

## BRATe

<b>Description</b>	Selects/queries EMMI part Baud RATE.
<b>Syntax</b>	EMMI:BRATe? EMMI:BRATe <string>
<b>Options</b>	"600"   "1200"   "2400"   "4800"   "9600"

---

## DATA?

<b>Description</b>	Returns a response message sent by the mobile station. Response messages are stored in a message in a message buffer in the HP 8922M.
<b>Syntax</b>	EMMI:DATA?
<b>Options</b>	This EMMI DATA is in the form:

num-decimal-digits/num-data-chars/emmi-hex-data  
(no spaces)

Where;

- num-decimal-digits: (range: 1 through 3) The number of characters following to be interpreted as num-data-chars.
- num-data-chars: (range: 0 through 510) The number of data characters that will follow. NOTE: This must be an even number since every two characters will represent one byte of hex data.
- emmi-hex-data: Hex character data. Each pair of characters represents one byte of EMMI hex data.

The user can do the following:

- Read all the messages in the message buffer by sending EMMI:DATA? commands until #10 is returned. (Messages are read first-in-first-out.)
- Clear the message buffer by sending EMMI:RESet.

**DATA <data entry>**

---

**DATA <data entry>**

**Description** Writes the DATA to the EMMI port.

**Syntax** EMMI:DATA <data entry>

**Options** This EMMI DATA is in the form:

num-decimal-digits/num-data-chars/emmi-hex-data  
(no spaces)

Where;

- num-decimal-digits: (range: 1 through 3) The number of characters following to be interpreted as num-data-chars.
- num-data-chars: (range: 0 through 510) The number of data characters that will follow. NOTE: This must be an even number since every two characters will represent one byte of hex data.
- emmi-hex-data: Hex character data. Each pair of characters represents one byte of EMMI hex data.

When the data write is complete, a status bit will be set that reflects what happened with the EMMI data. See the Status Subsystem for EMMI.

---

**RESet**

**Description** EMMI RESet clears out transmit and receive (message) buffers and sends XON (ready to receive) frame to the mobile station.

**Syntax** EMMI:RESet

**Options** Not applicable.

---

**TIMEout:MS:XON**

**Description** Sets/queries the EMMI TIMEout (time limit) allowed for the mobile to send XON. This adjusts a timer that provides the time delay needed when the EMMI bus is attempting to send a message before the MS or the HP 8922M are ready. If the XON timeout expires, then the STATUS:EMMI:EVENT? will return a 4 (XON timeout exceeded).

Default HP-IB and display unit is seconds (S).

**Syntax** EMMI:TIMEout:MS:XON?

EMMI:TIMEout:MS:XON <real> | [:FNUM]

**Options** Refer to Appendix B.

---

## **TIMEout:MS:RESPonse**

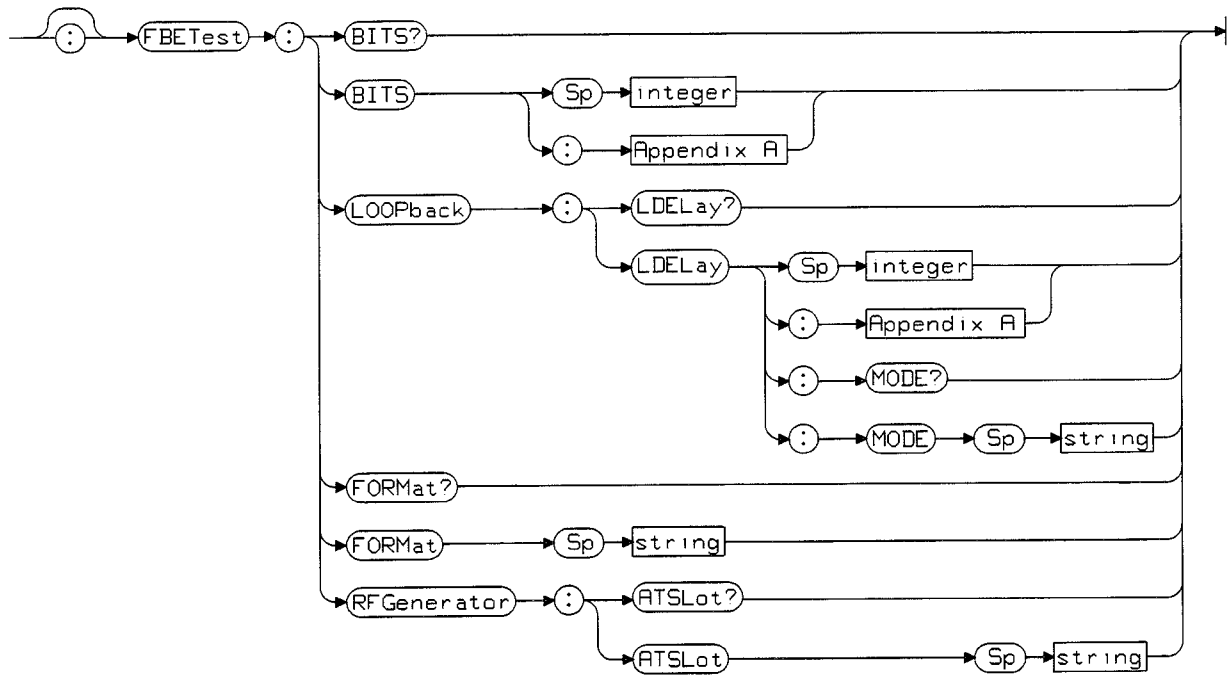
<b>Description</b>	Sets/queries the EMMI TIMEout (time limit) allowed for the mobile stations' RESPonse (For example; to send an ACK or NAK to the HP 8922M). If the response timeout expires, then the STATus:EMMI:EVENT? will return an 8 (response timeout exceeded).  Default HP-IB and display unit is seconds (S).
<b>Syntax</b>	EMMI:TIMEout:MS:RESPonse?  EMMI:TIMEout:MS:RESPonse <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

EMMI Subsystem (HP 8922M Only)

**TIMEout:MS:RESPonse**

---

**Fast Bit Error Test**



---

## BITS

<b>Description</b>	Sets/Queries the number of bits used during a measurement.
<b>Syntax</b>	FBETest:BITS? FBETest:BITS <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## LOOPback:LDElay

<b>Description</b>	Sets/Queries the loopback delay.
<b>Syntax</b>	FBETest:LOOPback:LDElay? FBETest:LOOPback:LDElay <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A. The integer value being 0 to 26.

---

## LOOPback:LDElay:MODE

<b>Description</b>	Sets/Queries the loopback delay mode.
<b>Syntax</b>	FBETest:LOOPback:LDElay:MODE? FBETest:LOOPback:LDElay:MODE <string>
<b>Options</b>	Where; <ul style="list-style-type: none"><li>• AUTO automatically sets LDElay (above) once when the measurement is started. This is a timing calibration action.</li><li>• MANUAL means the Loop DElay is controlled manually via the :LDElay command.</li></ul>

---

## FORMat

<b>Description</b>	Sets/Queries the data format to be Random Speach Frames or Random Bursts.
<b>Syntax</b>	FBETest:FORMat? FBETest:FORMat <string>
<b>Options</b>	Not Applicable.

---

## RFGenerator:ATSLot

<b>Description</b>	Sets/Queries the automatic pulse modulation for the adjacent timeslots of the base station generated signal.
<b>Syntax</b>	FBETest:RFGenerator:ATSLot? FBETest:RFGenerator:ATSLot <string>
<b>Options</b>	'OFF'   '+30DB'
<b>Where</b>	<b>+30DB</b> automatically pulses the adjacent timeslots 30 dB higher than the RF generator amplitude setting.  The entire preceding timeslot is 30 dB higher. The first few bits for the following timeslot are 30 dB higher. The remainder of the following timeslot is pulsed off.  <b>OFF</b> makes all timeslots the same amplitude.

---

**NOTE** This field is not featured in the HP 8922S.

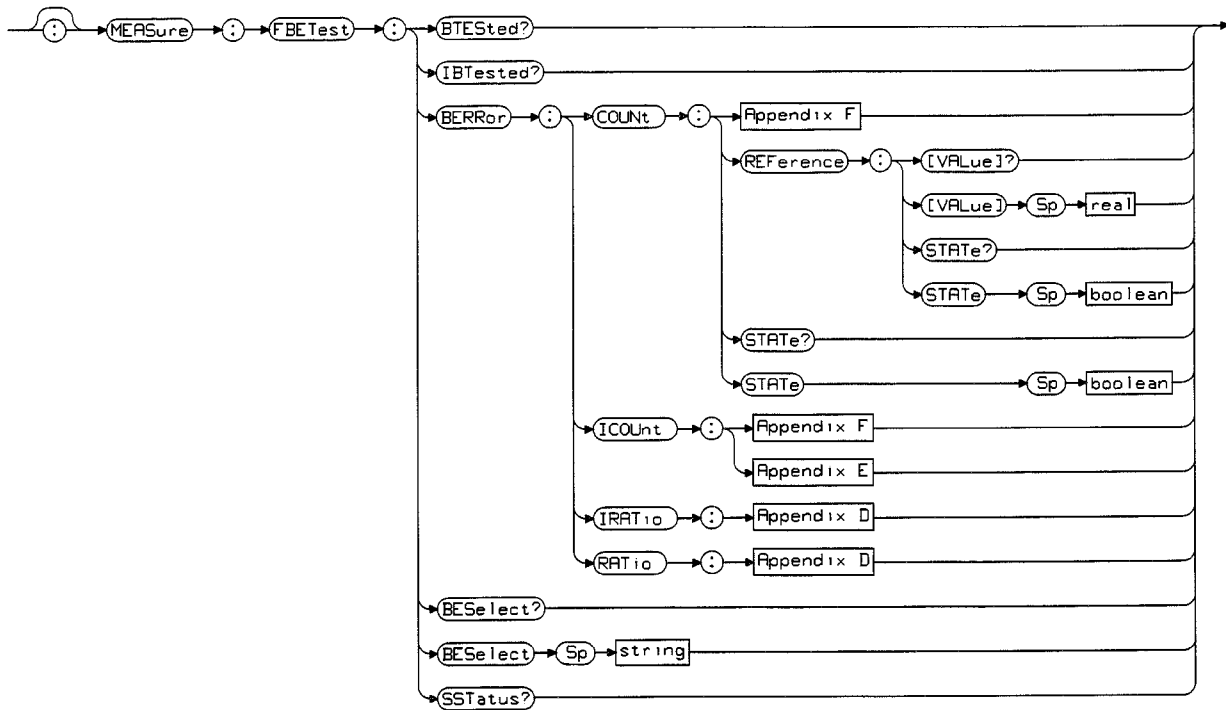
---



---

**Fast Bit Error Test (Measure Subsystem)**

Fast Bit Error Test (Measure Subsystem)



---

**BTESted**

<b>Description</b>	Queries the number of Bits TESted for the completed Bit Error Test measurements.
<b>Syntax</b>	MEASure:FBETest:BTESted?
<b>Options</b>	Not Applicable.

---

**IBTested**

<b>Description</b>	Queries the number of Bits TESted for the Intermediate Bit Error Test measurements. NOTE: This can only be queried when in the state TRIGger:BEtEst:MODE 'RUN'.
<b>Syntax</b>	MEASure:FBETest:IBTested?
<b>Options</b>	Not Applicable.

---

**BERRor:COUNT**

<b>Description</b>	Queries the Bit ERRor COUNT (completed).
<b>Syntax</b>	MEASure:FBETest:BERRor:COUNT? MEASure:FBETest:BERRor:COUNT[:AVG]
<b>Options</b>	Refer to Appendix F.

---

**BERRor:ICOUNT**

<b>Description</b>	Queries the Bit ERRor Intermediate COUNT.
--------------------	---

---

**NOTE** This can only be queried when in the state TRIGger:BEtEst:MODE 'RUN'.

<b>Syntax</b>	MEASure:FBETest:BERRor:ICOUNT? MEASure:FBETest:BERRor:ICOUNT[:MM-MOD]   [:AVG]
<b>Options</b>	Refer to Appendices E and F.

**BERRor:IRATio**

---

**BERRor:IRATio**

<b>Description</b>	Queries the Bit ERRor Intermediate RATio.
<b>NOTE</b>	This can only be queried when in the state TRIGger:BEtEst:MODE 'RUN'.
<b>Syntax</b>	MEASure:FBETest:BERRor:IRATio? MEASure:FBETest:BERRor:IRATio[:MM]
<b>Options</b>	Refer to Appendix D.

---

**BERRor:RATio**

<b>Description</b>	Queries the Bit ERRor RATio (completed).
<b>Syntax</b>	MEASure:FBETest:BERRor:RATio? MEASure:FBETest:BERRor:RATio[:MM]
<b>Options</b>	Refer to Appendix D.

---

**BESelect**

<b>Description</b>	Selects/queries the Bit ERRor SElected Bit Error Test measurement to display (BE Ratio, BE Count) for the given measurement cycle.
<b>Syntax</b>	MEASure:FBETest:BESelect? MEASure:FBETest:BESelect <string>
<b>Options</b>	'BE COUNT'   'BE RATIO'

---

**SSTatus**

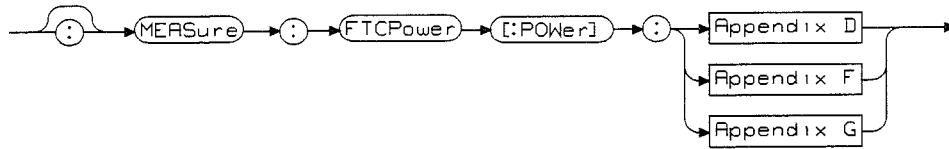
<b>Description</b>	Queries the Bit Error Test SYNC SStatus. Will return 'NO ERROR' or 'BAD SYNC'. This field will only be updated when the demod arm state goes from "DISARM" to "ARM." This is the same as DDEMod:SYNC:SStatus.
<b>Syntax</b>	MEASure:FBETest:SStatus?
<b>Options</b>	Not Applicable

---

**Fast TX Carrier Power (Measure Subsystem)**

## Fast TX Carrier Power (Measure Subsystem)

**FTCPower[:POWER]**



---

## **FTCPower[:POWER]**

**Description** Queries the Fast Transmitter Carrier Power MEASurement result. This is only valid for RFAN:INP of 'RF IN/OUT'.

HP-IB units are dBm, W;

default unit is dBm.

Display units are dBm, V, mV, uV, dBuV, W;

default unit is dBm.

**Syntax** MEASure:FTCPower[:POWER]?

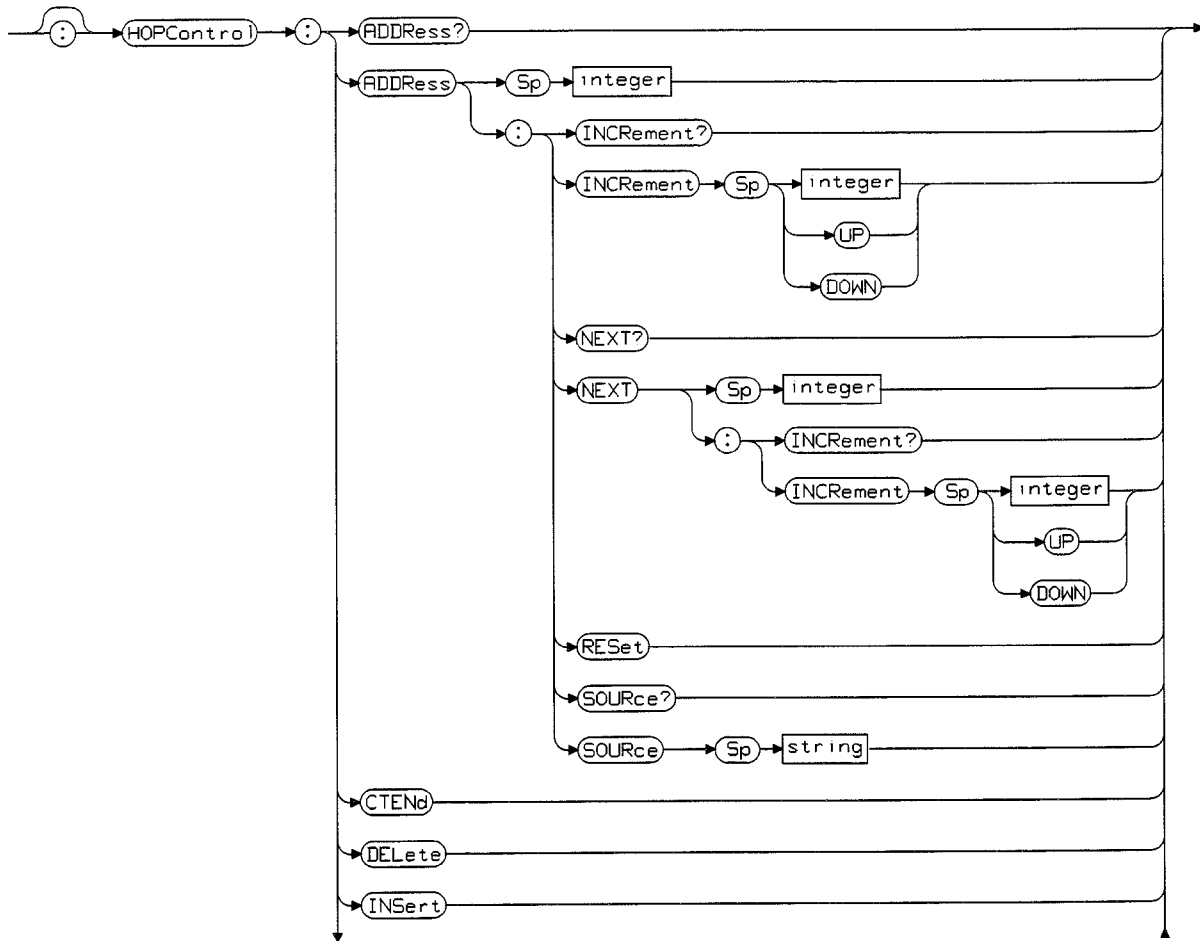
MEASure:FTCPower[:POWER][:MM] | [:AVG] | [:MET]

**Options** Refer to Appendices D, F and G.

---

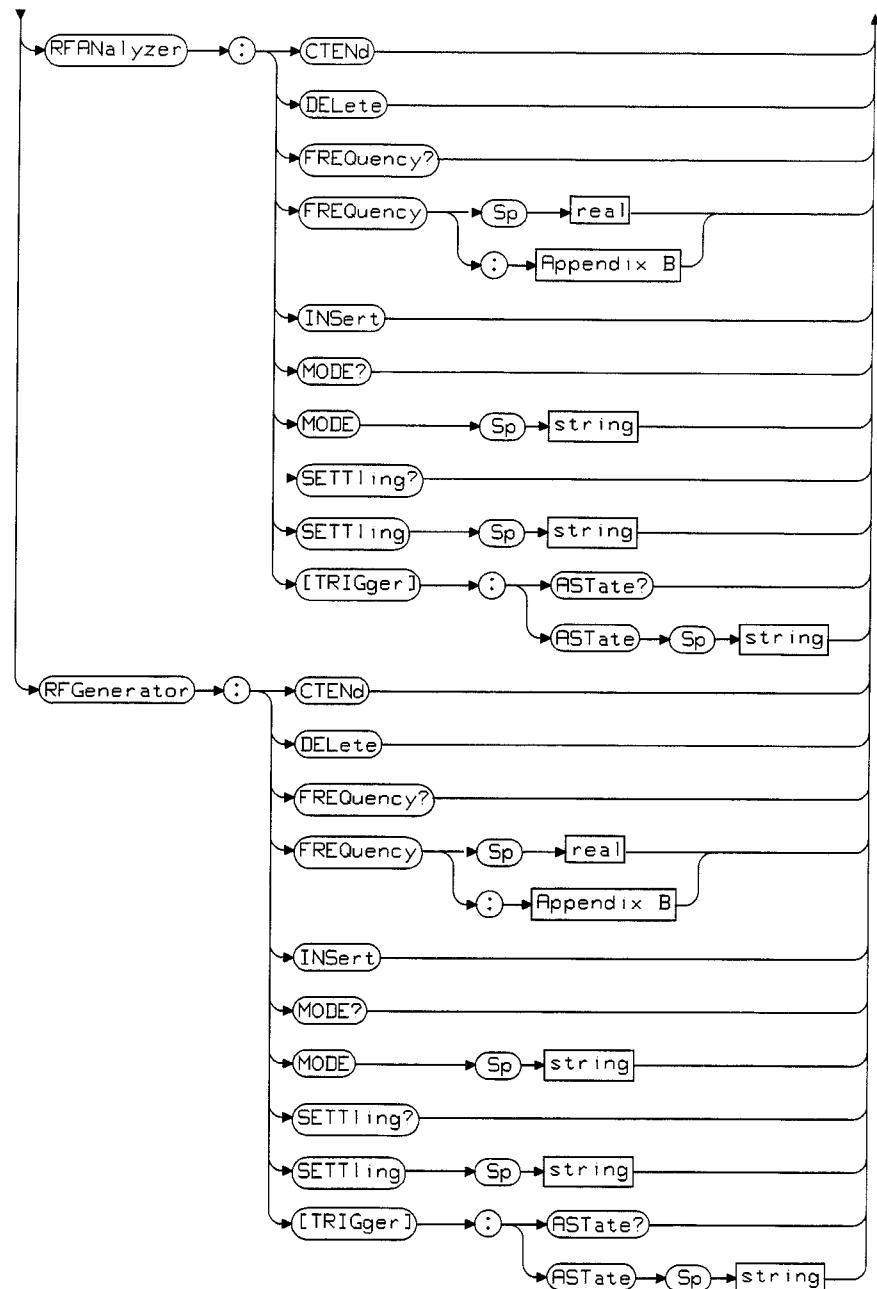
**Hop Control Subsystem**

# Hop Control Subsystem



Continued Over





**ADDRESS**

---

**ADDRESS**

<b>Description</b>	Sets/queries the ADDRESS for entering hop frequencies into the hop tables and for entering the next frequency for HOPC:ADDR:SOUR:INT mode.
<b>Syntax</b>	HOPControl:ADDRESS? HOPControl:ADDRESS <integer>?   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

**ADDRESS:NEXT**

<b>Description</b>	Sets/queries the NEXT HOP ADDRESS to hop to. This is used when HOPC:ADDR:SOUR is 'INT' to make looped internal sequences.
<b>Syntax</b>	HOPControl:ADDRESS:NEXT? HOPControl:ADDRESS:NEXT <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

**ADDRESS:RESet**

<b>Description</b>	RESets the internal sequence hop address register to zero.
<b>Syntax</b>	HOPControl:ADDRESS:RESet
<b>Options</b>	Not applicable.

---

**ADDRESS:SOURce**

<b>Description</b>	Selects/queries the HOP Control ADDRESS SOURce.
<b>Syntax</b>	HOPControl:ADDRESS:SOURce? HOPControl:ADDRESS:SOURce <string>
<b>Options</b>	'SEQ'   'EXT' Where; <ul style="list-style-type: none"> <li>• SEQ hopping mode causes the hop control address to come from a hop sequence address register. Hop addresses are automatically sequenced based on next settings.</li> <li>• EXT hopping mode causes the hop control address to come from external lines.</li> </ul>

---

## CTEND

<b>Description</b>	<p>This Clear To ENd command replaces the RF ANalyzer hop frequency entry and the RF Generator hop frequency entry at HOPC:ADDRESS, and all hop frequency entries after them, with 0 MHz.</p> <p>For example; the hop frequency entry at HOPC:ADDRESS, HOPC:ADDRESS + 1, ... up to entry 2047 are replaced with 0 MHz.</p> <p>HOPC:ADDR:NEXT values are set to ADDRESS+1 modulo 2048 starting at ADDRESS.</p>
<b>Syntax</b>	HOPControl:CTEND
<b>Options</b>	Not applicable.

---

## DELeTe

<b>Description</b>	<p>This DELeTes the RF ANalyzer hop frequency entry and the RF Generator hop frequency entry at HOPC:ADDRESS. All other RF ANalyzer and RF Generator hop frequency entries move down by one address. Entry 2047 in the hop table is replaced with 0 MHz.</p>
<b>Syntax</b>	HOPControl:DELeTe
<b>Options</b>	Not applicable.

---

## INSert

<b>Description</b>	<p>This INSerts an entry of 0 MHz into the RF ANalyzer hop table and the RF Generator hop table. All other entries move down one address. Entry 2047 in the RF ANalyzer hop table and the RF Generator hop table is lost.</p>
<b>Syntax</b>	HOPControl:INSert
<b>Options</b>	Not applicable.

---

## RFANalyzer or RFGenerator:CTENd

<b>Description</b>	This Clear To ENd command replaces the RF ANalyzer hop frequency entry at HOPC:ADDRESS, and all hop frequency entries after it, with 0 MHz.  For example;, the hop frequency entry at HOPC:ADDRESS, HOPC:ADDRESS + 1, ... up to entry 2047 are replaced with 0 MHz
<b>Syntax</b>	HOPControl:RFANalyzer:CTENd HOPControl:RFGenerator:CTENd
<b>Options</b>	Not applicable.

---

## RFANalyzer or RFGenerator:DELeTe

<b>Description</b>	This DELeTeS the RF ANalyzer hop frequency entry at HOPC:ADDRESS. All other RF ANalyzer hop frequency entries move down by one address. Entry 2047 in the hop table is replaced with 0 MHz.
<b>Syntax</b>	HOPControl:RFANalyzer:DELeTe HOPControl:RFGenerator:DELeTe
<b>Options</b>	Not applicable.

---

## RFANalyzer or RFGenerator:FREQuency

<b>Description</b>	Set/queries the RF ANalyzer or RF Generator hop FREQuency entry at HOPC:ADDRESS.  Default HP-IB unit is HZ.  Default display unit is MHZ.
<b>Syntax</b>	HOPControl:RFANalyzer:FREQuency? HOPControl:RFGenerator:FREQuency? HOPControl:RFANalyzer:FREQuency <real>   [:FNUM] HOPControl:RFGenerator:FREQuency <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

### RFANalyzer or RFGenerator:INSert

<b>Description</b>	This INSerts an entry of 0 MHz into the RF ANalyzer or RF Generator hop table. All other entries move down one address. The last entry in the RF ANalyzer or RF Generator hop table is lost.
<b>Syntax</b>	HOPControl:RFANalyzer:INSert HOPControl:RFGenerator:INSert
<b>Options</b>	Not applicable.

---

### RFANalyzer or RFGenerator:MODE

<b>Description</b>	Selects/queries the RF ANalyzer or RF Generator hop MODE.
<b>Syntax</b>	HOPControl:RFANalyzer:MODE? HOPControl:RFGenerator:MODE? HOPControl:RFANalyzer:MODE <string> HOPControl:RFGenerator:MODE <string>
<b>Options</b>	'NON-HOP'   'HOP'

---

### RFANalyzer or RFGenerator:SETTling

<b>Description</b>	Selects/queries the RF ANalyzer or RF Generator hop SETTling.
<b>Syntax</b>	HOPControl:RFANalyzer:SETTling? HOPControl:RFGenerator:SETTling? HOPControl:RFANalyzer:SETTling <string> HOPControl:RFGenerator:SETTling <string>
<b>Options</b>	'NORMAL'   'LARGEHOPS' Where; <ul style="list-style-type: none"><li>• NORMAL should be used for small hops.</li><li>• LARGEHOPS should be used for large hops (~ &gt;75 MHz).</li></ul>

---

## RFANalyzer or RFGenerator[:TRIGger]:AState

<b>Description</b>	Selects/queries the RF ANalyzer or RF Generator hop TRIGger Arm SState.
<b>Syntax</b>	HOPControl:RFANalyzer[:TRIGger]:AState? HOPControl:RFGenerator[:TRIGger]:AState? HOPControl:RFANalyzer[:TRIGger]:AState <string> HOPControl:RFGenerator[:TRIGger]:AState <string>
<b>Options</b>	'ARM'   'DISARM'

---

## **IEEE 488.2 Common Commands**

IEEE 488.2 mandates the use of some common commands. These commands have a special syntax (beginning with a \*), which is not legal for other commands. The common commands control some of the basic instrument functions:

- Instrument identification and reset
- Status reading and clearing
- Receiving and processing of commands and queries by the instrument

**\*CLS (Clear Status)**

---

**\*CLS (Clear Status)**

**Description**      The \*CLS (clear status) common command clears the status data structures, including the device defined error queue. This command also aborts the \*OPC. If the \*CLS command immediately follows a PROGRAM MESSAGE TERMINATOR, the output and the MAV (message available) bit will be cleared.

**Syntax**            \*CLS

**Example**            OUTPUT 714;”\*CLS”



## **\*ESE (Event Status Enable)**

**Description** The \*ESE command sets the Standard Event Status Enable Register bits. The Standard Event Status Enable Register contains a mask value for the bits to be enabled in the Standard Event Status Register. A “one” in the Standard Event Status Enable Register will enable the corresponding bit in the Standard Event Status Register, a logic zero will disable the bit. The \*ESE query returns the contents of the Standard Event Status Enable Register.

**Command Syntax** \*ESE? <mask>

Where <mask> = 0 to 255

**Example**

In this example, the \*ESE 1 command will enable the OPC (operation complete) bit 6 of the Standard Event Status Enable Register.

OUTPUT 714;”\*ESE 1”

**Query Syntax** \*ESE?

**Returned Format**

<mask><NL>

Where <mask> = 0 to 255

**Example**

OUTPUT 714;”\*ESE?”

ENTER 714;Event

PRINT Event

---

## \*ESR? (Event Status Register)

**Description**      The \*ESR? query returns the contents of the Standard Event Status Register.

---

**NOTE**

Reading the Standard Event Status Register clears the contents of the register.

**Query Syntax:**    \*ESR?

**Returned Format**

<status><NL>

Where <status> = 0 to 255

**Example**

```
OUTPUT 714; "*ESR?"
```

```
ENTER 714; Event
```

```
PRINT Event
```

When you read the Event Status Register, the value returned is the total bit weights of all bits that are true at the time you read the byte.

## **\*IDN? (Identification Number)**

**Description**

The \*IDN? query allows the instrument to identify itself. It returns the string:

```
"Hewlett-Packard,8922M,0,X.UU.VV"
```

X.UU.VV = the firmware revision of this instrument.

An \*IDN? query must be the last query in a message. Any queries after the \*IDN? query in this program message will be ignored.

**Query Syntax**

```
*IDN?
```

**Returned Format**

```
Hewlett-Packard,8922M,0,X.UU.VV<NL>
```

**Example**

```
DIM Id$ [100]
```

```
OUTPUT 714; "*IDN?"
```

```
ENTER 714; Id$
```

```
PRINT Id$
```

**\*OPC (Operation Complete)**

---

**\*OPC (Operation Complete)**

**Description** The \*OPC (operation complete) command will cause the instrument to set the operation complete bit in the Standard Event Status Register only when all pending operations are complete. The \*OPC? query places an ASCII "1" in the output queue when all pending device operations are complete. There is a one second minimum delay between the query and the response. A pending operation in the HP 8922M or HP 8922S is any measurement which is armed but not complete. When in remote operation with repetitive triggering all measurements, apart from BER, are self-arming. When in remote operation with single triggering all measurements, apart from BER, are armed by sending the **TRIGger[:IMMediate]** command or \*TRG. The BER measurement is armed by sending the **TRIGger:BERTest:RUN** command.

**Command Syntax** \*OPC

**Example**

```
OUTPUT 714; "*OPC"
```

**Query Syntax** \*OPC?

**Returned Format**

```
1<NL>
```

**Example**

```
OUTPUT 714; "*OPC?"
```

```
ENTER 714;Op
```

```
PRINT Op
```

**\*OPT?****Description**

The \*OPT? query will return a string containing the instrument options that are installed. Returns a "0" for any options that are not installed. Available options are

"SPECTRUM ANALYZER", "LOW POWER RF ATTEN", "CIPHERING",  
"HP83220A", "HP83220E", "ELECTRONIC ATTEN".

**Query Syntax**

\*OPT?

**Return Syntax**

Where <string> = "0,0,0,0,0,0" with no options installed

**Example**

Here are two examples of possible return strings for a fully loaded instrument.

```
"SPECTRUM ANALYZER,LOW POWER
RF ATTEN,CIPHERING,HP83220A,0,ELECTRONIC ATTEN".
```

```
"SPECTRUM ANALYZER,LOW POWER
RF ATTEN,CIPHERING,HP83220E,0,ELECTRONIC ATTEN".
```

**DIM Value\$[100]**

**OUTPUT 714;"\*OPT?"**

**ENTER 714;Value\$**

**PRINT Value\$**

**\*RCL (Recall)**

---

**\*RCL (Recall)**

**Description** The \*RCL command restores the state of the instrument from the specified internal save/recall register. An instrument setup must have been stored previously in the specified register. Registers 0 through 99 are general purpose and can be used with the \*SAV command.

**Command Syntax** \*RCL <rcl\_register>

Where <rcl\_register> = 0 through 99 though the total number of registers used may be limited by the amount of memory available.

**Example**

**OUTPUT** 714; " \*RCL 75 "

An instrument state stored using [REGister:]SAVE may be recalled using \*RCL or [REGister:]RECall. If the [REGister:]SAVE uses an alphanumeric string as the register name, the \*RCL command will not work. \*RCL only works with registers named using an integer from 0 through 99.

---

**IMPORTANT**

The following fields do not participate in Save/Recall, and will be set according to the recalled state of the operating mode (Active Cell | Test Mode | CW Generator).

- Cell Config - Settable | Activated
- Dig Demod Arm State - Arm | Disarm
- DSP Meas - Trig Source
- DSP Meas - Trig Delay
- Demod Arm State - Arm | Disarm
- Meas Arm State - Arm | Disarm
- Meas Sync - Single | Cont
- Bit Error Test - Run | Stop
- Bit Error Test MS Loopback Loop Delay mode - Manual | Auto
- Hop Control RF Generator - Arm | Disarm
- Hop Control RF Analyzer - Arm | Disarm
- Hop Control RF Generator - Non-Hop | Hop
- Hop Control RF Analyzer - Non-Hop | Hop
- None of the CONFigure commands except :RADio, :ROSCillator:OFFSet, ROSCillator:TUNing, and :PRINt:TITLe participate in Save/Recall, and will instead remain at their last setting.

---

**\*RST (Reset)**

**Description**      The \*RST command places the instrument in a known state.

**Command Syntax** \*RST

**Example**

OUTPUT 714; "\*RST"

**\*SAV (Save)**

---

**\*SAV (Save)**

**Description** The \*SAV command stores the current state of the instrument in an internal save register. The data parameter is the number of the save register where the data will be saved. Internal registers 0 through 99 are valid for this command. The total number of registers which can be saved is limited by the number of settings which differ from their preset condition and the memory available.

**Command Syntax** \*SAV <number>

Where <number> = 0 through 99

**Example**

**OUTPUT 714 ; " \*SAV 85 "**

The [REGister:]RECall command may be used to return the instrument to the state at which the instrument was saved using \*SAV. The [REGister:]RECall must use the same integer to return to this state. Strings are not accepted.



---

## **\*SRE (Service Request Enable)**

The \*SRE command sets the Service Request Enable Register bits. The Service Request Enable Register contains a mask value for the bits to be enabled in the Status Byte Register. A logic one in the Service Request Enable Register will enable the corresponding bit in the Status Byte Register, a logic zero will disable the bit.

The \*SRE query returns the current setting.

**Command Syntax** \*SRE <mask>

Where <mask> = 0 through 255

**Example**

OUTPUT 714; "\*SRE 16"

---

**NOTE**

This example enables a service request to be generated when a message is available in the output queue. When a message is available, the MAV bit will be high.

**Query Syntax** \*SRE?

<mask><NL>

Where <mask> = sum of all the bits that are set, 0 through 255.

**Example**

OUTPUT 714; "\*SRE?"

ENTER 714; Value

PRINT Value

## \*STB? (Status Byte)

**Description** The \*STB? query returns the current value of the instrument's status byte. The RQS (request service) bit is reported on bit 6. The RQS indicates whether or not the device has at least one reason for requesting service.

**Query Syntax** \*STB?

<value><NL>

Where <value> = 0 through 255

### Example

OUTPUT 714; "\*STB?"

ENTER 714; Value

PRINT Value

---

## **\*TST? (Test)**

**Description** The \*TST query causes the instrument to perform a self-test. The result of the test will be placed in the output queue.

---

### **NOTE**

Prior to sending this command, all front panel inputs must be disconnected.

A zero indicates the test passed and a non-zero value indicates the test failed.

**Command Syntax** \*TST?

#### **Returned Format**

<result><NL>

Where <result> = 0 or a non-zero value.

0 indicates the test has passed.

Non-zero indicates the test has failed.

---

## \*WAI (Wait)

The \*WAI command pauses the instrument, preventing it from executing any further HP-IB commands or queries until no operations are pending.

### Command Syntax \*WAI

#### Example

```
OUTPUT 714;"MEAS:PATTERN 'Facc' "
```

```
OUTPUT 714;"TRIG:MODE:RETRIGGER SINGLE"
```

```
OUTPUT 714;"*TRG"
```

```
OUTPUT 714;"*WAI"
```

! The following command will not execute until the trigger has occurred

! and is a valid measurement result.

```
OUTPUT 714;"MEAS:RF:FREQ:ACC?"
```

```
ENTER 714;Freq_acc
```

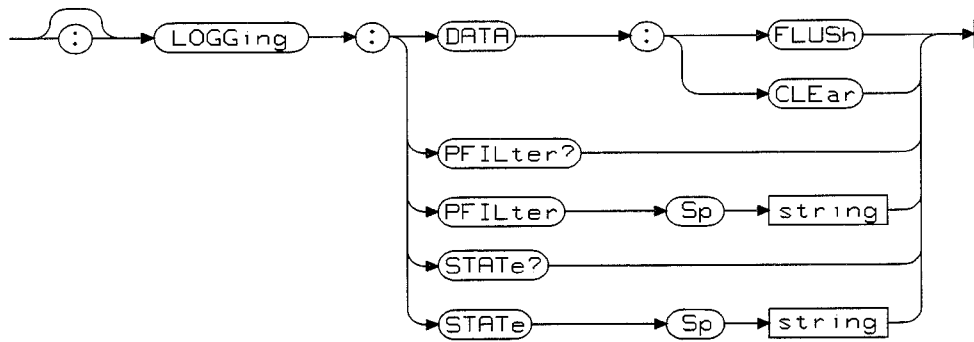
```
PRINT Freq_acc
```

---

## **LOGGing Subsystem**

Logging commands are used to control protocol logging through the Protocol Logging interface on the rear panel.

LOGGING Subsystem



---

## DATA:FLUSH

<b>Description</b>	FLUSH the LOGGING DATA - empties the contents of the log into an output stream to the external monitoring device. Note, the data will not be cleared.
<b>Syntax</b>	LOGGING:DATA:FLUSH
<b>Options</b>	Not Applicable

---

## DATA:CLEAR

<b>Description</b>	Clears the LOGGING DATA.
<b>Syntax</b>	LOGGING:DATA:CLEAR
<b>Options</b>	Not Applicable

---

## PFILTER

<b>Description</b>	Selects/queries the Pass FILTER used when data is logged.
<b>Syntax</b>	LOGGING:PFILTER? LOGGING:PFILTER <string>
<b>Options</b>	'NETWKONLY'   '+DATALINK'   '+SERVICE' Where; <ul style="list-style-type: none"><li>• NETWKONLY means log peer-to-peer messages between the network layers.</li><li>• +DATALINK means NETWKONLY plus log peer-to-peer messages between the between the data link layers.</li><li>• +SERVICE means NETWKONLY plus DATALINK plus log inter-layer messages and intra-layer service request and response messages.</li></ul>

---

## STATE

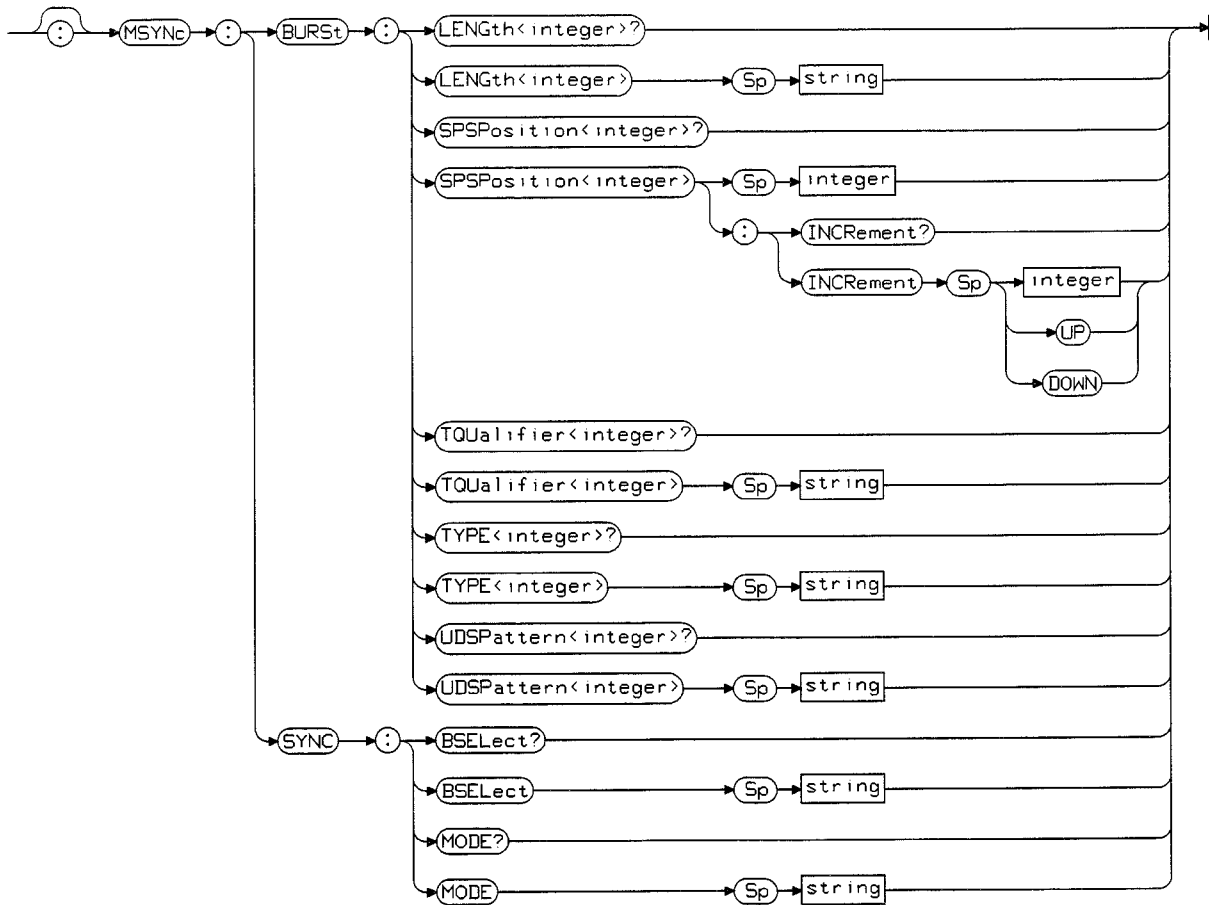
<b>Description</b>	Selects/queries the current LOGGING STATE
<b>Syntax</b>	LOGGING:STATE? LOGGING:STATE <string>
<b>Options</b>	'LOG'   'PAUSE' Where; <ul style="list-style-type: none"><li>• LOG indicates that data is being logged.</li><li>• PAUSE indicates that data is temporarily not being logged.</li></ul>



---

**Measurement Sync Subsystem**

Measurement Sync Subsystem



---

### **BURSt:LENGth**

<b>Description</b>	Selects/queries the MSYNc user-defined BURSt LENGth for the selected burst number
<b>Syntax</b>	MSYNc:BURSt:LENGth<n>? MSYNc:BURSt:LENGth<n> <string>?
<b>Options</b>	where <n> = 0 to 3. '87'   '147'

---

### **BURSt:SPSPosition**

<b>Description</b>	Sets/queries the MSYNc user-defined Sync Pattern Start Position for the selected burst number
<b>Syntax</b>	MSYNc:BURSt:SPSPosition<n>? MSYNc:BURSt:SPSPosition<n> <integer>   [:INUM]
<b>Options</b>	where <n> = 0 to 3. Refer to Appendix A.

---

### **BURSt:TQUalifier**

<b>Description</b>	Selects/queries the Trigger QUalifier for the selected burst number Note: this selects the trigger qualifier for both MSYNc:BURSt:TQU<n> and DDEMod:BURSt:TQU<n>.
<b>Syntax</b>	MSYNc:BURSt:TQUalifier<n>? MSYNc:BURSt:TQUalifier<n> <string>
<b>Options</b>	where <n> = 0 to 3. 'NORMAL'   'RF POWER' Where; <ul style="list-style-type: none"><li>• NORMAL means no trigger qualifier.</li><li>• RF POWER means 'rearm for another trigger if RF POWER never came up'.</li></ul>

---

## **BURSt:TYPE**

<b>Description</b>	Selects/queries the MSYNc BURSt TYPE for the selected burst number  Note: this selects the type for both MSYN:BURSt:TYPE<n> and DDEMod:BURSt:TYPE<n>.
<b>Syntax</b>	MSYNc:BURSt:TYPE<n>? MSYNc:BURSt:TYPE<n> <string>
<b>Options</b>	where <n> = 0 to 3. 'TSC0'   'TSC1'   'TSC2'   'TSC3'   'TSC4'   'TSC5'   'TSC6'   'TSC7'   'RACH'   'SCH'   'FCH'   'USER DEF'

---

## **BURSt:UDSPattern**

<b>Description</b>	Sets/queries the MSYNc User Defined Sync Pattern definition for the selected burst number
<b>Syntax</b>	MSYNc:BURSt:UDSPattern<n>? MSYNc:BURSt:UDSPattern<n> <quoted string>
<b>Options</b>	where <n> = 0 to 3.

---

## **SYNC:BSElect**

<b>Description</b>	Selects/queries the burst selection to synchronize measurements to.
<b>Syntax</b>	MSYNc:SYNC:BSElect? MSYNc:SYNC:BSElect <string>
<b>Options</b>	'0'   '1'   '2'   '3'   'EXT'  Where; <ul style="list-style-type: none"><li>• 0 means always sync to burst number 0.</li><li>• 1 means always sync to burst number 1.</li><li>• 2 means always sync to burst number 2.</li><li>• 3 means always sync to burst number 3.</li><li>• EXT means use external signals to decide which burst number to sync to.</li></ul>

---

## SYNC:MODE

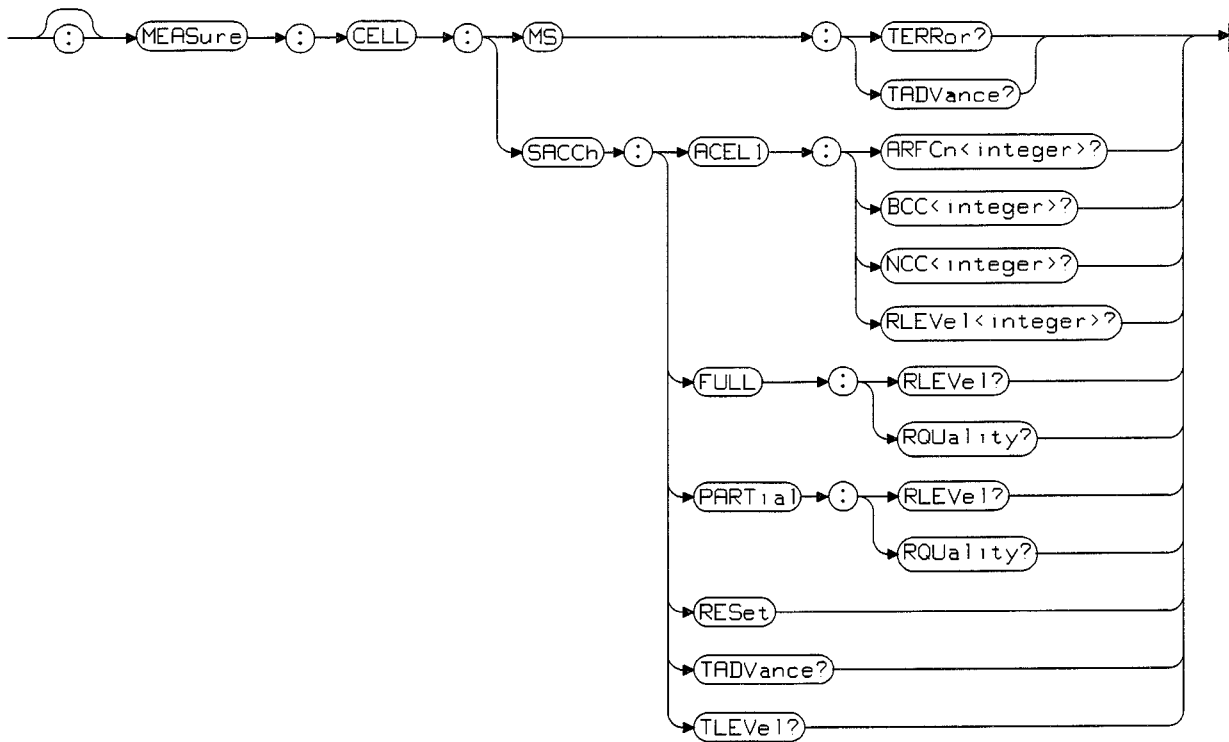
<b>Description</b>	Selects/queries the SYNC MODE algorithm that is used to determine the location of the demodulated data bits in the measured burst.
<b>Syntax</b>	MSYNc:SYNC:MODE? MSYNc:SYNC:MODE <string>
<b>Options</b>	'MIDAMBLE'   'AMPLITUDE' Where; <ul style="list-style-type: none"><li>• MIDAMBLE means sync using the best bit match of the demodulated data bits to the selected midamble or user-defined sync pattern.</li><li>• AMPLITUDE means sync by centering the burst in the detected amplitude envelope.</li></ul>

Measurement Sync Subsystem  
**SYNC:MODE**

---

**Mobile Station Commands  
(Measure Subsystem)**

Mobile Station Commands (Measure Subsystem)





---

**MS:TERRor**

<b>Description</b>	Queries the Mobile Station Timing Error actually Measured by the HP 8922M/S.
<b>Syntax</b>	MEASure:CELL:MS:TERRor?
<b>Options</b>	Not Applicable.

---

**MS:TADVance**

<b>Description</b>	Queries the Mobile Station Timing Advance actually Measured by the HP 8922M/S.
<b>Syntax</b>	MEASure:CELL:MS:TADVance?
<b>Options</b>	Not Applicable.

---

**SACCh:ACEL1:ARFCn**

<b>Description</b>	Queries the Adjacent Cell ARFCn.
<b>Syntax</b>	MEASure:CELL:SACCh:ACEL1:ARFCn<n>?
<b>Options</b>	Where n=1 through 6

---

**SACCh:ACEL1:BCC**

<b>Description</b>	Queries the Adjacent Cell (BSIC) Base Station Colour Code.
<b>Syntax</b>	MEASure:CELL:SACCh:ACEL1:BCC<n>?
<b>Options</b>	Where n=1 through 6

---

**SACCh:ACEL1:NCC**

<b>Description</b>	Queries the Adjacent Cell (BSIC) Network Colour Code.
<b>Syntax</b>	MEASure:CELL:SACCh:ACEL1:NCC<n>?
<b>Options</b>	Where n=1 through 6

**SACCh:ACEl1:RLEVel**

---

<b>SACCh:ACEl1:RLEVel</b>	
<b>Description</b>	Queries the Adjacent Cell RX Level.
<b>Syntax</b>	MEASure:CELL:SACCh:ACEl1:RLEVel<n>?
<b>Options</b>	Where n=1 through 6

---

<b>SACCh:FULL:RLEVel</b>	
<b>Description</b>	Queries the Full RX Level (serving cell).
<b>Syntax</b>	MEASure:CELL:SACCh:FULL:RLEVel?
<b>Options</b>	Not Applicable.

---

<b>SACCh:FULL:RQuality</b>	
<b>Description</b>	Queries the Full RX Quality (serving cell).
<b>Syntax</b>	MEASure:CELL:SACCh:FULL:RQuality?
<b>Options</b>	Not Applicable.

---

<b>SACCh:PARTial:RLEVel</b>	
<b>Description</b>	Queries the Partial RX Level (serving cell).
<b>Syntax</b>	MEASure:CELL:SACCh:PARTial:RLEVel?
<b>Options</b>	Not Applicable.

---

<b>SACCh:PARTial:RQuality</b>	
<b>Description</b>	Queries the Partial RX Quality (serving cell).
<b>Syntax</b>	MEASure:CELL:SACCh:PARTial:RQuality?
<b>Options</b>	Not Applicable.

---

---

**SACCh:RESet**

<b>Description</b>	RESets the SACCH measurement results.
<b>Syntax</b>	MEASure:CELL:SACCh:RESet
<b>Options</b>	Not Applicable.

---

**SACCh:TADVance**

<b>Description</b>	Queries the SACCH Timing Advance reported by the Mobile Station.
<b>Syntax</b>	MEASure:CELL:SACCh:TADVance?
<b>Options</b>	Not Applicable.

---

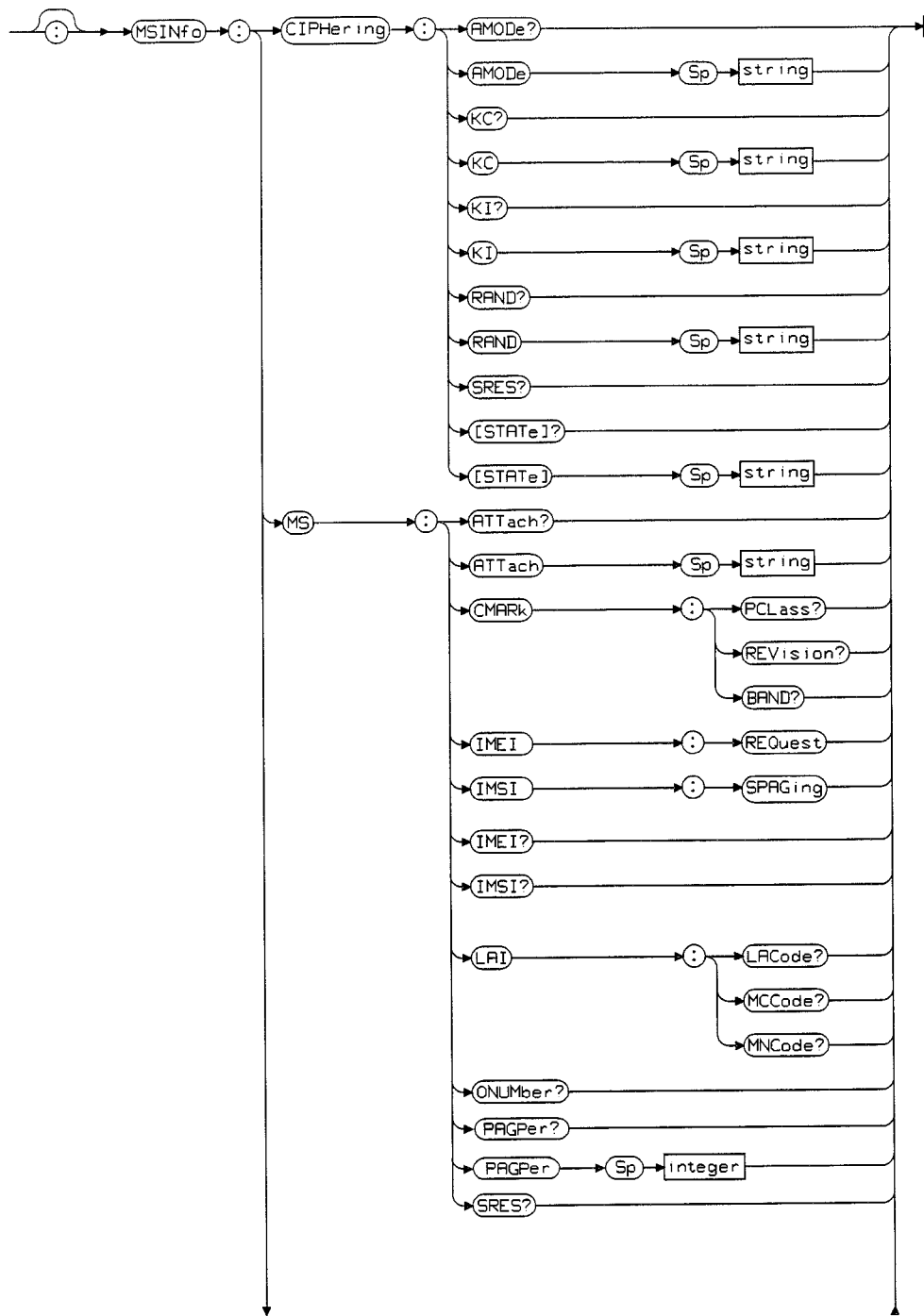
**SACCh:TLEVel**

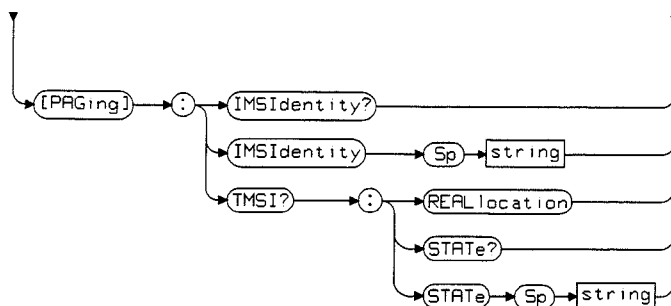
<b>Description</b>	Queries the SACCH TX Level reported by the Mobile Station.
<b>Syntax</b>	MEASure:CELL:SACCh:TLEVel?
<b>Options</b>	Not Applicable.

Mobile Station Commands (Measure Subsystem)  
**SACCh:TLEVel**

---

**MS Information Subsystem**






---

## CIPHering:AMODE

**Description**      Selects/queries the CIPhering Authentication MODE.

**Syntax**            MSINfo:CIPHering:AMODE?

MSINfo:CIPHering:AMODE <string>

**Options**            'FULL-54' | 'FULL-64' | 'PARTIAL' | 'NONE'

Where;

- FULL-54 means that the user need only provide the Authentication Key (KI). Only the first 54 bits of the Authentication Key will be used, and the 10 least-significant-bits will be unused.
- FULL-64 means that the user need only provide the Authentication Key (KI). The entire 64 bits of the Authentication Key will be used.
- PARTIAL means that the CIPHERING Key (KC) and a random number (RAND) is needed.
- NONE means that no authentication will take place.

---

## CIPHering:KC

**Description**      Sets/queries the CIPHERING Key (KC).

**Syntax**            MSINfo:CIPHering:KC?

MSINfo:CIPHering:KC <quoted string>

**Options**            Quoted string representing a hexadecimal (64 bit) value.

---

### CIPHERing:KI

<b>Description</b>	Sets/queries the Authentication Key (KI).
<b>Syntax</b>	MSINfo:CIPHERing:KI? MSINfo:CIPHERing:KI <quoted string>
<b>Options</b>	Quoted string representing a hexadecimal (128 bit) value.

---

### CIPHERing:RAND

<b>Description</b>	Sets/queries the RAND value (random number).
<b>Syntax</b>	MSINfo:CIPHERing:RAND? MSINfo:CIPHERing:RAND <quoted string>
<b>Options</b>	Quoted string representing a hexadecimal (128 bit) value.

---

### CIPHERing:SRES

<b>Description</b>	Queries the BS SRES (Signed RESponse to RAND).
<b>Syntax</b>	MSINfo:CIPHERing:SRES? MSINfo:CIPHERing:SRES <quoted string>
<b>Options</b>	This is a quoted string representing a 32 bit hexadecimal.

---

### CIPHERing[:STATe]

<b>Description</b>	Selects/queries the CIPHERing (encryption) STATe of the MS and BS for the next call made.
<b>Syntax</b>	MSINfo:CIPHERing[:STATe]? MSINfo:CIPHERing[:STATe] <string>
<b>Options</b>	'OFF'   'DISABLED'   'ENABLED' Where; <ul style="list-style-type: none"><li>• OFF means no ciphering and don't send out the ciphering signaling.</li><li>• DISABLED means send out the ciphering signaling, but select ciphering disabled.</li><li>• ENABLED means enable ciphering - this is only allowed if the Ciphering Option is installed (see *OPT?).</li></ul>



---

## MS:ATTach

<b>Description</b>	Selects/queries the IMSI attach/detach mode.
<b>Syntax</b>	MSINfo:MS:ATTach? MSINfo:MS:ATTach <string>
<b>Options</b>	'ON'   'OFF' Where; <ul style="list-style-type: none"><li>• When attach is set to ON the MS will automatically perform a location update after camping to the BCH, regardless of whether the cell attributes are the same as those stored by the MS. This allows a quick functional test to be performed on the MS before performing a call.</li><li>• The default is OFF.</li></ul>

---

## MS:CMARk:PCLass?

<b>Description</b>	Queries the Class MARK Power CLass - comes from the MS when a call is made.
<b>Syntax</b>	MSINfo:MS:CMARk:PCLass?
<b>Options</b>	Not Applicable.

---

## MS:CMARk:REVision?

<b>Description</b>	Queries the value encoded in the revision level bits of the MS.
<b>Syntax</b>	MSINfo:MS:CMARk:REVision?
<b>Options</b>	Not Applicable.

---

## MS:CMARk:BAND?

<b>Description</b>	Queries the value encoded in the frequency capability bits of the MS.
<b>Syntax</b>	MSINfo:MS:CMARk:BAND?
<b>Options</b>	Not Applicable.

---

### MS:IMEI:REQuest

<b>Description</b>	Fetches the International Mobile Equipment Identity from the MS. A call must be in place.
<b>Syntax</b>	MSINfo:MS:IMEI:REQuest
<b>Options</b>	Not options.

---

### MS:IMEI?

<b>Description</b>	Queries the MS International Mobile Equipment Identity. An IMEI:REQuest must have been made before this query can be carried out.
<b>Syntax</b>	MSINfo:MS:IMEI? <quoted string>
<b>Options</b>	This is quoted string of up to 15 decimal digits.

---

### MS:IMSI:SPAGing

<b>Description</b>	Sets the PAGing IMSI - copies the MS's IMSI (MS:IMSI) to the MS's Paging IMSI ([:PAGing]:IMSI).
<b>Syntax</b>	MSINfo:MS:IMSI:SPAGing
<b>Options</b>	No Options

---

### MS:IMSI?

<b>Description</b>	Queries the MS's International Mobile Subscriber Identity.
<b>Syntax</b>	MSINfo:MS:IMSI? <quoted string>
<b>Options</b>	This is quoted string of up to 15 decimal digits.

---

### MS:LAI:LACode?

<b>Description</b>	Queries the Location Area Code portion of the last LAI.
<b>Syntax</b>	MSINfo:MS:LAI:LACode?
<b>Options</b>	Not Applicable.

---

### MS:LAI:MCCode?

<b>Description</b>	Queries the Mobile Country Code portion of the last LAI.
<b>Syntax</b>	MSINfo:MS:MCCode?
<b>Options</b>	Not Applicable.

---

### MS:LAI:MNCCode?

<b>Description</b>	Queries the Mobile Network Code portion of the last LAI.
<b>Syntax</b>	MSINfo:MS:MNCCode?
<b>Options</b>	Not Applicable.

---

### MS:ONUMber?

<b>Description</b>	Queries the MS Originated NUMBER.
<b>Syntax</b>	MSINfo:MS:ONUMber?
<b>Options</b>	This quoted string represents up to 20-digit decimal number representing the party number the MS was calling for an MS-initiated call. The field will show a leading '+' if this is an international call.

---

### MS:PAGPer

<b>Description</b>	Sets/queries the paging period parameter in the broadcast control channel.
<b>Syntax</b>	MSINfo:MS:PAGPer? MSINfo:MS:PAGPer <integer>
<b>Options</b>	Where integer = 2 through 9.

---

### MS:SRES?

<b>Description</b>	Queries the MS SRES (MS Signed RESponse to RAND).
<b>Syntax</b>	MSINfo:MS:SRES?
<b>Options</b>	This is a quoted string representing a 32 bit hexadecimal.

---

### **[:PAGing]:IMSIIdentity**

<b>Description</b>	Sets/queries the MS's PAGing IMSI (International Mobile Subscriber Identity).
<b>Syntax</b>	MSINfo[:PAGing]:IMSIIdentity? MSINfo[:PAGing]:IMSIIdentity <quoted string>
<b>Options</b>	This is a quoted string representing up to 15 decimal digits.

---

### **[:PAGing]:TMSI:REALlocation**

<b>Description</b>	Queries the TMSI (Temporary Subscriber Identity) value. REALocates a new TMSI value based on generating a random number.
<b>Syntax</b>	MSINfo[:PAGing]:TMSI:REALlocation
<b>Options</b>	Not Applicable.

---

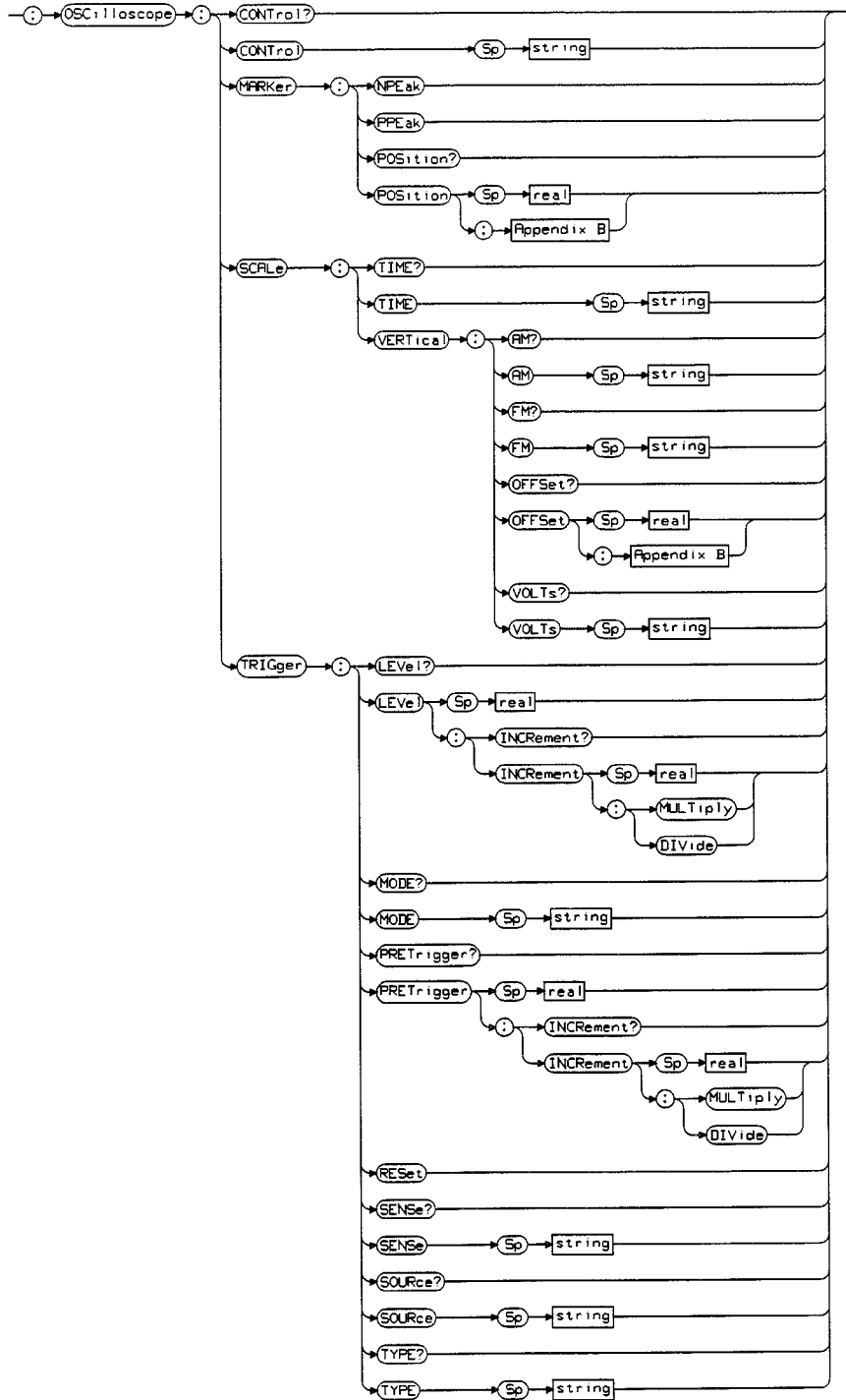
### **[:PAGing]:TMSI:STATe**

<b>Description</b>	Selects/queries whether to use the TMSI value when the next call is made.
<b>Syntax</b>	MSINfo[:PAGing]:TMSI:STATe? MSINfo[:PAGing]:TMSI:STATe <string>
<b>Options</b>	'ON'   'OFF'

---

**OSCilloscope Subsystem**

# OSCilloscope Subsystem



---

## CONTRol

<b>Description</b>	Selects/queries the OSCilloscope CONTRols - various fields will appear based on the CONTRol selection.
<b>Syntax</b>	OSCilloscope:CONTRol? OSCilloscope:CONTRol <string>
<b>Options</b>	'MAIN'   'TRIGGER'   'MARKER'

---

## MARKer:NPEak

<b>Description</b>	Causes the OSCilloscope MARKer to move to the lowest Negative PEak displayed.
<b>Syntax</b>	OSCilloscope:MARKer:NPEak
<b>Options</b>	Not Applicable.

---

## MARKer:PPEak

<b>Description</b>	Causes the OSCilloscope MARKer to move to the highest Positive PEak displayed.
<b>Syntax</b>	OSCilloscope:MARKer:PPEak
<b>Options</b>	Not Applicable.

---

## MARKer:POSition

<b>Description</b>	Sets/queries the MARKer POSition. This is the number of divisions from the left side of the graticule to the marker.
<b>Syntax</b>	OSCilloscope:MARKer:POSition? OSCilloscope:MARKer:POSition <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

**SCALE:TIME**

<b>Description</b>	Selects/queries the horizontal sweep time per division.
<b>Syntax</b>	OSCilloscope:SCALE:TIME? OSCilloscope:SCALE:TIME <string>
<b>Options</b>	'200 ms'   '100 ms'   '50 ms'   '20 ms'   '10 ms'   '5 ms'   '2 ms'   '1 ms'   '500 us'   '200 us'   '100 us'   '50 us'   '20 us'   '10 us'   '5 us'   '2 us'   '1 us'

**SCALE:VERTical:AM**

<b>Description</b>	Selects/queries the VERTICAL amplitude per division for AF Analyzer input selections (AFAN:INP) that have AM units of Percent.
<b>Syntax</b>	OSCilloscope:SCALE:VERTical:AM? OSCilloscope:SCALE:VERTical:AM <string>
<b>Options</b>	'50 %'   '20 %'   '10 %'   '5 %'   '2 %'   '1 %'   '0.5 %'   '0.2 %'   '0.1 %'   '0.05 %'

**SCALE:VERTical:FM**

<b>Description</b>	Selects/queries the VERTICAL amplitude per division for AF Analyzer input selections (AFAN:INP) that have FM units of Hertz.
<b>Syntax</b>	OSCilloscope:SCALE:VERTical:FM? OSCilloscope:SCALE:VERTical:FM <string>
<b>Options</b>	'50 kHz'   '20 kHz'   '10 kHz'   '5 kHz'   '2 kHz'   '1 kHz'   '500 Hz'   '200 Hz'   '100 Hz'   '50 Hz'   '20 Hz'   '10 Hz'



---

### **SCALE:VERTical:OFFSet**

<b>Description</b>	Sets/queries the number of divisions that the displayed signal is VERTically OFFSet above the Oscilloscope's fixed center line.
<b>Syntax</b>	OSCilloscope:SCALE:VERTical:OFFSet? OSCilloscope:SCALE:VERTical:OFFSet <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

### **SCALE:VERTical:VOLTs**

<b>Description</b>	Selects/queries the VERTical amplitude per division for AF Analyzer input selections (AFAN:INP) that have units of VOLTs.
<b>Syntax</b>	OSCilloscope:SCALE:VERTical:VOLTs? OSCilloscope:SCALE:VERTical:VOLTs <string>
<b>Options</b>	'20 V'   '10 V'   '5 V'   '2 V'   '1 V'   500 mV'   '200 mV'   '100 mV'   '50 mV'   '20 mV'   '10 mV'   '5 mV'   '2 mV'   '1 mV'   '500 uV'   '200 uV'   '100 uV'   '50 uV'   '20 uV'

---

### **TRIGger:LEVel**

<b>Description</b>	Sets/queries the TRIGger LEVel. This only applies when TRIGger:SOURce is 'Scope Lvl'. The TRIGger LEVel is indicated by small pointers that appear on each side of the graticule. HP-IB units is DIV.  Example: "OSC:TRIG:LEV 2 DIV" set the oscilloscope trigger to 2 divisions above the horizontal axis.
<b>Syntax</b>	OSCilloscope:TRIGger:LEVel? OSCilloscope:TRIGger:LEVel <real>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## TRIGger:MODE

<b>Description</b>	Selects/queries how measurements are armed to accept a trigger.
<b>IMPORTANT</b>	This command will set the trigger mode when in Local mode, it is overridden by TRIGger:MODE:RETRigger REPetitive   SINGle when in Remote mode.
<b>Syntax</b>	OSCilloscope:TRIGger:MODE? OSCilloscope:TRIGger:MODE <string>
<b>Options</b>	'CONT'   'SINGLE' Where; <ul style="list-style-type: none"><li>• CONT means that the oscilloscope is continuously armed to accept a trigger.</li><li>• SINGLE means that the oscilloscope is armed to accept a trigger each time that TRIGger:RESet is selected.</li></ul>

---

## TRIGger:PRETrigger

<b>Description</b>	Sets/queries the PRETrigger value. This is the number of divisions previous to the trigger point.
<b>Syntax</b>	OSCilloscope:TRIGger:PRETrigger? OSCilloscope:TRIGger:PRETrigger <real>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## TRIGger:RESet

<b>Description</b>	Arms a measurement when TRIGger:MODE 'SINGLE' is selected or when TRIGger:MODE:RETRigger SINGle is selected.
<b>Syntax</b>	OSCilloscope:TRIGger:RESet
<b>Options</b>	Not Applicable.

---

## TRIGger:SENSe

<b>Description</b>	Selects/queries whether TRIGgering occurs on the positive-going (POS) or negative-going(NEG) trigger signal.
<b>Syntax</b>	OSCilloscope:TRIGger:SENSe? OSCilloscope:TRIGger:SENSe <string>
<b>Options</b>	'POS'   'NEG'

---

## TRIGger:SOURce

<b>Description</b>	Selects/queries the Oscilloscope TRIGger SOURce.
<b>Syntax</b>	OSCilloscope:TRIGger:SOURce? OSCilloscope:TRIGger:SOURce <string>
<b>Options</b>	'SCOPE LVL'   'EXTERNAL' <ul style="list-style-type: none"><li>• SCOPE LVL means that the input signal level is used for triggering.</li><li>• EXTERNAL means that the front panel MEASURE TRIGGER IN is used for triggering.</li></ul>

---

## TRIGger:TYPE

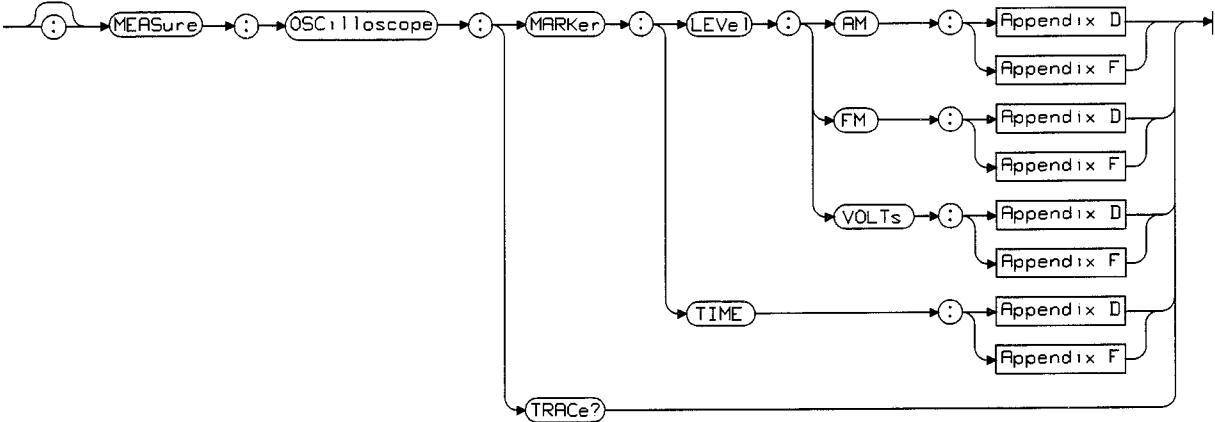
<b>Description</b>	Selects/queries the Oscilloscope TRIGger TYPE.
<b>Syntax</b>	OSCilloscope:TRIGger:TYPE? OSCilloscope:TRIGger:TYPE <string>
<b>Options</b>	'AUTO'   'NORM' <ul style="list-style-type: none"><li>• AUTO means automatically trigger a sweep is a triggering signal is not detected within about 50 ms of the last trigger.</li><li>• NORM means that a specific triggering signal is required before triggering.</li></ul>

OSCilloscope Subsystem  
TRIGger:TYPE

---

**Oscilloscope Commands (Measure Subsystem)**

Oscilloscope Commands (Measure Subsystem)



---

**MARKer:LEVel:AM**

<b>Description</b>	Queries the MARKer LEVel which is the signal level of the current marker position for AF Analyzer input selections (AFAN:INP) that have AM units of Percent. This value is a function of the marker position set or queried by OSC:MARK:POS.  HP-IB unit is Percent (PCT);  Display unit is Percent (PCT).
<b>Syntax</b>	MEASure:OSCilloscope:MARKer:LEVel:AM?  MEASure:OSCilloscope:MARKer:LEVel:AM[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**MARKer:LEVel:FM**

<b>Description</b>	Queries the MARKer LEVel which is the signal level of the current marker position for AF Analyzer input selections (AFAN:INP) that have FM units of Hertz. This value is a function of the marker position set or queried by OSC:MARK:POS.  HP-IB units are HZ, KHZ;  Display units are KHZ.
<b>Syntax</b>	MEASure:OSCilloscope:MARKer:LEVel:FM?  MEASure:OSCilloscope:MARKer:LEVel:FM[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**MARKer:LEVel:VOLTs**

<b>Description</b>	Queries the MARKer LEVel which is the signal level of the current marker position for AF Analyzer input selections (AFAN:INP) that have units of VOLTs. This value is a function of the marker position set or queried by OSC:MARK:POS.  HP-IB unit is Volts (V);  Display units are V, mV  default unit is V.
<b>Syntax</b>	MEASure:OSCilloscope:MARKer:LEVel:VOLTs?  MEASure:OSCilloscope:MARKer:LEVel:VOLTs[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**MARKer:TIME**

---

**MARKer:TIME**

<b>Description</b>	Queries the MARKer TIME MEASurement which time elapsed from the trigger point to the current marker position. This value is a function of the marker position set or queried by OSC:MARK:POS. HP-IB unit is seconds (S); Display units are S, MS; default unit is MS.
<b>Syntax</b>	MEASure:OSCilloscope:MARKer:TIME? MEASure:OSCilloscope:MARKer:TIME[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**TRACe**

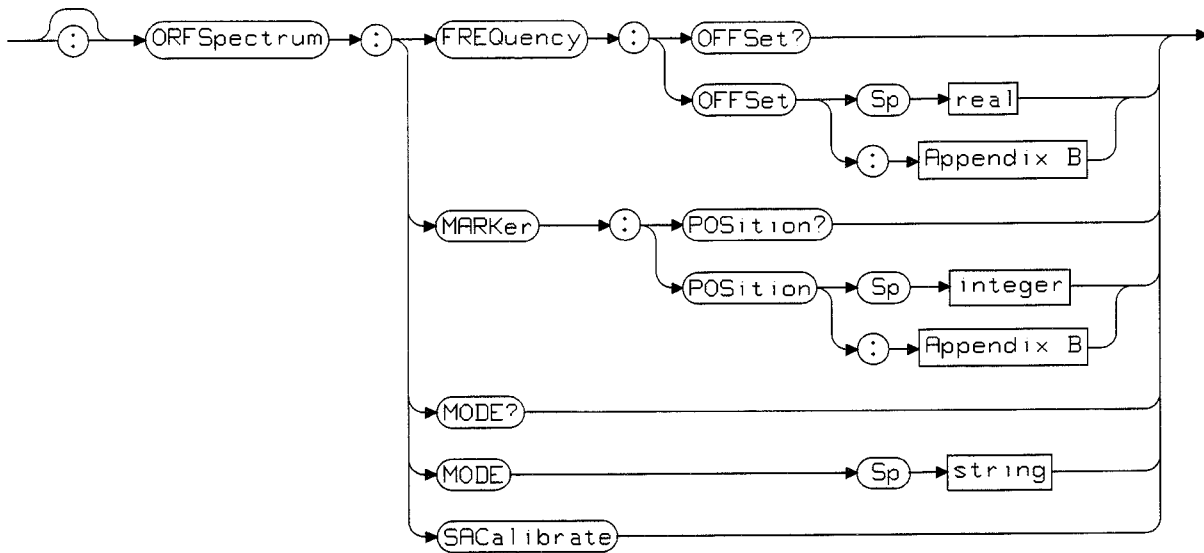
<b>Description</b>	Queries the oscilloscope TRACe MEASurement result.
<b>Syntax</b>	MEASure:OSCilloscope:TRACe?
<b>Options</b>	Not Applicable.



---

**Output RF Spectrum Subsystem**

# Output RF Spectrum Subsystem



---

## **FREQUENCY:OFFSet**

<b>Description</b>	Sets/queries the Output RF Spectrum FREQUENCY OFFSet setting. This field is only used when not making reference measurements. The offset is automatically set to 0.0 kHz when MODE is set to either RAMP REF or MOD REF.  Default HP-IB unit is HZ.  Default display unit is kHz.
<b>Syntax</b>	ORFSpectrum:FREQUENCY:OFFSet?  ORFSpectrum:FREQUENCY:OFFSet <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## **MARKer:POSition**

<b>Description</b>	Sets/queries the Output RF Spectrum MARKer POSition setting. The value is given in units of divisions from the left side of the trace (0 to 10 divisions).
<b>Syntax</b>	ORFSpectrum:MARKer:POSition?  ORFSpectrum:MARKer:POSition <integer>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## **MODE**

<b>Description</b>	Selects/queries the MODE for Output RF Spectrum measurements.
<b>Syntax</b>	ORFSpectrum:MODE? ORFSpectrum:MODE <string>
<b>Options</b>	'RAMP REF'   'RAMPING'   'MOD REF'   'MODULATN' Where; <ul style="list-style-type: none"><li>• RAMP REF means make a reference measurement needed to make Output RF Spectrum due to ramping measurements.</li><li>• RAMPING means power is measured for the Output RF Spectrum during the time when the envelope is ramping up and down. (The peak value is returned within the time interval 28 us before bit 0 to 28 us after bit 147.)</li><li>• MOD REF means make a reference measurement needed to make Output RF Spectrum due to modulation measurements.</li><li>• MODULATN (modulation) means power is measured for the Output RF Spectrum during the useful bits.</li></ul>

---

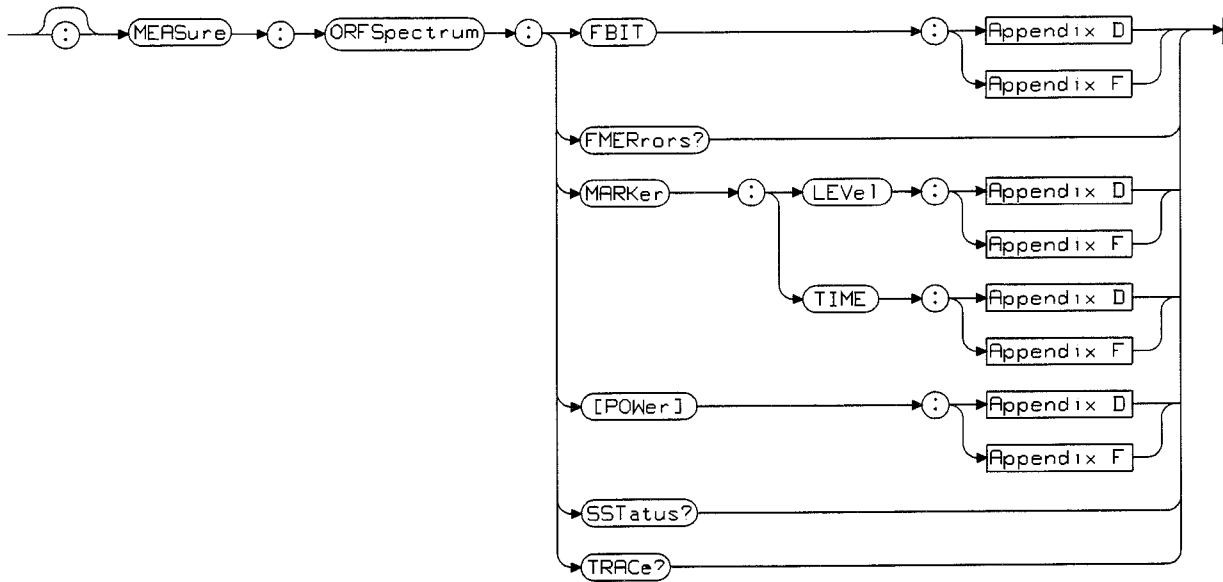
## **SACalibrate**

<b>Description</b>	Calibrates the Spectrum Analyzer for making Output RF Spectrum or Pulse On/Off Ratio measurements. This command is only active when TRIG:MODE[:DSP] = 'SINGLE'.
<b>Syntax</b>	ORFSpectrum:SACalibrate
<b>Options</b>	Not Applicable.

---

**Output RF Spectrum Commands  
(Measure Subsystem)**

Output RF Spectrum Commands (Measure Subsystem)



---

## FBIT

<b>Description</b>	<p>Queries the position of the First (useful) BIT in time relative to when the Output RF Spectrum measurement trigger occurred.</p> <p>HP-IB units are seconds (S), bit periods (T); default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods); default unit is US (micro-second).</p>
<b>Syntax</b>	<p>MEASure:ORFSpectrum:FBIT?</p> <p>MEASure:ORFSpectrum:FBIT[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

## FMErrors

<b>Description</b>	<p>FM ERRors query returns the number of FM demodulated bits different from the best bit match (of the demodulated burst bits) to the selected midamble before differential decoding for ORFS[:POWer] measurement. This only valid for MSYN:SYNC:MODE 'MIDAMBLE'.</p>
<b>Syntax</b>	MEASure:ORFSpectrum:FMErrors?
<b>Options</b>	Not Applicable.

---

## MARKer:LEVel

<b>Description</b>	<p>Queries the MARKer LEVel which is relative amplitude data. This value is a function of the marker position set or queried by ORFSpectrum:MARKer:POStion. Default unit is dB relative to the average power over the useful bits in the measured burst when ORFS:FREQ was set to zero.</p> <p>HP-IB unit is dB.</p> <p>Display unit is dB.</p>
<b>Syntax</b>	<p>MEASure:ORFSpectrum:MARKer:LEVel?</p> <p>MEASure:ORFSpectrum:MARKer:LEVel[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

**MARKer:TIME**

---

**MARKer:TIME**

<b>Description</b>	Queries the MARKer TIME which is the marker's position relative to bit zero in the measured burst. This value is a function of the marker position set or queried by ORFS:MARK:POS.  HP-IB units are seconds (S), bit periods (T);  default unit is seconds (S).  Display units are US (micro-second), T (bit periods);  default unit is US (micro-second).
<b>Syntax</b>	MEASure:ORFSpectrum:MARKer:TIME?  MEASure:ORFSpectrum:MARKer:TIME[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**[:POWer]**

<b>Description</b>	Queries the Output Spectrum POWer MEASurement result.  Default unit is dB relative (as per GSM rec. 5.05, etc.).  HP-IB unit is dB.  Display unit is dB.
<b>Syntax</b>	MEASure:ORFSpectrum[:POWer]?  MEASure:ORFSpectrum[:POWer][:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.



---

## **SStatus**

<b>Description</b>	Queries the Sync SStatus for the current DSP measurement.
<b>Syntax</b>	MEASure:ORFSpectrum:SStatus?
<b>Options</b>	<p>Returns one of the following states;</p> <p>'No Error'   'ShortBurst'   'Level Late'   'LevelShort'   'FM Error'   'Low Level'   'Math Error'   'RF Ovrload'.</p> <p>The message return priority (highest to lowest) is as follows:</p> <ul style="list-style-type: none"> <li>• Math Error</li> <li>• RF Ovrload   Low Level</li> <li>• FM Error</li> <li>• ShortBurst   Level Late   LevelShort</li> <li>• No Error</li> </ul> <p>The above defined as;</p> <ul style="list-style-type: none"> <li>• ShortBurst - amplitude envelope not long enough for the selected burst length.</li> <li>• RF Ovrload - the DSP Analyzer sampler hardware overloaded during sampling.</li> <li>• FM Error - at least one FM error was detected during the Midamble (or User Defined Sync Pattern) portion of the selected burst (only possible for MSYN:SYNC:MODE 'MIDAMBLE')</li> <li>• Level Late - amplitude of the burst did not rise until after the first few bits were received.</li> <li>• Level Short - amplitude of the burst fell before the last few bits were received.</li> <li>• Low Level - DSP Analyzer RF level never got high enough to make a valid measurement.</li> <li>• Math Error - DSP Analyzer math-related error occurred.</li> <li>• No Error - no error occurred in synchronizing to the selected burst</li> </ul>

**TRACe**

---

**TRACe**

**Description** Queries the Output RF Spectrum MEASurement result and returns 417 floating-point numbers representing the trace.

---

**NOTE** The time between each point is 1.7 uS.

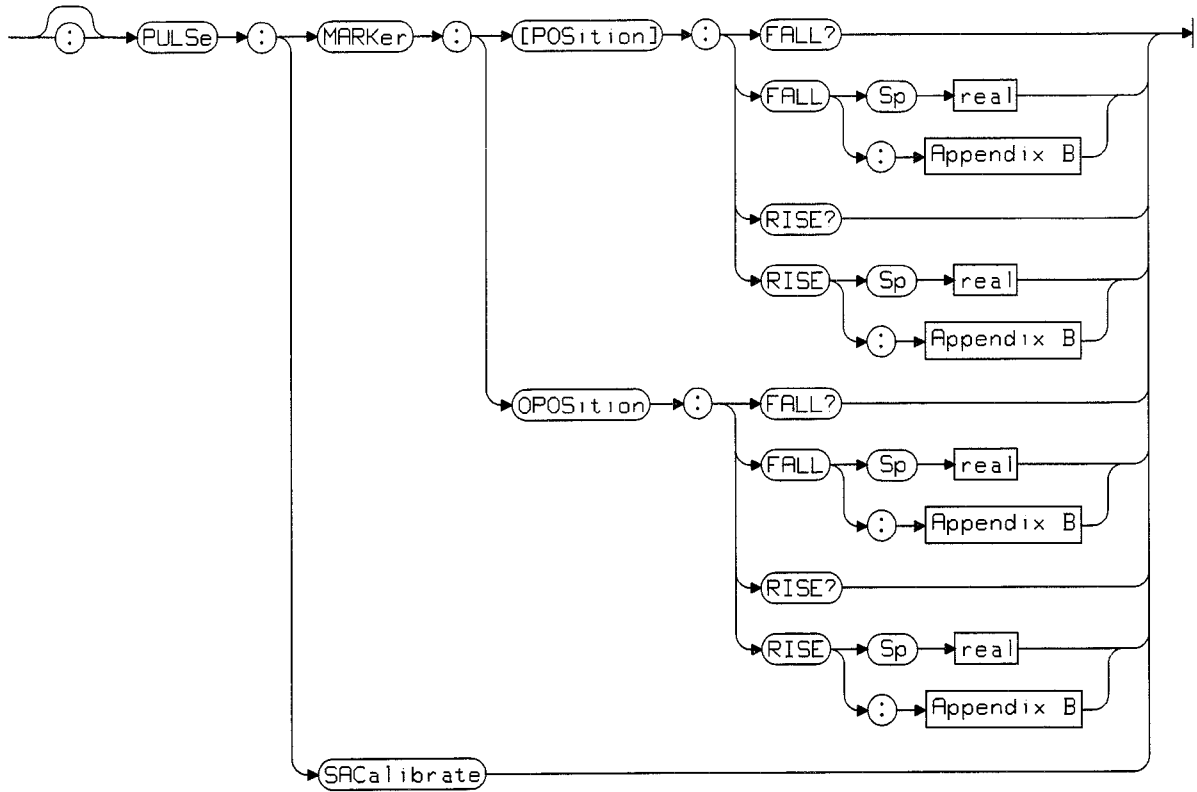
---

**Syntax** MEASure:ORFSpectrum:TRACe?

**Options** Not Applicable.

---

**PULSe On/Off Ratio Subsystem**



---

### MARKer[:POSition]:FALL

<b>Description</b>	Sets/queries the PULSe MARKer FALL trace POSition setting. The value is given in units of divisions from the left side of the trace (0 to 10 divisions).
<b>Syntax</b>	PULSe:MARKer[:POSition]:FALL? PULSe:MARKer[:POSition]:FALL <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

### MARKer[:POSition]:RISE

<b>Description</b>	Sets/queries the PULSe MARKer RISE trace POSition setting. The value is given in units of divisions from the left side of the trace (0 to 10 divisions).
<b>Syntax</b>	PULSe:MARKer[:POSition]:RISE? PULSe:MARKer[:POSition]:RISE <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

### MARKer:OPOSition:FALL

<b>Description</b>	Sets/queries the PULSe Off POSition FALL setting. This is the time (relative to the center of the last bit) that the amplitude on the amplitude envelope will be measured. The range is 0.0 us to +56.0 us.  HP-IB units are seconds (S), bit periods (T). default unit is seconds (S), default display unit is US (micro-second).
<b>Syntax</b>	PULSe:MARKer:OPOSition:FALL? PULSe:MARKer:OPOSition:FALL <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

---

## MARKer:OPOSITION:RISE

<b>Description</b>	<p>Sets/queries the PULSe Off POSition RISE setting. This is the time (relative to the center of bit zero) that the amplitude on the amplitude envelope will be measured. The range is -56.0 us to 0.0 us.</p> <p>HP-IB units are seconds (S), bit periods (T).</p> <p>default unit is seconds (S),</p> <p>default display unit is US (micro-second).</p>
<b>Syntax</b>	<p>PULSe:MARKer:OPOSITION:RISE?</p> <p>MARKer:OPOSITION:RISE &lt;real&gt;   [:FNUM]</p>
<b>Options</b>	<p>Refer to Appendix B.</p>

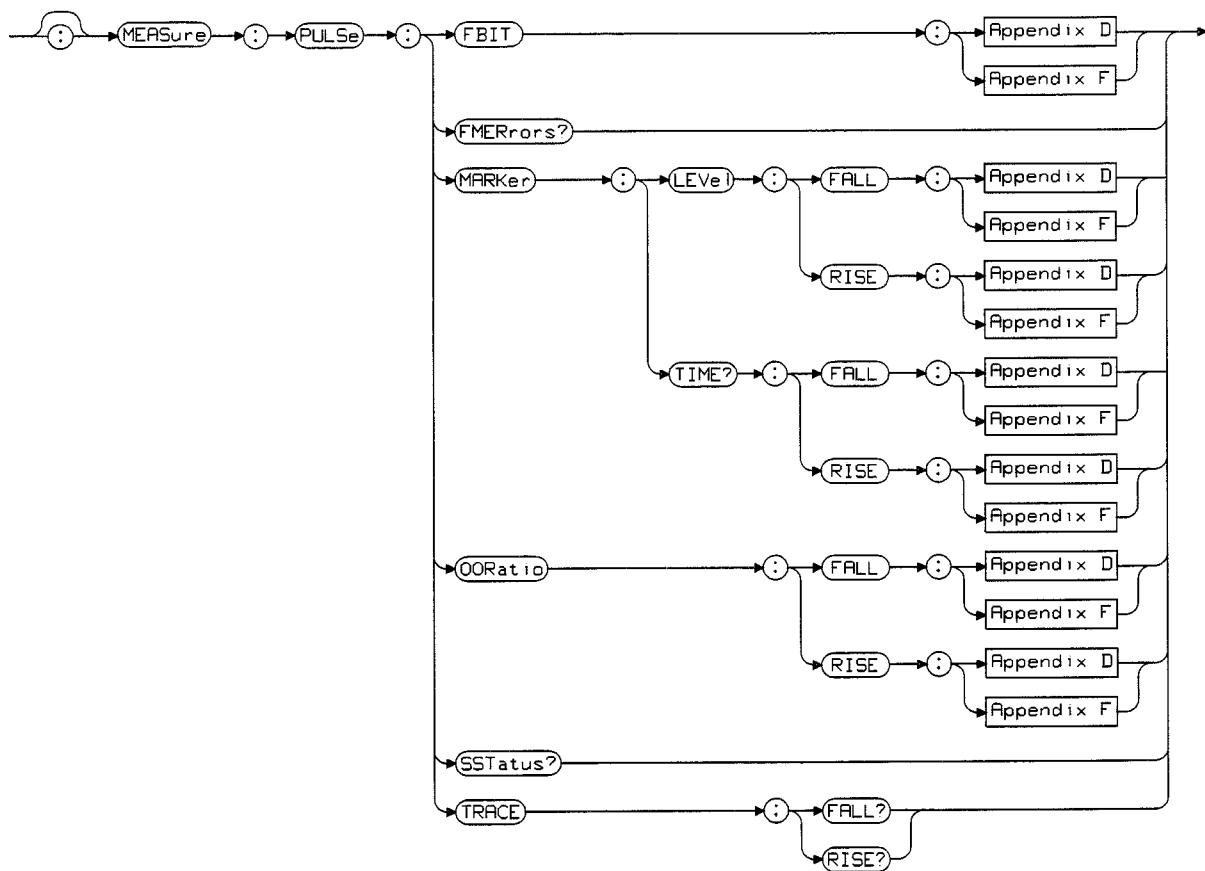
---

## SACalibrate

<b>Description</b>	<p>Calibrates the Spectrum Analyzer for making Output RF Spectrum or Pulse On/Off Ratio measurements. This command is only active when TRIG:MODE[:DSP] = 'SINGLE'.</p>
<b>Syntax</b>	<p>PULSe:SACalibrate</p>
<b>Options</b>	<p>Not Applicable.</p>

---

**Pulse On/Off Ratio Commands  
(Measure Subsystem)**





---

## FBIT

<b>Description</b>	<p>Queries the position of the First (useful) BIT in time relative to when the Pulse On/Off measurement trigger occurred.</p> <p>HP-IB units are seconds (S), bit periods (T); default unit is seconds (S).</p> <p>Display units are US (micro-second), T (bit periods); default unit is US (micro-second).</p>
<b>Syntax</b>	<p>MEASure:PULSe:FBIT?</p> <p>MEASure:PULSe:FBIT[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

## FMERrors

<b>Description</b>	<p>FM ERrors query returns the number of FM demodulated bits different from the best bit match (of the demodulated burst bits) to the selected midamble before differential decoding for the Pulse measurement. This only valid for MSYN:SYNC:MODE 'MIDAMBLE'.</p>
<b>Syntax</b>	MEASure:PULSe:FMERrors?
<b>Options</b>	Not Applicable.

---

## MARKer:LEVel:FALL

<b>Description</b>	<p>Queries the FALL trace MARKer LEVel which is relative amplitude data. This value is a function of the marker position set or queried by PULS:MARK:POS:FALL.</p> <p>Default unit is dB relative to the average power over the useful bits in the measured burst.</p> <p>HP-IB units are dB. Display units are dB.</p>
<b>Syntax</b>	<p>MEASure:PULSe:MARKer:LEVel:FALL?</p> <p>MEASure:PULSe:MARKer:LEVel:FALL[:MM]   [:AVG]</p>
<b>Options</b>	Refer to Appendices D and F.

---

---

## MARKer:LEVel:RISE

<b>Description</b>	Queries the RISE trace MARKer LEVel which is relative amplitude data. This value is a function of the marker position set or queried by PULS:MARK:POS:RISE.  Default unit is dB relative to the average power over the useful bits in the measured burst. HP-IB units are dB. Display units are dB.
<b>Syntax</b>	MEASure:PULSe:MARKer:LEVel:RISE? MEASure:PULSe:MARKer:LEVel:RISE[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

## MARKer:TIME:FALL

<b>Description</b>	Queries the FALL trace TIME which is the marker's position relative to bit zero in the measured burst. This value is a function of the marker position set or queried by PULS:MARK:POS:FALL.  HP-IB units are seconds (S), bit periods (T); default unit is seconds (S). Display units are US (micro-second), T (bit periods); default unit is US (micro-second).
<b>Syntax</b>	MEASure:PULSe:MARKer:TIME:FALL? MEASure:PULSe:MARKer:TIME:FALL[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**MARKer:TIME:RISE**

<b>Description</b>	Queries the RISE trace TIME which is the marker's position relative to bit zero in the measured burst. This value is a function of the marker position set or queried by PULS:MARK:POS:RISE.  HP-IB units are seconds (S),bit periods (T); default unit is seconds (S).  Display units are US (micro-second), T (bit periods); default unit is US (micro-second).
<b>Syntax</b>	MEASure:PULSe:MARKer:TIME:RISE? MEASure:PULSe:MARKer:TIME:RISE[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**OORatio:FALL**

<b>Description</b>	Queries the PULSe On/Off Ratio FALL trace MEASurement result.  Default units: dB relative to the average power over the useful bits in the measured burst. HP-IB unit is dB. Display unit is dB.
<b>Syntax</b>	MEASure:PULSe:OORatio:FALL? MEASure:PULSe:OORatio:FALL[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**OORatio:RISE**

<b>Description</b>	Queries the PULSe On/Off Ratio RISE trace MEASurement result.  Default units: dB relative to the average power over the useful bits in the measured burst. HP-IB unit is dB. Display unit is dB.
<b>Syntax</b>	MEASure:PULSe:OORatio:RISE? MEASure:PULSe:OORatio:RISE[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

## SSTatus

---

### SSTatus

**Description** Queries the Sync SStatus for the current DSP measurement.

**Syntax** MEASure:PULSe:SSTatus?

**Options** Returns one of the following states;

'No Error' | 'ShortBurst' | 'Level Late' | 'LevelShort' |

'FM Error' | 'Low Level' | 'Math Error' | 'RF Ovrload'.

The message return priority (highest to lowest) is as follows:

- Math Error
- RF Ovrload | Low Level
- FM Error
- ShortBurst | Level Late | LevelShort
- No Error

The above defined as;

- ShortBurst - amplitude envelope not long enough for the selected burst length.
- RF Ovrload - the DSP Analyzer sampler hardware overloaded during sampling.
- FM Error - at least one FM error was detected during the Midamble (or User Defined Sync Pattern) portion of the selected burst (only possible for MSYN:SYNC:MODE 'MIDAMBLE')
- Level Late - amplitude of the burst did not rise until after the first few bits were received.
- Level Short - amplitude of the burst fell before the last few bits were received.
- Low Level - DSP Analyzer RF level never got high enough to make a valid measurement.
- Math Error - DSP Analyzer math-related error occurred.
- No Error - no error occurred in synchronizing to the selected burst

---

**TRACe:FALL**

<b>Description</b>	Queries the Pulse On/Off FALL TRACe MEASurement result and returns 417 floating-point numbers representing the trace. NOTE: the time between each point is 0.2 uS.
<b>Syntax</b>	MEASure:PULSe:TRACe:FALL?
<b>Options</b>	Not Applicable.

---

**TRACe:RISE**

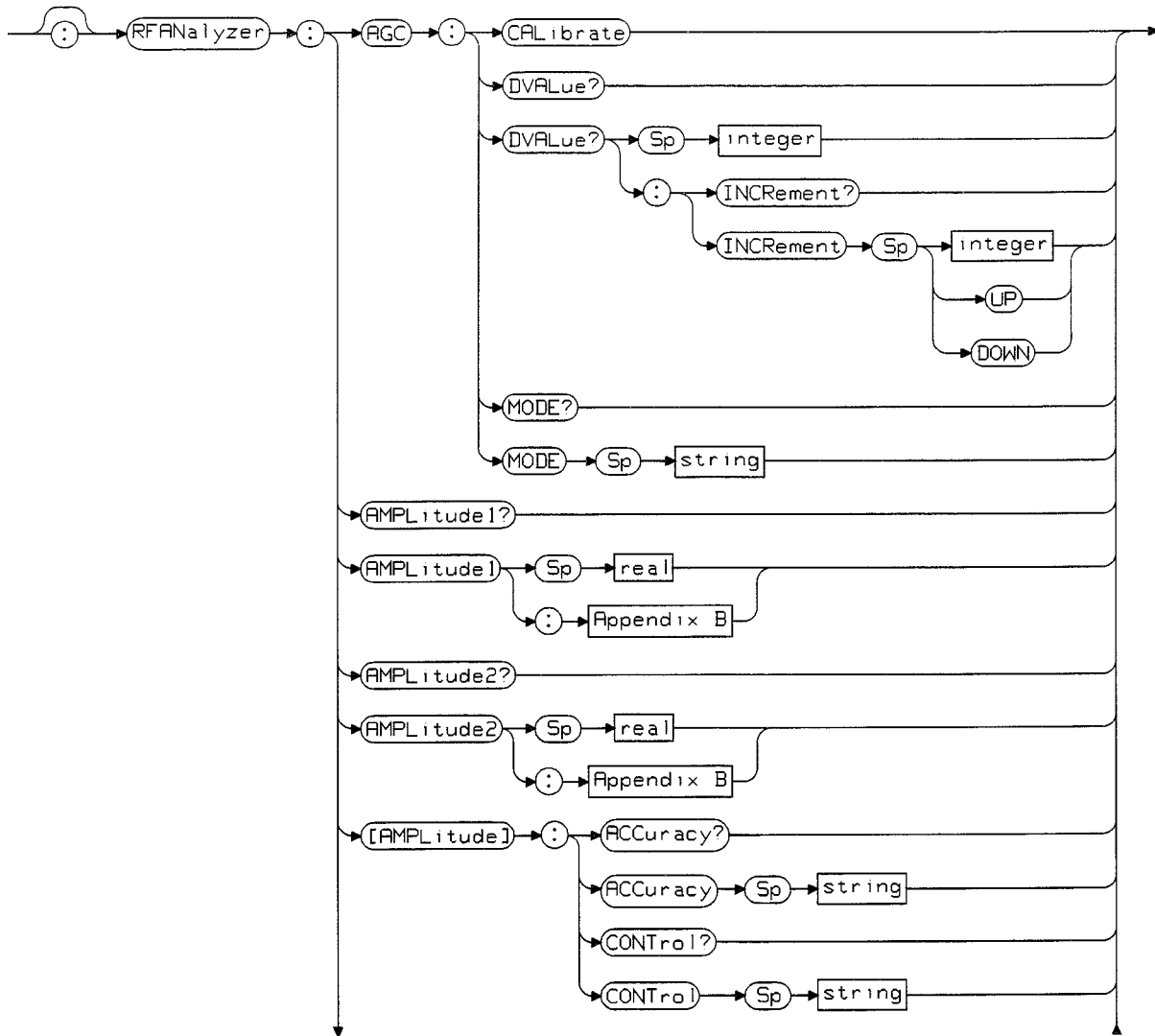
<b>Description</b>	Queries the Pulse On/Off RISE TRACe MEASurement result and returns 417 floating-point numbers representing the trace. NOTE: the time between each point is 0.2 uS.
<b>Syntax</b>	MEASure:PULSe:TRACe:RISE?
<b>Options</b>	Not Applicable.

Pulse On/Off Ratio Commands (Measure Subsystem)

TRACe:RISE

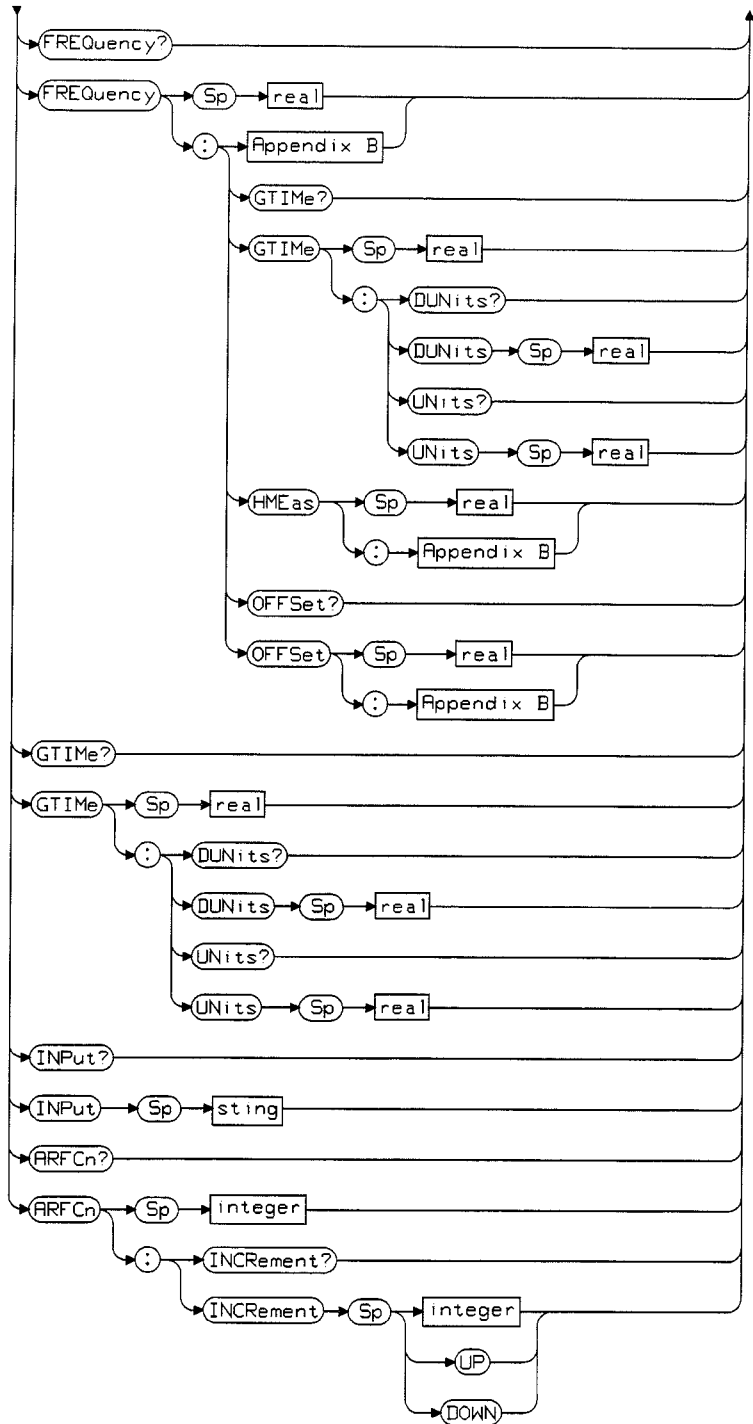
---

**RF Analyzer Subsystem**



Continued Over





---

## AGC:CALibrate

<b>Description</b>	Does an open loop AGC CALibration if in FRAN:AGC:MODE 'CLOSED'.
<b>Syntax</b>	RFANalyzer:AGC:CALibrate
<b>Options</b>	Not Applicable.

---

## AGC:DVALue

<b>Description</b>	Sets/queries the open/auto AGC DAC VALUE
<b>Syntax</b>	RFANalyzer:AGC:DVALue? RFANalyzer:AGC:DVALue <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## AGC:MODE

<b>Description</b>	Selects/queries the AGC MODE (NORMAL is closed loop).
<b>Syntax</b>	RFANalyzer:AGC:MODE? RFANalyzer:AGC:MODE <string>
<b>Options</b>	'CLOSED'   'OPEN'   'AUTO'

---

## AMPLitude1

<b>Description</b>	Sets/queries the amplitude (input level to assume) of the RF IN/OUT port. Used when RFAN:INP is 'RF IN/OUT'. HP-IB and display units are dBm, Volts (V) and Watts (W); Default HP-IB and display unit is dBm.
<b>Syntax</b>	RFANalyzer:AMPLitude1? RFANalyzer:AMPLitude1 <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## AMPLitude2

<b>Description</b>	Sets/queries the amplitude (input level to assume) of the AUX RF IN port. Used when RFAN:INP is 'AUX RF IN'.  HP-IB and display units are dBm, Volts (V) and Watts (W);  Default HP-IB and display unit is dBm.
<b>Syntax</b>	RFANalyzer:AMPLitude2?  RFANalyzer:AMPLitude2 <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## [:AMPLitude]:ACCuracy

<b>Description</b>	Selects/queries the RF ANalyzer AMPLitude ACCuracy.
<b>Syntax</b>	RFANalyzer[:AMPLitude]:ACCuracy?  RFANalyzer[:AMPLitude]:ACCuracy <string>
<b>Options</b>	'+-3dB'   '+-1dB'

---

## [:AMPLitude]:CONTrol

<b>Description</b>	Selects/queries the RFANalyzer AMPLitude CONTrolling mechanism.
<b>Syntax</b>	RFANalyzer[:AMPLitude]:CONTrol?  RFANalyzer[:AMPLitude]:CONTrol <string>
<b>Options</b>	'MS TX LEV'   'MANUAL'  Where; <ul style="list-style-type: none"> <li>• MS TX LEV means that the AMPLitude (RFAN:AMPL1 or RFAN:AMPL2) is set automatically based on the setting of CELL:MS:TLEVel.</li> <li>• MANUAL means that the user can manually set the AMPLitude (RFAN:AMPL1 or RFAN:AMPL2)</li> </ul>

---

---

## **FREQuency**

- Description** Sets/queries the non-hop FREQuency for the RF ANalyzer.  
Default HP-IB unit is HZ.  
Default display unit is MHZ.
- Syntax** RFANalyzer:FREQuency?  
RFANalyzer:FREQuency <real> | [:FNUM]
- Options** Refer to Appendix B.

---

## **FREQuency:GTIME**

- Description** Sets/queries the RF ANalyzer Gate TIME (RF Cnt Gate).  
Default HP-IB unit is seconds (S).  
Default display unit is micro-seconds (us).
- Syntax** RFANalyzer:FREQuency:GTIME?  
RFANalyzer:FREQuency:GTIME <real> | [:INUM]
- Options** Refer to Appendix A.

---

## **FREQuency:HMEas**

- Description** Sets the Hop Meas Frequency, which is the frequency to be assumed when making measurements while hopping.  
Default HP-IB unit is HZ.  
Default display unit is MHZ.
- Syntax** RFANalyzer:FREQuency:HMEas <real> | [:FNUM]
- Options** Refer to Appendix B.

---

## **FREQUENCY:OFFSet**

<b>Description</b>	Sets/queries the Hop Frequency OFFSet for the RF ANalyzer. Default HP-IB unit is HZ. Default display unit is MHZ.
<b>Syntax</b>	RFANalyzer:FREQUENCY:OFFSet? RFANalyzer:FREQUENCY:OFFSet <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## **GTIMe**

<b>Description</b>	Sets/queries the RF ANalyzer Gate TIME (RF Cnt Gate). Default HP-IB unit is seconds (S). Default display unit is micro-seconds (us).
<b>Syntax</b>	RFANalyzer:GTIMe? RFANalyzer:GTIMe <real>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

## **INPut**

<b>Description</b>	Selects/queries the selected INPut port for the RF ANalyzer.
<b>Syntax</b>	RFANalyzer:INPut? RFANalyzer:INPut <string>
<b>Options</b>	'RF IN/OUT'   'AUX RF IN'

---

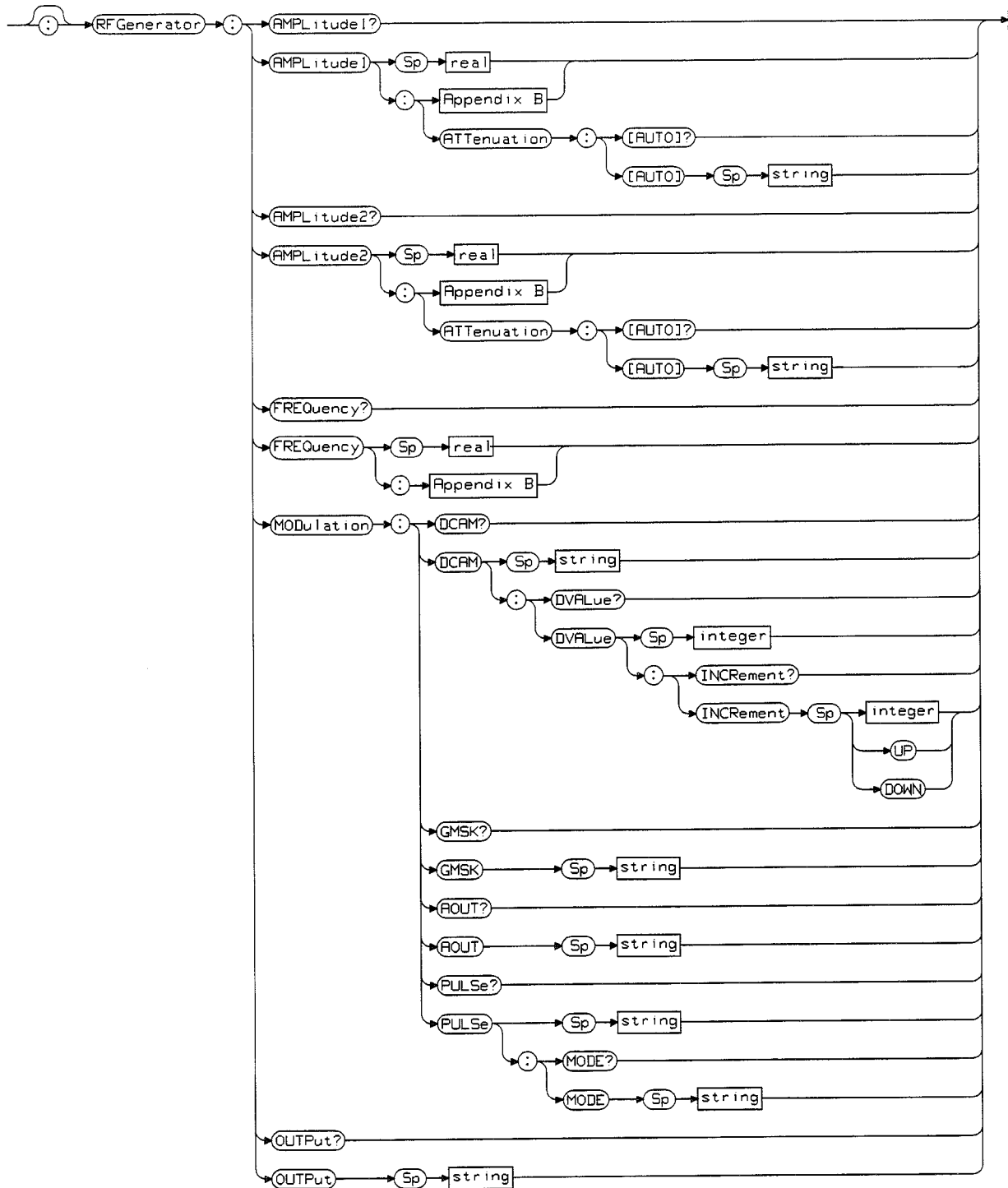
## **ARFCn**

<b>Description</b>	Selects/queries the Channel number which the RF ANalyzer will measure.
<b>Syntax</b>	RFANalyzer:ARFCn? RFANalyzer:ARFCn <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.



---

**RF Generator Subsystem**





---

## AMPLitude1

<b>Description</b>	Sets/queries the amplitude of the RF Generator when the RF IN/OUT port is selected. HP-IB and display units are dBm, Volts (V) and Watts (W); Default HP-IB and display unit is dBm.
<b>Syntax</b>	RFGenerator:AMPLitude1? RFGenerator:AMPLitude1 <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## AMPLitude1:ATTenuation[:AUTO]

<b>Description</b>	Selects the ATTenuation of the RF IN/OUT port automatically each time a change of amplitude setting occurs when ON.
<b>Syntax</b>	RFGenerator:AMPLitude1:ATTenuation[:AUTO]? RFGenerator:AMPLitude1:ATTenuation[:AUTO] <string>
<b>Options</b>	'ON'   'OFF'

---

## AMPLitude2

<b>Description</b>	Sets/queries the amplitude of the RF Generator when the AUX RFOUT port is selected. HP-IB and display units are dBm, Volts (V) and Watts (W); Default HP-IB and display unit is dBm.
<b>Syntax</b>	RFGenerator:AMPLitude2? RFGenerator:AMPLitude2 <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## AMPLitude2:ATTenuation[:AUTO]

<b>Description</b>	Selects the ATTenuation of the AUX RFOUT port automatically each time a change of amplitude setting occurs when ON.
<b>Syntax</b>	RFGenerator:AMPLitude2:ATTenuation[:AUTO]? RFGenerator:AMPLitude2:ATTenuation[:AUTO] <string>
<b>Options</b>	'ON'   'OFF'

---

---

## FREQuency

<b>Description</b>	Sets/queries the non-hop FREQuency of the RF Generator. Default HP-IB unit is HZ. Default display unit is MHZ.
<b>Syntax</b>	RFGenerator:FREQuency? RFGenerator:FREQuency <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## MODulation:DCAM

<b>Description</b>	Selects/queries the state of DC AM MODulation.
--------------------	--

---

**NOTE** This command is not available in the HP 8922S.

---

<b>Syntax</b>	RFGenerator:MODulation:DCAM?
---------------	------------------------------

RFGenerator:MODualtion:DCAM <string>

<b>Options</b>	'EXTERNAL'   'OFF'   'TCH LOWER'   'BCCHLOWER'   'BOTHLOWER'
----------------	--

Where;

- EXTERNAL means DC AM comes from an external AM input.
- OFF means no DC AM.
- TCH LOWER means the BCCH will be at the RF Level of the RF Analyzer Amplitude setting and the TCH RF Level will be lower by the dB determined by setting RFANalyzer:INPut.
- BCCHLOWER means the TCH will be at the RF Level of the RF Analyzer Amplitude setting and the TCH RF Level will be lower by the dB determined by setting RFANalyzer:INPut.
- BOTHLOWER means both the TCH and the BCCH will be lower by the dB determined by setting RFANalyzer:INPut.

---

### MODulation:DCAM:DVALue

<b>Description</b>	Sets/queries the DC AM DAC VALue for RFG:MODE:DCAM selected as TCH LOWER, 'BCCHLOWER' or 'BOTHLOWER'.
<b>Syntax</b>	RFGenerator:MODulation:DCAM:DVALue? RFGenerator:MODualtion:DCAM:DVALue <integer>   [:INUM]
<b>Options</b>	Refer to Appendix A.

---

### MODulation:GMSK

<b>Description</b>	Selects/queries the state of GMSK modulation.
<b>Syntax</b>	RFGenerator:MODulation:GMSK? RFGenerator:MODualtion:GMSK <string>
<b>Options</b>	'EXT'   'OFF' Where; <ul style="list-style-type: none"><li>• EXT means GMSK comes from external data and clock inputs.</li><li>• OFF means the RF output is an unmodulated carrier.</li></ul>

---

### MODulation:PULSe

<b>Description</b>	Selects/queries the state of PULSe modulation.
<b>Syntax</b>	RFGenerator:MODulation:PULSe? RFGenerator:MODualtion:PULSe <string>
<b>Options</b>	'EXT'   'HOP TRIG'   'OFF' Where; <ul style="list-style-type: none"><li>• EXT means PULSe modulation comes from an external (TTL) input.</li><li>• HOP TRIG means the RF output automatically pulses off (for a little while) during switching transients when an RF Generator hop trigger occurs.</li><li>• OFF means no PULSe modulation.</li></ul>

---

## MODulation:PULSe:MODE

<b>Description</b>	Selects/queries the pulse modulation level MODE.
<b>Syntax</b>	RFGenerator:MODulation:PULSe:MODE? RFGenerator:MODulation:PULSe:MODE <string>
<b>Options</b>	'NORMAL'   '30 DB' Where; <ul style="list-style-type: none"><li>• NORMAL means pulse off will be very far down.</li><li>• 30 DB means the RF envelope will usually be 30 dB higher than the selected amplitude and can be pulsed down to the selected amplitude setting.</li></ul>

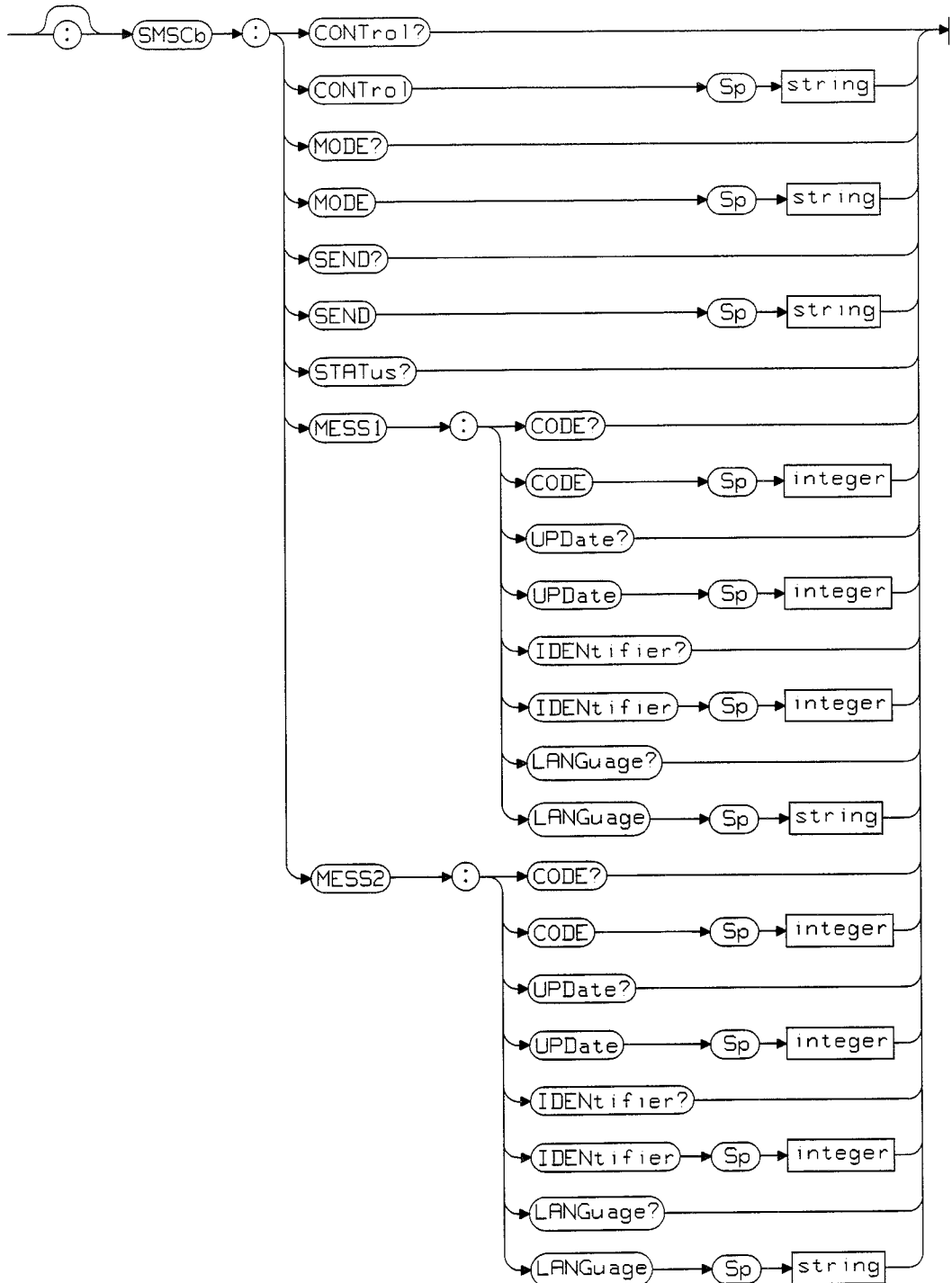
---

## OUTPut

<b>Description</b>	Selects/queries the selected OUTPut port for the RF Generator.
<b>Syntax</b>	RFGenerator:OUTPut? RFGenerator:OUTPut <string>
<b>Options</b>	'RF IN/OUT'   'AUX RFOUT'

---

**SMS Cell Broadcast Subsystem**



---

## CONTROL

<b>Description</b>	Selects/queries whether or not the CBCH is being configured.
<b>Syntax</b>	SMSCb:CONTROL? SMSCb:CONTROL <string>?
<b>Options</b>	'ENABLED'   'DISABLED'

---

## MODE

<b>Description</b>	Selects/queries the Message Fields. 'ALL' indicates that all the message attributes are editable. 'BASIC' indicates that only the identifier attribute is editable.
<b>Syntax</b>	SMSCb:MODE? SMSCb:MODE <string>
<b>Options</b>	'BASIC'   'ALL'

---

## SEND

<b>Description</b>	Selects/queries the type of message that is being sent.
<b>Syntax</b>	SMSCb:SEND? SMSCb:SEND <string>
<b>Options</b>	'NO MESSAGE'   'MESSAGE 1'   'MESSAGE 2'   'MESSAGES 1 & 2' Where; <ul style="list-style-type: none"> <li>• 'NO MESSAGE' indicates the CBCH is sending invalid messages.</li> <li>• 'MESSAGE 1' indicates the contents of Message 1 are being sent at 60 second intervals.</li> <li>• 'MESSAGE 2' indicates the contents of Message 2 are being sent at 30 second intervals.</li> <li>• 'MESSAGES 1 &amp; 2' alternatively sends the contents of Message 1 and Message 2, with a 60 second interval between successive messages.</li> </ul>

**STATus**

---

**STATus**

<b>Description</b>	Queries the status of the CBCH.
<b>Syntax</b>	SMSCb:STATus?
<b>Options</b>	Returns a value of; 'OFF'   'IDLE'   'SENDING' Where; <ul style="list-style-type: none"><li>• 'OFF' indicates that a CBCH is not configured.</li><li>• 'IDLE' indicates that invalid messages are being sent on the CBCH.</li><li>• 'SENDING' indicates that valid messages are being sent on the CBCH.</li></ul>

---

**MESS1 or MESS2:CODE**

<b>Description</b>	Selects/queries the message type.
<b>Syntax</b>	SMSCb:MESS1 or SMSCb:MESS2:CODE? SMSCb:MESS1 or SMSCb:MESS2:CODE <integer>
<b>Options</b>	Where <integer>=0 through 4095. For message 1 the default is 0. For message 2 the default is 4095.

---

**MESS1 or MESS2:UPDate**

<b>Description</b>	Selects/queries the revision of the message being sent.
<b>Syntax</b>	SMSCb:MESS1 or SMSCb:MESS2:UPDate? SMSCb:MESS1 or SMSCb:MESS2:UPDate <integer>
<b>Options</b>	Where <integer>=0 through 15. For message 1 the default is 0. For message 2 the default is 15.



---

### MESS1 or MESS2:IDENTifier

<b>Description</b>	Selects/queries the source of the message.
<b>Syntax</b>	SMSCb:MESS1 or SMSCb:MESS2:IDENTifier? SMSCb:MESS1 or SMSCb:MESS2:IDENTifier <integer>
<b>Options</b>	Where <integer>=0 through 65535. For message 1 the default is 0. For message 2 the default is 0.

---

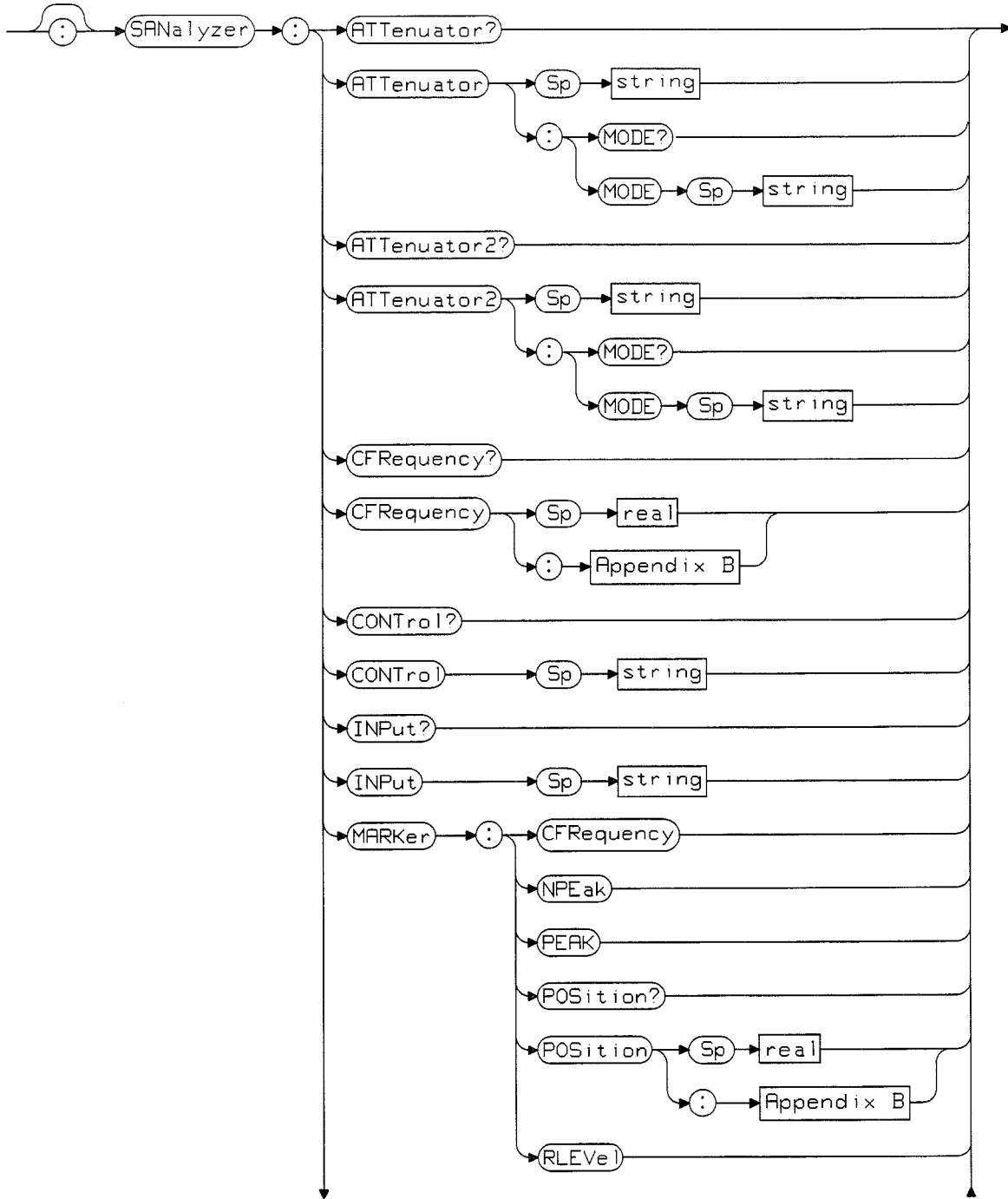
### MESS1 or MESS2:LANGuage

<b>Description</b>	Selects/queries the data coding scheme for the message. 'DEFAULT GSM' sets the value of the data coding scheme to 0xF0.
<b>Syntax</b>	SMSCb:MESS1 or SMSCb:MESS2:LANGuage? SMSCb:MESS1 or SMSCb:MESS2:LANGuage <string>
<b>Options</b>	'GERMAN'   'ENGLISH'   'ITALIAN'   'FRENCH'   'SPANISH'   'DUTCH'   'SWEDISH'   'DANISH'   'PORTUGESE'   'FINNISH'   'NORWEGIAN'   'GREEK'   'TURKISH'   'DEFAULT GSM' For message 1 the default is 'ENGLISH'. For message 2 the default is 'GERMAN'.

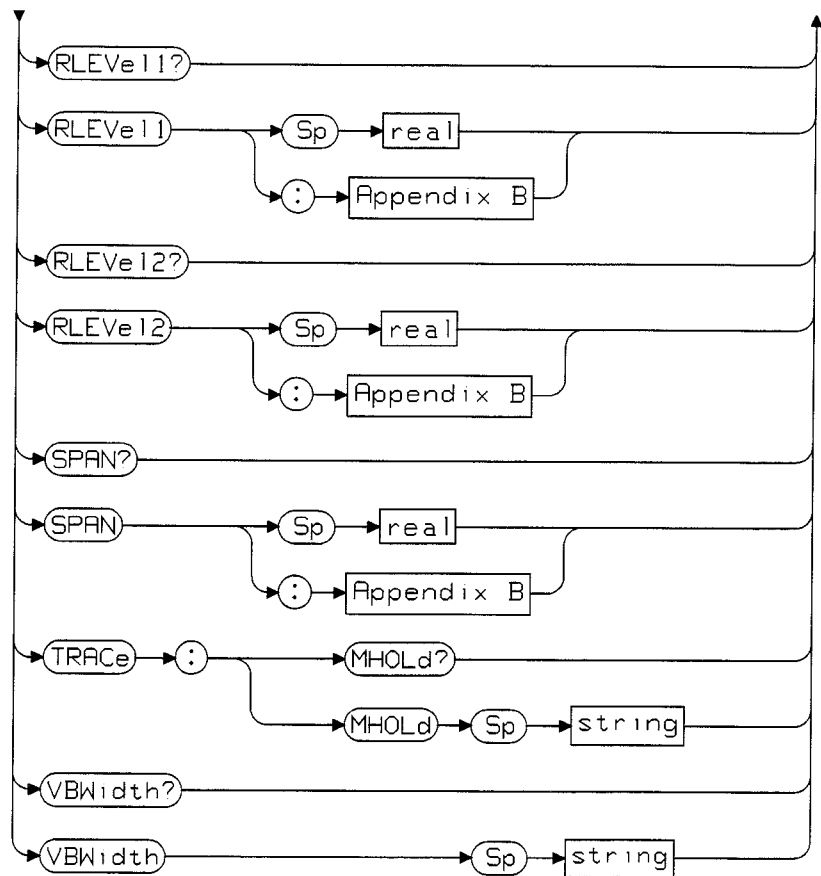


---

**Spectrum Analyzer Subsystem**



Continued Over



---

## ATTenuator

<b>Description</b>	Selects/queries the input ATTenuator GSM900 and EGSM900 selection. This is only valid when ATT1:MODE 'HOLD' is selected, otherwise, automatic attenuator selection is done.  NOTE: This is only valid for CONFigure:RADio 'GSM900'   'EGSM'
<b>Syntax</b>	SANalyzer:ATTenuator? SANalyzer:ATTenuator <string>?
<b>Options</b>	'0 dB'   '10 dB'   '20 dB'   '30 dB'   '40 dB'

---

## ATTenuator:MODE

<b>Description</b>	Selects/queries the ATTenuator1 MODE selection.
<b>Syntax</b>	SANalyzer:ATTenuator:MODE? SANalyzer:ATTenuator:MODE <string>?
<b>Options</b>	'AUTO'   'HOLD'

---

## ATTenuator2

<b>Description</b>	Selects/queries the input ATTenuator DCS1800 and PCS1900 selection. This is only valid when ATT2:MODE 'HOLD' is selected, otherwise, automatic attenuator selection is done.  NOTE: This is only valid for CONFigure:RADio 'DCS1800'   'PCS1900'
<b>Syntax</b>	SANalyzer:ATTenuator2? SANalyzer:ATTenuator2 <string>?
<b>Options</b>	'0 dB'   '5 dB'   '10 dB'   '15 dB'   '20 dB'   '25 dB'   '30 dB'   '35 dB'

---

### ATTenuator:MODE

<b>Description</b>	Selects/queries the ATTenuator2 MODE selection.
<b>Syntax</b>	SANalyzer:ATTenuator2:MODE? SANalyzer:ATTenuator2:MODE <string>?
<b>Options</b>	'AUTO'   'HOLD'

---

### CFRequency

<b>Description</b>	Center FRequency setting (This is the same as RFA:FREQ).
<b>Syntax</b>	SANalyzer:CFRequency? SANalyzer:CFRequency <real>?   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

### MARKer:CFRequency

<b>Description</b>	Sets MARKer and signal to Center FRequency.
<b>Syntax</b>	SANalyzer:MARKer:CFRequency
<b>Options</b>	Not Applicable.

---

### MARKer:NPEak

<b>Description</b>	Sets MARKer Next PEak.
<b>Syntax</b>	SANalyzer:MARKer:NPEak
<b>Options</b>	Not Applicable.

---

### MARKer:PEAK

<b>Description</b>	Sets MARKer PEAK.
<b>Syntax</b>	SANalyzer:MARKer:PEAK
<b>Options</b>	Not Applicable.

---

## MARKer:POSition

<b>Description</b>	Selects/queries the MARKer POSition setting.
<b>Syntax</b>	SANalyzer:MARKer:POSition? SANalyzer:MARKer:POSition <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## MARKer:RLEVel

<b>Description</b>	Sets MARKer and signal to Reference LEVel.
<b>Syntax</b>	SANalyzer:MARKer:RLEVel
<b>Options</b>	Not Applicable.

---

## RLEVel1

<b>Description</b>	Reference LEVel for the RF IN/OUT port. HP-IB units are dBm, Volts (V) and Watts (W); Default HP-IB and display unit is dBm.
<b>Syntax</b>	SANalyzer:RLEVel1? SANalyzer:RLEVel1 <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## RLEVel2

<b>Description</b>	Reference LEVel for the AUX RF IN port. HP-IB units are dBm, Volts (V) and Watts (W); Default HP-IB and display unit is dBm.
<b>Syntax</b>	SANalyzer:RLEVel2? SANalyzer:RLEVel2 <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.



---

## SPAN

<b>Description</b>	SPAN setting. Default HP-IB units HZ; Default and display unit is MHz.
<b>Syntax</b>	SANalyzer:SPAN? SANalyzer:SPAN <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## TRACe:MHOLD

<b>Description</b>	Selects/queries the Spectrum Analyzer Max HOLD function for the TRACe as ON or Off.
<b>Syntax</b>	SANalyzer:TRACe:MHOLD? SANalyzer:TRACe:MHOLD <string>
<b>Options</b>	'ON'   'OFF'.

---

## VBWidth

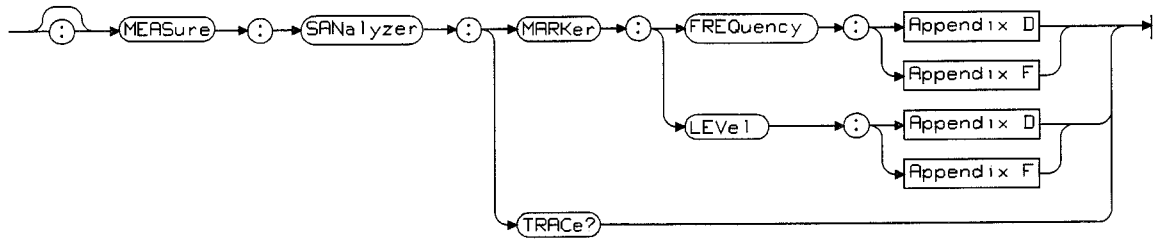
<b>Description</b>	Selects/queries the Video Bandwidth selection.
<b>Syntax</b>	SANalyzer:VBWidth? SANalyzer:VBWidth <string>
<b>Options</b>	'30 kHz'   '100 kHz'   '1 MHz'.

Spectrum Analyzer Subsystem  
**VBWidth**

---

**Spectrum Analyzer Commands  
(Measure Subsystem)**

# Spectrum Analyzer Commands (Measure Subsystem)



---

**MARKer:FREQuency**

<b>Description</b>	Queries the MARKer FREQuency MEASurement result. HP-IB unit is HZ. Display units are MHZ, kHz, HZ;
<b>Syntax</b>	MEASure:SANalyzer:MARKer:FREQuency? MEASure:SANalyzer:MARKer:FREQuency[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

**MARKer:LEVel**

<b>Description</b>	Queries the MARKer LEVel MEASurement result. HP-IB units are dBm, W. default unit is dBm. Display units are dBm, W, V, dBuV; default unit is dBm.
<b>Syntax</b>	MEASure:SANalyzer:MARKer:LEVel? MEASure:SANalyzer:MARKer:LEVel[:MM]   [:AVG]
<b>Options</b>	Refer to Appendices D and F.

---

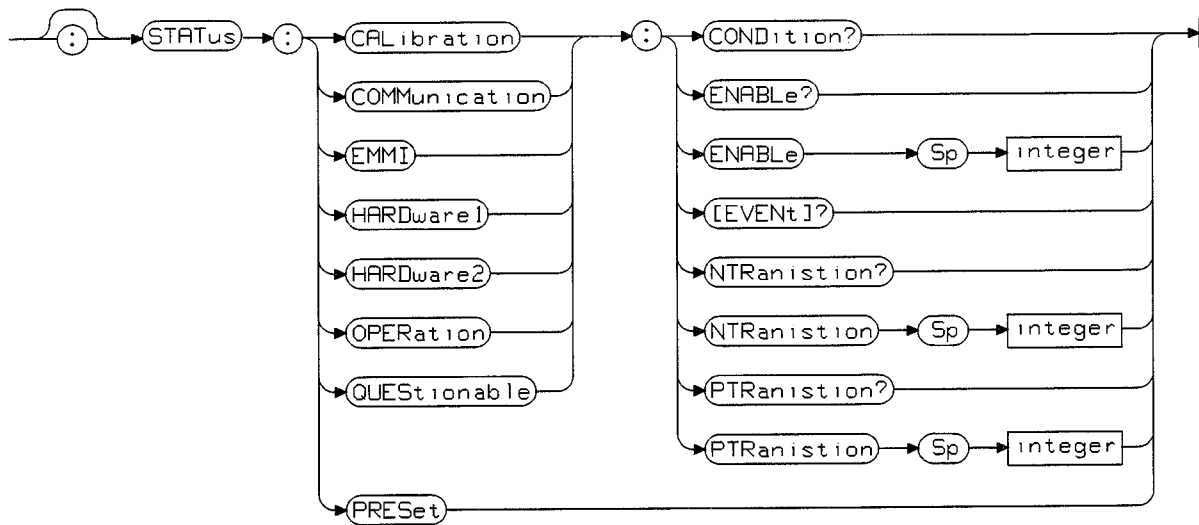
**TRACe**

<b>Description</b>	Queries the Spectrum Analyzer TRACe MEASurement result.
<b>Syntax</b>	MEASure:SANalyzer:TRACe?
<b>Options</b>	Not Applicable.

Spectrum Analyzer Commands (Measure Subsystem)  
**TRACe**

---

**Status Subsystem**





---

## Status Subsystem - Status Byte

The Status subsystem is used for setting and querying the various conditions of the instrument through the conditions set within the status byte. The following is a description of the states found with each of the parts within the status byte.

### Status Byte Bit Definitions

- 7 - Operation Status Register
- 6 - RQS
- 5 - Standard Event Status Register
- 4 - MAV
- 3 - Questionable Data/Signal Status Register
- 1 - Hardware 2 Status Register
- 0 - Hardware 1 Status Register

### Hardware 1 Status Register

#### Condition register bit definitions

- 7 - Communication Status Register Summary
- 6 - Power up tests failed
- 5 - Pulse On Trace RF Overload  
(PULSe)
- 4 - Measurement Trigger too early  
(DSPanalyzer, ORFSpectrum, PULSe)
- 3 - Measurement Trigger too late  
(DSPanalyzer, ORFSpectrum, PULSe)
- 2 - Measurement Sync Error  
(DSPanalyzer, ORFSpectrum, PULSe)
- 0 - Measurement armed  
(DSPanalyzer, ORFSpectrum, PULSe)

Status Subsystem  
**Status Subsystem - Status Byte**

**Event register bit definitions**

- 1 - Measurement Limit(s) Exceeded
- 8 - EMMI Status Register Event Summary
- 14 - OverPower Protection Tripped

**Hardware 2 Status Register**

**Condition register bit definitions**

- 2 - RF Frequency - change RF Gen Freq
- 1 - RF Src Level setting - change Ref Level, Input Port or Attenuator (if using "Hold")."
- 0 - RF Analyzer Level setting - change RF Gen Amplitude, Output Port or Atten Hold (if on)."

**Questionable Data/Signal Status Register**

The QUESTIONABLE status register set contains bits which give an indication of the quality of various aspects of the signal/data.

A bit set in the condition register indicates that the data currently being acquired or generated is of questionable quality due to some condition affecting the parameter associated with that bit.

**Condition register bit definitions**

- 7 - CALibration Register Summary

**Standard Event Status Register**

**Condition register bit definitions**

- 5 - Command Error
- 4 - Execution Error
- 3 - Device Dependant Error
- 2 - Query Error

**Event register bit definitions**

- 7 - Power On Occurred
- 6 - User Request
- 1 - Request Control
- 0 - Operation Complete Occurred

**Operation Status Register**

The OPERation status register set contains conditions which are part of the instrument's normal operation.

**Condition register bit definitions**

- 14 - PROGram running

**Communication Status Register**

**Condition register bit definitions**

- 3 - Protocol Processor Communication Channel Failure
- 2 - DSP Analyzer Communication Channel Failure
- 1 - Hop Controller Communication Channel Failure
- 0 - Communication failure with Signaling Board

**CALibration Status Register**

**Condition register bit definitions**

- 6 - Reference calibrate failure
- 5 - AGC Open Loop cal failure
- 3 - Voltmeter Self cal failure
- 2 - Counter Self cal failure
- 1 - Sampler Self cal failure
- 0 - Spectrum Analyzer Self cal failure

**EMMI Status Register**  
**Event register bit definitions**

- 3 - Response timeout
- 2 - Mobile XON timeout
- 1 - NAK
- 0 - ACK

The STATUS:EMMI:EVENT? queries the EMMI STATUS buffer. When an EMMI:DATA <data entry> occurs, one of the above bits will be set. Reading the status will clear all bits, subsequently setting the EMMI status to idle. Based on the above bits, the status buffer will return one of five numbers indicating the status of the last EMMI message sent by the HP 8922M.

0 - There was no data sent since that last status check and there were no events to report, or the last EMMI:DATA <data entry> had improper format.

1 - A message was received and acknowledged by the mobile station. Important: this does not mean that the mobile was able to understand or perform the operation (ACK received).

2 - The HP 8922M attempted to send a message, but the mobile station did not receive the message intact (NAK received).

4 - EMMI data was sent, but the XON timeout expired before the acknowledge was received (EMMI:TIMEout:MS:XON).

8 - EMMI data was sent, but the Response timeout expired (EMMI:TIMEout:MS:RESPonse).

---

**NOTE**

This register is not available in the HP 8922S.

Condition register bits will hold their state until the condition changes. Event register bits will be cleared as soon as they are read.

---

### **CONDition**

<b>Description</b>	Queries the contents of the CONDition register associated with the status structure defined in the command.
<b>Syntax</b>	CONDition?
<b>Options</b>	Not Applicable

---

### **ENABle**

<b>Description</b>	Sets/queries the ENABle mask which allows true conditions in the event register to be reported in the summary bit. If a bit is 1 in the enable register and its associated event bit transitions to true, a positive transition will occur in the associated summary bit.
<b>Syntax</b>	ENABle? ENABle <integer>
<b>Options</b>	The integer number can be changed using :INCRement command.

---

### **[EVENT]**

<b>Description</b>	Queries the contents of the EVENT register associated with the status structure defined in the command.
<b>Syntax</b>	[EVENT]?
<b>Options</b>	Not Applicable

---

### **NTRanition**

<b>Description</b>	Sets/queries the Negative TRanition filter. Setting a bit in the negative transition filter causes a 1 to 0 transition in the corresponding bit of the associated CONDition register to cause a 1 to be written in the associated bit of the corresponding EVENT register.
<b>Syntax</b>	NTRanition? NTRanition <integer>
<b>Options</b>	The integer number can be changed using :INCRement command.

---

## PTRanition

<b>Description</b>	Sets/queries the Positive TRansition filter. Setting a bit in the positive transition filter causes a 0 to 1 transition in the corresponding bit of the associated CONDition register to cause a 1 to be written in the associated bit of the corresponding EVEnt register.
<b>Syntax</b>	PTRanition? PTRanition <integer>
<b>Options</b>	The integer number can be changed using :INCRement command.

---

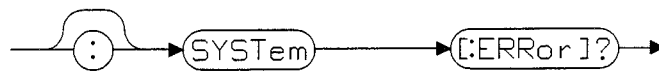
## PRESet

<b>Description</b>	PRESet configures the status data structures such that device-dependent events are reported through the status-reporting mechanism. The preset command affects only the enable register and transition filter registers. (Preset all registers except event status registers, service request enable register, event status enable register and condition register bits.)
<b>Syntax</b>	PRESet
<b>Options</b>	Not Applicable

---

**System Subsystem**

System Subsystem  
SYSTem[:ERRor]



---

## SYSTem[:ERRor]

**Description** Queries the SYSTem ERRor queue. This returns an error number and a corresponding quoted message string separated by a comma. Once the error is queried, it is removed from the queue. If the error queue becomes full, then the earliest messages are removed.

Example: if a command parameter is given that is out of range, then SYST:ERR? will return:

-200,"Execution error;Parameter value out of range."

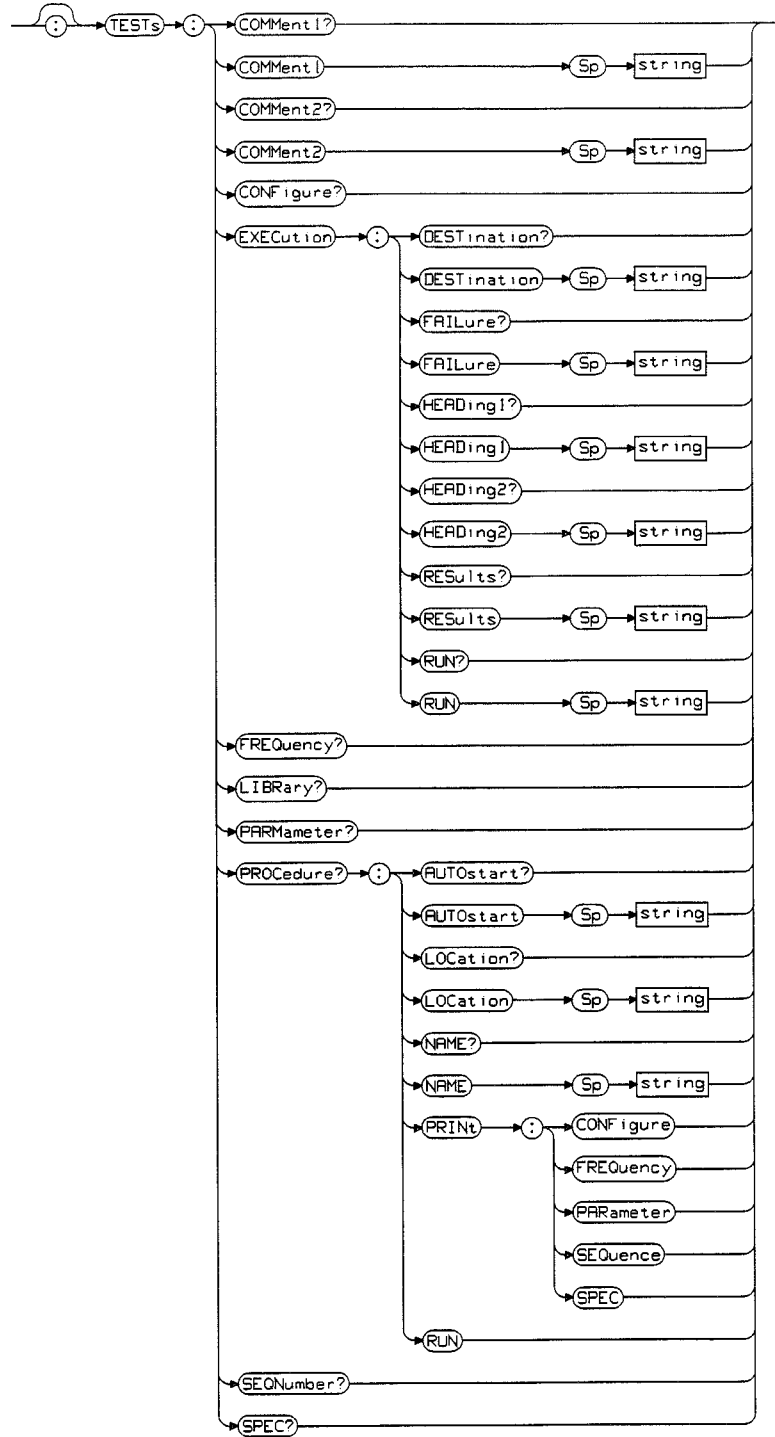
**Syntax** SYSTem[:ERRor]?

**Options** Not Applicable.



---

**Tests Subsystem**



---

## COMMeNt1

<b>Description</b>	Sets/Queries the first line of the comment field. This field describes the test procedure file.
<b>Syntax</b>	TESTs:COMMeNt1? TEST:COMM1? TESTs:COMMeNt1 <string> TEST:COMM1 <string>
<b>Options</b>	The string to be a quoted string of no more than 50 characters. For example:

```
OUTPUT Uut;"TEST:COMM1 'This procedure performs
full parametric testing'"
```

---

## COMMeNt2

<b>Description</b>	Sets/Queries the second line of the comment field. This field describes the test procedure file.
<b>Syntax</b>	TESTs:COMMeNt2? TEST:COMM2? TESTs:COMMeNt2 <string> TEST:COMM2 <string>
<b>Options</b>	The string to be a quoted string of no more than 50 characters. For example:

```
OUTPUT Uut;"TEST:COMM2 'of GSM Mobiles'"
```

---

## CONFIgure?

<b>Description</b>	Queries the external instrument configuration as defined in the edit configuration screen of the tests subsystem.
<b>Syntax</b>	TESTS:CONFIgure? <n>
<b>Options</b>	Where <n> is the instrument number (inst#) and is from 1 to 14.

---

## EXECution:DESTination

<b>Description</b>	Sets/Queries the output destination field for the test results. The test results can be output to the CRT or printer. A printer must be correctly configured in order to get a printout.
<b>Syntax</b>	TESTs:EXECution:DESTination? TEST:EXEC:DEST? TESTs:EXECution:DESTination <string> TEST:EXEC:DEST <string>
<b>Options</b>	'CRT'   'PRINTER' For Example; <pre>Output Uut; "TEST:EXEC:DEST 'PRINTER'" Output Uut; "TEST:EXEC:DEST 'CRT' "</pre>

---

## EXECution:FAILure

<b>Description</b>	Sets/Queries the Unit Under Test (UUT) failure mode. This allows the user to either continue or stop the test when the test results fail to meet test specified limits. When the continue option is selected, the error is listed to the printout or CRT depending on which option has previously been chosen.
<b>Syntax</b>	TESTs:FAILure? TEST:FAIL? TESTs:FAILure <string> TEST:FAIL <string>
<b>Options</b>	'STOP'   'CONTINUE' Where; <b>STOP</b> means that the test will stop running whenever the UUT fails to meet test specification limits. <b>CONTINUE</b> means that the test will continue even though the UUT has failed to meet test specification limits.

---

## EXECution:HEADing1

<b>Description</b>	Sets/Queries the first line of the output heading field.
<b>Syntax</b>	TESTs:EXECution:HEADing1? TEST:EXEC:HEAD1? TESTs:EXECution:HEADing1 <string> TEST:EXEC:HEAD1 <string>
<b>Options</b>	A quoted string of no more than 50 characters.

---

## EXECution:HEADing2

<b>Description</b>	Sets/Queries the second line of the output heading field.
<b>Syntax</b>	TESTs:EXECution:HEADing2? TEST:EXEC:HEAD2? TESTs:EXECution:HEADing2 <string> TEST:EXEC:HEAD1 <string>
<b>Options</b>	A quoted string of no more than 50 characters.

---

## EXECution:RESults

<b>Description</b>	Sets/Queries the output results sent to the output device (CRT/Printer).
<b>Syntax</b>	TESTs:EXECution:RESults? TEST:EXEC:RES? TESTs:EXECution:RESults <string> TEST:EXEC:RES <string>
<b>Options</b>	'ALL'   'FAILURES' Where; <b>ALL</b> All test results are shown on the output device (CRT and/or printer). Printouts include a "banner" listing the test conditions, measured values, lower and upper limits, and whether the test passed or failed. The <b>Comment</b> field is shown at the top along with any identifying information from the <b>Output Heading</b> field. Date, and time is also output. <b>FAILURE</b> Test results are shown only when a UUT failure or software error occurs. Printouts include a "banner" listing the test conditions, measured values, and lower and upper limits of the failed test. The <b>Comment</b> field and any identifying information from the <b>Output Heading</b> field is also output.

---

## **EXECution:RUN**

<b>Description</b>	Sets/Queries the test running mode. It enables the test to be run continuously or paused after each test.
<b>Syntax</b>	TESTs:EXECution:RUN? TEST:EXEC:RUN? TESTs:EXECution:RUN <string> TEST:EXEC:RUN <string>
<b>Options</b>	'CONTINUOUS'   'SINGLE STEP' Where; <b>CONTINUOUS</b> All tests run in sequence. Testing pauses only if the operator is required to interact with the UUT or HP 8922M/S; interaction such as changing UUT channels, changing audio level, and so forth, cause testing to pause. <b>SINGLE STEP</b> The program stops running at the completion of each test. The test-system operator is prompted to select Continue to proceed with testing.

---

## **FREQuency?**

<b>Description</b>	Queries the test RX and TX frequency.
<b>Syntax</b>	TESTs:FREQuency? <n> TEST:FREQ? <n>
<b>Options</b>	Where <n> is the channel number of the frequency being queried. <n> is from 1 to 50

---

## LIBRARY?

<b>Description</b>	Queries the test library information
<b>Syntax</b>	TESTs:LIBRARY? TEST:LIBR?
<b>Options</b>	This query returns the following; <b>[NO LIB] or Current</b>
<b>Name</b>	Returns the current name of the Library file being used or, if no library is being used, [NO LIB] is returned.
<b>Where From</b>	Returns the location of the library file (for example: CARD, DISK).
<b>Date</b>	Returns the date when the library file was created.

---

## PARMameter?

<b>Description</b>	Queries the test parameters for a given parameter number.
<b>Syntax</b>	TESTs:PARMameter? <n> TEST:PARM? <n>
<b>Options</b>	Where <n> is the parameter number (Parm#). <n> is from 1 to the last Parameter number defined in the test procedure. For example; <pre>OUTPUT UUT;"TEST:PARM? 5"</pre>

---

## PROCEDURE:AUTOstart

<b>Description</b>	Sets/Queries the autostart state. This allows the HP 8922M/S to go straight to the procedure menu each time the instrument is powered up, providing a Memory Card is inserted in the front panel.
<b>Syntax</b>	TESTs:PROCEDURE:AUTOstart? TEST:PROC:AUTO? TESTs:PROCEDURE:AUTOstart <string> TEST:PROC:AUTO <string>
<b>Options</b>	'OFF'   'ON'



---

### PROCEDURE:LOCATION

<b>Description</b>	Sets/Queries the location from where the Test Procedure can be found.
<b>Syntax</b>	TESTs:PROCEDURE:LOCATION? TEST:PROC:LOC? TESTs:PROCEDURE:LOCATION <string> TEST:PROC:LOC <string>
<b>Options</b>	'CARD'   'ROM'   'RAM'   'DISK'

---

### PROCEDURE:NAME

<b>Description</b>	Sets/Queries the name of the test procedure to be downloaded.
<b>Syntax</b>	TESTs:PROCEDURE:NAME? TEST:PROC:NAME? TESTs:PROCEDURE:NAME <string> TEST:PROC:NAME <string>
<b>Options</b>	The Test Procedure filename is no be more than 9 characters long.

---

### PROCEDURE:PRINT:CONFIGURE

<b>Description</b>	Prints out the test edit configuration to the current device selected.
<b>Syntax</b>	TESTs:PROCEDURE:PRINT:CONFIGURE TEST:PROC:PRIN:CONF
<b>Options</b>	Not Applicable

---

### PROCEDURE:PRINT:FREQUENCY

<b>Description</b>	Prints out all the Test Procedure frequencies as defined in the Test edit frequency screen.
<b>Syntax</b>	TESTs:PROCEDURE:PRINT:FREQUENCY TEST:PROC:PRIN:FREQ
<b>Options</b>	Not Applicable

---

---

### PROCEDURE:PRINT:PARAMETER

<b>Description</b>	Prints out all the Test Procedure parameters
<b>Syntax</b>	TESTs:PROCEDURE:PRINT:PARAMETER TEST:PROC:PRIN:PAR
<b>Options</b>	Not Applicable

---

### PROCEDURE:PRINT:SEQUENCE

<b>Description</b>	Prints out all the test name descriptions for all of the Step numbers.
<b>Syntax</b>	TESTs:PROCEDURE:PRINT:SEQUENCE TEST:PROC:PRIN:SEQ
<b>Options</b>	Not Applicable

---

### PROCEDURE:PRINT:SPEC

<b>Description</b>	Prints out all the Test Procedure Specifications.
<b>Syntax</b>	TESTs:PROCEDURE:PRINT:SPEC TEST:PROC:PRIN:SPEC
<b>Options</b>	Not Applicable

---

### PROCEDURE:RUN

<b>Description</b>	Runs the current test procedure.
<b>Syntax</b>	TESTs:PROCEDURE:RUN TEST:PROC:RUN
<b>Options</b>	Not Applicable

---

## SEQNumber?

<b>Description</b>	Queries the test number that has been set for a particular sequence number. This is also defined in the Test edit sequence screen.
<b>Syntax</b>	TESTs:SEQNumber? <n> TEST:SEQN? <n>
<b>Options</b>	Where <n> is the Step Number (Step#). <n> is from 1 to 50

---

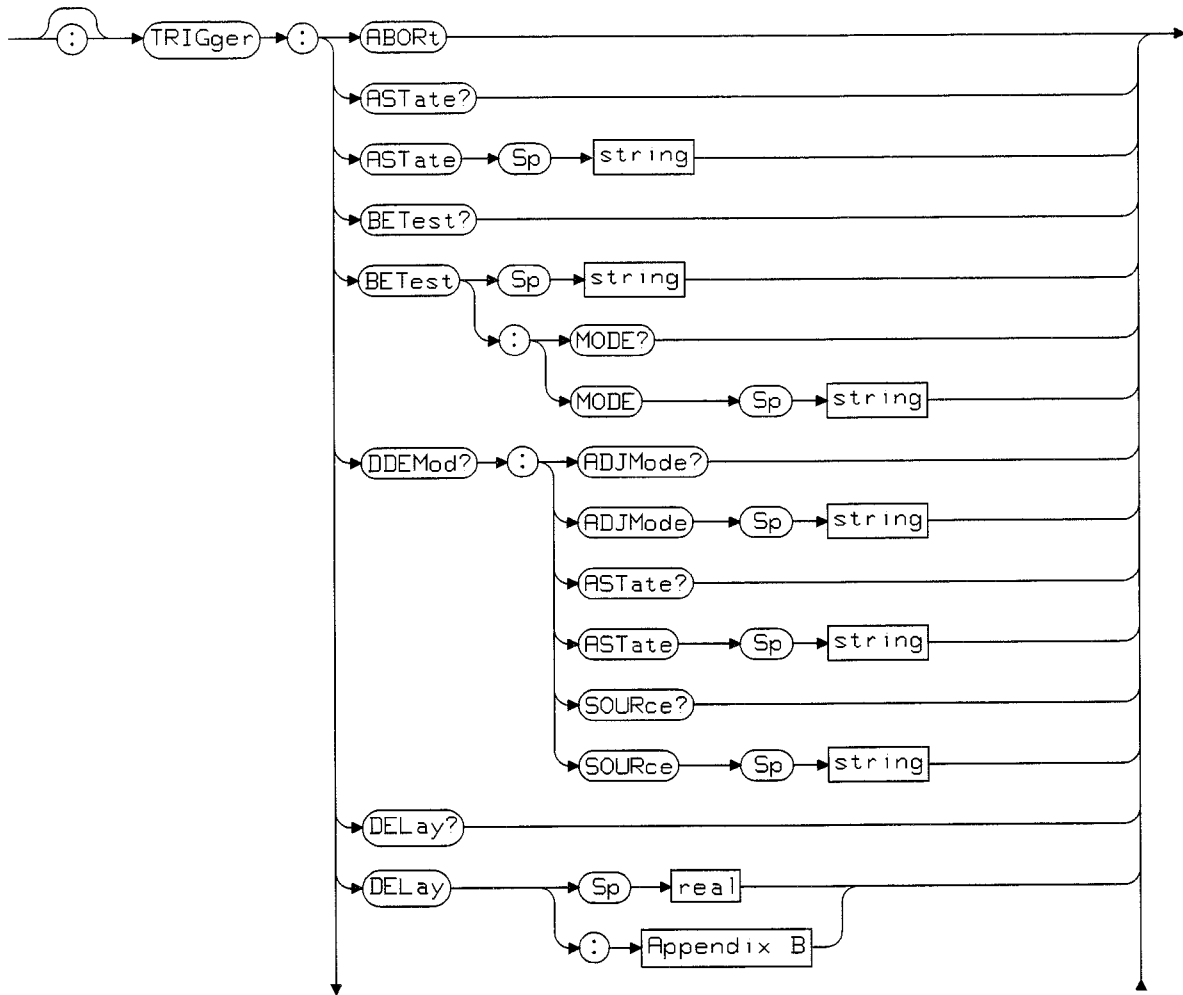
## SPEC?

<b>Description</b>	Queries the test specification limits for a given Step number.
<b>Syntax</b>	TESTs:SPEC? <n> TEST:SPEC? <n>
<b>Options</b>	Where <n> is step number being queried. <n> is from 1 to the last step defined. The returned query gives the step number, specification and whether it is an Upper or Lower limit.

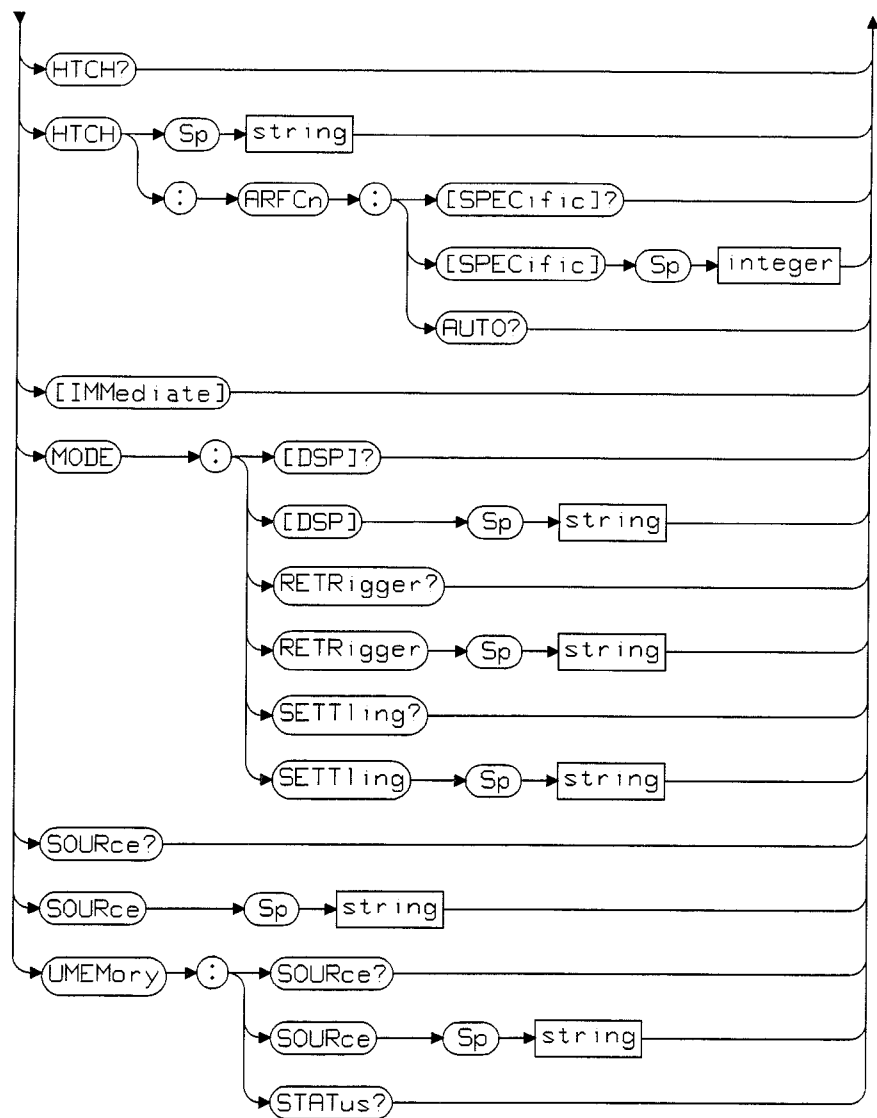
Tests Subsystem  
**SPEC?**

---

**Trigger Subsystem**



Continued Over



**ABORt**

---

**ABORt**

<b>Description</b>	ABORtS TRIGgering of a measurement that has been triggered using TRIGger:IMMediate.
<b>Syntax</b>	TRIGger:ABORt
<b>Options</b>	Not Applicable.

---

**NOTE** ABORt, [:IMMediate], and MODE are remote-only commands and apply to the following types of measurements: AF Analyzer, CW Meas, OSCilloscope, and SANalyzer.

---



---

**AState**

<b>Description</b>	Selects/queries the Arm SState of the currently selected measurement. This command is used for all appropriate measurements listed in the MEASure subsystem.
<b>Syntax</b>	TRIGger:AState? TRIGger:AState <string>
<b>Options</b>	'ARM'   'DISARM'

---

**NOTE** ASState, SOURce, MODE[:DSPanalyzer] and UMEMory apply to the following types of measurements: DSPanalyzer - Phase, Amplitude, Data Bits PULSe - Pulse On/Off Ratio ORFSpectrum - Output RF Spectrum DELay and HTCH apply to Digital Demod and Bit Error Test as well as the above measurements.

---



---

**BETest**

<b>Description</b>	Selects/queries the TRIGger for Bit Error Test measurements for local operation.
<b>Syntax</b>	TRIGger:BETest? TRIGger:BETest <string>
<b>Options</b>	'SINGLE'   'CONT' Where;

- SINGLE means each Bit Error Test measurement will just be made once (based on each measurement's definition of number of bits to make the measurement over).
- CONT means make each Bit Error Test measurement continuously, repeatedly, copying Intermediate results into Complete results as one or more of the termination conditions are met.



---

## **BETest:MODE**

<b>Description</b>	Selects/queries the Bit Error Test measurement TRIGger MODE.
<b>Syntax</b>	TRIGger:BETest:MODE? TRIGger:BETest:MODE <string>
<b>Options</b>	'RUN'   'STOP' Where; <ul style="list-style-type: none"> <li>• RUN initializes the Bit Error Test measurements to start and starts all Bit Error Test measurements.</li> <li>• STOP Bit Error Test measurements - this is useful in aborting long Bit Error Test measurements.</li> </ul>

---

## **DDEMod:ADJMode**

<b>Description</b>	Selects/queries the Digital DEMod TRIGger ADJust Mode. Trigger adjust mode enables the user to change TRIG:DEL even while Demod is armed. Some Demod triggers will be missed while changing trigger delay.
<b>Syntax</b>	TRIGger:DDEMod:ADJMode? TRIGger:DDEMod:ADJMode <string>
<b>Options</b>	'ENABLED'   'DISABLED'

---

## **DDEMod:AState**

<b>Description</b>	Selects/queries the Arm STate of the Digital DEMod TRIGger. Must be on digital demod, cell configuration or cell control screens to Arm Digital Demod.
<b>Syntax</b>	TRIGger:DDEMod:AState? TRIGger:DDEMod:AState <string>
<b>Options</b>	'ARM'   'DISARM'

---

## DDEMod:SOURce

<b>Description</b>	Selects/queries the Digital DEMod TRIGger SOURce.
<b>Syntax</b>	TRIGger:DDEMod:SOURce? TRIGger:DDEMod:SOURce <string>
<b>Options</b>	'EXT MEAS'   'EXT DEMOD'   'RF RISE' Where; <ul style="list-style-type: none"><li>• EXT DEMOD means Demod is triggered from an external trigger signal that is normally intended for doing Demod.</li><li>• RF RISE means the measurement is triggered automatically when a rising edge is detected on the RF envelope of the input.</li><li>• EXT MEAS means Demod is triggered from an external trigger signal that is normally intended for doing measurements.</li></ul>

---

## DELaY

<b>Description</b>	Sets/queries the TRIGger DELay. This applies to measurements as well as Digital Demod. HP-IB units are seconds (S), bit periods (T). Default HP-IB unit is seconds (S). Default display unit is bit periods (T).
<b>Syntax</b>	TRIGger:DELaY? TRIGger:DELaY <real>   [:FNUM]
<b>Options</b>	Refer to Appendix B.

---

## HTCH

<b>Description</b>	Selects/queries the Hopped TCH ARFCN Trigger control. This only applies when TCH:MODE is 'HOPPED' and the Cell Configuration is 'ACTIVATED' and the radio has been assigned to a TCH channel.
<b>Syntax</b>	TRIGger:HTCH? TRIGger:HTCH <string>
<b>Options</b>	'SPECIFIC'   'AUTO'

---

### HTCH:ARFCn[:SPECific]

<b>Description</b>	Sets/queries the SPECific ARFCn to use for a Hopping TCH measurement when TRIGger:TCH is set to 'SPECific'.
<b>Syntax</b>	TRIGger:HTCH:ARFCn[:SPECific]? TRIGger:HTCH:ARFCn[:SPECific] <integer>
<b>Options</b>	Not Applicable.

---

### HTCH:ARFCn:AUTO

<b>Description</b>	Queries the ARFCn that is being used for a Hopping TCH measurement when TRIGger:TCH is set to 'AUTO'. This value is the lowest ARFCN in the currently used MA table (MA1 or MA2).
<b>Syntax</b>	TRIGger:HTCH:ARFCn:AUTO?
<b>Options</b>	Not Applicable.

---

### [:IMMediate]

<b>Description</b>	IMMediately TRIGgers the currently active measurement.
<b>Syntax</b>	TRIGger[:IMMediate]
<b>Options</b>	Not Applicable.

---

**NOTE** ABORt, [:IMMediate], and MODE are remote-only commands and apply to the following types of measurements: AF Analyzer, CW Meas, OSCilloscope, and SANalyzer.

---

---

## MODE[:DSP]

<b>Description</b>	Selects/queries the DSP TRIGger MODE as SINGLE or CONTinuous. This is used for Phase, Amplitude, Output RF Spectrum, Pulse On/Off Ratio and Data Bits measurements.
<b>Syntax</b>	TRIGger:MODE[:DSP]? TRIGger:MODE[:DSP] <string>
<b>Options</b>	'SINGLE'   'CONT'

---

**NOTE** In CONTinues mode, the user does not manually arm the instrument, but must provide a trigger in order for the measurement to complete.

---

**NOTE** This command is valid in both local and remote modes.

---

## MODE:RETRigger

<b>Description</b>	Selects/queries the RETRigger MODE for the currently active measurement. Default setting is REPetitive.
<b>Syntax</b>	TRIGger:MODE:RETRigger? TRIGger:MODE:RETRigger <string>
<b>Options</b>	'SINGLE'   'REPETITIVE'

---

**CAUTION:** The remote-only command will override local triggering commands for continuous (repetitive) and single settings for AF Analyzer, CW Meas, OSCilloscope, and SANalyzer.

---

---

## SOURCE

<b>Description</b>	Selects/queries the measurement TRIGGER SOURCE.
<b>Syntax</b>	TRIGGER:SOURCE? TRIGGER:SOURCE <string>
<b>Options</b>	'EXT MEAS'   'EXT DEMOD'   'RF RISE' Where; <ul style="list-style-type: none"><li>• EXT MEAS means the measurement is triggered from an external trigger signal that is normally intended for doing measurements.</li><li>• RF RISE means the measurement is triggered automatically when a rising edge is detected on the RF envelope of the input.</li><li>• EXT DEMOD means the measurement is triggered from an external trigger signal that is normally intended for doing demod.</li></ul>

---

## UMEMORY:SOURCE

<b>Description</b>	Selects/queries the USE MEM (Use MEMORY) TRIGGER SOURCE.
<b>Syntax</b>	TRIGGER:UMEMORY:SOURCE? TRIGGER:UMEMORY:SOURCE <string>
<b>Options</b>	'EXTERNAL'   'BAD SYNC' Where; <ul style="list-style-type: none"><li>• BAD SYNC means that the UMEMORY (USE MEM) memory will be automatically filled when the Demod Sync Status changes from 'No Error' to 'Bad Sync' (DDEMOD:SYNC:STATUS?).</li><li>• EXTERNAL means that the UMEMORY (USE MEM) memory will be automatically filled when an external line on the SYSTEM BUS connector on the rear panel is in a particular state when a valid demod trigger occurs.</li></ul>

---

## UMEMory:STATus

<b>Description</b>	Queries the current STAT e of the memory.
<b>Syntax</b>	TRIGger:UMEMory:STATe?
<b>Options</b>	Returns 'No Data'   'New Data'   'Old Data'. Where; <ul style="list-style-type: none"><li>• NO DATA means that the UMEMory (USE MEM) memory contains no valid data.</li><li>• NEW DATA means that the UMEMory (USE MEM) memory contains newly captured data from the most recent time demod was armed (TRIGger:DDEMod:ASTate 'ARM') and bad synchronization occurred (midamble did not exactly match the bits in the defined midamble).</li><li>• OLD DATA means that the UMEMory (USE MEM) memory contains previously captured data from a previous time demod was armed (TRIGger:DDEMod:ASTate 'ARM') or from a previous DSP analyzer, Output RF Spectrum or Pulse On/Off Ratio measurement (TRIGger:ASTate 'ARM').</li></ul>

---

## **Appendix A - [:INUM] - Integer Numeric Fields**

Optional commands that apply to Integer Numeric Entry fields.

**INCRement** Sets and queries the field's current INCRement value.

INCRement <UP | DOWN | (value)>

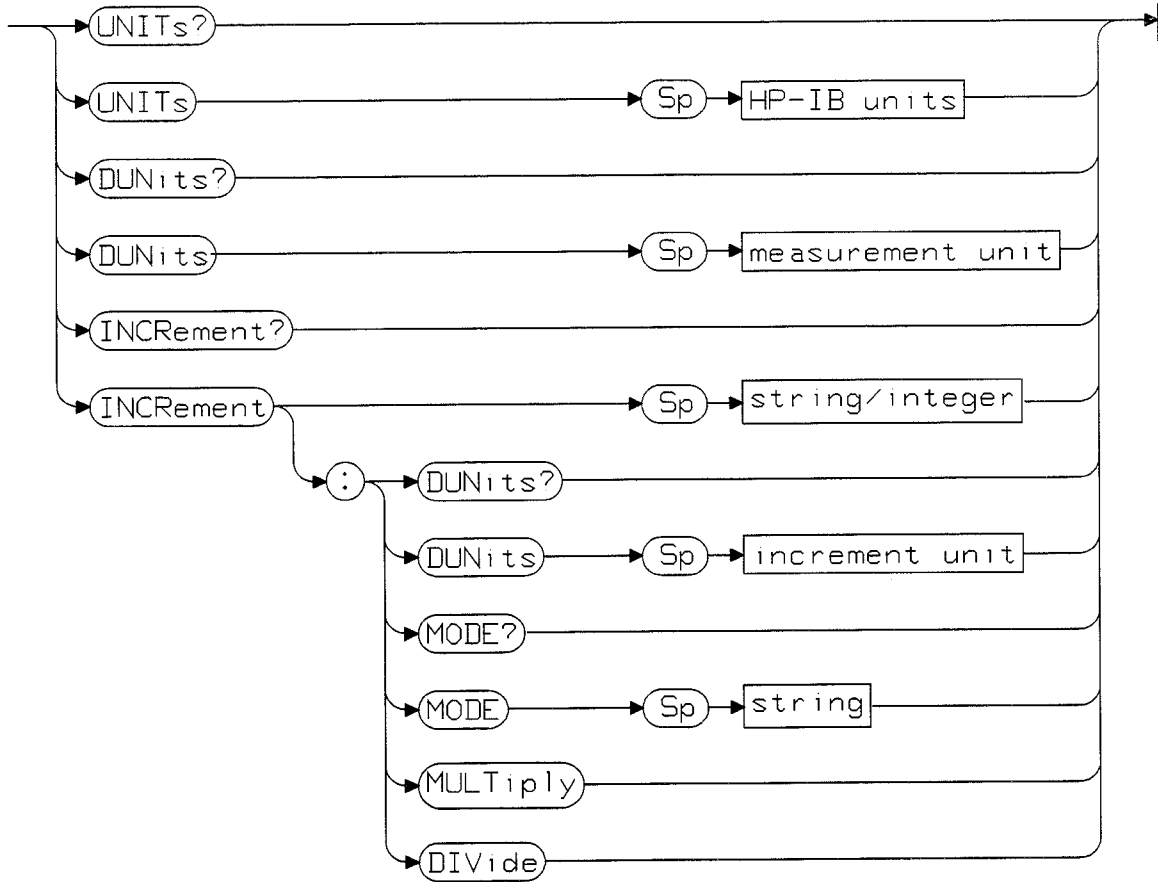
INCRement <value> sets the field INCRement value. INCR UP or INCR DOWN cause the field to be modified up or down by the current INCRement value.



---

## **Appendix B - [:FNUM] - Floating Point Numeric Fields**

Optional commands that apply to Floating Point Numeric Entry fields.



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## Commands

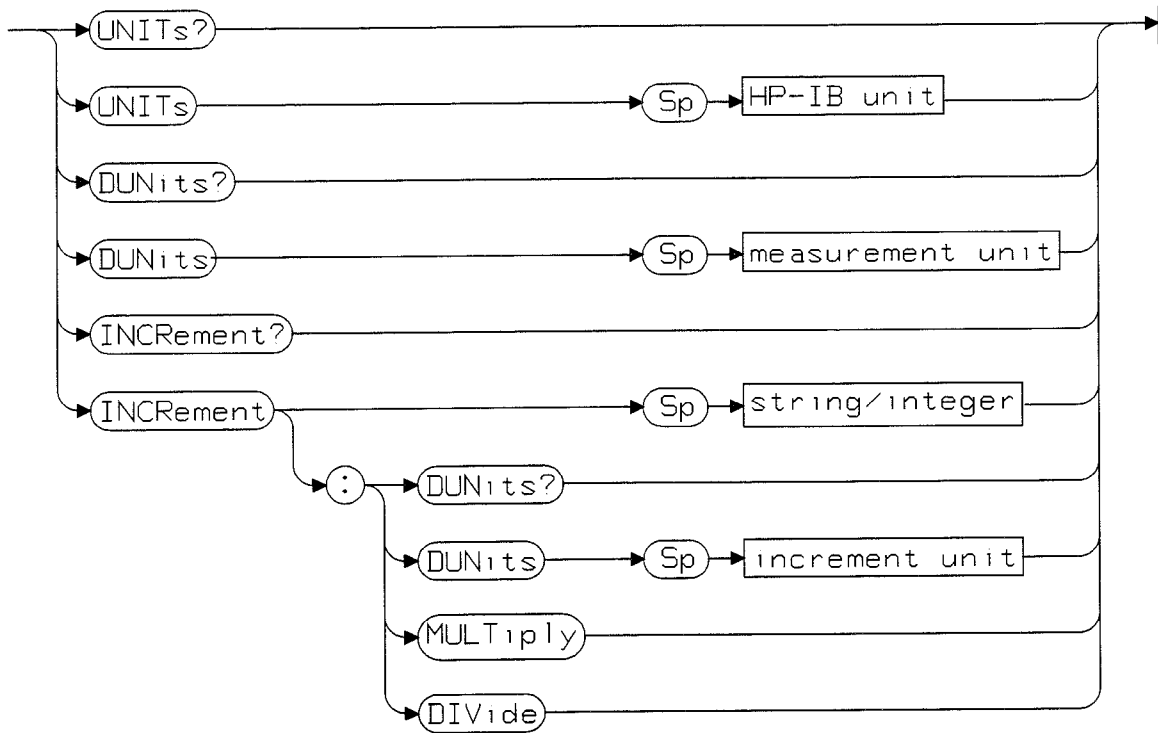
<b>UNITs</b>	UNITs?	
	UNITs <HP-IB unit>	
		Sets/queries the HP-IB fundamental UNITs that the floating point number queries will be returned in.
<b>DUNits</b>	DUNits?	
	DUNits <measurement unit>	
		Sets/queries the Displayed UNits on the front panel for the given floating point number.
<b>INCRement</b>	INCRement?	
		Queries the field's current INCRement value.
	INCRement <UP   DOWN   (value) [units]>	
		INCRement <value> sets the field INCRement value. INCR UP or INCR DOWN cause the field to be modified up or down by the current INCRement value.
<b>INCRement: DUNits</b>	INCRement:DUNits?	
	INCRement:DUNits <increment unit>	
		Sets/queries the Displayed UNits on the front panel for the field's increment setting.
<b>INCRement: MODE</b>	INCRement:MODE?	
	INCRement:MODE 'LINear'   'LOGarithm'	
		Sets/queries the MODE of INCRement value to be in either LINear or LOGarithmic (displayed in dB) steps.
<b>INCRement: MULTiply</b>	INCRement:MULTiply	
		MULTipplies the INCRement value by 10.
<b>INCRement: DIVide</b>	INCRement:DIVide	
		DIVides the INCRement value by 10.



---

## **Appendix C - [:FNUM-MOD] - Floating Point Numeric (less MODE)**

Optional commands that apply to Floating Point Numeric Entry fields. These commands are the same as Appendix B except they do not include INCR:MODE command.



---

## Commands

<b>UNITS</b>	UNITS?	
	UNITS <HP-IB unit>	
		Sets/queries the HP-IB fundamental UNITS that the floating point number queries will be returned in.
<b>DUNits</b>	DUNits?	
	DUNits <measurement unit>	
		Sets/queries the Displayed UNits on the front panel for the given floating point number.
<b>INCRement</b>	INCRement?	
		Queries the field's current INCRement value.
	INCRement <UP   DOWN   (value) [units]>	
		INCRement <value> sets the field INCRement value. INCR UP or INCR DOWN cause the field to be modified up or down by the current INCRement value.
<b>INCRement: DUNits</b>	INCRement:DUNits?	
	INCRement:DUNits <increment unit>	
		Sets/queries the Displayed UNits on the front panel for the field's increment setting.
<b>INCRement: MULTiPLY</b>	INCRement:MULTiPLY	
		MULTiplies the INCRement value by 10.
<b>INCRement: DIVide</b>	INCRement:DIVide	
		DIVides the INCRement value by 10.

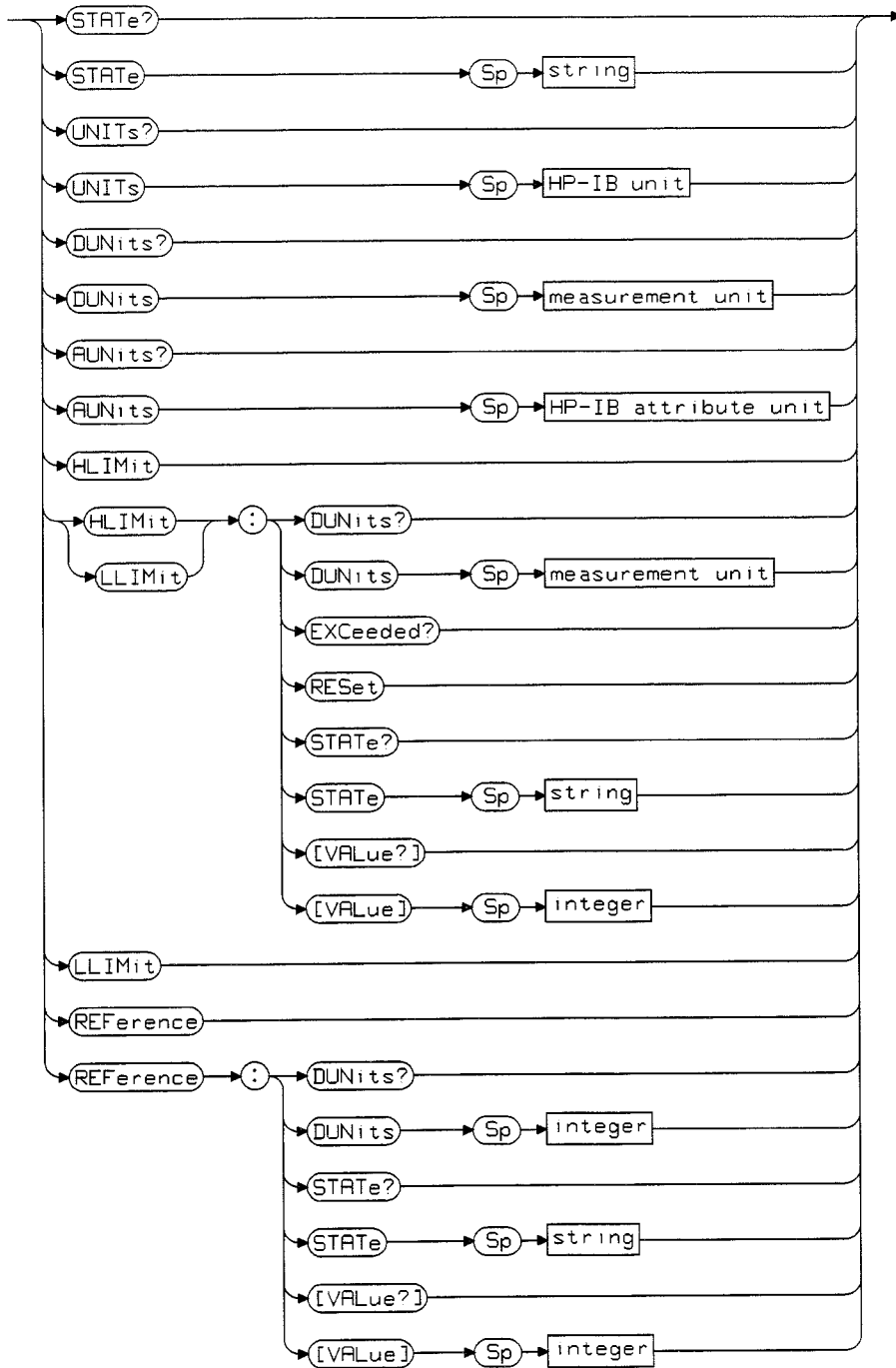
Appendix C - [:FNUM-MOD] - Floating Point Numeric (less MODE)  
**Commands**



---

## **Appendix D - [:MM] - Measurement Fields**

The following list of optional commands that control Measurement field functions. These attributes are listed here in hierarchal relationship. Included are commands for state, units, low limits and high limits, and reference.



## Commands

<b>STATe</b>	STATe?	
	STATeON   OFF   1   0	
	Selects/queries the STATe of the measurement to be ON or OFF. Note: ON = 1 and OFF = 0	
<b>UNITs</b>	UNITs?	
	UNITs	<HP-IB measurement unit>
	Sets/queries the HP-IB fundamental UNITs that measurement queries will be returned in.	
<b>DUNits</b>	DUNits?	
	DUNits	<measurement unit>
	Sets/queries the Displayed UNits on the front panel for the given measurement.	
<b>AUNits</b>	AUNits?	
	AUNits	<HP-IB attribute unit>
	Sets/queries the HP-IB fundamental UNITs that measurement Attribute queries (e.g., low limit, high limit, etc.) are returned in.	
<b>HLIMit</b>	HLIMit	
	High LIMit measurement information.	
<b>HLIMit: DUNits</b>	HLIMit:DUNits?	
	HLIMit:DUNits	<measurement unit>
	Sets/Queries the measurement High LIMit Displayed UNits.	
<b>HLIMit: EXCeeded</b>	HLIMit:EXCeeded?	
	Queries whether the High LIMit for the measurement was EXCeeded.	
<b>HLIMit: RESet</b>	HLIMit:RESet	
	RESet the High LIMit exceeded state so that new limit data can be acquired.	
<b>HLIMit: STATe</b>	HLIMit:STATe?	
	HLIMit:STATe	ON   OFF   1   0
	Sets/queries the High LIMit STATe. Note: ON = 1 and OFF = 0.	
<b>HLIMit [:VALue]</b>	[:VALue]?	
	[:VALue]	<numeric value>
	Sets/queries the measurement High LIMit VALue.	
<b>LLIMit</b>	LLIMit	
	Low LIMit measurement information.	

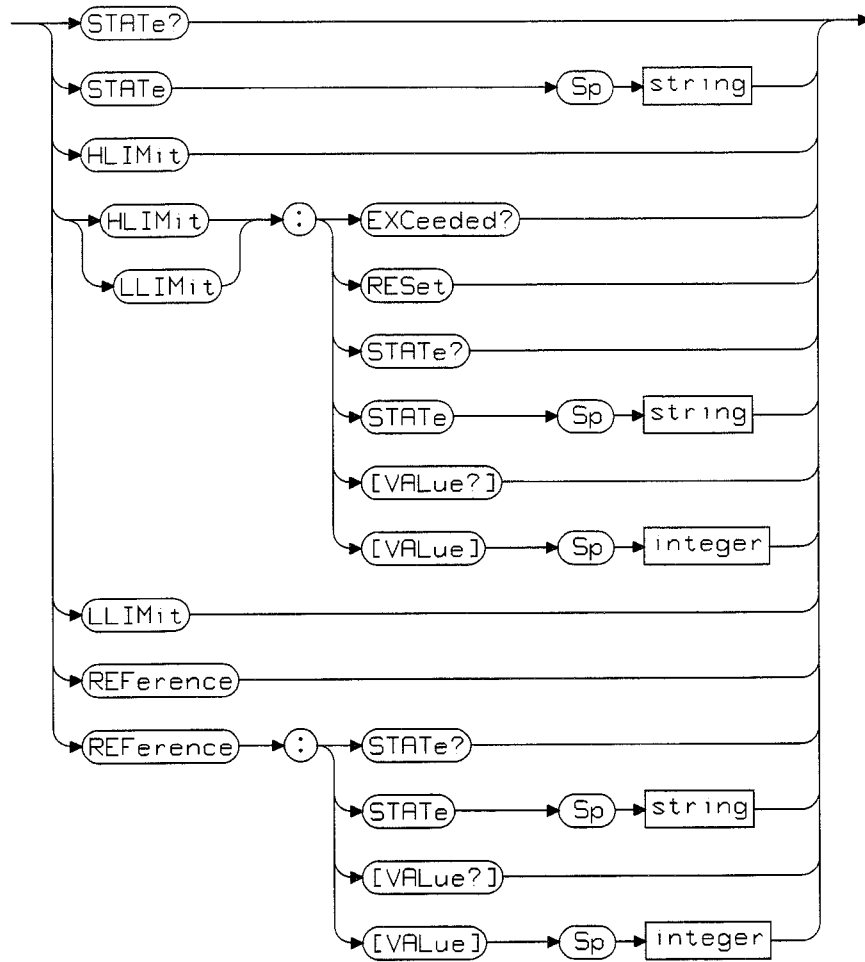
Appendix D - [:MM] - Measurement Fields  
Commands

<b>LLIMit: DUNits</b>	<code>LLIMit:DUNits?</code> <code>LLIMit:DUNits &lt;measurement unit&gt;</code>	Sets/Queries the measurement Low LIMit Displayed UNits.
<b>LLIMit: EXCeeded</b>	<code>LLIMit:EXCeeded?</code>	Queries whether the Low LIMit for the measurement was EXCeeded.
<b>LLIMit: RESet</b>	<code>LLIMit:RESet</code>	RESet the Low LIMit exceeded state so that new limit data can be acquired.
<b>LLIMit: STATe</b>	<code>LLIMit:STATe?</code> <code>LLIMit:STATe ON   OFF   1   0</code>	Sets/queries the Low LIMit STATe. Note: ON = 1 and OFF = 0.
<b>LLIMit [:VALue]</b>	<code>[:VALue]?</code> <code>[:VALue] &lt;numeric value&gt;</code>	Sets/queries the measurement Low LIMit VALue.
<b>REFerence</b>	<code>REFerence</code>	Measurement REFerence information.
<b>REFerence: DUNits</b>	<code>REFerence:DUNits?</code> <code>REFerence:DUNits &lt;measurement unit&gt;</code>	Sets/queries the REFerence Displayed UNits on the front panel for the given measurement.
<b>REFerence: STATe</b>	<code>REFerence:STATe</code> <code>REFerence:STATe ON   OFF   1   0</code>	Sets/queries the REFerence STATe. Note: ON = 1 and OFF = 0.
<b>REFerence [:VALue]</b>	<code>REFerence[:VALue]?</code> <code>REFerence[:VALue] [&lt;numeric value&gt;]</code>	Sets/queries the measurement REFerence VALue. If no <numeric value> is specified, then the REFerence VALue will be set to the current measurement result.

---

## **Appendix E - [:MM-MOD] - Measurement Fields (less UNITS, DUNits, AUNits)**

The following list of optional commands that control Measurement field functions. These attributes are listed here in hierarchal relationship. Included are commands for state, units, low limits and high limits, and reference. These commands are the same as those for Appendix D except for UNITS, DUNits and AUNits.



---

## Commands

<b>STATe</b>	STATe?	
	STATe ON   OFF   1   0	
	Selects/queries the STATe of the measurement to be ON or OFF. Note: ON = 1 and OFF = 0	
<b>HLIMit</b>	HLIMit	
	High LIMit measurement information.	
<b>HLIMit: EXCeeded</b>	HLIMit:EXCeeded?	
	Queries whether the High LIMit for the measurement was EXCeeded.	
<b>HLIMit: RESet</b>	HLIMit:RESet	
	RESet the High LIMit exceeded state so that new limit data can be acquired.	
<b>HLIMit: STATe</b>	HLIMit:STATe?	
	HLIMit:STATe ON   OFF   1   0	
	Sets/queries the High LIMit STATe. Note: ON = 1 and OFF = 0.	
<b>HLIMit [:VALue]</b>	[:VALue]?	
	[:VALue] <numeric value>	
	Sets/queries the measurement High LIMit VALue.	
<b>LLIMit</b>	LLIMit	
	Low LIMit measurement information.	
<b>LLIMit: EXCeeded</b>	LLIMit:EXCeeded?	
	Queries whether the Low LIMit for the measurement was EXCeeded.	
<b>LLIMit: RESet</b>	LLIMit:RESet	
	RESet the Low LIMit exceeded state so that new limit data can be acquired.	
<b>LLIMit: STATe</b>	LLIMit:STATe?	
	LLIMit:STATe	ON   OFF   1   0
	Sets/queries the Low LIMit STATe. Note: ON = 1 and OFF = 0.	
<b>LLIMit [:VALue]</b>	[:VALue]?	
	[:VALue]	<numeric value>
	Sets/queries the measurement Low LIMit VALue.	
<b>REFerence</b>	REFerence	
	Measurement REFerence information.	

---

Appendix E - [:MM-MOD] - Measurement Fields (less UNITS, DUNits, AUNits)  
**Commands**

**REference:  
STAtE**

REference:STAtE?

REference:STAtE ON | OFF | 1 | 0

Sets/queries the REference STAtE. Note: ON = 1 and OFF = 0.

**REference  
[:VALue]**

REference[:VALue]?

REference[:VALue] [<numeric value>]

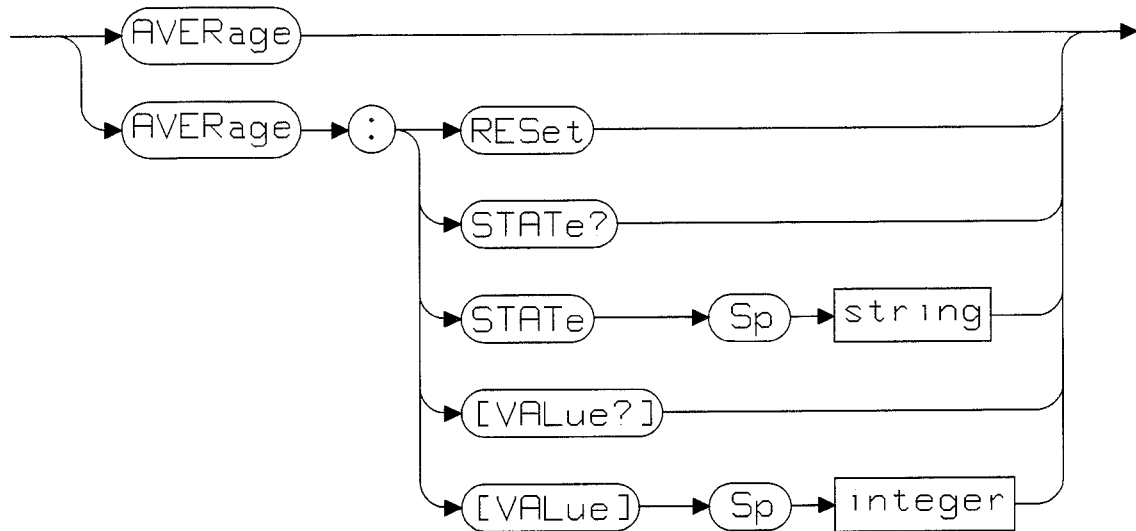
Sets/queries the measurement REference VALue. If no <numeric value> is specified, then the REference VALue will be set to the current measurement result.



---

## **Appendix F - [:AVG] - Measurement Fields Using Averaging**

The following list of optional commands that apply to measurement fields that use averaging. These attributes are listed here in hierarchal relationship.



---

## Commands

### **AVERage**

AVERage

MEASurement AVERage commands. NOTE : These are only useful for continuous measurements.

### **AVERage: RESet**

AVERage:RESet

RESet the AVERaged measurement result to begin giving measurement results from the first measurement up to the number of measurements given by <measurement>:AVERage:VALue.

### **AVERage: STATe**

AVERage:STATe?

AVERage:STATe ON | OFF | 1 | 0

Sets/queries the AVERage STATe.

Note: ON = 1 and OFF = 0.

ON allows display of the average value of the number of measurements given in <measurement>:AVERage:VALue

### **AVERage [:VALue]**

[:VALue]?

[:VALue] <numeric value>

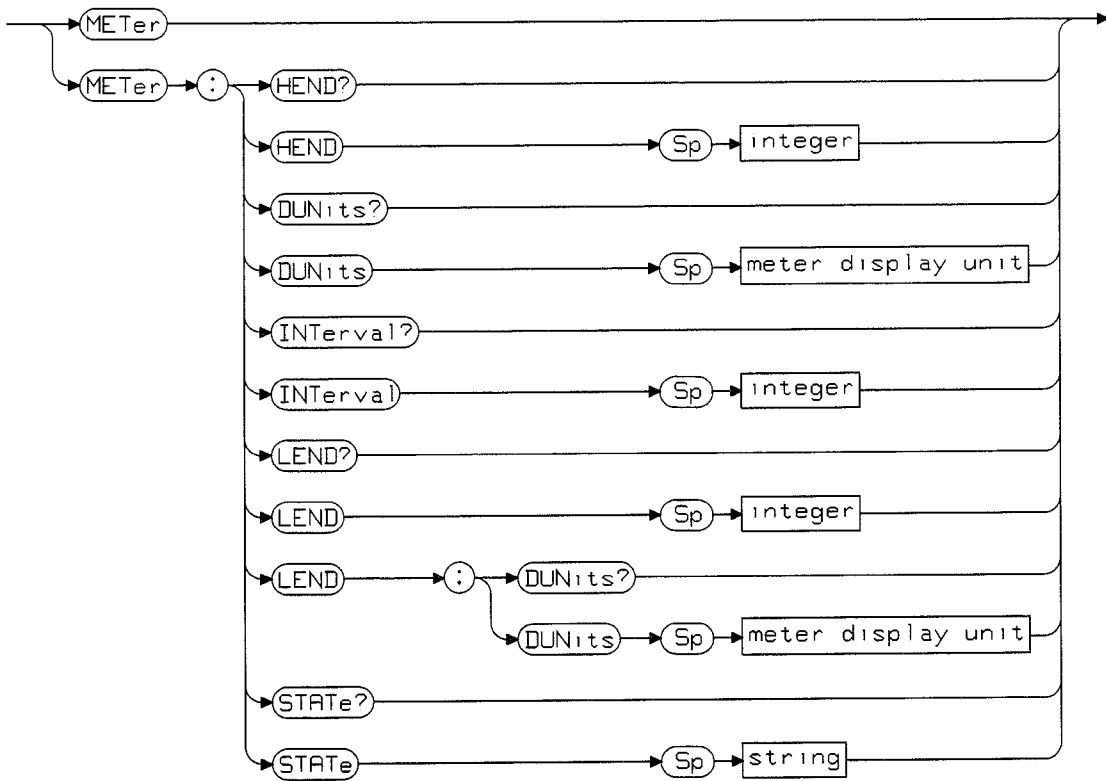
Sets/queries the number (VALue) of measurements to be used in calculating the AVERaged measurement result.

Appendix F - [:AVG] - Measurement Fields Using Averaging  
Commands

---

## **Appendix G - [:MET] - Measurement Fields Using Meters**

The following is a list of optional commands that apply to measurement fields that use meters. These attributes are listed here in hierarchal relationship.



---

## Commands

<b>METer</b>	<code>METer</code>	METer commands. NOTE : These are only useful for continuous measurements.
<b>METer: HEND</b>	<code>METer:HEND?</code> <code>METer:HEND &lt;numeric value&gt;</code>	Sets/queries the High END value to display on the METer for the measurement.
<b>METer: DUNits</b>	<code>METer:DUNits?</code> <code>METer:DUNits &lt;meter display unit&gt;</code>	Sets/queries the measurement METer High END Displayed UNits.
<b>METer: INTerval</b>	<code>METer:INTerval?</code> <code>METer:INTerval &lt;numeric value&gt;</code>	Sets/queries the number of INTervals to display on the METer between the low end and high end for the measurement.
<b>METer: LEND</b>	<code>METer:LEND?</code> <code>METer:LEND &lt;numeric value&gt;</code>	Sets/queries the Low END value to display on the METer for the measurement.
<b>METer: LEND: DUNits</b>	<code>METer:LEND:DUNits?</code> <code>METer:LEND:DUNits &lt;meter display unit&gt;</code>	Sets/Queries the measurement METer Low END Displayed UNits.
<b>METer: STATE</b>	<code>METer:STATE?</code> <code>METer:STATE ON   OFF   1   0</code>	Sets/queries the METer STATE. Note: ON = 1 and OFF = 0.

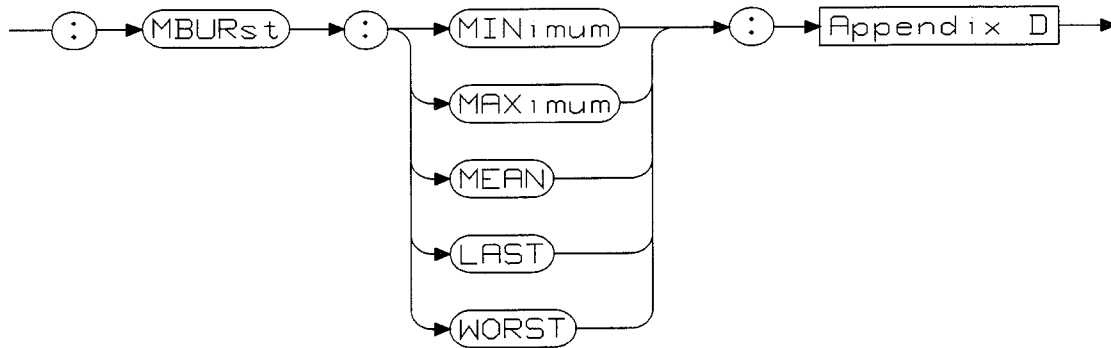
Appendix G - [:MET] - Measurement Fields Using Meters  
Commands



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## **Appendix H - [:MULTI-B] - Measurement Fields Using Multi-Burst**

The syntax diagram below lists the optional commands that can be used with multi-burst measurements.



---

## Commands

<b>MBURst: MINimum</b>	Returns the minimum value of a measurement over the number of bursts that have been requested. The full syntax is;  <code>MBURst:MINimum   [:MM]</code>
<b>MBURst: MAXimum</b>	Returns the maximum value of a measurement over the number of bursts that have been requested. The full syntax is;  <code>MBURst:MAXimum   [:MM]</code>
<b>MBURst: MEAN</b>	Returns the average value of the measurement over the number of bursts that have been requested. The full syntax is;  <code>MBURst:MEAN   [:MM]</code>
<b>MBURst: LAST</b>	Returns the value of the requested measurement in the last burst of the number of bursts that have been requested. The full syntax is;  <code>MBURst:LAST   [:MM]</code>
<b>MBURst: WORSt</b>	Returns the highest value of the maximum and minimum values across all the bursts made during the multi-burst measurement. Note that the absolute value of the maximum and minimum values are taken (that is, negative values become positive). The full syntax is;  <code>MBURst:WORSt   [:MM]</code>

Appendix H - [:MULTI-B] - Measurement Fields Using Multi-Burst  
Commands