

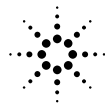
**Agilent Technologies 8960 Series 10 Wireless Communications Test Set  
Agilent Technologies E1966A 1xEV-DO Terminal Test Application**

# **Reference Guide**

1xEV-DO Test Application Revision A.01  
1000-1853 (not orderable)

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**[www.agilent.com/find/8960support/](http://www.agilent.com/find/8960support/)**



**Agilent Technologies**

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Liberty Lake, WA 99019-9599  
U.S.A.

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## Edition/Print Date

All Editions and Updates are listed below.

January 2003

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## Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies Inc. assumes no liability for the customer's failure to comply with these requirements.

### GENERAL

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

All Light Emitting Diodes (LEDs) used in this product are Class 1 LEDs as per IEC 60825-1.

This product has been designed and tested in accordance with *IEC Publication 1010*, "Safety Requirements for Electronic Measuring Apparatus," and has been supplied in a safe condition. This instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

### ENVIRONMENTAL CONDITIONS

This instrument is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

**Ventilation Requirements:** When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4° C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

### BEFORE APPLYING POWER

Verify that the product is set to match the available line voltage, the correct fuse is installed, and all safety precautions are taken. Note the instrument's external markings described under Safety Symbols.

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## GROUND THE INSTRUMENT

To minimize shock hazard, the instrument chassis and cover must be connected to an electrical protective earth ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

## FUSES

Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard.

## DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes.

## DO NOT REMOVE THE INSTRUMENT COVER

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified service personnel.

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

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### WARNING

**The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.**

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### CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

---

### Safety Symbols

Caution, refer to accompanying documents

Warning, risk of electric shock

Earth (ground) terminal

Alternating current

Frame or chassis terminal

Standby (supply). Units with this symbol are not completely disconnected from ac mains when this switch is off.

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## Product Markings

CE - the CE mark is a registered trademark of the European Community. A CE mark accompanied by a year indicated the year the design was proven.

CSA - the CSA mark is a registered trademark of the Canadian Standards Association.

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## CERTIFICATION

*Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members*

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## Warranty Statement

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## ASSISTANCE

*Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products. For any assistance, contact your nearest Agilent Technologies Sales and Service Office.*

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## Service and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center. You can find a list of local service representatives on the Web at:


<http://www.agilent-tech.com/services/English/index.html>




If you do not have access to the Internet, one of these centers can direct you to your nearest representative:


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(Toll free in US)


 452-4844

 **Europe**

(31 20) 547 9900

 **India**

206-4725

 **Latin Measurement Assistance Center**

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24/F, Cityplaza One,(fax) (852) 2506 9233  
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Taikoo Shing, Hong Kong

## DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN45014

**Manufacturers Name:** Agilent Technologies UK Ltd.  
**Manufacturers Address:** Electronic Products & Solutions  
Group - Queensferry  
South Queensferry  
West Lothian, EH30 9TG  
Scotland, United Kingdom

**Declares, that the product**

**Product Name:** 8960 Series 10 Wireless Communications Test Set  
**Model Number:** E5515B  
**Product Options:** This declaration covers all options of the above product.

**Conforms with the following European Directives:**

The product herewith compiles with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EFC (including 93/68/EFC) and carries the CE Marking accordingly.

# DECLARATION OF CONFORMITY

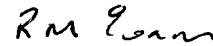
According to ISO/IEC Guide 22 and CEN/CENELEC EN45014

<b>EMC</b>	<b>Standard</b>	<b>Limit</b>
	IEC 61326-1:1997+A1:1998/EN 61326-1:1997+A1:1998 CISPR 11:1990 / EN 55011:1991 IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995	Group 1 Class A <sup>[1]</sup> 4kV CD, 8kV AD
	IEC 61000-4-3:1995 / EN 61000-4-3:1995 IEC 61000-4-4:1995 / EN 61000-4-4:1995 IEC 61000-4-5:1995 / EN 61000-4-5:1995 IEC 61000-4-6:1996 / EN 61000-4-6:1996 IEC 61000-4-11:1994 / EN 61000-4-11:1994	3 V/m, 80-1000 MHz 0.5V signal lines, 1kV power lines 0.5 kV line-line, 1 kV line-ground 3V, 0.15-80 MHz 1 cycle, 100%
<b>Safety:</b>	IEC 61010-1:1990+A1:1992+A2:1995 / EN 61010-1:1993+A2:1995 Canada CSA C22.2 No. 1010.1:1992	

## Supplemental Information:

<sup>[1]</sup> The product was tested in a typical configuration with Agilent Technologies test systems

**14 December 2000**



*R.M. Evans / Quality Manager*

**14 December 2000**



*W.V. Roland / Reliability & Regulatory  
Engineering Manager*

For further information, please contact your local Agilent Technologies sales office, agent, or distributor.  
Authorized EU-representative: Agilent Technologies Deutschland GmbH, Herrenberger StraÙe 130, D71034 Boblingen, Germany

# DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN45014

**Manufacturers Name:** Agilent Technologies UK Ltd.  
**Manufacturers Address:** Electronic Products & Solutions  
Group - Queensferry  
South Queensferry  
West Lothian, EH30 9TG  
Scotland, United Kingdom

**Declares, that the product**

**Product Name:** 8960 Series 10 Wireless Communications Test Set  
**Model Number:** E5515C  
**Product Options:** This declaration covers all options of the above product.

# DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN45014

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## Conforms with the following European Directives:

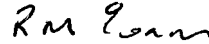
The product herewith compiles with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EFC (including 93/68/EFC) and carries the CE Marking accordingly.

EMC	Standard	Limit
	IEC 61326-1:1997+A1:1998/EN 61326:1997/A1:1998	
	CISPR 11:1990 / EN 55011:1991	Group 1 Class A <sup>[1]</sup>
	IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995	4kV CD, 8kV AD
	IEC 61000-4-3:1995 / EN 61000-4-3:1995	3 V/m, 80-1000 MHz
	IEC 61000-4-4:1995 / EN 61000-4-4:1995	0.5kV signal lines, 1kV power lines
	IEC 61000-4-5:1995 / EN 61000-4-5:1995	0.5 kV line-line, 1 kV line-ground
	IEC 61000-4-6:1996 / EN 61000-4-6:1996	3V, 0.15-80 MHz
	IEC 61000-4-11:1994 / EN 61000-4-11:1994	1 cycle, 100%
<b>Safety:</b>	IEC 61010-1:1990+A1:1992+A2:1995 / EN 61010-1:1993+A2:1995 Canada: CSA C22.2 No. 1010.1:1992	

## Supplemental Information:


<sup>[1]</sup> The product was tested in a typical configuration with Agilent Technologies test systems

01 May 2001



R.M. Evans / Quality Manager

01 May 2001



W.V. Roland / Reliability & Regulatory  
Engineering Manager

For further information, please contact your local Agilent Technologies sales office, agent, or distributor.

Authorized EU-representative: Agilent Technologies Deutschland GmbH, Herrenberger StraÙe 130, D71034 Boblingen, Germany

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## Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive, from 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB(A).

- Sound Pressure  $L_p < 70$  dB(A).
- At Operator Position.
- Normal Operation.
- According to ISO 7779:1988/EN 27779:1991 (Type Test).

---

## **Herstellerbescheinigung**

Diese Information steht im Zusammenhang mit den Anforderungen der Maschinenlärminformationsverordnung vom 18 Januar 1991.

- Schalldruckpegel  $L_p < 70 \text{ dB(A)}$ .
- Am Arbeitsplatz.
- Normaler Betrieb.
- Nach ISO 7779:1988/EN 27779:1991 (Typprüfung).



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# Measurements

## Instrument Configuration Measurement Matrix

The following table shows which measurements and instruments are available in each “Operating Mode” .

**Table 1. Measurement and Instrument Availability in Operating Modes**

Measurement/Instrument	Operating Mode		
	Active Cell	CW	Off
Access Probe Power	X		
Audio Analyzer: Audio Frequency, Audio Level, Distortion, SINAD	X	X	X
Audio Generator	X	X	X
Channel Power	X		
Digital Average Power	X		
Packet Error Rate	X		
Spectrum Monitor	X	X	X
Swept Audio	X	X	X
Time Response of Open Loop Power Control	X		
TX Spurious Emissions	X		
Waveform Quality/Code Domain	X		

### Related Topics

[“Test Adherence to Standards” on page 35](#)

## Test Adherence to Standards

### Standards Table

This table lists the capabilities of the E1966A 1xEV-DO Terminal Test Application. This test capability is effective with the release of revision A.01.20.

**Table 2. Support of C.S0033 Tests**

C.S0033 Test	Supported by E1966A?	Comments
3.1.1 Receiver Tests		
3.1.1.1 Frequency Coverage Requirements	Yes	Supports Band Classes 0, 1, 3, 4, 5, 6 and 9. See <a href="#">“Cell Band” on page 159.</a>
3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN	Yes	See <a href="#">“3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN” on page 59.</a>
3.1.1.2.2 Demodulation of Forward Traffic Channel in Multipath Fading Channel	Partially	Requires external fader and AWGN generator.
3.1.1.2.3 Decision of Power Control Bit for Channels Belonging to Different Power Control Sets During Soft Handoff	No	Requires soft handoff capability.
3.1.1.2.4 Decision of Power Control Bit for Channels Belonging to the Same Power Control Set	No	Requires soft handoff capability.
3.1.1.2.5 Demodulation of Reverse Power Control Channel During Soft Handoff	No	Requires soft handoff capability.
3.1.1.3.1 Receiver Sensitivity and Dynamic Range	Yes	See <a href="#">“3.1.1.3.1 Receiver Sensitivity and Dynamic Range” on page 60.</a>
3.1.1.3.2 Single Tone Desensitization	Partially	Requires external CW signal generator.
3.1.1.3.3 Intermodulation Spurious Response Attenuation	Partially	Requires two external CW signal generators.
3.1.1.3.4 Adjacent Channel Selectivity	Partially	Requires external HRPD (1xEV-DO) and CDMA sources.
3.1.1.3.5 Receiver Blocking Characteristics	Partially	Requires external CW signal generator.
3.1.1.4.1 Conducted Spurious Emissions	No	Requires full spectrum analyzer
3.1.1.4.2 Radiated Spurious Emissions	No	Requires full spectrum analyzer
3.1.2 Transmitter Tests		

## Test Adherence to Standards

**Table 2. Support of C.S0033 Tests**

C.S0033 Test	Supported by E1966A?	Comments
3.1.2.1.1 Frequency Coverage	Yes	Supports Band Classes 0, 1, 3, 4, 5, 6 and 9. See <a href="#">“Cell Band” on page 159.</a>
3.1.2.1.2 Frequency Accuracy	Yes	See <a href="#">“3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 93.</a>
3.1.2.2.1 Time Reference	Partially	Supports static time reference only. See <a href="#">“3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 93.</a>
3.1.2.2.2 Waveform Quality and Frequency Accuracy	Yes	See <a href="#">“3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 93.</a>
3.1.2.2.3 Redundant ACK Transmission	No	Requires dynamic ACK response.
3.1.2.3.1 Range of Open Loop Output Power	Partially	Supports 100% forward packet activity only (see <a href="#">“Fixed Settings” on page 168.</a> ) See <a href="#">“3.1.2.3.1 Range of Open Loop Output Power” on page 41</a>
3.1.2.3.2 Time Response of Open Loop Power Control	Yes	See <a href="#">“3.1.2.3.2 Time Response of Open Loop Power Control” on page 71</a>
3.1.2.3.3 Range of Closed Loop Power Control	Partially	Supports tests 1 and 3-6, Minimum Standard (a) only, by remote program only.
3.1.2.3.4 Maximum RF Output Power	Yes	See <a href="#">“3.1.2.3.4 Maximum RF Output Power” on page 55</a>
3.1.2.3.5 Minimum Controlled Output Power	Yes	See <a href="#">“3.1.2.3.5 Minimum Controlled Output Power” on page 52</a>
3.1.2.3.6 Standby Output Power	Partially	Supports idle standby output power fully. Supports measurement of standby power between access probe bursts by remote program only.
3.1.2.3.7 RRI Channel Output Power	Yes	See <a href="#">“3.1.2.3.7 RRI Channel Output Power” on page 94</a>
3.1.2.3.8.1 DRC Channel Output Power	Yes	See <a href="#">“3.1.2.3.8.1 DRC Channel Output Power” on page 95</a>
3.1.2.3.8.2 ACK Channel Output Power	Yes	See <a href="#">“3.1.2.3.8.2 ACK Channel Output Power” on page 95</a>
3.1.2.3.8.3 Data Channel Output Power	Partially	Does not support test 6. See <a href="#">“3.1.2.3.8.3 Data Channel Output Power” on page 96</a>
3.1.2.4.1 Conducted Spurious Emissions	Yes	Supports adjacent and alternate channels only. <a href="#">“3.1.2.4.1 Conducted Spurious Emissions” on page 78</a>
3.1.2.4.2 Radiated Spurious Emissions	Partially	Requires external spectrum analyzer.
3.1.2.4.3 Occupied Bandwidth	Partially	Requires external spectrum analyzer.



## **Related Topics**

[“E1966A 1xEV-DO Terminal Test Application Revision Information” on page 775](#)

[“Concurrent Measurements” on page 246](#)

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## Access Probe Power Measurement Description

- [“How is an Access Probe Power Measurement Made?”](#)
- [“Access Probe Power Measurement Parameters”](#)
- [“Access Probe Power Measurement Results”](#)
- [“Access Probe Power Input Signal Requirements”](#)
- [“Key C.S0033 Tests Performed using the Access Probe Power Measurement”](#)
- [“Calibrating the Access Probe Power Measurement”](#)

### How is an Access Probe Power Measurement Made?

The test set's access probe power measurement is a channel power measurement (see [“Channel Power Measurement Description” on page 50](#)) triggered by a rise in RF power detected on the test set's RF input. When an input signal appears that is within +/- 9 dB of the expected power for an access probe, the measurement is triggered. To prevent the measurement from triggering on noise, the signal level must be at least -45 dBm/1.23 MHz.

The access probe power measurement captures an access probe and digitizes the waveform. It then uses DSP to determine the average power level (within the 1.23 MHz measurement bandwidth) of the first ~1.667 ms of the probe.

### Considerations when Making Access Probe Power Measurements

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**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements.

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Access probe sequences consist of a series of RF power “steps” which increase in power according to the step size setting until the maximum number of steps is reached, or the data connection processing event completes (for example when the data connection is established). The following parameters determine the access probe sequence characteristics:

- [“Probe Initial Adjust” on page 145](#)
- [“Probe Num Step” on page 146](#)
- [“Probe Power Step” on page 147](#)
- [“Probe Sequence Max” on page 148](#)

To view the full access probe sequence, you must prevent the test set from responding to the access terminal by turning [“Call Limit Mode”](#) on.

---

**NOTE** It is recommended that you always turn [“Call Limit Mode”](#) on when measuring access probe power. The easiest way to induce access probes from the access terminal is to page the access terminal. If you do not have call limit mode set to on, the connection will complete, which clears

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the access probe power result from the measurement screen. Set call limit mode back to off when you have finished measuring access probe power.

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## Access Probe Power Measurement Parameters

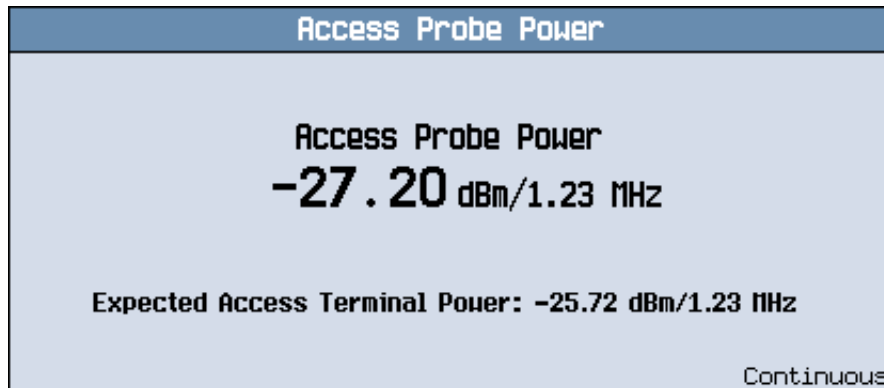
- Trigger Arm - (see [“Trigger Arm \(Single or Continuous\) Description” on page 253](#)). When the test set is making access probe power measurements in the continuous trigger arm state, it will display the power level of the most recent access probe power measurement. To measure only the first access probe and prevent triggering on subsequent access probes, set Trigger Arm to Single. You must then press **Start Single** to arm the measurement.
- Timeout Time/State - (see [“Timeouts” on page 250](#)).

## Access Probe Power Measurement Results

- Integrity Indicator - (see [“Integrity Indicator” on page 255](#)).
- Access Probe Power (in dBm/1.23 MHz): The average power level of the first 2.5 ms of the captured access probe.

The Expected Access Terminal Power (see [“Expected Power” on page 185](#)) is also displayed on the measurement screen when receiver power control is set to auto (see [“Automatic Receiver Control” on page 182](#)), and [“Application”](#) is set to RTAP.

A typical measurement result is shown below:



## Access Probe Power Input Signal Requirements

[“Input Signal Requirements” on page 101](#)

## Key C.S0033 Tests Performed using the Access Probe Power Measurement

- [“3.1.2.3.1 Range of Open Loop Output Power” on page 41](#)

## Calibrating the Access Probe Power Measurement

The access probe power measurement is automatically calibrated during a channel power calibration. Follow the channel power calibration schedule and the access probe power measurement will be properly calibrated.

## **Access Probe Power Measurement Description**

Refer to [“Calibrating the Test Set” on page 98](#) for a description of channel power calibration.

## **Related Topics**

Manual Operation: [“Measuring Access Probe Power” on page 659](#)

[“Programming an Access Probe Power Measurement” on page 261](#)

[“Access Probe Power Troubleshooting” on page 712](#)

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### 3.1.2.3.1 Range of Open Loop Output Power

#### Definition

This test verifies that the access terminal transmits at the proper power level determined by the open loop output equation. It is important that the AT transmit at the proper power level without the assistance of closed loop power control adjustments so that it can acquire a traffic channel successfully.

#### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set Probe Sequence Max to 1 sequence.
3. Set Preamble Length to 7 frames.
4. Set Open Loop Adjust to -78 dB or -81 dB, depending upon band class.
5. Set the AN forward packet activity to 100%.
6. There are 3 tests which evaluate the AT's performance for  $\hat{I}_{or}$  at high, medium and low levels:
  - Test 1:  $\hat{I}_{or} = -25$  dBm/1.23 MHz
  - Test 2:  $\hat{I}_{or} = -65$  dBm/1.23 MHz
  - Test 3:  $\hat{I}_{or}$  is set to a level between -103 and -81 dBm/1.23 MHz, depending upon band class and access terminal class.
7. Set the access network to ignore all access attempts.
8. Send a page to the access terminal.
9. Measure the output power of the access terminal during transmission of a probe (this assumes probe Power Step is set to 0 dB and all probes will be at the initial probe power level, so measuring any one will suffice).
10. Repeat all tests with a forward packet activity of 0%. (This verifies the AT is able to transmit at the proper open loop power level when the forward channel is bursted.)

#### Minimum Standard

The access terminal output power shall be within +/- 9.5 dB of the correct level (this includes 0.5 dB allowance for test equipment uncertainties). A Probe Initial Adjust of 0 dB is assumed in calculating the correct level.

#### Related Topics

Manual Operation: [“Testing 3.1.2.3.1 Range of Open Loop Output Power” on page 661](#)

[“Programming an Access Probe Power Measurement” on page 261](#)

[“Access Probe Power Measurement Description” on page 38](#)

[“Access Probe Power Troubleshooting” on page 712](#)

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## Audio Analyzer Measurement Description

### How is an analog audio measurement made?

The Audio Analyzer can measure Audio Level (V), SINAD (dB), Distortion (%), and Audio Frequency. Measurements are made through the test set's front panel AUDIO IN connectors. When measuring a mobile's audio output, the audio signal may come from either an acoustic coupler or from a test interface connection to the mobile's audio circuitry.

See [“Audio Analyzer Block Diagram” on page 45](#).

The AUDIO IN connectors feed the inputs to a floating-input differential amplifier, with each input having an impedance of about 100,000 ohms to chassis ground. For best noise immunity, connect the audio signal and its ground reference to the two input ports through shielded coaxial cables, or input the signal to the AUDIO IN HI connector and ground the AUDIO IN LO connector's center contact.

None of the analog audio measurement results are affected by the Amplitude Offset setting.

### SINAD/Distortion State

Select On or Off to enable or disable the SINAD and Distortion measurements. When On, these measurement results are displayed below the Audio Level measurement and the SINAD/Distortion Fundamental Frequency must be entered to specify the audio frequency for the measurement (range: 100 Hz to 10 kHz). When Off, four dashes are displayed in place of the measurement results.

### Audio Frequency State

Select On or Off to enable or disable the Audio Frequency measurement.

### Filter Type

- None - no filtering is provided (default).
- 100 Hz BW Band Pass Filter (Tunable) - The 100 Hz BW BPF Center Frequency setting is available when this filter is selected, and can be set in the range of 300 Hz to 15 kHz.
- C-Message
- 50 Hz to 15 kHz
- 300 Hz to 15 kHz

### Detector Type

Select either Peak or RMS (default) for making and displaying an Audio Level measurement (does not affect other measurements). The type of detector selected is displayed next to the Audio Level measurement results. A 1-volt rms sinewave input signal would measure  $1.414 V_{\text{Peak}}$  when the Peak detector is used. A 1-volt peak input signal would measure  $0.707 V_{\text{RMS}}$  when the RMS detector is used.

### Expected Peak Voltage

The Expected Amplitude sets the analog audio clipping level and must be set. This voltage is always the *absolute peak* audio input signal voltage expected at the AUDIO IN connectors, and must be in the range of  $7.07 \text{ mV}_{\text{peak}}$  ( $5 \text{ mV}_{\text{rms}}$ ) to  $20 \text{ V}_{\text{peak}}$ . Remember, measuring a 1-volt rms sinewave input signal would require a  $1.414 \text{ V}_{\text{peak}}$  expected voltage value to avoid clipping (over-driving) the input.

### De-Emphasis State

Set to On or Off (default) to enable or disable 750 microsecond de-emphasis.

### Expander Reference Level

Set value from 10 mV/kHz to 10 V/kHz, or Off (default). Entering a numeric value automatically turns the state to On. Entering Off disables the expander (state = off).

### Trigger Source

Audio Analyzer measurements use immediate triggering and are continuously re-triggered by the analyzer any time the Trigger Arm parameter is set to Continuous. Trigger timing is independent of any mobile protocol signaling.

### Considerations When Making Manual Audio Analyzer Measurements

When manually controlling the test set from the front panel, all measurements default to using continuous triggering. If you make digital measurements on a DTC using RF Rise or Protocol triggering, and then hand off to an AVC and select an analog measurement, the analog measurement may not trigger and display a result. This is because the digital measurement is still waiting for a burst transmission to trigger it (which it won't get from an analog signal) and therefore the measurements "freeze". To prevent this from happening when making analog measurements, either turn off the digital measurements or set their trigger source to Immediate.

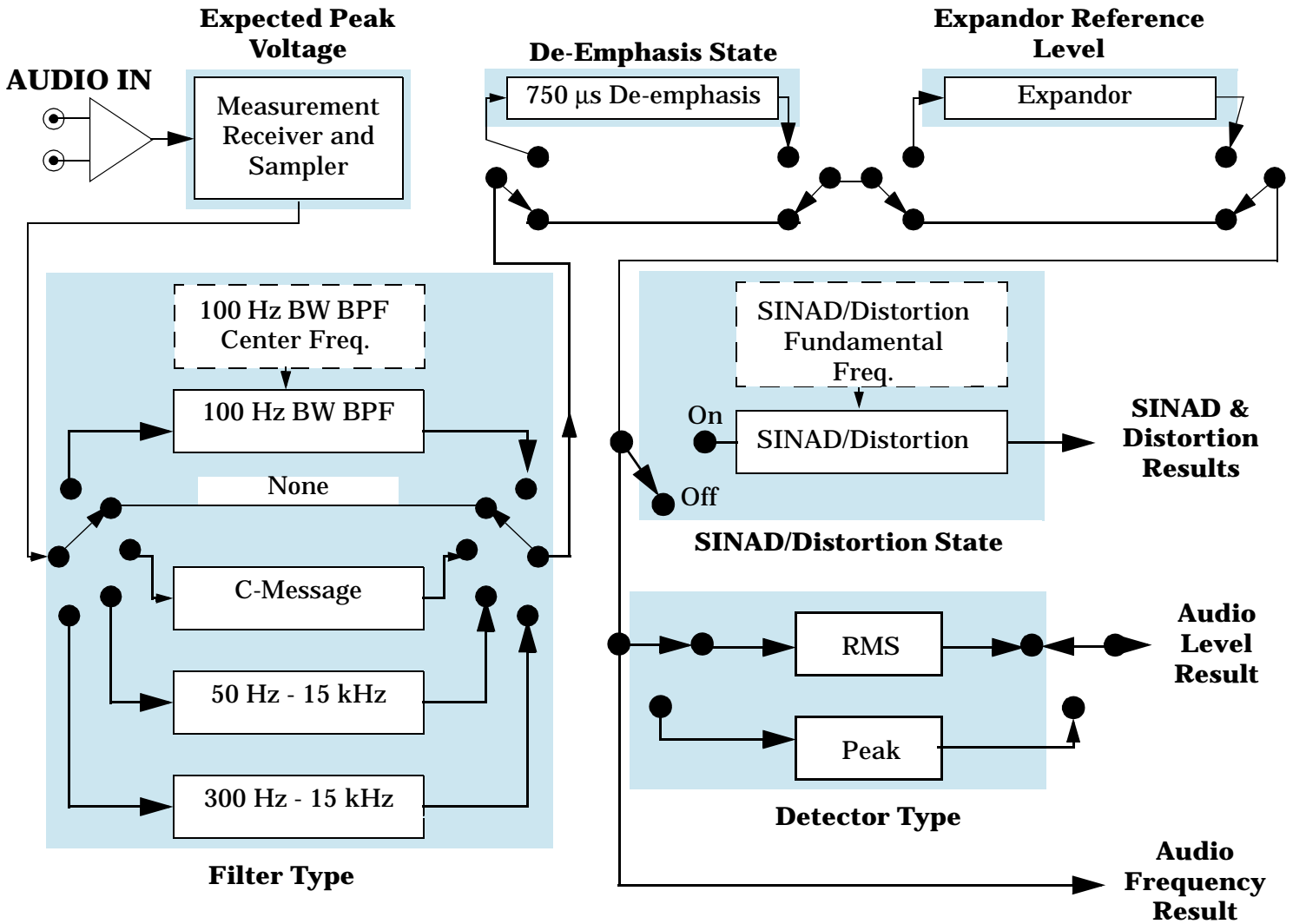
## **Audio Analyzer Measurement Description**

### **Related Topics**

- [“Audio Analyzer Block Diagram” on page 45](#)
- [“Audio Analyzer Troubleshooting” on page 714](#)
- [“Audio Level Measurement Description” on page 47](#)
- [“Audio Frequency Measurement Description” on page 46](#)
- [“SINAD Measurement Description” on page 49](#)
- [“Distortion Measurement Description” on page 48](#)
- [“Programming an Audio Frequency Measurement” on page 265](#)
- [“Programming an Audio Level Measurement” on page 266](#)
- [“Programming a SINAD Measurement” on page 270](#)
- [“Programming a Distortion Measurement” on page 268](#)
- [“Statistical Measurement Results” on page 249 \(Multi-measurements\)](#)
- [“Triggering of Measurements” on page 251](#)
- [“Timeouts” on page 250](#)



# Audio Analyzer Block Diagram



## Related Topics

[“Audio Analyzer Measurement Description” on page 42](#)

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## Audio Frequency Measurement Description

### Considerations When Making Manual Audio Frequency Measurements

When manually controlling the test set from the front panel, all measurements default to using continuous triggering. If you make digital measurements on a DTC using RF Rise or Protocol triggering, and then hand off to an AVC and select an analog measurement, the analog measurement may not trigger and display a result. This is because the digital measurement is still waiting for a burst transmission to trigger it (which it won't get from an analog signal) and therefore the measurements "freeze". To prevent this from happening when making analog measurements, either turn off the digital measurements or set their trigger source to Immediate.

### Related Topics

["Programming an Audio Frequency Measurement" on page 265](#)

["Audio Analyzer Measurement Description" on page 42](#)

["Audio Analyzer Block Diagram" on page 45](#)

["Audio Analyzer Troubleshooting" on page 714](#)

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## Audio Level Measurement Description

### How is an Audio Level measurement made?

Audio Level measures the AC voltage of the signal applied to the front-panel AUDIO IN connectors, and is one of the Audio Analyzer measurements. Audio Level can be measured for signals in the frequency range of 100 Hz to 20 kHz, at levels from 1 mV<sub>peak</sub> to 20V<sub>peak</sub>. The measurement is made after any filtering is applied, and can be made using an rms or peak detector. The type of detector being used for the measurement is displayed next to the measurement value.

When measuring very low voltages, it may be helpful to use the Audio Analyzer's adjustable bandpass filter and the rms detector to reduce noise components.

For information on using the Audio Analyzer, see [“Audio Analyzer Measurement Description” on page 42](#).

This measurement is not affected by the Amplitude Offset setting.

### Considerations When Making Manual Audio Level Measurements

When manually controlling the test set from the front panel, all measurements default to using continuous triggering. If you make digital measurements on a DTC using RF Rise or Protocol triggering, and then hand off to an AVC and select an analog measurement, the analog measurement may not trigger and display a result. This is because the digital measurement is still waiting for a burst transmission to trigger it (which it won't get from an analog signal) and therefore the measurements “freeze”. To prevent this from happening when making analog measurements, either turn off the digital measurements or set their trigger source to Immediate.

### Related Topics

[“Programming an Audio Level Measurement” on page 266](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“Audio Analyzer Measurement Description” on page 42](#)

[“Audio Analyzer Block Diagram” on page 45](#)

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## Distortion Measurement Description

### How is a Distortion measurement made?

Distortion is an audio quality measurement that compares the audio signal level from the mobile at a specified (desired) frequency to the level of signals present at other frequencies. The audio signals from the mobile are typically demodulated tones sent over an analog voice channel (AVC).

The test set makes two measurements to determine distortion. First, the test set measures the total audio signal level into the Audio Analyzer. Next, a precise notch filter is then used to remove the signal at the specified frequency. The remaining signal level indicates the level of unwanted signals (distortion). Distortion is expressed as a percentage of the total audio signal.

Distortion can be measured in the range of 100 Hz to 10 kHz. For information on using the Audio Analyzer, see [“Audio Analyzer Measurement Description” on page 42](#).

The distortion measurement can be used to perform the audio harmonic distortion test. In this test, two audio signals are used: a 1004 Hz tone and the 6000 Hz SAT. The 1004 Hz tone is notched out to make the measurement. See IS-137A, section 2.2.2.5 for more information.

### Considerations When Making Manual Distortion Measurements

When manually controlling the test set from the front panel, all measurements default to using continuous triggering. If you make digital measurements on a DTC using RF Rise or Protocol triggering, and then hand off to an AVC and select an analog measurement, the analog measurement may not trigger and display a result. This is because the digital measurement is still waiting for a burst transmission to trigger it (which it won't get from an analog signal) and therefore the measurements “freeze”. To prevent this from happening when making analog measurements, either turn off the digital measurements or set their trigger source to Immediate.

### Related Topics

[“Audio Analyzer Measurement Description” on page 42](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“Programming a Distortion Measurement” on page 268](#)

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## SINAD Measurement Description

### How is a SINAD measurement made?

SINAD is a receiver audio quality measurement for mobiles on an analog voice channel (AVC). It is the ratio of Signal+Noise+Distortion divided by Noise+Distortion, expressed in dB. SINAD is measured using the test set's Audio Analyzer. SINAD can be measured in the range of 100 Hz to 10 kHz. For information on using the Audio Analyzer, see [“Audio Analyzer Measurement Description” on page 42](#).

The SINAD measurement is used to determine receiver RF sensitivity. SINAD is usually measured either of two ways:

- Reduce the Cell Power from the test set until 12 dB SINAD is displayed (re-triggering for each measurement), or
- Set the Cell Power from the test set to a specified low level and verify a  $\geq 12$  dB SINAD reading.

See IS-137A, section 2.3.1.1, for more information.

### Difference in Agilent 8960 Series 10 and 8920B Test Set SINAD Measurements

If you have previously used the Agilent 8920B RF Communications Test Set to measure SINAD, you may notice that the Agilent 8960 Series 10 test set's SINAD value may be lower by up to 0.8 dB when measuring 12 dB SINAD. This is due to the more precise digital notch filter used by the 8960, causing a more accurate noise measurement to be made. The 8920B uses an analog filter that does not have as tight a filter notch as the 8960.

### Considerations When Making Manual SINAD Measurements

When manually controlling the test set from the front panel, all measurements default to using continuous triggering. If you make digital measurements on a DTC using RF Rise or Protocol triggering, and then hand off to an AVC and select an analog measurement, the analog measurement may not trigger and display a result. This is because the digital measurement is still waiting for a burst transmission to trigger it (which it won't get from an analog signal) and therefore the measurements “freeze”. To prevent this from happening when making analog measurements, either turn off the digital measurements or set their trigger source to Immediate.

### Related Topics

[“Programming a SINAD Measurement” on page 270](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“Audio Analyzer Measurement Description” on page 42](#)

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## Channel Power Measurement Description

- [“How is a Channel Power Measurement Made?”](#)
- [“Channel Power Measurement Parameters”](#)
- [“Channel Power Measurement Results”](#)
- [“Channel Power Input Signal Requirements”](#)
- [“Key C.S0033 Tests Performed using the Channel Power Measurement”](#)
- [“Calibrating the Channel Power Measurement”](#)

### How is a Channel Power Measurement Made?

Channel power measurements are made by analyzing a digitized version of the input signal's downconverted IF using the test set's DSP (see [“Block Diagram” on page 765](#)). The measurement triggers on the test set's internal ~1.667 ms slot clock. The measurement thus always starts at the beginning of a slot, measures the power during the slot, and reports the average power for the slot. Because the measurement is triggered on the slot clock rather than the frame clock, any slot within the frame can be measured, increasing measurement speed. The measurement only measures power within a 1.23 MHz measurement bandwidth. The measurement is cross-calibrated with digital average power to determine the absolute power level. The result is given in dBm/1.23 MHz.

### Channel Power Measurement Parameters

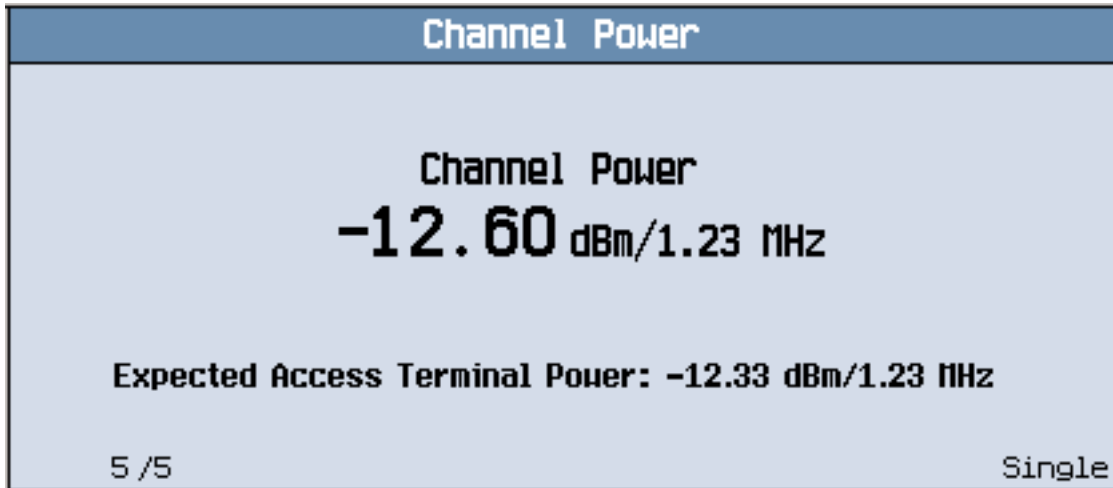
- Multi-Measurement Count - When ON, this enables averaging of multiple channel power results. For example, when multi-measurement count is set to 3, the test set calculates the average power in a slot, then calculates the average power in the next available slot, then calculates the power in the next available slot, and then averages these 3 results. (See [“Statistical Measurement Results” on page 249](#)).
- Trigger Arm - (see [“Trigger Arm \(Single or Continuous\) Description” on page 253](#)).
- Timeout Time/State - (see [“Timeouts” on page 250](#)).

### Channel Power Measurement Results

- Integrity Indicator - (see [“Integrity Indicator” on page 255](#)).
- Channel Power (in dBm/1.23 MHz)

The Expected Access Terminal Power (see [“Expected Power” on page 185](#)) is also displayed on the measurement screen when receiver power control is set to auto (see [“Automatic Receiver Control” on page 182](#)), and [“Application”](#) is set to RTAP.

A typical measurement result is shown below:



### Channel Power Input Signal Requirements

[“Input Signal Requirements” on page 101](#)

### Key C.S0033 Tests Performed using the Channel Power Measurement

[“3.1.2.3.5 Minimum Controlled Output Power” on page 52](#)

### Calibrating the Channel Power Measurement

Refer to [“Calibrating the Test Set” on page 98](#) for a description of channel power calibration.

### Related Topics

[“Measuring Channel Power” on page 662](#)

[“Programming a Channel Power Measurement” on page 272](#)

[“Channel Power Measurement Troubleshooting” on page 715](#)

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### 3.1.2.3.5 Minimum Controlled Output Power

#### Definition

The minimum controlled output power of the access terminal is the output power, measured at the access terminal antenna connector, when both closed loop and open loop power control indicate minimum output.

#### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 9.6 kbps.
3. Set  $\hat{I}_{or}$  to -25 dBm/1.23 MHz.
4. Transmit continuous down power control bits.
5. Measure the access terminal power.

#### Minimum Standard

The mean output power of the access terminal shall be less than -50 dBm/1.23 MHz centered at the CDMA Channel frequency.

#### Related Topics

Manual Operation: [“Testing 3.1.2.3.5 Minimum Controlled Output Power” on page 663](#)

[“Programming a Channel Power Measurement” on page 272](#)

[“Channel Power Measurement Description” on page 50](#)

[“Channel Power Measurement Troubleshooting” on page 715](#)



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## Digital Average Power Measurement Description

- [“How is a Digital Average Power Measurement Made?” on page 53](#)
- [“Digital Average Power Measurement Parameters” on page 53](#)
- [“Digital Average Power Measurement Results” on page 53](#)
- [“Digital Average Power Input Signal Requirements” on page 54](#)
- [“Key C.S0033 Tests Performed using the Digital Average Power Measurement” on page 54](#)
- [“Calibrating the Digital Average Power Measurement” on page 54](#)

### How is a Digital Average Power Measurement Made?

Digital average power measurements are broadband power measurements made directly on the RF input (the signal is not downconverted in frequency, see [“Block Diagram” on page 765](#)). The input waveform is detected by a true average power detector. The test set’s digital signal processor (DSP) then determines the average power of the signal over a 10 ms measurement period (6 slots).

The measurement triggers on the test set’s internal ~1.667 ms slot clock. The result is reported in dBm.

The digital average power measurement has a bandwidth of approximately 4 GHz. For this reason, significant signal energy outside the 1.23 MHz access terminal transmit bandwidth will increase the measured value.

### Digital Average Power Measurement Parameters

- Multi-Measurement Count - (See [“Statistical Measurement Results” on page 249](#)).
- Trigger Arm - (see [“Trigger Arm \(Single or Continuous\) Description” on page 253](#)).
- Timeout Time/State - (see [“Timeouts” on page 250](#)).

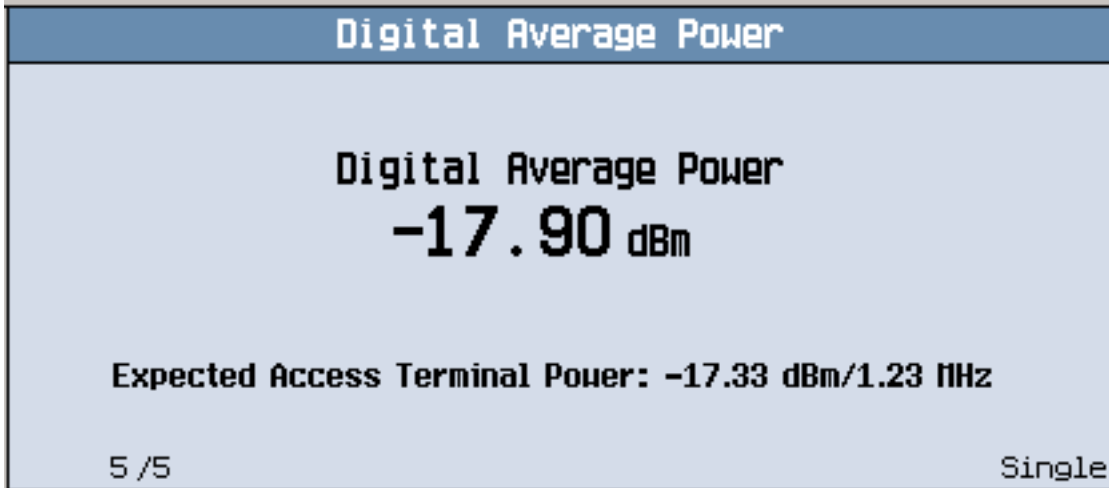
### Digital Average Power Measurement Results

- Integrity Indicator - (see [“Integrity Indicator” on page 255](#)).
- Digital Average Power (in dBm)

The Expected Access Terminal Power (see [“Expected Power” on page 185](#)) is also displayed on the measurement screen when receiver power control is set to auto (see [“Automatic Receiver Control” on page 182](#)), and [“Application”](#) is set to RTAP.

## Digital Average Power Measurement Description

A typical measurement result is shown below:



## Digital Average Power Input Signal Requirements

[“Input Signal Requirements” on page 101](#)

## Key C.S0033 Tests Performed using the Digital Average Power Measurement

- [“3.1.2.3.4 Maximum RF Output Power” on page 55](#)

## Calibrating the Digital Average Power Measurement

Refer to [“Calibrating the Test Set” on page 98](#) for a description of digital average power calibration.

## Related Topics

Manual Operation: [“Measuring Digital Average Power” on page 664](#)

[“Programming a Digital Average Power Measurement” on page 275](#)

[“Digital Average Power Troubleshooting” on page 717](#)

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## 3.1.2.3.4 Maximum RF Output Power

### Definition

This test measures the maximum power that the access terminal transmits as measured at the access terminal antenna connector.

### Method of Measurement

1. Set Open Loop Adjust to -81 dB or -84 dB, depending upon band class.
2. Set Probe Initial Adjust to 15 dB.
3. Set Probe Num Step to 15 probes/sequence (this step will be removed from C.S0033 in January 2003).
4. Set Power Step to 7.5 dB/step (this step will be removed from C.S0033 in January 2003).
5. Set Probe Sequence Max to 15 sequences (this step will be removed from C.S0033 in January 2003).
6. Connect the access network emulator to the AT.
7. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 153.6 kbps.
8. Configure the Test Application FTAP with a Forward Traffic Channel rate of 307.2 kbps (2-slot version), and such that the ACK Channel is transmitted at all the slots. (It is necessary for the access terminal to transmit the R-ACK Channel to provide its maximum output power.)
9. Set  $\hat{I}_{or}$  to -105.5 dBm/1.23 MHz.
10. Transmit continuous up power control bits.
11. Measure the access terminal power.

### Minimum Standard

The mean output power of the access terminal shall be within the specified limits (the limits range between -22 dBW and 8 dBW, depending upon band class and access terminal class).

### Related Topics

Manual Operation: [“Testing 3.1.2.3.4 Maximum RF Output Power” on page 666](#)

[“Programming a Digital Average Power Measurement” on page 275](#)

[“Digital Average Power Measurement Description” on page 53](#)

[“Digital Average Power Troubleshooting” on page 717](#)

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## Packet Error Rate (PER) Measurement Description

- [“How is a PER Measurement Made?”](#)
- [“PER Measurement Parameters”](#)
- [“PER Measurement Results”](#)
- [“PER Input Signal Requirements”](#)
- [“Key C.S0033 Tests Performed Using PER”](#)

### How is a PER Measurement Made?

Packet Error Rate (PER) is the ratio, in percent, of the number of FTAP Test Packets not successfully received by the access terminal (AT) to the number of FTAP Test Packets sent to the AT by the test set (see [“Forward Test Application Protocol \(FTAP\)” on page 129](#)). PER is used to test the performance of an access terminal’s receiver.

To perform a packet error rate measurement, the test set sends an FTAP Test Packet to the access terminal. Each packet contains 16 FCS (Frame Check Sequence) bit, which provide information about the packet. If the AT is able to decode the packet and the FCS checks (the information relayed by the FCS matches the packet characteristics), then the packet is successfully received.

The AT sends one or more FTAP Loop Back Packets to the test set to indicate how many FTAP Test Packets were successfully received for each 16-slot “observation interval” (frame). The AT sends one Loop Back Packet (or more, if needed to convey all of the records) containing a record for each FTAP Test Packet in the observation interval. The FTAP Loop Back Packets are queued for transmission on the Reverse Traffic Channel, and the AT must provide buffering for at least 8 FTAP Loop Back Packets. An FTAP Loop Back Packet is generated even if no FTAP Test Packets were received during the 16-slot observation interval.

In performing the PER measurement, the test set:

- always operates with 100% packet activity (see [“Fixed Settings” on page 168](#)). 100% packet activity means that all slots contain Forward Traffic Channel or Control Channel packets (data). The test set fills any empty slots with filler data directed to a random AT other than the AT under test. (0% packet activity means that the source is pulsed off when there is no data to transmit in the slot, and then pulsed on to transmit the MAC and Pilot Channels. This is not supported by the test set.)
- always implements forced single encapsulation. Forced single encapsulation means that there is always only one valid MAC Packet per Physical Packet, regardless of the size of the Physical Packet. Depending upon data rate, the Physical Packet can be contain between 1 and 4 MAC Packets. If other MAC Packets are contained in the Physical Packet, they are loaded with all “F” data and the indicator bits are set to indicate that these packets are invalid.
- by default, only directs half of the valid FTAP Test Packets to the AT under test, as per C.S0033 specifications. ([“AT Directed Packets”](#) is set to 50% by default. However this parameter may be adjusted to optimize PER throughput based on AT performance.)

You must establish an FTAP connection to perform packet error rate measurements (see [“How Do I Open a Session and Connection?” on page 647](#)).

### Confidence Level Testing

Confidence level testing is a feature of PER measurements that applies statistical analysis to PER measurements so that pass/fail test results can be obtained in the shortest possible time. When confidence level is on, the PER measurement keeps track of the number of packets measured, the number of packet errors, and performs a statistical analysis of the probability that the value entered in the PER requirement field will (or will not) be exceeded.

The confidence level parameter is typically set at 95%. With that setting, the PER measurement returns a pass result before the maximum packet count is reached if statistically there is a 95% probability that the percentage of packet errors will not exceed the PER requirement value if the measurement is allowed to reach the maximum packet count. The PER measurement returns a fail result before the maximum packet count is reached if statistically there is a 95% probability that the percentage of packet errors counted will exceed the PER requirement if the measurement is allowed to reach the maximum packet count. If the number of packet errors counted does not allow a reliable prediction of “pass” or “fail,” the measurement continues until the number of packets tested equals max packets. “Max packets” and the PER percentage result are then returned.

If confidence level is off, the measurement always runs until the number of packets tested equals max packets.

Several hundred packets of data must be measured before a statistical prediction can be made as to whether the test will pass or fail. The test set includes a speed-up feature which is always active. This feature allows the test set to end the PER measurement right away (with a “fail” indication), if it is obvious that the test will fail, rather than waiting for the minimum number of packets required to apply confidence limit checking.

### PER Measurement Parameters

- **Maximum Packet Count** - Sets the maximum number of packets to be counted during the PER measurement (range is 25 to 10,000,000 packets). If the number of packets tested reaches Maximum Packet Count, the measurement will stop.
- **PER Requirement** - Sets the PER percentage that must not be exceeded for a “pass” result to be returned (range is 0.1% to 15%).
- **Confidence State** - Controls whether the confidence level will be used during the PER measurement. If confidence level is on, the PER measurement will continue until a pass/fail indication occurs, or until maximum packet count is reached. If confidence level is off, the PER measurement will run until maximum packet count is reached.
- **Confidence Level** - Sets the required confidence level for the PER requirement (range is 80% to 99.99%).
- **Trigger Arm** - (See [“Trigger Arm \(Single or Continuous\) Description” on page 253](#)).
- **Timeout Time/State** - Range is 0.1 to 266,667.0 seconds. (See [“Timeouts” on page 250](#)).

### PER Measurement Results

- **Integrity Indicator** - (see [“Integrity Indicator” on page 255](#)).
- **PER** - ratio, in percent, of the packet error count to the number of packets tested.
- **Confidence Pass/Fail** - indicates whether the measurement achieved confidence of failure or success, or whether maximum packet count was reached.
- **Packet Error Count** - number of packets received with errors.

## Packet Error Rate (PER) Measurement Description

- Packets Tested - number of packets tested.

Intermediate measurement results are periodically available on the front panel display, but are not available programmatically through the GPIB interface.

A typical display is shown below:

Packet Error Rate	
Confidence	PER
<b>Pass</b>	<b>0.00 %</b>
Packet Error Count:	0
Packets Tested:	327
Maximum Packet Count:	10000
Eb/Nt:	2.19 dB
PER Requirement:	1.00 %
	Single

## PER Input Signal Requirements

[“Input Signal Requirements” on page 101](#)

## Key C.S0033 Tests Performed Using PER

[“3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN” on page 59](#)

[“3.1.1.3.1 Receiver Sensitivity and Dynamic Range” on page 60](#)

## Related Topics

Manual Operation: [“Measuring Packet Error Rate \(PER\)” on page 667](#)

[“Programming a Packet Error Rate \(PER\) Measurement” on page 278](#)

[“Packet Error Rate Measurement Troubleshooting” on page 719](#)

[“Test Application Protocol \(TAP\)” on page 129](#)

### 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN

#### Definition

Demodulation of Forward Traffic Channel in AWGN is the most important receiver test, for it tests the raw decoder ability of the baseband ASIC and the IF bandwidth of the access terminal (AT). This test evaluates how well the AT demodulates the Forward Traffic Channel in the presence of noise (how well it extracts the desired signal from the noise). The AWGN source simulates the interference power coming from surrounding cells when the AT is operating in a fully loaded network environment. The figure of merit is Packet Error Rate (PER).

#### Method of Measurement

1. Connect the access network emulator and AWGN to the AT.
2. Set the AN forward packet activity to 100%.
3. Set the Control Channel data rate to 38.4 kbps (because the default power level for 38.4 kbps Control Channel is high enough to overcome the large AWGN power required for these tests).
4. Set Pilot Drop to -14 dB (to prevent the access terminal from generating Pilot Strength Measurement Reports due to the low Pilot Channel to AWGN ratio).
5. Set up a Test Application session and open an FTAP connection.
6. Set  $\hat{I}_{or}$  to -55 dBm/1.23 MHz
7. There are 20 tests which evaluate the AT's performance for all Forward Traffic Channel data rates (38.4 to 2,457.6 kbps) for varying  $E_b/N_t$ . Set  $I_{oc}$  as specified for each test (ranges from -70.4 to -43.6 dBm/1.23 MHz).
8. Calculate PER for each test.

#### Minimum Standard

PER shall not exceed 0.5% to 5% with 95% confidence (depending upon data rate and  $E_b/N_t$ ).

#### Related Topics

Manual Operation: [“Testing 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN” on page 668](#)

[“Programming a Packet Error Rate \(PER\) Measurement” on page 278](#)

[“Packet Error Rate \(PER\) Measurement Description” on page 56](#)

[“Packet Error Rate Measurement Troubleshooting” on page 719](#)

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### 3.1.1.3.1 Receiver Sensitivity and Dynamic Range

#### Definition

**Receiver Sensitivity:** This test evaluates how well the access terminal (AT) demodulates a very low level Forward Traffic Channel signal. This simulates the AT in very poor propagation conditions, typically far from an access network sector or cell, where it would request a low data rate.

**Dynamic Range:** This test evaluates how well the access terminal (AT) demodulates a very high level Forward Traffic Channel signal (tests whether it gets overloaded). This simulates the AT in very good propagation conditions, typically very near an access network, where it would request a high data rate.

The figure of merit for each test is Packet Error Rate (PER).

#### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set up a Test Application session and open an FTAP connection.
3. Test 1 Receiver Sensitivity: Set the Forward Traffic Channel rate to the 2-slot version of 307.2 kbps and  $\hat{I}_{or}$  to -105.5 dBm/1.23 MHz.
4. Test 2 Dynamic Range: Set the Forward Traffic Channel rate to 2,457.6 kbps and  $\hat{I}_{or}$  to -25 dBm/1.23 MHz.
5. Calculate PER for each test.

#### Minimum Standard

PER shall be less than or equal to 0.5% with 95% confidence.

#### Related Topics

Manual Operation: [“Testing 3.1.1.3.1 Receiver Sensitivity and Dynamic Range” on page 669](#)

[“Programming a Packet Error Rate \(PER\) Measurement” on page 278](#)

[“Packet Error Rate \(PER\) Measurement Description” on page 56](#)

[“Packet Error Rate Measurement Troubleshooting” on page 719](#)



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## Spectrum Monitor Description

### How is the spectrum monitor (SMON) used?

The Spectrum Monitor (SMON) can be used to locate, identify and measure transmitted signals from a device under test. The Spectrum Monitor can be used while a call is in progress.

The Spectrum Monitor is intended to be used for indication only. The Spectrum Monitor does not have the same level accuracy specifications as other measurements provided by the test set, and should therefore not be used when parametric accuracy is required (for example, calibration of a mobile). It is recommended that you use the other wireless format-specific measurements when you require accurate parametric measurements.

The Spectrum Monitor has the following two modes of operation:

- Swept mode, in which the X axis represents *frequency*, and the Y axis represents absolute amplitude.
- Zero span mode, in which the X axis represents *time* and the Y axis represents absolute amplitude.

You can use the markers on the Spectrum Monitor's graphical display to set the expected frequency and power levels that are used by the test or lab application for parametric measurements.

The center frequency used by the Spectrum Monitor is initially set at the expected frequency maintained by the test set's base station emulator. The expected frequency range is 292.5 MHz to 2700 MHz.

The range of frequencies which the spectrum monitor is calibrated to measure is determined by the range of traffic band frequencies supported by the specific test or lab application that is currently running. For example, if you are using the GSM Test Application, any of the frequencies used by the GSM traffic bands are available for you to monitor accurately. You can view signals which fall outside of any of the frequencies used by GSM, but the Spectrum Monitor will not be calibrated.

From the test set's front panel, the Spectrum Monitor can be accessed by pressing the **Instrument Selection** key, then selecting **Spectrum Monitor**. If you require more details on manual operation of the Spectrum Monitor, see ["How Do I Use the Spectrum Monitor?" on page 684](#).

### Single or Multi-Measurements

The Spectrum Monitor can return either single or averaged results.

- If you set the averaging state OFF then the trace represents a single measurement sweep.
- If you set the averaging state ON, and the averaging count number to a value greater than one, then the trace represents the rolling average of the specified number of sweeps.

### Input Signal Requirements

The Spectrum Monitor will complete and meet its accuracy specifications under the following input signal conditions.

- The signal is within 40 dB of the reference level.
- The measurement frequency is within the traffic band frequencies supported by the specific lab or test application that is currently running, and the expected frequency is tuned to the carrier.

## **Spectrum Monitor Description**

### **Trigger Source**

Triggering choices available for the Spectrum Monitor are Auto, Immediate, Protocol, RF Rise, and External.

When Auto triggering is selected, the test set chooses Protocol triggering if a protocol trigger is available. Otherwise, RF Rise triggering is selected.

For more information on measurement triggering, refer to [“Triggering of Measurements” on page 251](#).

### **Related Topics**

[“Programming the Spectrum Monitor” on page 285](#)

[“How Do I Use the Spectrum Monitor?” on page 684](#)

[“Spectrum Monitor Troubleshooting” on page 720](#)

## Swept Audio Measurement Description

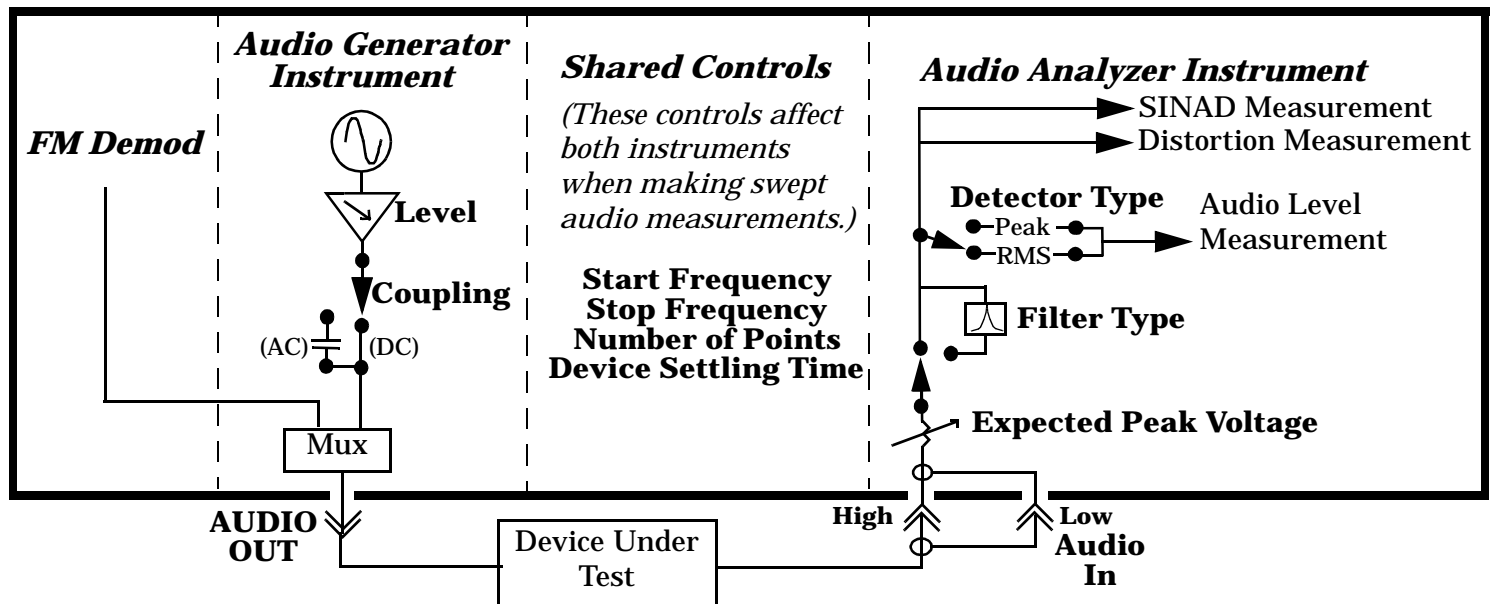
### Description

#### How are swept audio measurements made?

Swept audio measurements synchronize the frequencies of the test set's audio generator and audio analyzer instruments to automatically make measurements at up to 60 frequency points. Audio level, SINAD, and distortion measurements can be performed at each measurement point in the sweep.

This measurement only generates and analyzes audio signals; no modulation of the RF generator, or demodulation by the receiver, is performed. A representation of this operation is shown below.

**Figure 1. Swept Audio Measurements Block Diagram**



To perform the swept audio measurements, you must route audio generator signal to the AUDIO OUT port (not the FM Demod signal). See [“Interactions with the Audio Analyzer and Audio Generator Instruments” on page 64](#). The audio signal from the device under test is sent to the audio analyzer through the AUDIO IN ports.

The start and stop frequencies for the sweep define the frequency range. The user specifies the number of measurement points, which are evenly spaced through the specified frequency range.

Measurement settling time can be set to specify how long the audio signal is generated at each frequency before a measurement is made by the audio analyzer. This is used to account for settling time in the device being tested and any signal delay through the device. Increasing the settling time increases the sweep time.

If the 100 Hz BW bandpass filter is selected, the center frequency of the filter is synchronized to the audio generator and audio analyzer frequencies.

Typical applications include measuring the audio distortion of a mobile station across several frequencies and measuring the frequency response of an audio filter or amplifier.

## Swept Audio Measurement Description

This is not a measurement procedure specified in the EIA/TIA standards.

## Operating Considerations

### Front Panel Access

Swept Audio measurements are accessed manually by pressing the front-panel **Instrument selection** key.

### Multi-measurement Use

When multi-measurements are used with the swept audio measurement, the AF analyzer makes the number of measurements specified at each point in the sweep. For example, if five measurement points are specified, and the multi-measurement count is set to 20, a total of 100 measurements are performed during the sweep.

## Interactions with the Audio Analyzer and Audio Generator Instruments

To route Audio Generator signal to the front panel AUDIO OUT port, use the "SYSTEM:AUDio:OUTPut:SOURce" command or press the **System Config** hardkey, then select **Audio Out Port (F1)** on the System Config Screen (2 of 2).

The Swept Audio *measurement* and the Audio Analyzer *instrument* cannot be used at the same time to make audio measurements. If you enable either function while the other function is already enabled, the first function is turned off and a message is displayed that informs you of this situation.

Selecting the Swept Audio measurement will automatically adjust Audio Generator instrument settings. These settings will not be restored to their original values when the Swept Audio measurement is closed.

The amplitude of the Audio Generator instrument can be changed while the Swept Audio measurement is enabled. However, trying to change the Audio Generator instrument's frequency while using swept audio measurements is not allowed, and causes an error message to be displayed.

## Specifying a Specific Measurement Frequency Point Within a Sweep

If you need to make sure that a measurement is performed at a specific frequency within the sweep, you can use the following algorithms to calculate the values to enter:

To find which point in the sweep ( $n$ ) corresponds to the frequency you want the sweep to make a measurement at ( $F$ ), use the following algorithm -

$$n = 1 + INT\left(\frac{(F \text{ } \text{D} \text{ } S)(P \text{ } \text{D} \text{ } 1)}{Emin \text{ } \text{D} \text{ } S}\right)$$

$S$  = sweep start frequency,  $P$  = number of measurement points to make in the sweep,  $F$  = specific frequency to make a measurement at during the sweep,  $n$  = measurement point corresponding to  $F$ ,

$Emin$  = minimum upper sweep frequency

$INT$  = the largest integer value that is less than or equal to the expression in parenthesis. For example, if the value of the expression is 3.65037, the integer value is 3.0; the value of  $n$  would therefore be 4.

To determine the actual stop frequency ( $E$ ) to enter, use the following algorithm -

$$E = \frac{(F \text{ } \text{D} \text{ } S)(P \text{ } \text{D} \text{ } 1)}{(n \text{ } \text{D} \text{ } 1)} + S$$

For example if you wanted to make a measurement at 1004 Hz ( $F$ ) during a sweep of 15 points ( $P$ ) that begins at 300 Hz ( $S$ ) and ends after 3 kHz ( $E_{min}$ ), the first algorithm tells you that 1004 Hz occurs at the fourth point in the sweep ( $n$ ). Use the second algorithm to calculate the actual stop frequency ( $E$ ) you would enter for that sweep (3585.333 Hz).

### Related Topics

[“Programming a Swept Audio Measurement” on page 287](#)

[“Swept Audio Measurement Troubleshooting” on page 721](#)

[“Audio Analyzer Measurement Description” on page 42](#)

[“Audio Level Measurement Description” on page 47](#)

[“Distortion Measurement Description” on page 48](#)

[“SINAD Measurement Description” on page 49](#)

## Time Response of Open Loop Power Control (TROLPC) Measurement Description

- [“How is a TROLPC Measurement Made?”](#)
- [“TROLPC Measurement Parameters”](#)
- [“TROLPC Measurement Results”](#)
- [“TROLPC Input Signal Requirements”](#)
- [“Key C.S0033 Tests Performed using the TROLPC Measurement”](#)
- [“Calibrating the TROLPC Measurement”](#)

### How is a TROLPC Measurement Made?

The TROLPC measurement is a power versus time measurement that analyzes the output power of a mobile station for the 100 ms period following an abrupt (step) change in output power from the test set (+ or - 20 dB).

When you initiate the test set's TROLPC measurement, cell power either increases or decreases by 20 dB (depending upon whether you initiate an up or down step change). When the cell power changes, the access terminal reacts by decreasing or increasing its power, according to the open loop equation. The test set automatically sends alternating up and down closed loop power control bits while the measurement is executing, so the access terminal's response is determined solely by the open loop equation, and not influenced by closed loop power control (the alternating power control bits appear only as “ripple” on the measured trace).

The test set begins measuring the AT power as soon as the test set's source begins its transition to the new cell power setting (this transition is very rapid), and continues to measure power for the 100 ms following the change in cell power. The test set measures power at 371 data points over the 100 ms following the step change in cell power. Data point 0 reports the average power from 0 ms to ~0.270 ms after the power transition. Data point 1 reports the average power from ~0.270 ms to ~0.540 ms, and so on, up to data point 370 which reports the average power from ~99.730 ms to 100 ms. (Each data point reports the average power over a period of ~270  $\mu$ s, within the 1.23 MHz measurement bandwidth.)

Before the test set's source begins its transition, the test set begins sending alternating closed loop power control bits. The test set then transitions its source such that the power control bit sent at the power transition is opposite in direction to the transition (the bit sent at the power transition is an “up” bit when the cell power transition is -20 dB, and a “down” bit when the cell power transition is +20 dB).

The test set automatically ranges its measuring receiver to the maximum expected value from the mobile station as the test is performed.

When the measurement is complete, the test set returns closed loop power control to the mode it was set to before the measurement was initiated.

You must establish an RTAP connection to perform the TROLPC measurement (see [“How Do I Open a Session and Connection?”](#) on page 647).

## Time Response of Open Loop Power Control (TROLPC) Measurement Description

C.S0033 does not specify that the R-ACK Channel must be active for 3.1.2.3.2 Time Response of Open Loop Power Control. If the R-ACK Channel is active during this test, the access terminal's power may fall outside of the mask specifications. To help ensure that your access terminal does not fail this test, you should disable the R-ACK Channel by setting [“ACK Channel Bit Fixed Mode Attribute”](#) to on and setting [“AT Directed Packets”](#) to 0%.

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**IMPORTANT** No other measurements can be running while the TROLPC measurement is active. If any measurements are running, they are closed when TROLPC is initiated, and a message is displayed indicating that a measurement has been closed. Activating another measurement inactivates the TROLPC measurement.

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### TROLPC Measurement Parameters

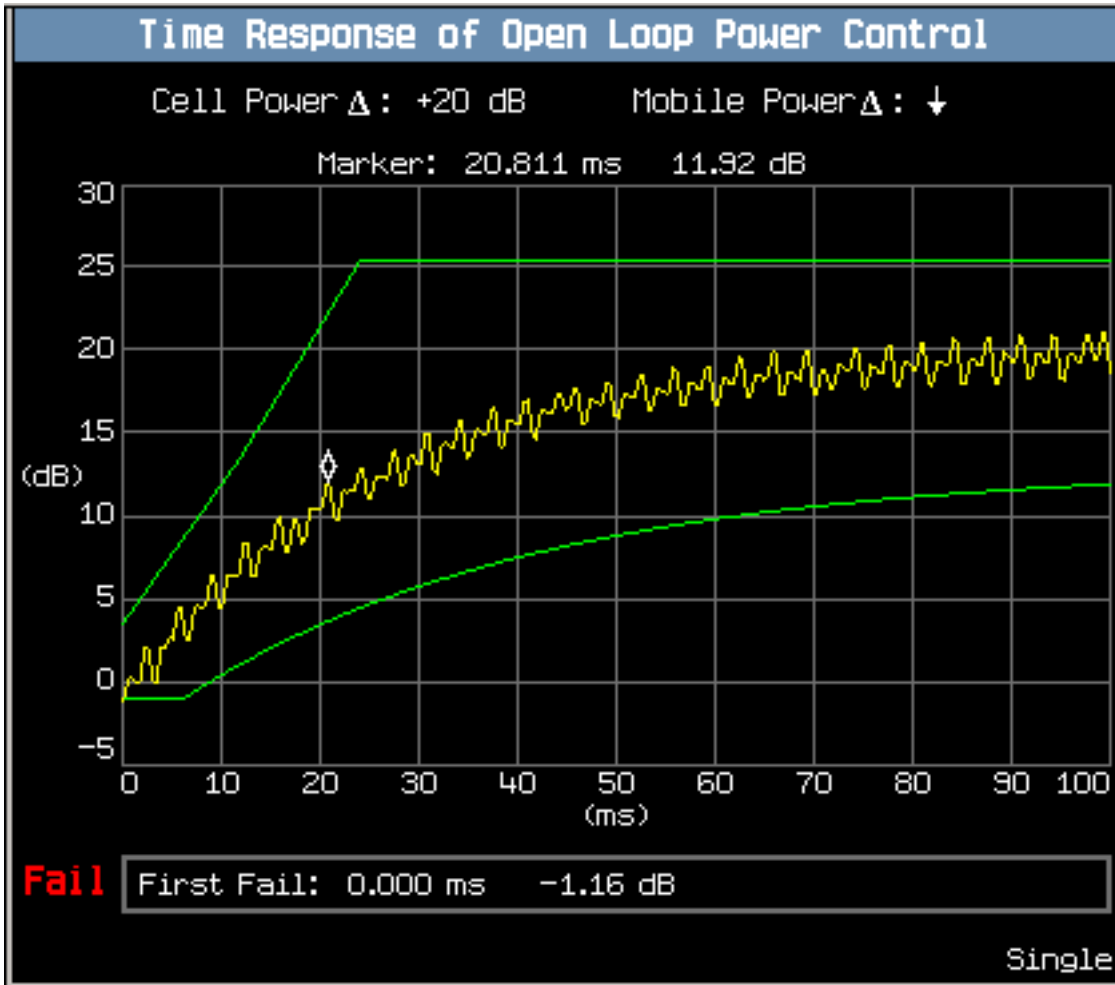
- Timeout Time/State - (see [“Timeouts”](#) on page 250).

### TROLPC Measurement Results

- Integrity Indicator - (see [“Integrity Indicator”](#) on page 255).
- Pass/Fail: An overall pass/fail indicator is displayed on the measurement screen and is available via GPIB commands (see [“FETCh:TROPower:MASK\[:FAIL\]?”](#) ). Fail is returned if the access terminal's power does not stay within the amplitude mask as defined in C.S0033 3.1.2.3.2 (see [“3.1.2.3.2 Time Response of Open Loop Power Control”](#) on page 71).
- Power Versus Time Data Points: The 371 data points that describe the access terminal's power versus time behavior are available from the measurement screen marker, and via GPIB commands (see [“FETCh:TROPower:TRACe?”](#) ).

## Time Response of Open Loop Power Control (TROLPC) Measurement Description

- **First Fail Point:** If the measurement result is “Fail,” the measurement screen displays the first point that the access terminal output power crossed the amplitude mask.

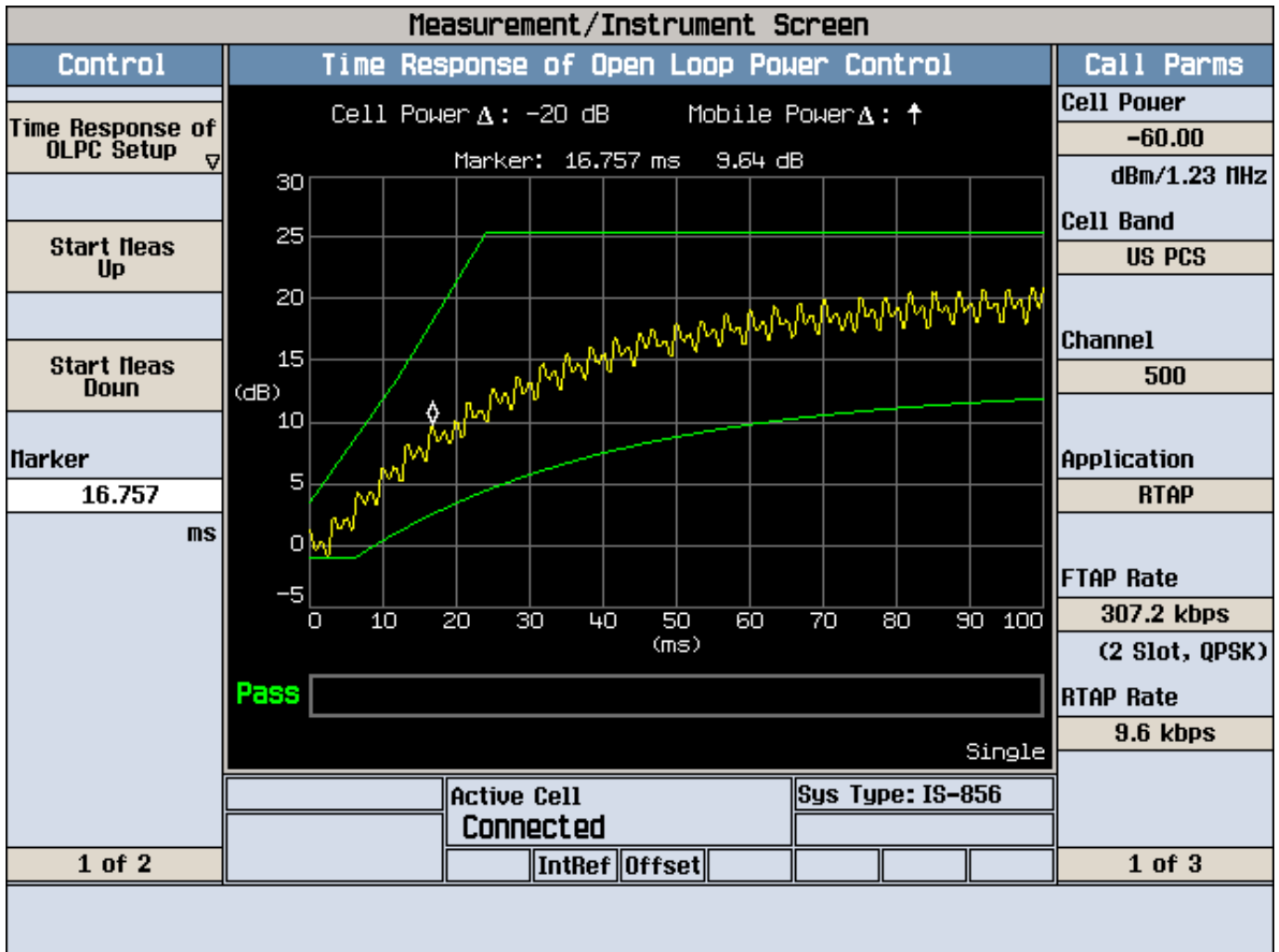




## Time Response of Open Loop Power Control (TROLPC) Measurement Description

### The TROLPC Measurement Screen

The TROLPC measurement screen includes two softkeys to initiate the measurement for either a +20 dB or -20 dB step change (Start Meas Up (F1) or Start Meas Down (F2)). A graphical display is provided to show the measurement result, which you can navigate with the marker.



- The y-axis on the graphical display is fixed at -5 dB to +30 dB. There are no polarity indicators on the y-axis, in accordance with the test standard specifications. All changes in mobile station output power are displayed as absolute values.
- The x-axis on the graphical display is fixed from 0 ms to 100 ms.
- The directions of cell power and access terminal power level changes are displayed in text above the grid.
- The amplitude mask is displayed as green lines on the display. (The access terminal power trace is shown in yellow.)
- The marker can be positioned on each of the 371 power versus time data points. The access terminal power level for that data point is then displayed.

## **Time Response of Open Loop Power Control (TROLPC) Measurement Description**

### **TROLPC Input Signal Requirements**

[“Input Signal Requirements” on page 101](#)

### **Key C.S0033 Tests Performed using the TROLPC Measurement**

- [“3.1.2.3.2 Time Response of Open Loop Power Control” on page 71](#)

### **Calibrating the TROLPC Measurement**

The TROLPC measurement is automatically calibrated during a channel power calibration. Follow the channel power calibration schedule and the TROLPC measurement will be properly calibrated. Refer to [“Calibrating the Test Set” on page 98](#) for a description of channel power calibration.

### **Related Topics**

Manual Operation: [“Measuring Time Response of Open Loop Power Control \(TROLPC\)” on page 670](#)

[“Programming a Time Response of Open Loop Power Control \(TROLPC\) Measurement” on page 289](#)

[“Time Response of Open Loop Power Control Troubleshooting” on page 722](#)

[“ACK Channel Bit Fixed Mode Attribute” on page 154](#)

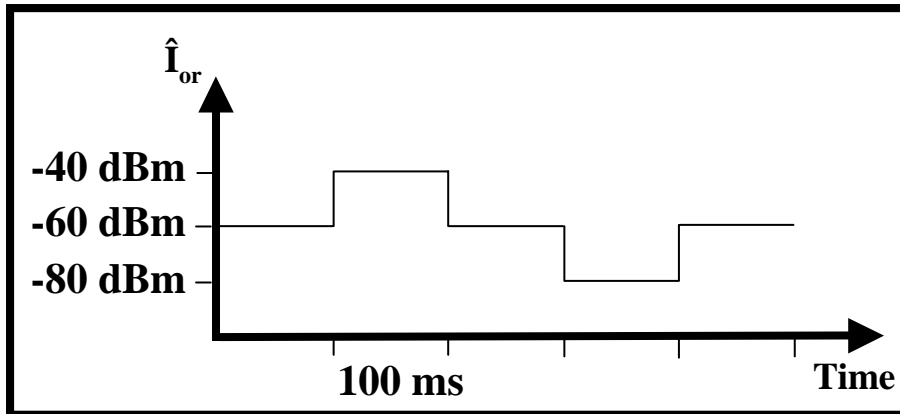
### 3.1.2.3.2 Time Response of Open Loop Power Control

#### Definition

Following a step change in the mean input power, the mean output power of the access terminal changes as a result of the open loop power control. This test measures the open loop power control time response to a step change in the mean input power.

#### Method of Measurement

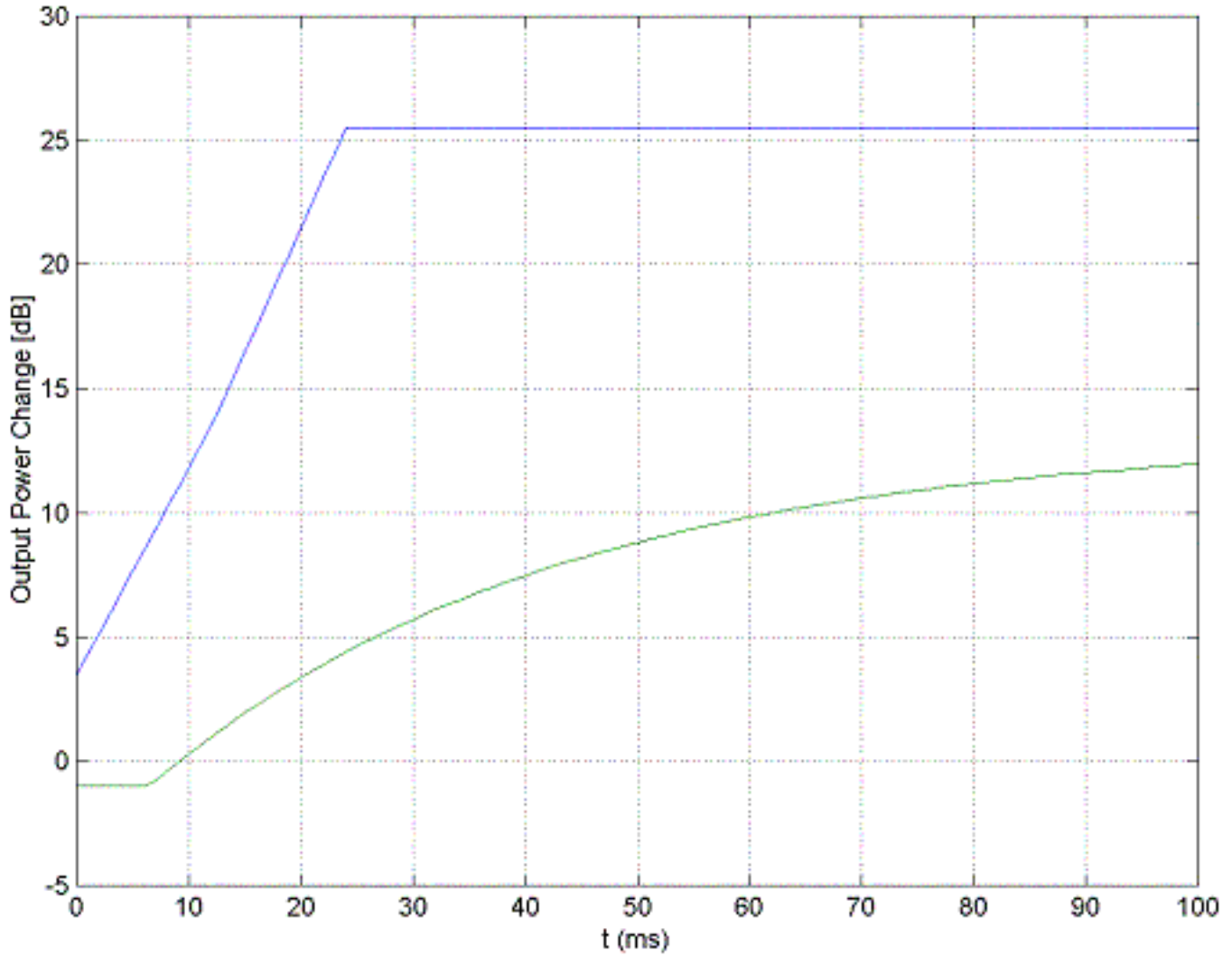
1. Connect the access network emulator to the AT.
2. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 9.6 kbps.
3. Configure the Test Application FTAP so that the ACK Channel is not transmitted by the access terminal.
4. Set  $\hat{I}_{or}$  to -60 dBm/1.23 MHz.
5. Send alternating '0' and '1' power control bits on the Forward Traffic Channel.
6. Change  $\hat{I}_{or}$  by +20 dB, -20 dB, -20 dB, and +20 dB and measure the transmitted output power as a function of time after each step change for 100 ms.



### 3.1.2.3.2 Time Response of Open Loop Power Control

#### Minimum Standard

The mean output power of the access terminal shall transition to its final value in a direction opposite in sign to the change in  $\hat{I}_{or}$ , with a magnitude contained between the mask limits as pictured below:



#### Simplified Mask Limit Equations

For an  $\hat{I}_{or}$  step change of 20 dB, the mask limit equations can be simplified and are as follows:

The upper pass/fail limit line is made up of three line segments. In the following formulas,  $p$  is mobile station power delta, in dB, and  $t$  is equal to time in milliseconds.

#### Equation 1. Upper limit line segment 1:

$$0 \leq t < 12$$

$$p = (5/6) \times t + 3.5$$

#### Equation 2. Upper limit line segment 2:

$$12 \leq t < 24$$

$$p = t + 1.5$$

#### Equation 3. Upper limit line segment 3:

$$24 \leq t \leq 100$$

$$p = 25.5$$

The lower pass/fail limit line is made up of one line segment and a curve. In the following formulas, let  $t1$  equal:

#### Equation 4. Calculating the value of $t1$ (in ms):

$$t1 = 1.25 \text{ D } (36 \times \ln \frac{7}{8}) \cong 6.057$$

#### Equation 5. Lower limit line segment 1:

$$0 \leq t < t1$$

$$p = \text{D}1$$

#### Equation 6. Lower limit line segment 2:

$$t1 \leq t \leq 100$$

$$p = \text{D}3 + 16 \times \left( 1 \text{ D } e^{-\frac{1.25 \text{ D } t}{36}} \right)$$

#### Related Topics

Manual Operation: [“Testing 3.1.2.3.2 Time Response of Open Loop Power Control” on page 672](#)

[“Programming a Time Response of Open Loop Power Control \(TROLPC\) Measurement” on page 289](#)

[“Time Response of Open Loop Power Control \(TROLPC\) Measurement Description” on page 66](#)

[“Time Response of Open Loop Power Control Troubleshooting” on page 722](#)

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## TX Spurious Emissions Measurement Description

- [“How is a TX Spurious Emissions Measurement Made?”](#)
- [“TX Spurious Emissions Measurement Parameters”](#)
- [“TX Spurious Emissions Measurement Results”](#)
- [“TX Spurious Emissions Input Signal Requirements”](#)
- [“Key C.S0033 Tests Performed using the TX Spurious Emissions Measurement”](#)
- [“Calibrating the TX Spurious Emissions Measurement”](#)

### How is a TX Spurious Emissions Measurement Made?

TX Spurious Emissions is a measure of the access terminal's transmission at frequencies outside its assigned channel.

The test set's TX Spurious Emissions measurement is made by first making a channel power measurement centered on the assigned channel, to determine carrier power. The test set then measures the power at four frequencies offset from the center of the assigned channel. The test set measures the average power present at each frequency offset, over a slot, within a 30 kHz filter centered on the offset frequency. The test set then reports the power of each frequency offset relative to the carrier power (the result is given in dB).

The four frequency offsets at which power is measured depends upon the AT band class:

- Frequency offsets for band classes 1, 4, and 6:
  - $\pm 885$  kHz (lower and upper adjacent channels)
  - $\pm 1.98$  MHz (lower and upper alternate channels)
- Frequency offsets for band classes 0, 3, 5, and 9:
  - $\pm 1.25$  MHz (lower and upper adjacent channels)
  - $\pm 1.98$  MHz (lower and upper alternate channels)

The measurement triggers on the test set's internal  $\sim 1.667$  ms slot clock.

You must establish an RTAP connection to perform the TX spurious emissions measurement (see [“How Do I Open a Session and Connection?”](#) on page 647).

### TX Spurious Emissions Measurement Parameters

- **Mask Control:** When set to auto, the pass/fail limits for the spurious emissions at the adjacent and alternate channels are set as specified by C.S0033 3.1.2.4.1. When set to manual, you can set the pass/fail limits for the measurement. Separate pass/fail limits are provided for the adjacent and alternate channel measurements.
- **Adjacent Limit (in dBc):** Sets the pass/fail limit for the adjacent channel measurement (range is -65 to -10 dBc).
- **Alternate Limit (in dBc):** Sets the pass/fail limit for the alternate channel measurement (range is -65 to -10 dBc).

## TX Spurious Emissions Measurement Description

- Multi-Measurement Count - When ON, this enables averaging of the TX spurious emissions results. (See [“Statistical Measurement Results” on page 249](#)).
- Trigger Arm - (see [“Trigger Arm \(Single or Continuous\) Description” on page 253](#)).
- Timeout Time/State - (see [“Timeouts” on page 250](#)).

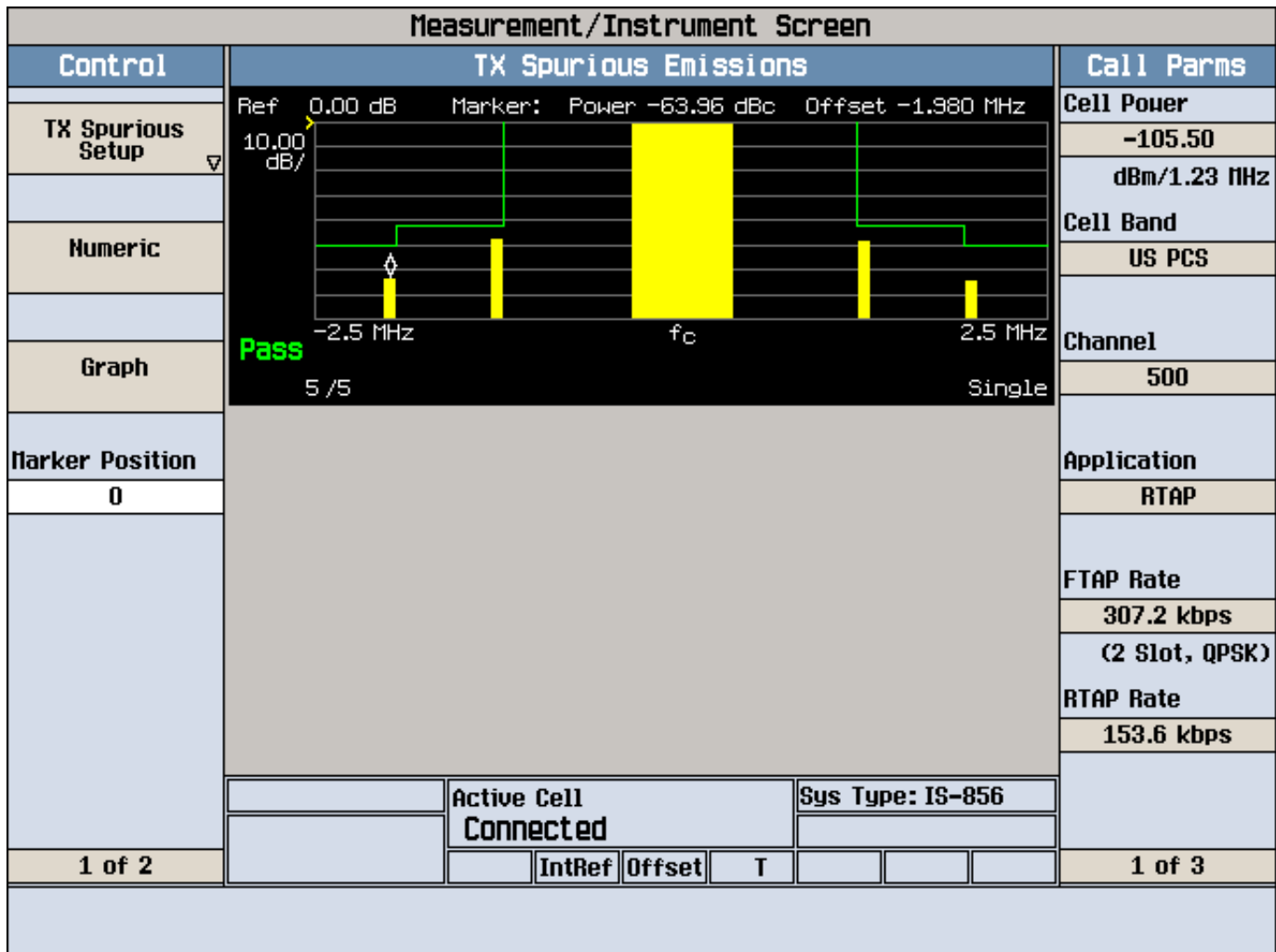
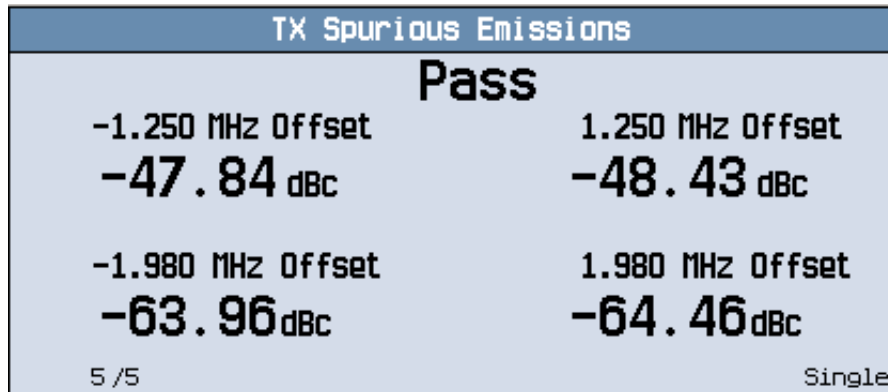
## TX Spurious Emissions Measurement Results

- Integrity Indicator - (see [“Integrity Indicator” on page 255](#)).
- Pass/Fail Result: An overall pass/fail indicator is displayed on the measurement screen and is available via GPIB commands (see [“FETCh:CTXSpurious:MASK\[:FAIL\]?”](#) ). The pass/fail result indicates whether the spurious emissions for all adjacent and alternate channels are within limits.
- Spurious Emissions for Adjacent and Alternate Channels: The test set returns the spurious emissions levels for all adjacent and alternate channels. These spurious emissions levels are available from the measurement screen marker and via GPIB commands (see [“FETCh:CTXSpurious<\[:ALL\] | :INTEGRITY>?”](#) ).

## TX Spurious Emissions Measurement Description

### The TX Spurious Emissions Measurement Screen

The TX Spurious Emissions measurement screen can display numeric results or a graphical display.





## TX Spurious Emissions Measurement Description

- The y-axis on the graphical display is fixed at -80 dBc/30 kHz to 0 dBc/30 kHz.
- The x-axis on the graphical display is fixed at -2.5 MHz to 2.5 MHz relative to the carrier frequency.
- Pass/fail limit lines are shown in green on the graphical display. These lines are set based on Mask Control and Adjacent/Alternate Limit (see [“TX Spurious Emissions Measurement Parameters” on page 74](#)). If spurious emissions at any adjacent or alternate channel exceed a limit line, the word Fail appears on the display.
- The carrier is displayed in the center of the display as a solid yellow bar. The spurious emissions power at the four frequency offsets is displayed as yellow bars.
- The marker can be positioned on each of the four frequency offsets. The spurious emissions for that frequency offset is then displayed.

## TX Spurious Emissions Input Signal Requirements

[“Input Signal Requirements” on page 101](#)

## Key C.S0033 Tests Performed using the TX Spurious Emissions Measurement

- [“3.1.2.4.1 Conducted Spurious Emissions” on page 78](#)

## Calibrating the TX Spurious Emissions Measurement

The TX spurious emissions measurement is automatically calibrated during a channel power calibration. Follow the channel power calibration schedule and the TX spurious emissions measurement will be properly calibrated. Refer to [“Calibrating the Test Set” on page 98](#) for a description of channel power calibration.

## Related Topics

Manual Operation: [“Measuring TX Spurious Emissions” on page 674](#)

[“Programming a Tx Spurious Emissions Measurement” on page 292](#)

[“Tx Spurious Emissions Measurement Troubleshooting” on page 724](#)

### 3.1.2.4.1 Conducted Spurious Emissions

#### Definition

Conducted spurious emissions are emissions at frequencies that are outside the assigned CDMA Channel, measured at the access terminal antenna connector. This test measures the spurious emissions during continuous transmission.

#### Method of Measurement

1. Set Open Loop Adjust to -81 dB or -84 dB, depending upon band class.
2. Set Probe Initial Adjust to 15 dB.
3. Set Probe Num Step to 15 probes/sequence (this step will be removed from C.S0033 in January 2003).
4. Set Power Step to 7.5 dB/step (this step will be removed from C.S0033 in January 2003).
5. Set Probe Sequence Max to 15 sequences (this step will be removed from C.S0033 in January 2003).
6. Connect the access network emulator to the AT.
7. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 153.6 kbps.
8. Configure the Test Application FTAP with a Forward Traffic Channel rate of 307.2 kbps (2-slot version), and such that the ACK Channel is transmitted at all the slots. (It is necessary for the access terminal to transmit the R-ACK Channel to provide its maximum output power.)
9. Set  $\hat{I}_{or}$  to -105.5 dBm/1.23 MHz.
10. Transmit continuous up power control bits.
11. Measure the spurious emission levels at the specified frequency offsets.

#### Minimum Standard

The spurious emissions shall be within the specified limits for each band class. The key specifications are as follows:

**Table 3. Key Minimum Standard Specifications**

Band Classes	Frequency Offsets	Emission Limit (dBc/30 kHz)
0, 2, 3, 5, 7, 9	885 kHz to 1.98 MHz	-42
0, 2, 3, 5, 7, 9	1.98 MHz to 4.00 MHz	-54
1, 4, 6, and 8	1.25 MHz to 1.98 MHz	-42
1, 4, 6, and 8	1.98 MHz to 4.00 MHz	-50

**Related Topics**

Manual Operation: [“Testing 3.1.2.4.1 Conducted Spurious Emissions” on page 676](#)

[“Programming a Tx Spurious Emissions Measurement” on page 292](#)

[“TX Spurious Emissions Measurement Description” on page 74](#)

[“Tx Spurious Emissions Measurement Troubleshooting” on page 724](#)

## Waveform Quality + Code Domain Measurement Description

- [“How is a Waveform Quality + Code Domain Measurement Made?”](#)
- [“Waveform Quality + Code Domain Measurement Parameters”](#)
- [“Waveform Quality + Code Domain Measurement Results”](#)
  - [“Waveform Quality Measurement Results”](#)
  - Code Domain Power:
    - [“Code Domain Power Measurement Results Available from the Measurement Screen”](#)
    - [“Code Domain Power Measurement Results Available Programmatically”](#)
  - Code Domain Power + Noise:
    - [“Code Domain Power + Noise Measurement Results Available from the Measurement Screen”](#)
    - [“Code Domain Power + Noise Measurement Results Available Programmatically”](#)
- [“Waveform Quality + Code Domain Input Signal Requirements”](#)
- [“Key C.S0033 Tests Performed Using the Waveform Quality + Code Domain Measurement”](#)
- [“Calibrating the Waveform Quality + Code Domain Measurement”](#)

### How is a Waveform Quality + Code Domain Measurement Made?

Waveform quality is the basic measure of the performance of a CDMA transmitter. Waveform quality provides information on how well the access terminal's signal matches the ideal signal.

The test set's waveform quality measurement is made by sampling (on a slot-by-slot basis) the AT transmitter down-converted input signal, then applying DSP (Digital Signal Processing) techniques to determine the original data input to the access terminal transmitter's Walsh spreading function for each channel. The DSP then generates a representation of what the “ideal” signal would be given the coding and data in use at the time of transmission. The ideal waveform is then compared with the measured waveform to determine the waveform quality.

Code domain power determines the power in each Walsh code of the access terminal's signal. This allows you to determine how the power is distributed in the access terminal's signal.

The test set's code domain measurements are made by decoding each Walsh code in the access terminal's signal using a Walsh code correlation algorithm which measures the waveform correlation factor for each Walsh code.

The waveform quality + code domain measurement returns two sets of results: waveform quality results and code domain results. When you initiate the waveform quality + code domain measurement, both sets of results are always determined, you do not need to initiate them individually (saving you measurement time). The measurement triggering occurs on the test set's internal ~26.667 ms frame clock (the measurement always begins at the start of a frame).

You must establish an RTAP connection to perform waveform quality + code domain measurements (see [“How Do I Open a Session and Connection?”](#) on page 647).

## Waveform Quality + Code Domain Measurement Parameters

- **Slots to Measure** - Sets the number of contiguous slots that are sampled during the waveform quality + code domain measurement.

For example, if Slots to Measure is set to 2, then two contiguous slots are sampled and the average result for these two slots is returned. Slots to Measure may be set to any integer from 1 to 8 slots. The test set's performance is only specified for Slots to Measure set to 1 and 8 slots, but the performance for Slots to Measure equaling 2 to 7 may be derived mathematically.

C.S0033 specifications require that all code domain power measurements acquire 1.66... ms (1 slot) of active data for each channel involved in the calculation. Because not all channels are active for an entire slot, code domain measurements often must acquire data for several slots to compile 1.66... ms of active data for the channels under test. For example, for any code domain tests involving the power in the R-Pilot channel, the measurement must obtain data from 2 slots, since the R-Pilot channel is only active for 7/8 of a slot. The recommended Slots to Measure settings are thus as follows:

**Table 4. Recommended Slots to Measure Settings**

C.S0033 Test Number	Test Name	Recommended Slots to Measure Setting
3.1.2.1.2	Frequency Accuracy	1
3.1.2.2.1	Time Reference	1
3.1.2.2.2	Waveform Quality and Frequency Accuracy	1
3.1.2.3.7	RRI Channel Output Power	8 (This test compares the R-RRI Channel power to the R-Pilot Channel power. Because the RRI Channel is only active for 1/8 of a slot, you must set Slots to Measure to at least 8 for this test.)
3.1.2.3.8.1	DRC Channel Output Power	2 (This test compares the R-DRC Channel power to the R-Pilot Channel power. Because the R-Pilot Channel is only active for 7/8 of a slot, you must set Slots to Measure to at least 2 for this test.)
3.1.2.3.8.2	ACK Channel Output Power	2 (This test compares the R-ACK Channel power to the R-Pilot Channel power. Because the R-Pilot Channel is only active for 7/8 of a slot, and because the R-ACK Channel is only active 1/2 of a slot, you must set Slots to Measure to at least 2 for this test.)
3.1.2.3.8.3 Tests 1-5	Data Channel Output Power	2 (These tests compare the R-Data Channel power to the R-Pilot Channel power. Because the R-Pilot Channel is only active for 7/8 of a slot, you must set Slots to Measure to at least 2 for these tests.)
3.1.2.3.8.3 Test 5	Inactive Channel Power	1 (This test measures the power in the inactive channels relative to total power, there is no comparison to R-Pilot power. So Slots to Measure can be set to 1 for this test.)

R-DRC, R-ACK, and R-Data Channel power, as well as inactive Walsh code power levels are measured when you perform test 3.1.2.3.7. To minimize test time, use the power results returned for these other channels when testing the R-RRI channel in test 3.1.2.3.7.

- **Multi-Measurement Count** - Sets the number of times the measurement will be performed. Each measurement begins on the next available frame boundary (it must wait for the previous measurement to

## Waveform Quality + Code Domain Measurement Description

complete, then it begins on the next available frame boundary). When all of the measurements have been performed, the average, minimum, maximum and standard deviation of the results are returned for waveform quality (standard deviation is only available programmatically), only average result is returned for code domain.

For example, if Slots to Measure is set to two and Multi-Measurement Count is set to four:

1. Two contiguous slots are measured and averaged
2. On the next available frame boundary, two contiguous slots are measured and averaged.
3. On the next available frame boundary, two contiguous slots are measured and averaged.
4. On the next available frame boundary, two contiguous slots are measured and averaged.
5. The results of steps 1-4 are averaged and reported.

(See [“Statistical Measurement Results”](#) on page 249).

- Trigger Arm - (see [“Trigger Arm \(Single or Continuous\) Description”](#) on page 253).
- Timeout Time/State - (see [“Timeouts”](#) on page 250).

## Waveform Quality + Code Domain Measurement Results

- Integrity Indicator - (see [“Integrity Indicator”](#) on page 255).
- [“Waveform Quality Measurement Results”](#) on page 82
- [“Code Domain Power Measurement Results Available from the Measurement Screen”](#) on page 84
- [“Code Domain Power Measurement Results Available Programmatically”](#) on page 87
- [“Code Domain Power + Noise Measurement Results Available from the Measurement Screen”](#) on page 89
- [“Code Domain Power + Noise Measurement Results Available Programmatically”](#) on page 91

## Waveform Quality Measurement Results

The waveform quality (numeric rho) measurement returns:

- Multi-Code Rho: The fraction of signal energy that correlates with an ideal signal after time offset and frequency error have been removed. Range is 0.0000 to 1.0000, with 1 being a perfectly correlated signal.
- Frequency Error (in Hz): Measure of how accurately the access terminal is transmitting at its assigned center frequency.
- Time Error (in  $\mu$ s on measurement screen, in s programmatically): Measure of how accurately the access terminal has aligned its timing to the pilot signal broadcast from the test set.
- Carrier Feedthrough (in dBc): The ratio of the movement away from the origin of the constellation of the transmitted signal to the unit circle magnitude of the constellation (measure of I/Q modulator DC offsets).
- Phase Error (in degrees): The root-mean-square sum of the phase components of each of the error vectors included in the EVM calculation, expressed in degrees (rms phase difference between the ideal and actual signal).
- Magnitude Error (in %): The ratio of the root-mean-square sum of the magnitude components of each of the error vectors included in the EVM calculation to the unit circle magnitude of the signal vector (rms amplitude difference between the ideal and actual signal).

## Waveform Quality + Code Domain Measurement Description

- Error Vector Magnitude (EVM) (in %): The ratio of the root-mean-square sum of the magnitude of each of the error vectors to the unit circle magnitude of the signal vector.

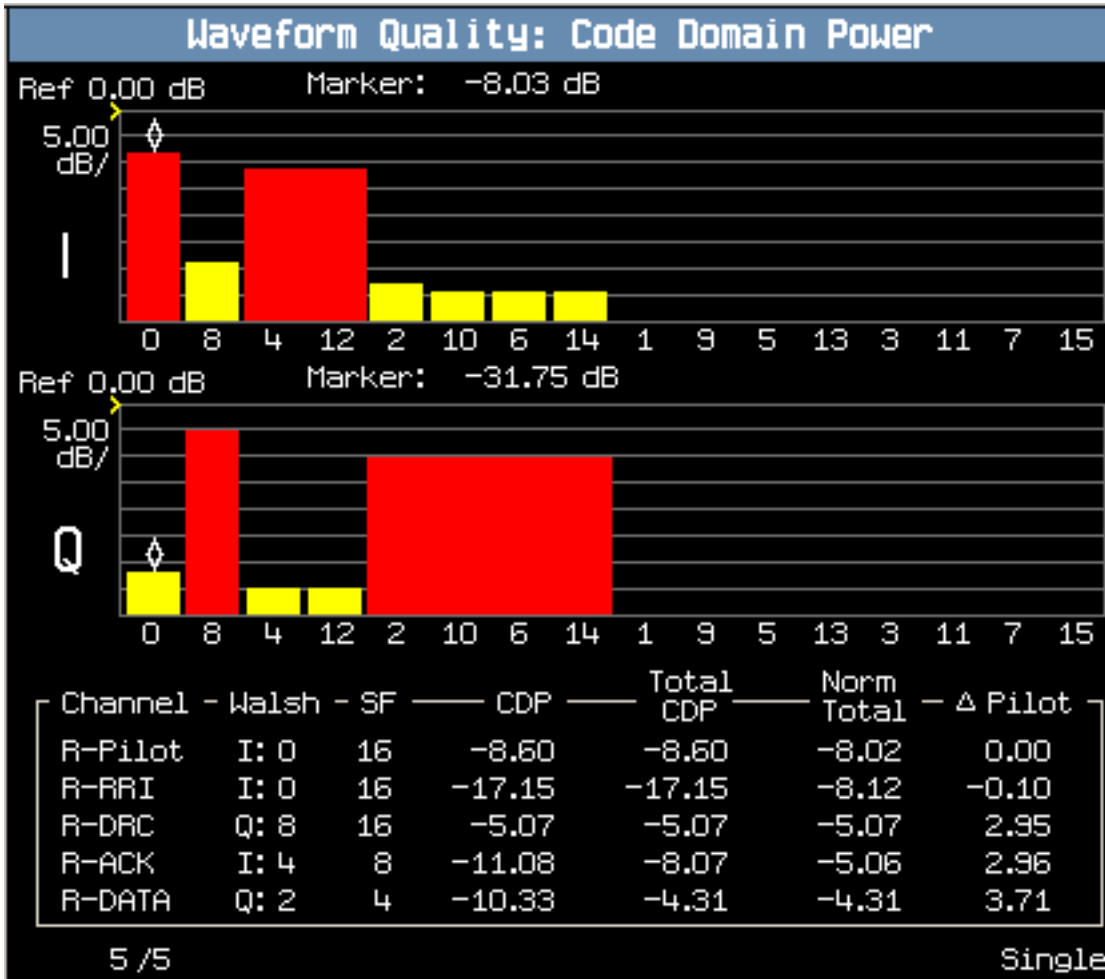
A typical measurement result is shown below:

Waveform Quality: Numeric Rho	
<b>Rho</b>	<b>Frequency Error</b>
<b>0.9940</b>	<b>-6.8 Hz</b>
<b>Time Error:</b>	<b>-0.05 us</b>
<b>Carrier Feedthrough:</b>	<b>-44.29 dBc</b>
<b>Phase Error:</b>	<b>4.78 °</b>
<b>Magnitude Error:</b>	<b>2.15 %</b>
<b>EVM:</b>	<b>7.79 %</b>
	Single

## Waveform Quality + Code Domain Measurement Description

### Code Domain Power Measurement Results Available from the Measurement Screen

The measurement screen for Code Domain Power includes a graphical display and a table of data. The graphical display includes two histograms which indicate the power in the 16 Walsh codes on the I and Q channels of the access terminal's signal. The table of data provides information about each of the reverse channels (R-Pilot, R-RR1, R-DRC, R-ACK and R-Data), such as Walsh code, Spread Factor, and Total Code Domain Power.



### Code Domain Power Graphical Display

The graphical display's histograms indicate the power in the 16 Walsh codes on the access terminal's I channel (Walsh codes I:0<sub>SF16</sub> to I:15<sub>SF16</sub>) and the 16 Walsh codes on the Q channel (Walsh codes Q:0<sub>SF16</sub> to Q:15<sub>SF16</sub>). Note that the Walsh codes are not displayed in sequential order of 0 to 15, but rather in bit reversed order. This ordering allows for the Walsh codes comprising a single reverse channel to be grouped together on the display (for example, Q:2<sub>SF16</sub>, Q:10<sub>SF16</sub>, Q:6<sub>SF16</sub>, and Q:14<sub>SF16</sub>, which constitute R-Data (Q:2<sub>SF4</sub>). See [“Reverse Channel Walsh Code Distribution” on page 170](#)).

The following results are available from the graphical display:

- A red histogram bar indicates that the Walsh code is active. A yellow bar indicates that the Walsh code is inactive.



## Waveform Quality + Code Domain Measurement Description

- **Marker Power of the Walsh code (in dB):**  
The height of the histogram bars indicate power level. When the marker is positioned on a Walsh code, the power of that Walsh code is displayed. This is the average power in the Walsh code over a slot, divided by the total power in all of the Walsh codes during the same slot. This power level includes any desired signal as well as noise present in the selected Walsh code. The Marker Power is reported for the spread factor 16 Walsh code selected. For example if you select Walsh code I:4, the power in I:4<sub>SF16</sub> (0000111100001111) is displayed. The marker result does not acknowledge that this Walsh code is actually occupied by the R-ACK I:4<sub>SF8</sub> which encompasses both I:4<sub>SF16</sub> and I:12<sub>SF16</sub> (see [“Reverse Channel Walsh Code Distribution” on page 170](#)). For information regarding the power in a particular reverse channel such as R-ACK, you must reference the table of data on the measurement screen.

### Code Domain Power Tabular Data

The table on the measurement screen provides information about each of the reverse channels (R-Pilot, R-RRI, R-DRC, R-ACK and R-Data. See [“Reverse Channel Overview” on page 169](#)). The measurement results are as follows:

- **Walsh:** This column reports whether the channel resides on I or Q, and at what Walsh code.
- **SF (Spread Factor):** This column reports the **“Spread Factor”** of the channel. (Note: if the channel has a SF of 16, 8 or 4, its width in the histogram above will be 1, 2, or 4 bars, respectively.)
- **CDP (Code Domain Power)**  
This column reports the following (in dB):
  - **R-Pilot:** The test set measures the power in Walsh code I:0<sub>SF16</sub> during the last 7/8 of the slot. Since the power in the first 1/8 of the slot contains the R-RRI transmission, the test set sets this power to zero. It then averages this power distribution over the entire slot and divides by the total power in all of the Walsh codes during the same slot.
  - **R-RRI:** The test set measures the power in Walsh code I:0<sub>SF16</sub> during the first 1/8 of the slot. Since the power in the last 7/8 of the slot contains the R-Pilot transmission, the test set sets this power to zero. It then averages this power distribution over the entire slot, and divides by the total power in all of the Walsh codes during the same slot.  
(If you add the values for R-Pilot and R-RRI CDP, the result is equal to the Marker Power for Walsh code I:0<sub>SF16</sub>.)
  - **R-DRC:** The test set measures the power in Walsh code Q:8<sub>SF16</sub> and divides by the total power in all of the Walsh codes during the same slot.  
Because R-DRC is transmitted over an entire slot, this result is equal to the Marker Power for Walsh code Q:8<sub>SF16</sub>.
  - **R-ACK:** The test set measures the power in Walsh code I:4<sub>SF16</sub> during the first 1/2 of the slot. Since the R-ACK doesn't transmit during the second 1/2 of the slot, the test set sets this power to zero. It then averages this power distribution over the entire slot, and divides by the total power in all of the Walsh codes during the same slot.  
Ideally this value is equal to the Marker Power for Walsh code I:4<sub>SF16</sub> (They will only be equal if the power in Walsh code I:4<sub>SF16</sub> during the second 1/2 of the slot is zero. If there is noise, or some of the R-ACK transmission occurs in the second 1/2 of the slot, then that power will not be measured and included in the CDP result. However the marker power will include this power, since it does not assume the power in the second 1/2 of the slot is zero, but actually measures it.)

## Waveform Quality + Code Domain Measurement Description

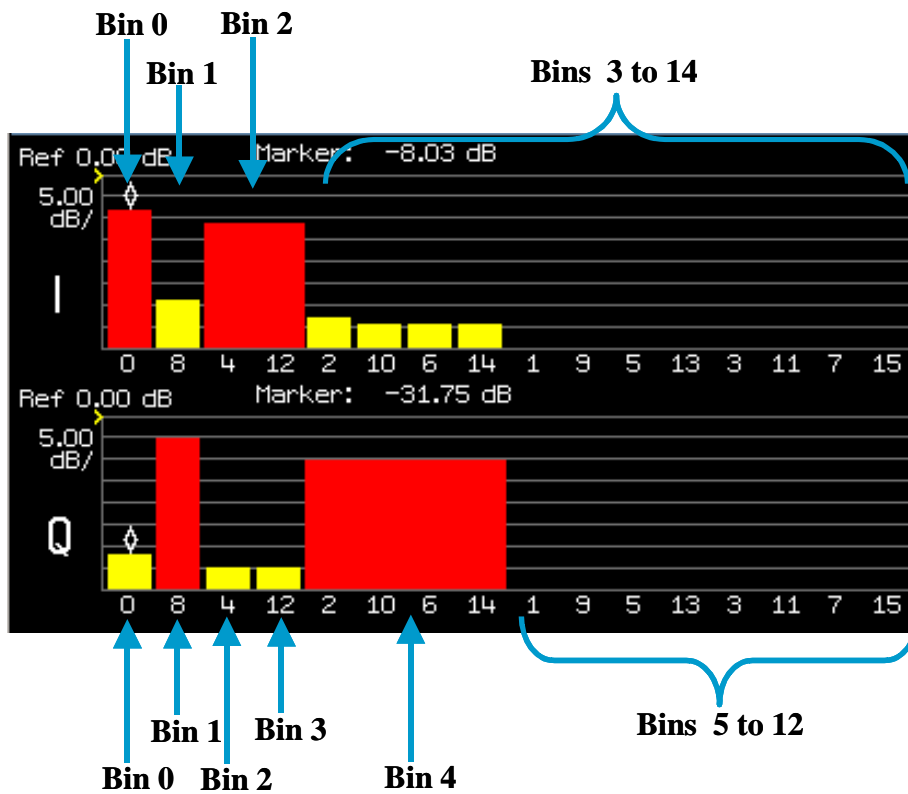
- R-Data: The test set measures the power in Walsh code  $Q:2_{SF16}$  and divides by the total power in all of the Walsh codes during the same slot.  
Because R-Data is transmitted over an entire slot, this result is equal to the Marker Power for Walsh code  $Q:2_{SF16}$ .
- Total CDP (Total Code Domain Power)  
This column is derived mathematically from the CDP column. It multiplies CDP for each channel by the base spread factor 16 and divides by the channel's spread factor.  
If you convert the values in this column to linear power ratios, they should ideally add up to 1 (if all of the AT's power is contained in these 5 channels, and none is transmitted as noise on other Walsh codes).
  - R-Pilot: Multiply R-Pilot CDP by 16/16 (add 0 dB).
  - R-RRI: Multiply R-RRI CDP by 16/16 (add 0 dB).
  - R-DRC: Multiply R-DRC CDP by 16/16 (add 0 dB).
  - R-ACK: Multiply R-ACK CDP by 16/8 (add +3.01 dB).
  - R-Data: Multiply R-Data CDP by 16/4 (add +6.02 dB).
- Norm Total (Normalized Total Code Domain Power)  
This column is derived mathematically from the Total CDP column, and normalizes the power in each reverse channel to a duration of one slot. It multiplies Total CDP for each channel by 1 slot and divides by the "on" time of the channel (what fraction of a slot is the channel transmitting).
  - R-Pilot: Multiply R-Pilot Total CDP by 1/(7/8) (add +0.5799 dB).
  - R-RRI: Multiply R-RRI Total CDP by 1/(1/8) (add +9.03 dB).
  - R-DRC: Multiply R-DRC Total CDP by 1/1 (add 0 dB). (Because R-DRC is transmitted during an entire slot, this value is equal to R-DRC Total CDP.)
  - R-ACK: Multiply R-ACK Total CDP by 1/(1/2) (add +3.01 dB)
  - R-Data: Multiply R-DATA Total CDP by 1/1 (add 0 dB). (Because R-Data is transmitted during an entire slot, this value is equal to R-Data Total CDP.)
- $\Delta$  Pilot (Normalized Total CDP Relative to R-Pilot)  
This column is derived mathematically from the Norm Total column. This column compares the Norm Total power of each reverse channel to the Norm Total power of the R-Pilot Channel. Thus, this column is derived by subtracting the R-Pilot Norm Total power (in dB), from each reverse channel's Norm Total power (in dB).
  - R-Pilot: This value is always 0 dB.
  - R-RRI: Ideally, this value should equal 0 dB because the R-RRI power level should be transmitted at the same power level as the R-Pilot.
  - R-DRC: Ideally, this value should equal DRC Channel Gain (see ["Expected Power" on page 185](#)).
  - R-ACK: Ideally, this value should equal ACK Channel Gain (see ["Expected Power" on page 185](#)).
  - R-Data: Ideally, this value should equal Data Offset Nom + Data Offset <rate> + Data Channel Gain (see ["Expected Power" on page 185](#)).

**Code Domain Power Measurement Results Available Programmatically**

From the measurement screen you can obtain code domain power results from the graphical display and from the table of data below it. Similarly, there are two groups of commands for obtaining code domain power results programmatically. One group of commands provides results which are similar to the graphical display - these commands return information for each of the 16 Walsh codes on the I and Q channels (such as I:0<sub>SF16</sub>). The other group of commands provides results which are similar to the table of data - the commands return information for each of the reverse channels (such as R-ACK).

**Code Domain Power Measurement Results Available by Numbered Bins** The measurement results for the 16 I and 16 Q channel Walsh codes are grouped into bins, which can be queried. The following figure shows the bin numbering system:

**Figure 2. Bin Numbering System**



Bins are dynamically allocated to Walsh codes. Every spread factor 16 Walsh code is assigned a bin, unless it is part of another, wider spread factor Walsh code (spread factor less than 16). For example, in the figure above, Walsh code I:12<sub>SF16</sub> is not assigned its own bin. Instead, information about I:12<sub>SF16</sub> is available from I channel bin 2, which is assigned to I:4<sub>SF8</sub>. There are a maximum of 16 bins available, numbered 0 to 15. If no Walsh codes have spread factors less than 16, 16 bins will be assigned measurement data. In the figure above, I channel bin 15 and Q channel bins 13-15 are unassigned (do not contain any measurement data).

## Waveform Quality + Code Domain Measurement Description

The following information is available for each bin:

- Walsh code state: active (1) or inactive (0).
- Walsh code number.
- Spread Factor: 16, 8 or 4. See [“Spread Factor” on page 169](#).

### Bin Power (in dB):

When you select a Walsh code with the marker on the measurement screen's graphical display, its power level is displayed. Similarly, when you query the power of a bin, the power of each of the spread factor 16 Walsh codes assigned to the bin is reported. If more than one spread factor 16 Walsh code is assigned to a bin, each has the same power level, because they are all actually part of a wider spread factor Walsh code (spread factor less than 16). For example, in the figure above ([“Bin Numbering System” on page 87](#)), the spread factor reported for I channel bin 2 is 8, indicating that two spread factor 16 Walsh codes are assigned to the bin. The bin power returned for I channel bin 2 is the power level of either Walsh code  $I:12_{SF16}$  or  $I:4_{SF16}$ , which are part of  $I:4_{SF8}$ .

Bin power is the average power over a slot in the spread factor 16 Walsh code, divided by the total power in all of the Walsh codes during the same slot. This power level includes any desired signal as well as noise present in the selected Walsh code.

Note the difference between Bin Power and Marker Power: Marker Power - There are always 16 marker positions containing measurement results, each position reporting the power for a single spread factor 16 Walsh code. Bin Power - There are often fewer than 16 bins containing measurement results, and a single bin may report the power for each of several spread factor 16 Walsh codes.

The commands to query this data for all bins on the I or Q channel are:

- [“FETCh:DOWQuality:CDPower:ICHannel\[:ALL\]?” on page 440](#)
- [“FETCh:DOWQuality:CDPower:QChannel\[:ALL\]?” on page 442](#)

These commands always return 64 comma-separated values (4 results for each of 16 bins). If all 16 bins are not assigned data (due to the presence of Walsh codes with spread factors less than 16), four comma-separated +9.91 E+37 (NAN) values will be returned for each unassigned bin. In other words, after all assigned bin data is reported, a series of +9.91 E+37 values separated by commas will be returned until a total of 64 values have been returned.

An example return result for [“FETCh:DOWQuality:CDPower:QChannel\[:ALL\]?” on page 442](#) is shown below:

```
+0.00000000E+000,+0.00000000E+000,+1.60000000E+001,-3.17802200E+001,
+1.00000000E+000,+8.00000000E+000,+1.60000000E+001,-4.97573800E+000,
+0.00000000E+000,+4.00000000E+000,+1.60000000E+001,-3.44952500E+001,
+0.00000000E+000,+1.20000000E+001,+1.60000000E+001,-3.44952500E+001,
+1.00000000E+000,+2.00000000E+000,+4.00000000E+000,-1.02941100E+001,
+0.00000000E+000,+1.00000000E+000,+1.60000000E+001,-4.28410000E+001,
+0.00000000E+000,+9.00000000E+000,+1.60000000E+001,-4.29233900E+001,
+0.00000000E+000,+5.00000000E+000,+1.60000000E+001,-4.27497100E+001,
+0.00000000E+000,+1.30000000E+001,+1.60000000E+001,-4.27871900E+001,
+0.00000000E+000,+3.00000000E+000,+1.60000000E+001,-4.30107000E+001,
+0.00000000E+000,+1.10000000E+001,+1.60000000E+001,-4.26903300E+001,
```

## Waveform Quality + Code Domain Measurement Description

```
+0.00000000E+000,+7.00000000E+000,+1.60000000E+001,-4.30544700E+001,  
+0.00000000E+000,+1.50000000E+001,+1.60000000E+001,-4.32616100E+001,  
9.91E37,9.91E37,9.91E37,9.91E37,  
9.91E37,9.91E37,9.91E37,9.91E37,  
9.91E37,9.91E37,9.91E37,9.91E37
```

Note that four comma-separated +9.91 E+37 (NAN) values are returned for bins 13, 14 and 15. These bins do not contain measurement results (see “[Bin Numbering System](#)” on page 87).

The commands to query how many bins are assigned for the I or Q channels are:

- “[FETCh:DOWQuality:CDPower:ICHannel:COUNT\[:BIN\]?](#)” on page 442
- “[FETCh:DOWQuality:CDPower:QChannel:COUNT\[:BIN\]?](#)” on page 443

The commands to query data for a particular I or Q channel bin are:

- “[FETCh:DOWQuality:CDPower:ICHannel:BIN? <bin num>](#)” on page 440
- “[FETCh:DOWQuality:CDPower:QChannel:BIN? <bin num>](#)” on page 443

**Code Domain Power Measurement Results Available for Each Reverse Channel** The “[Code Domain Power Tabular Data](#)” available from the measurement screen can be queried using the following commands:

- [FETCh:DOWQuality:CDPower:PILot\[:REVerse\]?](#)
- [FETCh:DOWQuality:CDPower:RRICchannel\[:REVerse\]?](#)
- [FETCh:DOWQuality:CDPower:DRCChannel\[:REVerse\]?](#)
- [FETCh:DOWQuality:CDPower:ACKChannel\[:REVerse\]?](#)
- [FETCh:DOWQuality:CDPower:DATA\[:REVerse\]?](#)

See

[“FETCh:DOWQuality:CDPower<:PILot | :RRICchannel | :DRCChannel | :ACKChannel | :DATA>\[:REVerse\]?”](#) on page 439 for details on what each query returns.

## Code Domain Power + Noise Measurement Results Available from the Measurement Screen

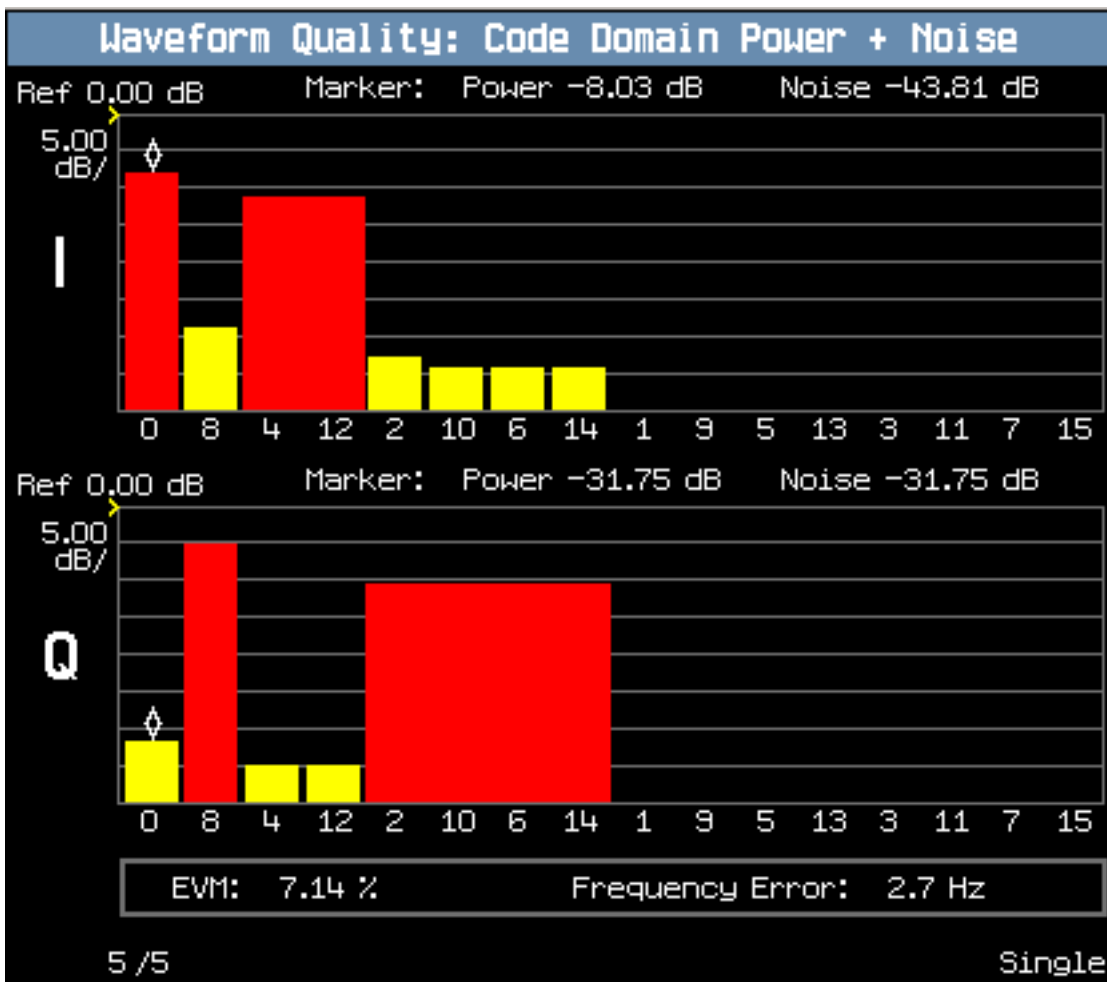
The measurement screen for Code Domain Power + Noise includes a graphical display which is identical to that on the Code Domain Power screen, except for the treatment of active Walsh codes. On the Code Domain Power screen, active Walsh codes are displayed on the histogram as solid red bars, and when a Walsh code is selected by the marker, the power reported is the total of desired signal power and noise present in the selected Walsh code. On the Code Domain Power + Noise screen, the active Walsh codes are displayed as red and yellow bars, with yellow indicating the noise power in the Walsh code. When the marker is placed on a Walsh code, the total power for the Walsh code is reported as on the Code Domain Power screen, but a separate value is also given for the noise power in the Walsh code.

## Waveform Quality + Code Domain Measurement Description

The following results are thus available from the graphical display:

- A red and yellow histogram bar, or a solid red bar (if no noise is measured in the Walsh code) indicates that the Walsh code is active. A solid yellow bar indicates that the Walsh code is inactive.
- Marker Power of the Walsh code (in dB):  
This is identical to the Marker Power for Code Domain Power (see “Code Domain Power Graphical Display” on page 84).
- Noise Power of the Walsh code (in dB):  
When the marker is positioned on a Walsh code, the noise power of that spread factor 16 Walsh code is also displayed. This is the average power level of the noise present in the Walsh code over a slot, divided by the total power in all of the Walsh codes during the same slot.

A typical measurement result is shown below:



### Code Domain Power + Noise Measurement Results Available Programmatically

Programmatically, you can obtain the following Code Domain Power + Noise measurement results from bins (see [“Code Domain Power Measurement Results Available by Numbered Bins”](#) on page 87 for more information about numbered bins):

- Walsh code state: active (1) or inactive (0).
- Spread factor: 16, 8 or 4. See [“Spread Factor”](#) on page 169.
- Noise Power (in dB):  
This is the level of noise present in each of the spread factor 16 Walsh codes assigned to the bin. If more than one spread factor 16 Walsh code is assigned to a bin, each has the same noise level, because they are all actually part of a wider spread factor Walsh code (spread factor less than 16). Noise Power is the average power level of the noise present in the Walsh code over a slot, divided by the total power in all of the Walsh codes during the same slot.
- Bin Power (in dB):  
This is identical to the Code Domain Power Bin Power result (see [“Code Domain Power Measurement Results Available by Numbered Bins”](#) on page 87).

The commands to query this data for all bins on the I or Q channel are:

- [“FETCh:DOWQuality:CDPNoise:ICHannel\[:ALL\]?”](#) on page 444
- [“FETCh:DOWQuality:CDPNoise:QChannel\[:ALL\]?”](#) on page 446

These commands always return 64 comma-separated values (4 results for each of 16 bins). If all 16 bins are not assigned data (due to the presence of Walsh codes with spread factors less than 16), four comma-separated +9.91 E+37 (NAN) values will be returned for each unassigned bin. In other words, after all assigned bin data is reported, a series of +9.91 E+37 values separated by commas will be returned until a total of 64 values have been returned.

The commands to query how many bins are assigned for the I or Q channels are:

- [“FETCh:DOWQuality:CDPNoise:ICHannel:COUNT\[:BIN\]?”](#) on page 445
- [“FETCh:DOWQuality:CDPNoise:QChannel:COUNT\[:BIN\]?”](#) on page 447

The commands to query data for a particular I or Q channel bin are:

- [“FETCh:DOWQuality:CDPNoise:ICHannel:BIN? <bin num>”](#) on page 445
- [“FETCh:DOWQuality:CDPNoise:QChannel:BIN? <bin num>”](#) on page 447

### Waveform Quality + Code Domain Input Signal Requirements

[“Input Signal Requirements”](#) on page 101

### Key C.S0033 Tests Performed Using the Waveform Quality + Code Domain Measurement

[“3.1.2.2.2 Waveform Quality and Frequency Accuracy”](#) on page 93

[“3.1.2.3.7 RRI Channel Output Power”](#) on page 94

[“3.1.2.3.8 Code Domain Power”](#) on page 95

## Waveform Quality + Code Domain Measurement Description

### Calibrating the Waveform Quality + Code Domain Measurement

The waveform quality + code domain measurement is automatically calibrated during a channel power calibration. Follow the channel power calibration schedule and the waveform quality + code domain power measurement will be properly calibrated. Refer to [“Calibrating the Test Set” on page 98](#) for a description of channel power calibration.

### Related Topics

Manual Operation: [“Measuring Waveform Quality + Code Domain Power” on page 678](#)

[“Programming a Waveform Quality/Code Domain Measurement” on page 295](#)

[“Waveform Quality Measurement Troubleshooting” on page 725](#)



## 3.1.2.2.2 Waveform Quality and Frequency Accuracy

### Definition

Waveform quality is the basic measure of the performance of a CDMA transmitter. The figure of merit for waveform quality is rho. Rho, also called the power correlation coefficient, is the percentage of transmitted power that correlates to the ideal code. Rho provides a measure of how well the signal's power distribution matches the ideal power distribution. A value of 1.00 indicates that all of the transmitted power correlates with the ideal transmission code.

Several measurement results are returned when a rho measurement is performed, including frequency error and transmit time error. Frequency error is a measure of how accurately the access terminal is transmitting at its assigned frequency. Transmit time error indicates how accurately the AT has aligned its timing to the access network's pilot in static conditions.

This test measures rho, and also encompasses the 3.1.2.1.2 Frequency Accuracy and 3.1.2.2.1 Time Reference (static only) tests.

### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 9.6 kbps.
3. Configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots. (It is necessary for the access terminal to transmit the R-ACK Channel to determine modulation quality of its complete signal.)
4. Set  $\hat{I}_{or}$  to -75 dBm/1.23 MHz.
5. Measure rho, frequency error and transmit time error.

### Minimum Standard

Rho shall be  $>0.944$ .

Frequency error shall be within  $\pm 300$  Hz for band classes 0, 2, 3, 5, 7, 9 and 10, and within  $\pm 150$  Hz for band classes 1, 4, 6 and 8.

Static transmit time error shall be within  $\pm 1 \mu\text{s}$ .

### Related Topics

Manual Operation: [“Testing 3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 681](#)

[“Programming a Waveform Quality/Code Domain Measurement” on page 295](#)

[“Waveform Quality + Code Domain Measurement Description” on page 80](#)

[“Waveform Quality Measurement Troubleshooting” on page 725](#)

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### 3.1.2.3.7 RRI Channel Output Power

#### Definition

During a connection, the RRI Channel is transmitted over the first 256 chips of every slot. The RRI Channel punctures the Pilot Channel and both channels are transmitted at the same power level. This test verifies that the RRI Channel is transmitted at the same power level as the Pilot Channel.

#### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set up a Test Application session and open an RTAP connection.
3. Set  $\hat{I}_{or}$  to -75 dBm/1.23 MHz.
4. Measure  $\Delta_{RRI/Pilot}$ .

#### Minimum Standard

$10 \log_{10} (\Delta_{RRI/Pilot})$  shall be within +/- 0.25 dB.

#### Related Topics

Manual Operation: [“Testing 3.1.2.3.7 RRI Channel Output Power”](#) on page 682

[“Programming a Waveform Quality/Code Domain Measurement”](#) on page 295

[“Waveform Quality + Code Domain Measurement Description”](#) on page 80

[“Waveform Quality Measurement Troubleshooting”](#) on page 725

### 3.1.2.3.8 Code Domain Power

The code domain power is the power in each code channel of a CDMA Channel. The time reference used in the code domain power test is derived from the Reverse Channel overall waveform and is used as the reference for demodulation of all the code channels.

- “3.1.2.3.8.1 DRC Channel Output Power” on page 95
- “3.1.2.3.8.2 ACK Channel Output Power” on page 95
- “3.1.2.3.8.3 Data Channel Output Power” on page 96

#### 3.1.2.3.8.1 DRC Channel Output Power

##### Definition

The DRC Channel is transmitted at a power level DRCChannelGain relative to the Pilot/RRI Channel power level. This test verifies the output power of the DRC Channel relative to that of the Pilot Channel.

##### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set DRCChannelGain to 0 dB.
3. Set up a Test Application session and open an RTAP connection.
4. Configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots.
5. Set  $\hat{I}_{or}$  to -75 dBm/1.23 MHz.
6. Measure the power of the Pilot and DRC Channels.
7. Repeat for DRCChannelGain set to 3 dB.

##### Minimum Standard

$10 \log_{10} (\text{power}_{\text{DRC}}/\text{power}_{\text{Pilot}})$  shall be within DRCChannelGain (dB) +/- 0.25 dB.

#### 3.1.2.3.8.2 ACK Channel Output Power

##### Definition

When transmitted, the ACK Channel is transmitted at a power level ACKChannelGain relative to the Pilot/RRI Channel power level. This test verifies the output power of the ACK Channel relative to that of the Pilot Channel.

### 3.1.2.3.8 Code Domain Power

#### Method of Measurement

1. Connect the access network emulator to the AT.
2. Set ACKChannelGain to 0 dB.
3. Set up a Test Application session and open an RTAP connection.
4. Configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots.
5. Set  $\hat{I}_{or}$  to -75 dBm/1.23 MHz.
6. Measure the power of the Pilot and ACK Channels.
7. Repeat for ACKChannelGain set to 3 dB.

#### Minimum Standard

$10 \log_{10} (\text{power}_{ACK}/\text{power}_{Pilot})$  shall be within ACKChannelGain (dB) +/- 0.25 dB.

### 3.1.2.3.8.3 Data Channel Output Power

#### Definition

When transmitted, the Data Channel is transmitted at a power level DataChannelGain relative to the Pilot/RRI Channel power level. The value of DataChannelGain varies with Reverse Data Channel rate and is set as part of the configuration of the Reverse Traffic Channel MAC Protocol. The default DataChannelGain values are as follows:

**Table 5. DataChannelGain Default Values**

Rate (kbps)	DataChannelGain (dB)
9.6	3.75
19.2	6.75
38.4	9.75
76.8	13.25
153.6	18.5

This test verifies the output power of the Data Channel relative to that of the Pilot Channel.

## Method of Measurement

1. Connect the access network emulator to the AT.
2. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 9.6 kbps (Test 1).
3. Configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots.
4. Set  $\hat{I}_{or}$  to -75 dBm/1.23 MHz.
5. Measure the power of the R-Pilot and R-Data Channels.
6. Repeat (measure the power of the R-Pilot and R-Data Channels) for Reverse Data Channel rates of 19.2, 38.4 and 76.8 kbps (Tests 2-4).
7. Test 5: Set the Reverse Data Channel rate to 153.6 kbps and measure the power of the R-Pilot and R-Data Channels. Also measure the power of all 16 I channel Walsh codes and all 16 Q channel Walsh codes.
8. Test 6: Page the access terminal and measure the power of the R-Pilot and R-Data Channels over the capsule portion of each Access Channel probe.

## Minimum Standard

Tests 1-4:

- $10 \log_{10} (\text{power}_{\text{Data}}/\text{power}_{\text{Pilot}})$  shall be within DataChannelGain (dB) +/- 0.25 dB.

Test 5:

- $10 \log_{10} (\text{power}_{\text{Data}}/\text{power}_{\text{Pilot}})$  shall be within DataChannelGain (dB) +/- 0.25 dB.
- The power in all inactive channels (all Walsh codes other than I:0<sub>SF16</sub>, Q:8<sub>SF16</sub>, I:4<sub>SF8</sub>, and Q:2<sub>SF4</sub>) shall be 23 dB or more below the total transmit power.

Test 6:

- $10 \log_{10} (\text{power}_{\text{Data}}/\text{power}_{\text{Pilot}})$  shall be within DataChannelGain (dB) +/- 0.25 dB (the default DataChannelGain is 3.75 dB because the capsule data rate is 9.6 kbps).

## Related Topics

Manual Operation: [“Testing 3.1.2.3.8 Code Domain Power” on page 682](#)

[“Programming a Waveform Quality/Code Domain Measurement” on page 295](#)

[“Waveform Quality + Code Domain Measurement Description” on page 80](#)

[“Waveform Quality Measurement Troubleshooting” on page 725](#)

---

## Calibrating the Test Set

### Calibration Strategy

Various calibration routines must be run to ensure measurement accuracy. The type of calibration and appropriate intervals for performing calibrations vary with each application.

### Description

There are three calibrations that can be performed on the test set:

- Channel Power calibration
- Digital Average Power calibration
- I/Q calibration

### Calibration Procedures

- Channel Power calibration

To perform the channel power calibration from the front panel, initialize the Channel Power measurement and press the Calibrate Channel Power softkey. To perform a channel power calibration from a remote program, use the “[CALibration:CPOWer?](#)” command. During Channel Power calibration no power should be applied to the front panel.

Channel Power calibration takes about two minutes.

This calibration generates calibration data for the following measurements:

- [“Access Probe Power Measurement Description” on page 38](#)
- [“Channel Power Measurement Description” on page 50](#)
- [“Time Response of Open Loop Power Control \(TROLPC\) Measurement Description” on page 66](#)
- [“TX Spurious Emissions Measurement Description” on page 74](#)
- [“Waveform Quality + Code Domain Measurement Description” on page 80](#)

During calibration the internal temperature of the test set will be measured and calibration data will be generated that covers the measurement amplitude range of the available frequency bands. During channel power measurements, the test set will once again measure the internal temperature and calibrate the temperature measurement that was made when calibration data was generated.

An integrity bit is set true and is returned with Channel Power measurement results when the measurement is uncalibrated due to temperature drift. See [“Integrity Indicator” on page 255](#).

- Digital Average Power calibration

To perform the digital average power calibration, initialize the Digital Average Power measurement and press the Calibrate Digital Avg Pwr softkey. To perform a digital average power calibration from a remote program, use the “[CALibration:DAPower?](#)” command. During Digital Average Power calibration no power should be applied to the front panel RF IN/OUT connector.

Digital average power measurement (see [“Digital Average Power Measurement Description” on page 53](#)) calibration loops back a CDMA signal from within the test set to the average power meter to generate a table of calibration values.

Digital Average Power measurement calibration takes about ten minutes.

Power must be cycled off then back on after the Digital Average Power calibration routine has completed.

- I/Q calibration

This calibration is required if the Baseband Generator or the Vector Output modules are serviced or swapped. The CALibration:IQ subsystem should not be used as part of frequent (i.e. daily, weekly or monthly) test set calibration.

Manually initiating the IQ calibration routines requires pressing the SYSTEM CONFIG hardkey, then pressing the 1 of 2 hardkey, then pressing the Service softkey.

Remotely initiating any of the calibration routines is accomplished through the use of single query-only headers (see [“CALibration” on page 337](#)). The test set returns a numeric value indicating the outcome of the calibration attempt.

## Calibrating the Test Set

### Recommended Calibration Intervals

Table 6.

Condition:	Calibrating Channel Power Measurements	Calibrating Digital Average Power Measurements	I/Q Calibration
When Test Set is being used for the first time after power-on (allow 30-minute warm-up period).	✓		
After firmware is upgraded	✓		
If the ambient temperature changes more than 5 degrees C since latest calibration	✓		
Once every month	✓		
Once every year	✓	✓	
If Baseband Generator or Vector Output modules are serviced			✓

### Calibration Links

[“CALibration Subsystem” on page 336](#)

[“CALibration” on page 337](#)



## Input Signal Requirements

All measurements meet or exceed specifications when the following requirements are met:

- The frequency of the signal being measured must be in the range of 412 MHz to 483 MHz, 800 MHz to 960 MHz, or 1.7 GHz to 2.0 GHz, and within 100 kHz of the expected frequency.
- The signal level into the test set's RF IN/OUT connector must be within 9 dBm of the expected input power (see [“Expected Power” on page 185](#)), and must be:

**Table 7. Input Signal Power Level Requirements**

Measurement	Input Signal Power Level Requirement
Access Probe Power	between -45 dBm and +37 dBm (-45 is the minimum level required to trigger the access probe power measurement).
Channel Power	between -61 dBm and +37 dBm (with reliable performance down to -69 dBm).
Digital Average Power	between -30 dBm and +37 dBm.
Packet Error Rate	between -25 dBm and +37 dBm.
Tx Spurious Emissions	between 0 dBm and +30 dBm.
TROLPC	between -25 dBm and +37 dBm.
Waveform Quality + Code Domain	between -25 dBm and +37 dBm.

---

## Amplitude Offset

### Description

Amplitude offsets compensate for loss or gain between the test set's RF IN/OUT front panel connector and the mobile station's RF connector.

To access the amplitude offset feature, press the **SYSTEM CONFIG** key, followed by the RF IN/OUT Amplitude Offset (F5) key.

Amplitude offset settings are preserved during power cycles or instrument preset.

### Setting Up Amplitude Offsets and Frequency Points

Up to 20 frequency points can be assigned an amplitude offset. Negative amplitude offset values should be entered when there is a loss through the RF cabling and test fixtures and positive values should be entered when there is a gain.

The RF IN/OUT Amplitude Offset table displays the current (on/off) state of the amplitude offset feature. There are also 20 rows for entering frequencies and 20 rows for entering corresponding offset values. To enter values in the table use the RF IN/OUT Amplitude Offset Setup menu.

To set up amplitude offsets remotely, one comma-separated string is sent to set up frequency points and another comma-separated string assigns the corresponding amplitudes.

### GPIO Commands

```
OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY 1710.2 MHZ,1805.2 MHZ,1784.8 MHZ,1879.8 MHZ"
!sets the first 4 frequencies in the amplitude offset table.
```

```
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -2.55,-3.12,-3.68,-4.23"
!sets the first 4 amplitude offsets in the amplitude offset table.
```

### Turning amplitude offsets on/off

When the RF IN/OUT Amplitude Offset State is on, all offsets that are not individually turned off are applied and the word "Offset" appears in the Instrument Status Area of the test set's display.

If the RF IN/OUT Amplitude Offset State is off, none of the amplitude offsets are applied.

### GPIO Command

```
OUTPUT 714;"SYSTEM:CORRECTION:STATE ON"
!Sets the RF IN/OUT Amplitude Offset State to On
```

---

**NOTE** If the RF IN/OUT Amplitude Offset State is turned off, none of the amplitude offsets are on, even if values are entered for the individual offsets.

---

### Examples of Amplitude Offset Behavior

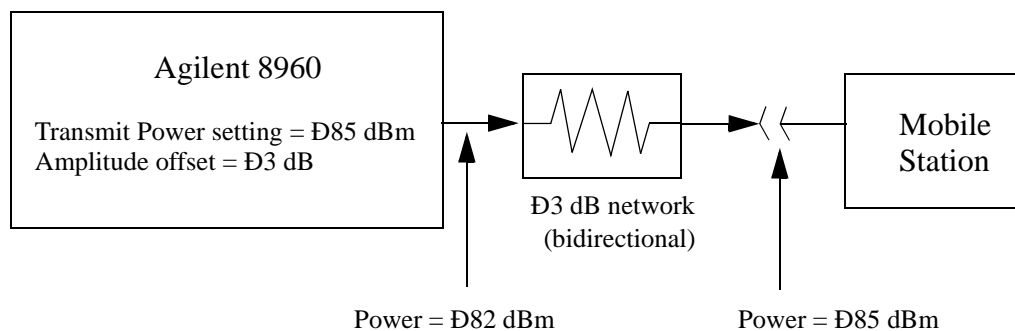
When the amplitude offset table entries accurately represent the loss in all components (cabling, connectors, and test fixturing) in the signal path between the test set and the mobile station, the test set will make the necessary adjustments in both receiver and transmitter measurements.

### Mobile Station Receiver Example

When you set a transmit power level, the test set uses the amplitude offset value to adjust the power so that the test set's transmit power level refers to the power level received at the mobile station.

As shown in [Figure 3. "Amplitude Offset Mobile Station Receiver Example"](#), with the test set's transmit power set to -85 dBm and a -3 dB amplitude offset the actual power level transmitted from the test set will be automatically offset to -82 dBm. With a 3 dB loss in the signal path the mobile station will receive -85 dBm, the actual setting.

**Figure 3. Amplitude Offset Mobile Station Receiver Example**



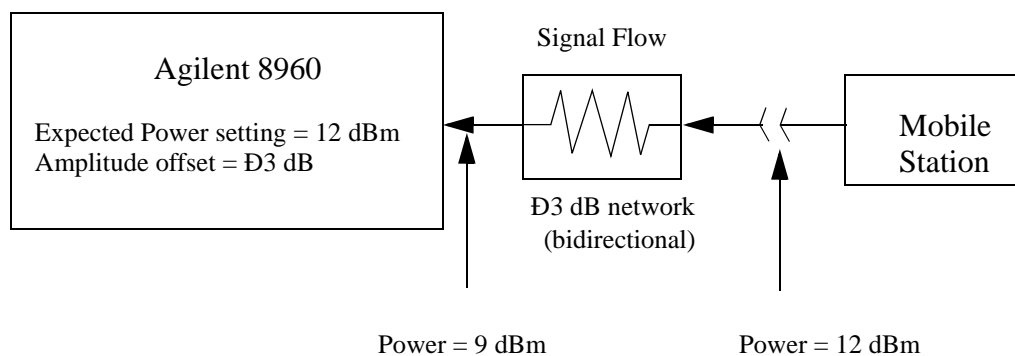
### Mobile Station Transmitter Example

When you measure power from the mobile station, the displayed and queried values are offset to show the level at the mobile station.

As shown in [Figure 4. "Amplitude Offset Mobile Station Transmitter Example"](#), with the mobile station transmitting 12 dBm and a -3 dB amplitude offset is entered, the measured power at the test set would be 9 dBm. The displayed power level is automatically adjusted to 12 dBm to show the level at the mobile station.

If the expected power, which can be set manually or automatically is 12 dBm, the test set's internal hardware adjusts itself to receive 9 dBm which is the actual power from the mobile station after 3 dB loss in the network.

**Figure 4. Amplitude Offset Mobile Station Transmitter Example**



## Amplitude Offset

### Amplitude Offsets Between Frequency Settings

If mobile station testing is performed at frequencies that do not have amplitude offsets assigned to them, the test set will estimate an amplitude offset based on the nearest settings. For example, the following screen shows five amplitude offsets for frequencies ranging from 890.2 MHz to 1710.2 MHz.

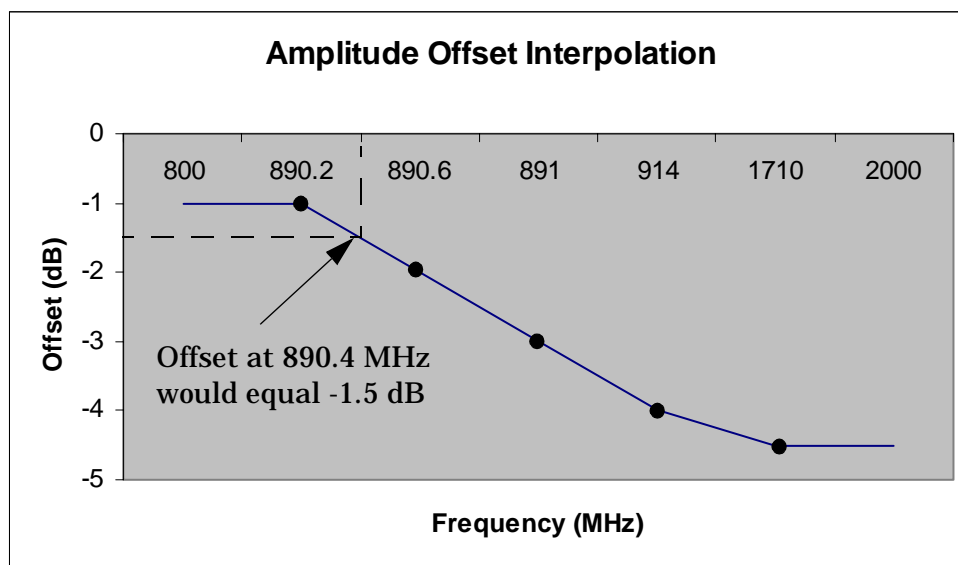
**Figure 5. RF IN/OUT Amplitude Offset Setup**

System Config Screen						
RF IN/OUT	RF IN/OUT Amplitude Offset					Utilities
	RF IN/OUT Amplitude Offset State: On					Message Log
	<u>Number</u>	<u>Frequency (MHz)</u>	<u>Offset (dB)</u>			
	1	890.20	-1.00			
	2	890.60	-2.00			
	3	891.00	-3.00			
	4	914.00	-4.00			
	5	1710.20	-4.50			
	6	Off	Off			
	7	Off	Off			
	8	Off	Off			
RF IN/OUT Amptd Offset Setup ▾	RF IN/OUT Amplitude Offset Setup			Value		
	RF In/Out Amplitude Offset State			On		
	Frequency 1			890.200 MHz		
	Offset 1			-1.00 dB		
	Frequency 2			890.600 MHz		
	Offset 2			-2.00 dB		
	Frequency 3			891.000 MHz		
	Offset 3			-3.00 dB		
Close Menu	Frequency 4			914.000 MHz		
		Active Cell		Sys Type: IS-2000		
		Idle				
		IntRef	Offset			
						1 of 2

For test frequencies between the lowest (890.2 MHz) and highest (1710.2 MHz) frequency points that are not entered in the table, the test set will calculate offsets using piece-wise linear interpolation.

The graph shown in [Figure 6. "Amplitude Offset Interpolation"](#) is a conceptual representation of the test set's amplitude offset configuration using the settings from the RF IN/OUT Amplitude Offset table in [Figure 5. "RF IN/OUT Amplitude Offset Setup"](#). Each of the five points are shown on a non-scaled frequency versus amplitude offset graph. At a test frequency of 890.4 MHz, which is midway between point number one (-1 dB) and point number two (-2 dB) the test set applies an offset of -1.5 dB. Be aware that since amplitude offsets are in units of dB, this piece-wise linear interpolation does not produce a linear transition from point to point.

**Figure 6. Amplitude Offset Interpolation**



If testing is done outside the range of frequencies bounded by the lowest and highest frequency entries, the test set simply uses the amplitude offset that is paired with the nearest frequency point.

---

**IMPORTANT** It is highly recommended that amplitude offsets are set up for each test frequency. This eliminates inaccuracies due to the mismatch between the test set's linear interpolation and the actual frequency response of the RF path between the test set and mobile station.

---

## Related Topics

[“SYSTEM:CORRection” on page 610](#)

## Amplitude Offset

# Call Processing

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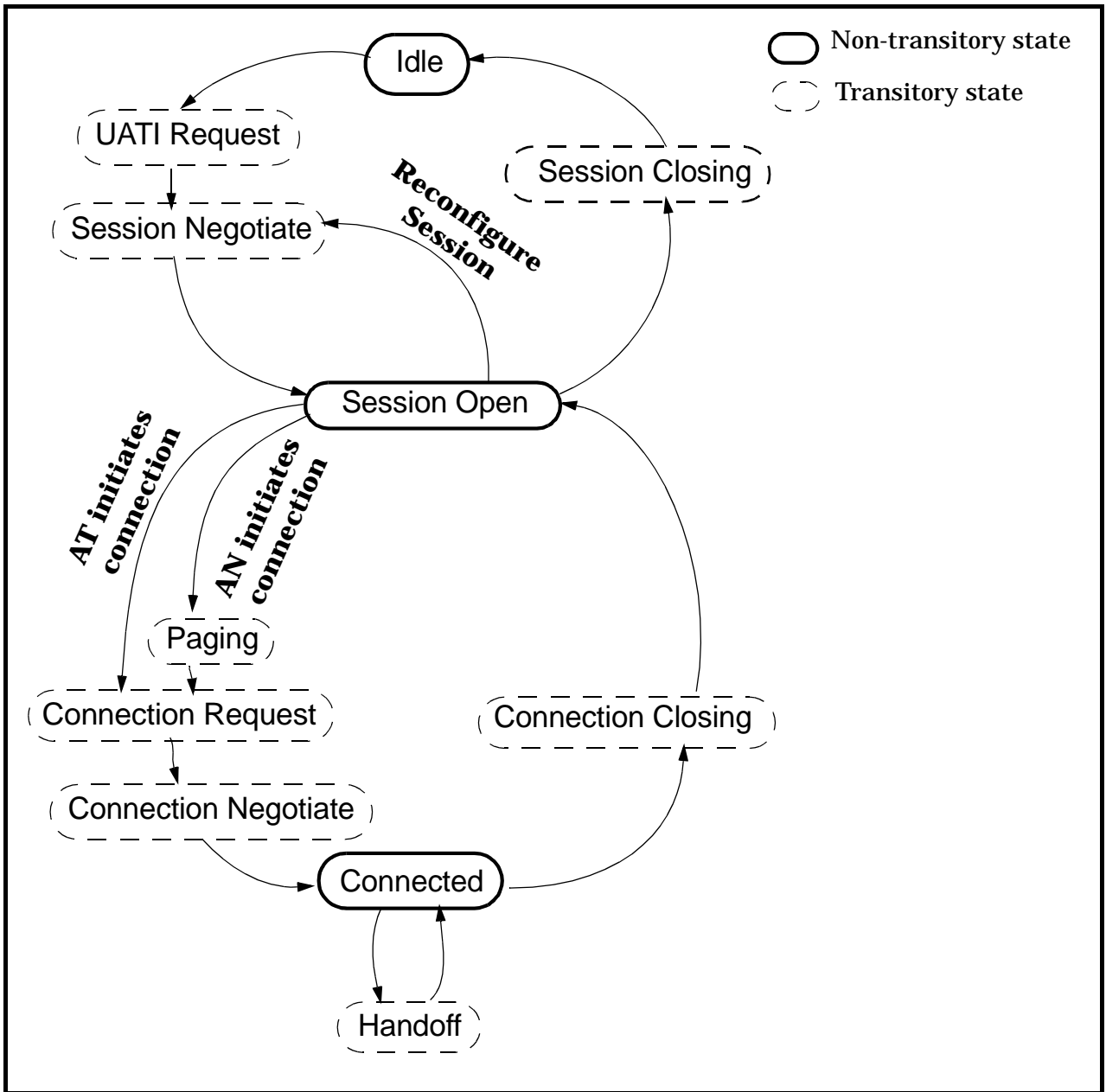
## Data Connection Processing States

There are 11 key states in the 1xEV-DO data connection processing lifecycle (see [“Data Connection Processing Lifecycle” on page 109](#)).

1. Once the access terminal (AT) is powered on, it acquires the system and then moves into Idle state (see [“Idle State” on page 111](#)).
2. Before the AT can send or receive any data, it must first establish a session, and then open a data connection. Most ATs will immediately initiate a session once they reach the idle state. That way, when the user is ready to retrieve some data, the AT can immediately move from the session open to connected state. Also, having a session open allows the AT to receive data from the access network (AN), because only the AT can initiate a session. The AN can't send data to the AT unless the AT has established a session. The AT initiates a session by sending a UATI Request (see [“UATI Request State” on page 112](#)).
3. The session is then configured through the negotiation of configurable attributes such as Application, Preferred Control Channel Cycle and Probe Sequence Max (see [“Session Negotiate State” on page 113](#)).
4. Once this is complete, the session is open (see [“Session Open State” on page 115](#)). To change any of the configurable attributes for the session, the session must be renegotiated.
5. Once a session is established, either the AT or the AN can start the data connection. For example, the user may request to download e-mails, or navigate to a web page to check the weather, thus starting data transmission. Or, the AN may start data transmission because a meeting reminder is coming in, or because the user has requested an automatic notification of ball game updates. If the AN is establishing the data connection it will page the AT and direct it to send a connection request (see [“Paging State” on page 116](#)).
6. If the AT is initiating the connection, it simply sends a connection request (see [“Connection Request State” on page 117](#)).
7. The configuration of the connection is then negotiated, (see [“Connection Negotiate State” on page 118](#)) including TAP parameters in a test environment, (see [“Test Application Protocol \(TAP\)” on page 129](#))
8. and then the data connection is open (see [“Connected State” on page 120](#)).
9. The AT may handoff to a new frequency because it is moving out of the current frequency coverage area, or perhaps the current frequency is heavily loaded and the network wants to balance the load (see [“Handoff State” on page 121](#)).
10. The connection may be closed by either the AN or AT (see [“Connection Closing State” on page 123](#)).
11. The session may be closed by either the AN or AT (see [“Session Closing State” on page 124](#)).



Figure 7. Data Connection Processing Lifecycle



## Data Connection Processing States

### Related Topics

[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

[“Idle State” on page 111](#)

[“UATI Request State” on page 112](#)

[“Session Negotiate State” on page 113](#)

[“Session Open State” on page 115](#)

[“Paging State” on page 116](#)

[“Connection Request State” on page 117](#)

[“Connection Negotiate State” on page 118](#)

[“Connected State” on page 120](#)

[“Handoff” on page 121](#)

[“Connection Closing State” on page 123](#)

[“Session Closing State” on page 124](#)

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## Idle State

In the Idle state, there is no communication or connection between the test set and access terminal. In this state, the access terminal does not have an assigned UATI.

The Idle state is a non-transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

[“UATI Request State” on page 112](#)

[“Data Connection Processing States” on page 108](#)

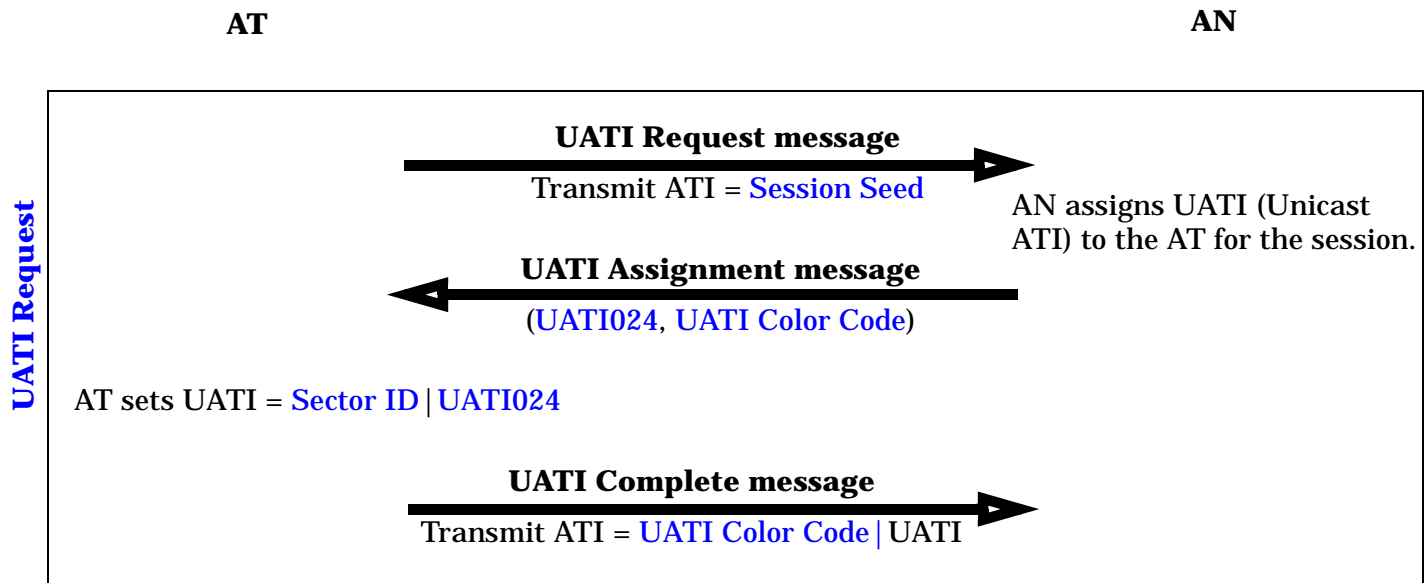
[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

## UATI Request State

The access terminal initiates a session by sending a UATI Request message (UATI is a Unicast Access Terminal Identifier), using the Session Seed as its Transmit ATI. The Session Seed is used to address the AT until it is assigned a UATI.

In the UATI Request state, the test set is in the process of assigning the access terminal a UATI.



The UATI request state is a transitory state (see “Data Connection Processing Lifecycle” on page 109).

To query the state of the data connection, see “Data Connection State Synchronization” on page 240.

### Related Topics

Programming: “Step 4: Make a connection” on page 196

Manual Operation: “How Do I Open a Session and Connection?” on page 647

“Idle State” on page 111

“Session Negotiate State” on page 113

“Data Connection Processing States” on page 108

“Establishing a Data Connection” on page 125

“Data Connection State Synchronization” on page 240

“Troubleshooting Data Connection Processing” on page 726

## Session Negotiate State

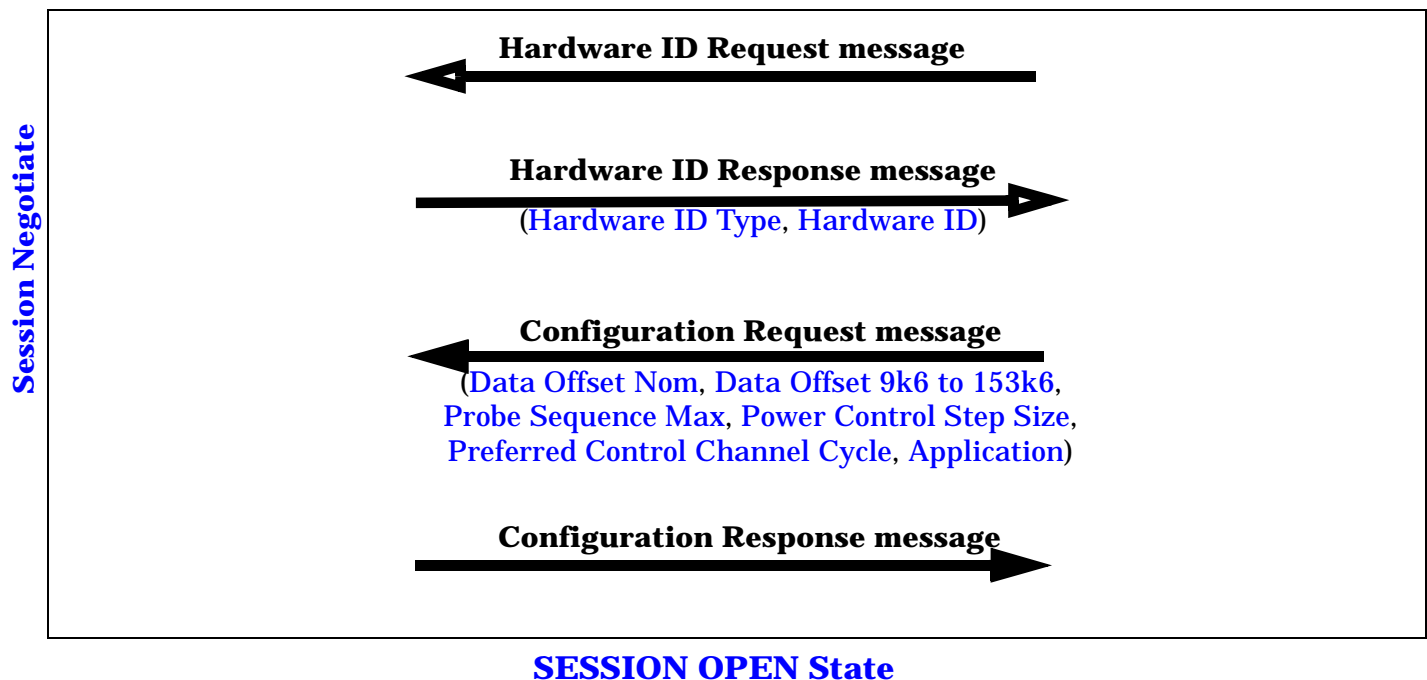
In the session negotiate state, the configurable attributes for the session (sometimes called session settings), such as Probe Sequence Max, Power Control Step Size and Preferred Control Channel Cycle, are configured.

Once a session is established, to change a configurable attribute, the session must be re-negotiated.

In the session negotiate state, the test set also requests the access terminal's hardware ID by sending the Hardware ID Request message.

AT

AN



Session negotiations are performed on a traffic channel connection. If a traffic channel connection is not present when the session is negotiated or re-negotiated, a temporary traffic channel connection is established (this temporary connection is closed after the session negotiation is complete).

---

**IMPORTANT** You can not change a parameter which is configured during the session negotiate state when a session is open and “**Call Limit Mode**” is on (because the test set would not be able to establish a traffic connection to re-negotiate the value when call limit mode is on).

---



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**IMPORTANT** If a connection is open when a session negotiation is initiated, once the session negotiation is complete, the connection will be closed. You must re-open the connection.

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## **Session Negotiate State**

The session negotiate state is a transitory state (see [“Data Connection Processing Lifecycle”](#) on page 109).

To query the state of the data connection, see [“Data Connection State Synchronization”](#) on page 240.

## **Related Topics**

[“UATI Request State”](#) on page 112

[“Session Open State”](#) on page 115

[“Data Connection Processing States”](#) on page 108

[“Establishing a Data Connection”](#) on page 125

[“Data Connection State Synchronization”](#) on page 240

[“Troubleshooting Data Connection Processing”](#) on page 726

[“Fixed Settings”](#) on page 168, [Session Configuration Response Timeout](#)

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## Session Open State

In the session open state, the access terminal has an assigned UATI. The access terminal is not assigned any dedicated air-link resources. Communications between the access terminal and test set occur on the Access Channel and Control Channel. During a single session the AT and test set can open and close a connection several times.

The session open state is a non-transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

[“Session Negotiate State” on page 113](#)

[“Paging State” on page 116](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

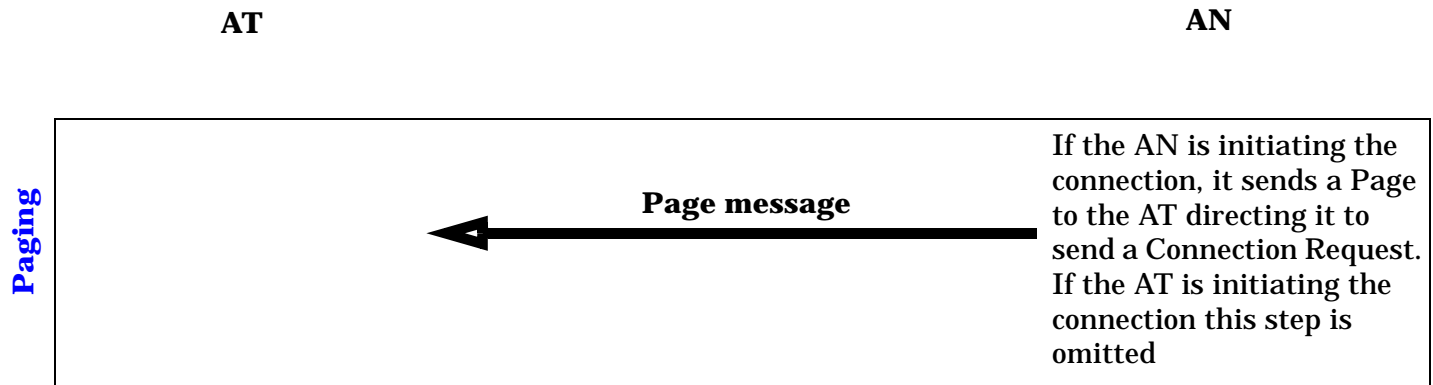
[“Data Connection State Synchronization” on page 240](#)

[“Fixed Settings” on page 168, Session Timeout](#)

## Paging State

If the test set is establishing a data connection with the access terminal, it pages the AT and directs it to send a Connection Request message.

In the Paging state, the test set is paging the AT to establish a data connection. The test set pages the AT on the Control Channel.



Before paging the AT, you must have a session open. Page the access terminal by sending the [“CALL:FUNCTION:DATA:START” on page 373](#) command, or by selecting `Start Data Connection`.

The paging state is a transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

GPIB Command: [“CALL:FUNCTION:DATA:START” on page 373](#)

Programming: [“Step 4: Make a connection” on page 196](#)

Manual Operation: [“How Do I Open a Session and Connection?” on page 647](#)

[“Session Open State” on page 115](#)

[“Connection Request State” on page 117](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Data Connection Processing Event Synchronization” on page 237](#)

[“Data Connection State Synchronization” on page 240](#)

[“Troubleshooting Data Connection Processing” on page 726](#)



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## Connection Request State

If the AN is establishing a data connection it will page the AT and direct it to send a Connection Request message (see [“Paging State” on page 116](#)). If the access terminal is initiating a connection, it simply sends a Connection Request message.

In the connection request state, the test set has received a Connection Request message from the access terminal.



The connection request state is a transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

[“Paging State” on page 116](#)

[“Connection Negotiate State” on page 118](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

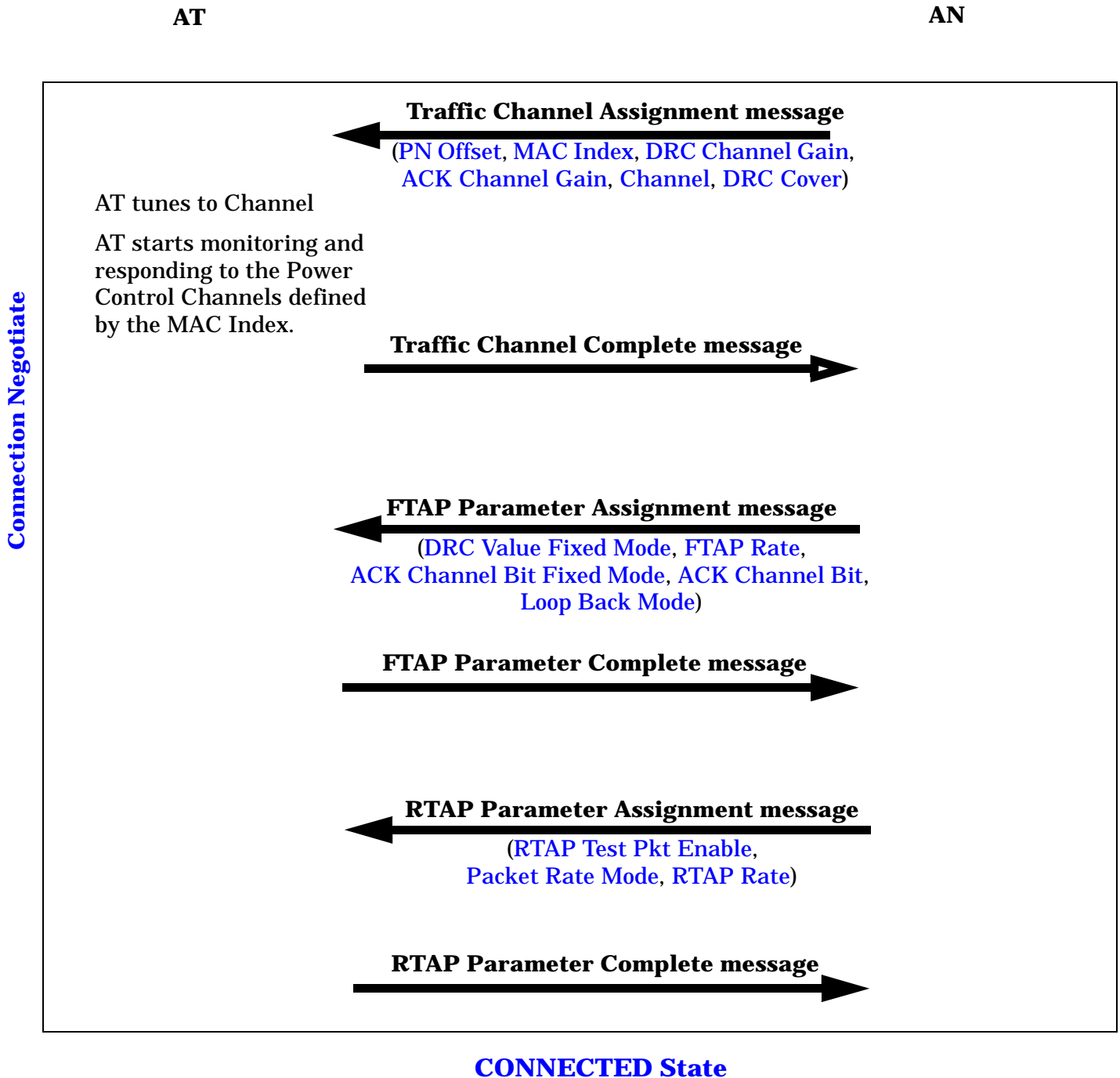
[“Data Connection State Synchronization” on page 240](#)

[“Fixed Settings” on page 168](#), Connection Request Timeout

## Connection Negotiate State

In the connection negotiate state, the test set is in the process of negotiating a data connection.

During this state, connection parameters are configured using the Traffic Channel Assignment message, and TAP is configured (see “[Test Application Protocol \(TAP\)](#)” on page 129).



The connection negotiate state is a transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)). To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

[“Connection Request State” on page 117](#)

[“Connected State” on page 120](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

[“Troubleshooting Data Connection Processing” on page 726](#)

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## Connected State

In the connected state, there is an established data connection with data transferring between the access terminal and test set.

The access terminal can use the Reverse Traffic Channel and the test set can use the Forward Traffic Channel and Control Channel to communicate with each other. The access terminal can be assigned the Forward Traffic Channel, and is assigned a Reverse Power Control Channel and a Reverse Traffic Channel.

The connected state is a non-transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

[“Connection Negotiate State” on page 118](#)

[“Handoff” on page 121](#)

[“Connection Closing State” on page 123](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

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# Handoff

## Handoff State

The handoff state is a transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

## Explicit versus Implicit Handoffs

There are two types of handoffs that the test set can perform, implicit and explicit.

Implicit handoffs are simply a side effect of changing any parameter that is negotiated using a Traffic Channel Assignment message (such as PN Offset, DRC Channel Gain, or Channel). For example, an implicit handoff occurs when you type in a new channel number in the `Channel` field or select a new `Cell Band`. You can perform an implicit handoff at any time. If you perform an implicit handoff while in idle state, the settings are immediately applied by the test set and there is no signalling to the access terminal. If you change the channel while in the session open state, the settings are immediately applied, the session is preserved, and a Sector Parameters message is sent to the access terminal. The session timer (see [“Fixed Settings” on page 168](#)) is restarted to give the AT full time to respond to the change. If you perform an implicit handoff while in the connected state, the settings are applied and a Traffic Channel Assignment message is sent to the AT, directing it to the new band or channel (the Channel record in the message contains System Type, Band Class and Channel Number fields).

An explicit handoff can only be performed while in the connected state. Before performing an explicit handoff, you must first specify the handoff cell band and/or handoff channel (the cell band and channel you want to handoff to). Then, when you initiate the explicit handoff using the `CALL:HANDOff` command or by selecting the `Execute Handoff` soft key, the AT is directed to the handoff cell band and/or handoff channel by a Traffic Channel Assignment message. This allows you to set up the handoff channel and band in advance, and then direct the AT to a new cell band and channel with a single command during testing, which can save test time (instead of moving the AT first to the new cell band and then moving it again to the desired channel, you move it directly to the new cell band and channel).

In summary, you can perform an implicit handoff while in any state. You can only perform an explicit handoff while in the connected state. Performing an explicit handoff allows you to hand off to a new band and channel using a single command.

## Programming Usage

Implicit handoff:

- Changing the current cell band: [“CALL:BAND” on page 359](#)
- Changing the current channel: [“CALL:CHANnel” on page 364](#)

Explicit handoff:

- Specifying the handoff cell band and channel: [“CALL:SETup” on page 392](#)
- Initiating the handoff: [“CALL:HANDOff” on page 374](#)
- Programming example: [“Step 6: Reconfigure Test Set and Mobile Station Connection Parameters” on page 202](#)

## **Handoff**

### **Manual Operation**

Implicit handoff:

- [“How Do I Change Call Parameters?” on page 644](#)

Explicit handoff:

- [“How Do I Perform a Handoff?” on page 649](#)

### **Related Topics**

[“Connected State” on page 120](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

[“Cell Band” on page 159](#)

[“Channel” on page 160](#)

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## Connection Closing State

In the connection closing state, the test set is in the process of closing the data connection.

To close the data connection, send the [“CALL:FUNCTION:DATA:STOP” on page 373](#) command or select `End Data Connection`. You can close the connection at any time, and the data connection will be taken to the session open state.

The connection closing state is a transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

GPIB Command: [“CALL:FUNCTION:DATA:STOP” on page 373](#)

Programming: [“Step 7: End the Connection” on page 204](#)

Manual Operation: [“How Do I Close the Connection?” on page 652](#)

[“Connected State” on page 120](#)

[“Session Open State” on page 115](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

[“Troubleshooting Data Connection Processing” on page 726](#)

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## Session Closing State

The access terminal may close the session to conserve battery power, or because the user has turned it off. The network may order the access terminal to close the session if there is no activity for an extended time (to free up its assigned UATI).

In the session closing state, the test set is in the process of closing the current session.

Close the session by sending the [“CALL:SClose” on page 391](#) command, or by selecting `Close Session`. You can close the session at any time, and the data connection will be taken to the idle state. However, most access terminals will try to immediately re-establish a session. You can prevent the access terminal from re-establishing a session by turning [“Call Limit Mode”](#) on.

The session closing state is a transitory state (see [“Data Connection Processing Lifecycle” on page 109](#)).

To query the state of the data connection, see [“Data Connection State Synchronization” on page 240](#).

### Related Topics

GPIB Command: [“CALL:SClose” on page 391](#)

Programming: [“Step 7: End the Connection” on page 204](#)

Manual Operation: [“How Do I Close the Session?” on page 651](#)

[“Session Open State” on page 115](#)

[“Idle State” on page 111](#)

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Data Connection State Synchronization” on page 240](#)

[“Troubleshooting Data Connection Processing” on page 726](#)

[“Fixed Settings” on page 168](#), `Session Close Timeout`

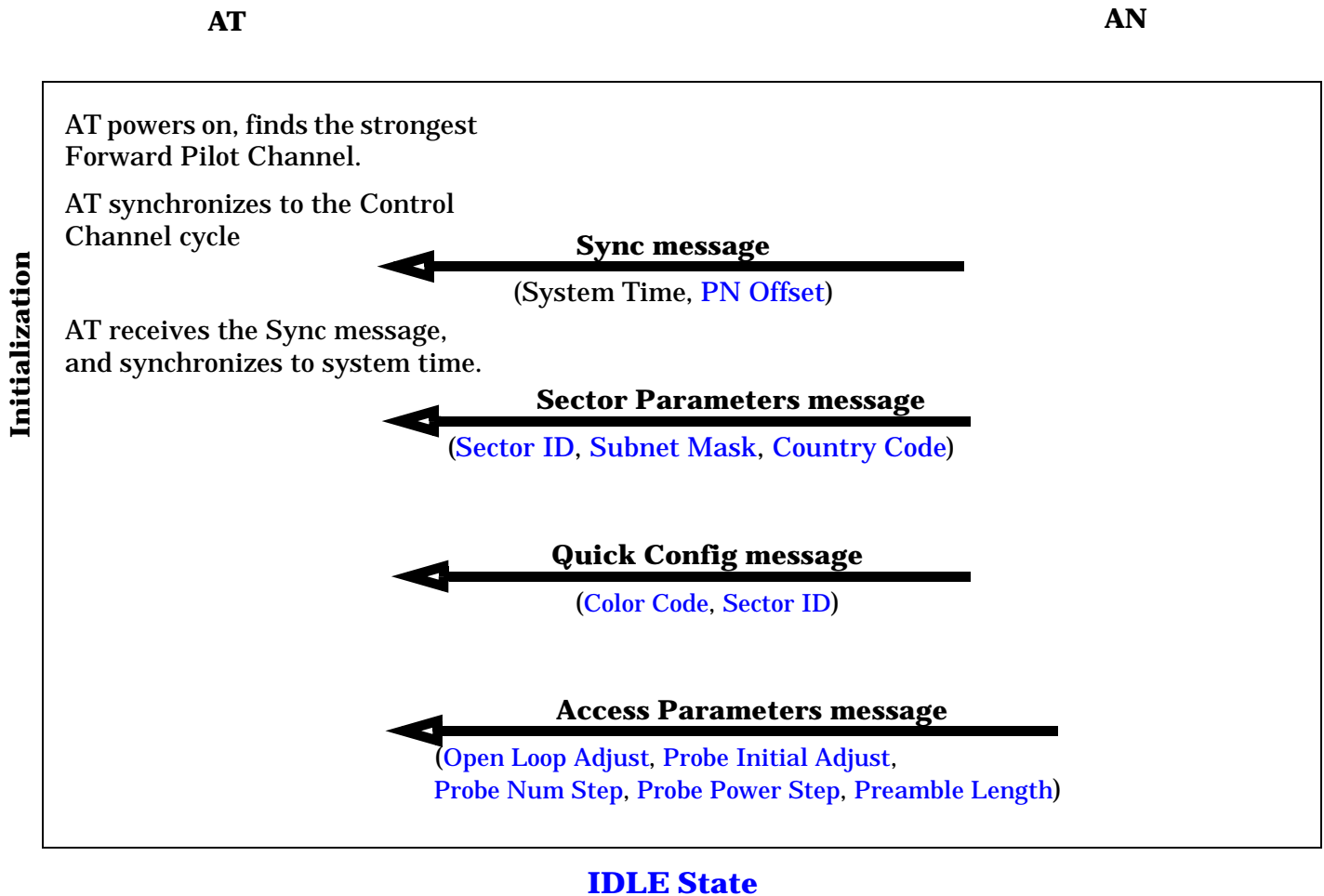


## Establishing a Data Connection

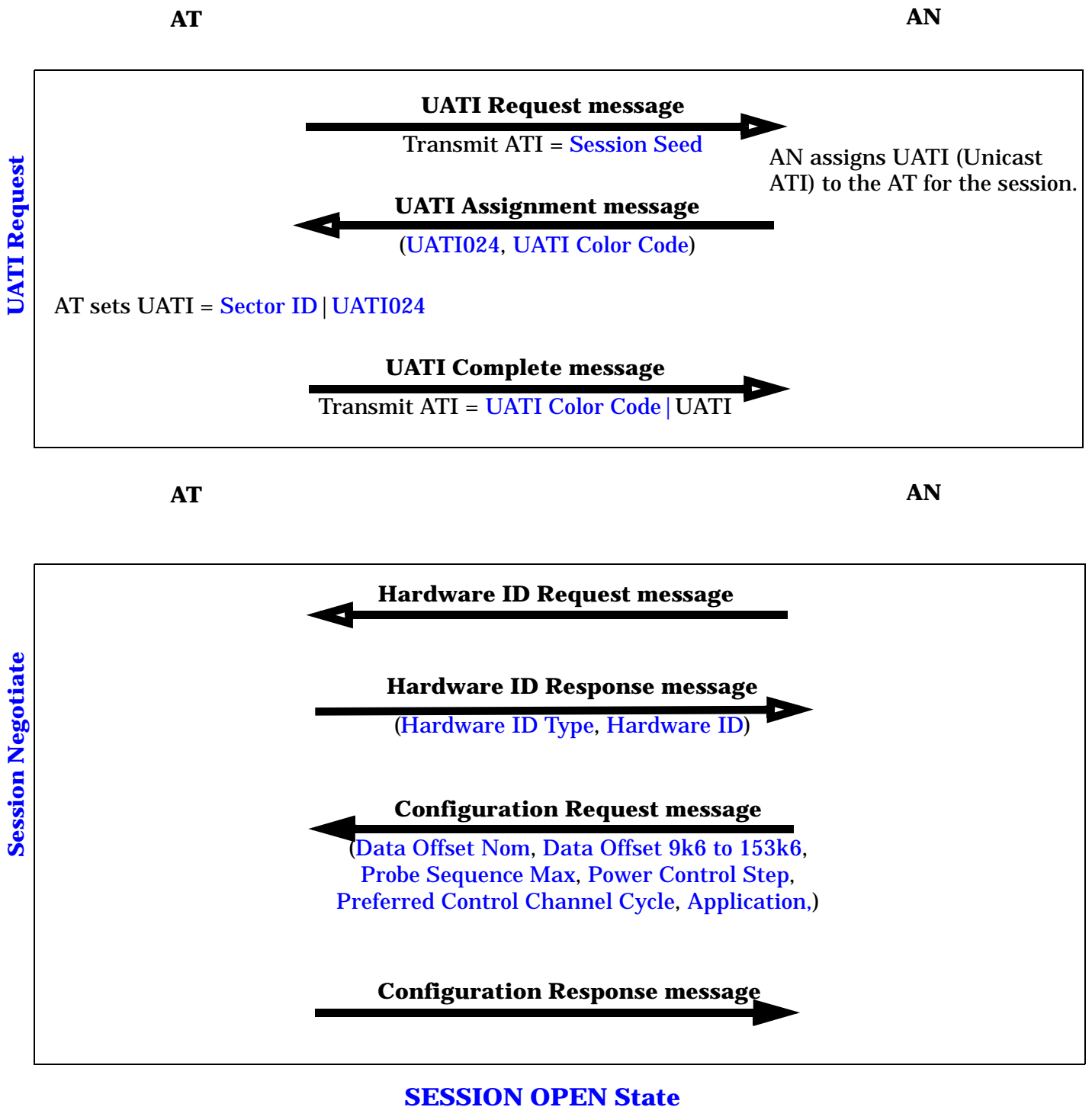
The following diagrams illustrate the key steps and messaging to establish a data connection between the access terminal (AT) and access network (AN).

Click on the blue text for more information on that topic.

**Figure 8. Establishing a Data Connection**



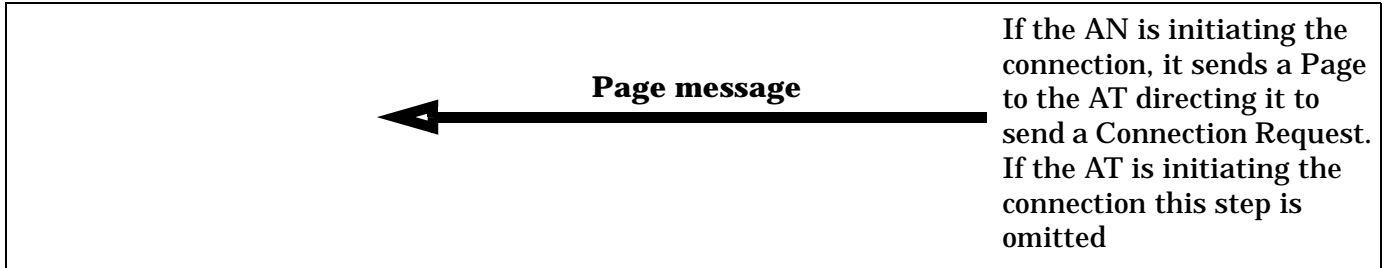
## Establishing a Data Connection



AT

AN

Paging



AT

AN

Connection Request



## Establishing a Data Connection

AT

AN

Connection Negotiate

AT tunes to Channel  
AT starts monitoring and  
responding to the Power  
Control Channels defined  
by the MAC Index.

**Traffic Channel Assignment message**  
(PN Offset, MAC Index, DRC Channel Gain,  
ACK Channel Gain, Channel, DRC Cover)

**Traffic Channel Complete message**

**FTAP Parameter Assignment message**  
(DRC Value Fixed Mode, FTAP Rate,  
ACK Channel Bit Fixed Mode, ACK Channel Bit,  
Loop Back Mode)

**FTAP Parameter Complete message**

**RTAP Parameter Assignment message**  
(RTAP Test Pkt Enable,  
Packet Rate Mode, RTAP Rate)

**RTAP Parameter Complete message**

**CONNECTED State**

## Related Topics

[“Data Connection Processing States” on page 108](#)

## Test Application Protocol (TAP)

The following description reviews the Test Application Protocol as defined in 3GPP2 C.S0029, the Test Application Specification for High Rate Packet Data. This description discusses the TAP functionality used to perform key access terminal minimum performance tests in a factory/laboratory environment. It does not discuss the usage of TAP for gathering link statistics or characterizing the forward and reverse link performance in a field environment.

### TAP Overview

C.S0029 provides a set of procedures to allow testing of access terminal (AT) minimum performance. In a 1xEV-DO network, the link between the access terminal (AT) and access network (AN) are dynamic. As propagation conditions change, the AT requests data at different rates, and from different serving sectors. This type of dynamic system makes it very difficult to control the test conditions for performing AT minimum performance testing. The Test Application Specification allows many of the connection characteristics to be fixed during testing, and enables the AT to send Loop Back Packets to help characterize its receiver performance.

C.S0029 specifies two test application protocols, FTAP (Forward Test Application Protocol) and RTAP (Reverse Test Application Protocol). FTAP allows testing of the AT's receiver, whereas RTAP allows testing of the AT's transmitter.

To open a TAP connection, during the “[Session Negotiate State](#)”, 0x0003 (Test Application Protocol) is specified as the Application type. FTAP and RTAP are then configured using the FTAP and RTAP Parameter Assignment messages as the connection is established.

### Forward Test Application Protocol (FTAP)

The Forward Test Application Protocol allows testing of the access terminal's receiver. FTAP provides the procedures and messages used by the access terminal and the access network to:

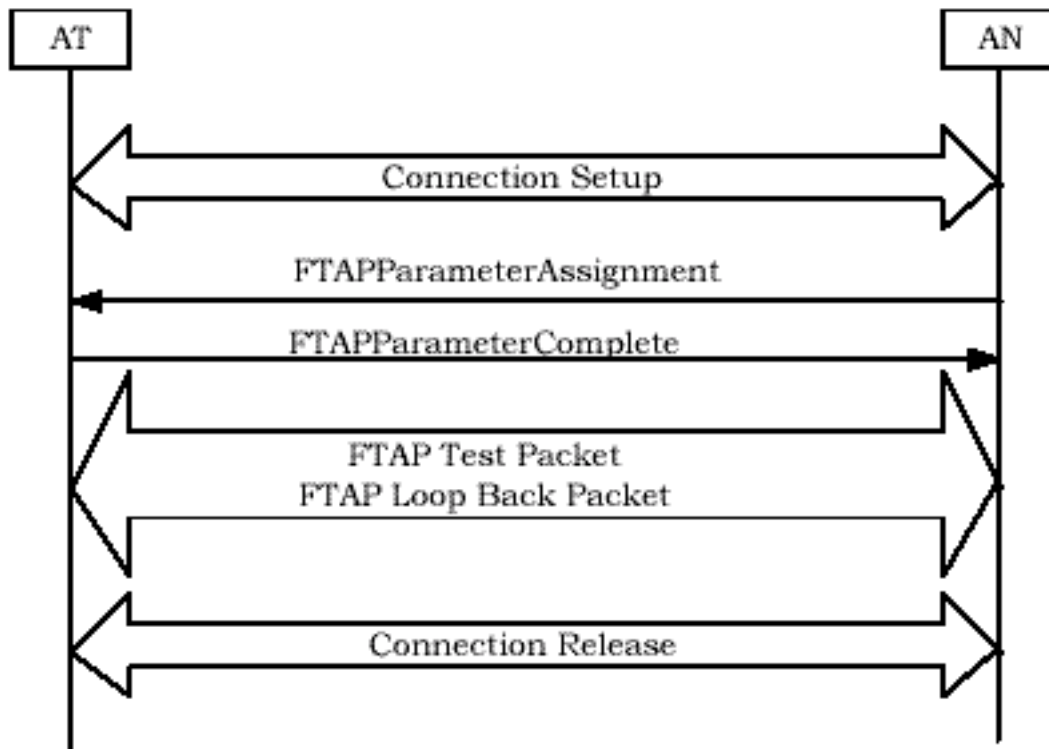
- Control the Forward Traffic Channel.
- Configure the R-ACK and R-DRC Channels (transmit configured ACK Channel bits, DRC values and DRC covers.)
- Generate and transmit FTAP Test Packets on the Forward Traffic Channel and process the received packets at the AT.
- Generate and transmit information about the received FTAP Test Packets at the AT through FTAP Loop Back Packets sent by the AT.

Basic procedure:

- TAP connection is opened.
- The AN sends an FTAP Parameter Assignment message, which may include the following attributes:
  - DRC Value Fixed mode: If the DRC Value Fixed Mode attribute is sent, the AT shall set its transmitted DRC (data rate requested from the AN) to the specified DRC Value.
  - DRC Cover Fixed mode: If the DRC Cover Fixed Mode attribute is sent, the AT shall set its transmitted DRC Cover (sector cover associated with the current serving sector) to the specified DRC Cover.

## Test Application Protocol (TAP)

- ACK Channel Bit Fixed mode: If the ACK Channel Bit Fixed Mode attribute is sent, the AT shall transmit the specified ACK Channel Bit during every slot. If the specified ACK Channel Bit is '1' (NACK), then the AT shall receive the packets as if they were all of full-length duration, and continue receiving them until the full-length in slots has elapsed, even if the packet was successfully decoded earlier.
- Loop Back mode: If the Loop Back Mode attribute is sent, the AT shall transmit FTAP Loop Back Packets on the Reverse Traffic Channel. The AT sends one or more FTAP Loop Back Packets for each 16 slot time period (frame), indicating how many FTAP Test Packets were successfully decoded in that frame. (Depending upon the Forward Traffic Channel data rate, from 1 to 16 valid FTAP Test Packets are sent each frame, but the standard specifies that only half of these packets be directed to the AT under test. See [“AT Directed Packets” on page 156.](#)) An FTAP Loop Back Packet is sent even if no FTAP Test Packets are received during the frame.
- The AT sends an FTAP Parameter Complete message to indicate completion of test configurations specified by the FTAP Parameter Assignment message.
- The access network and the access terminal exchange FTAP Test Packets and FTAP Loop Back Packets (if Loop Back Mode is enabled).
- The AN calculates Packet Error Rate (PER) based on the number of FTAP Test Packets sent to the AT and the number successfully decoded by the AT.



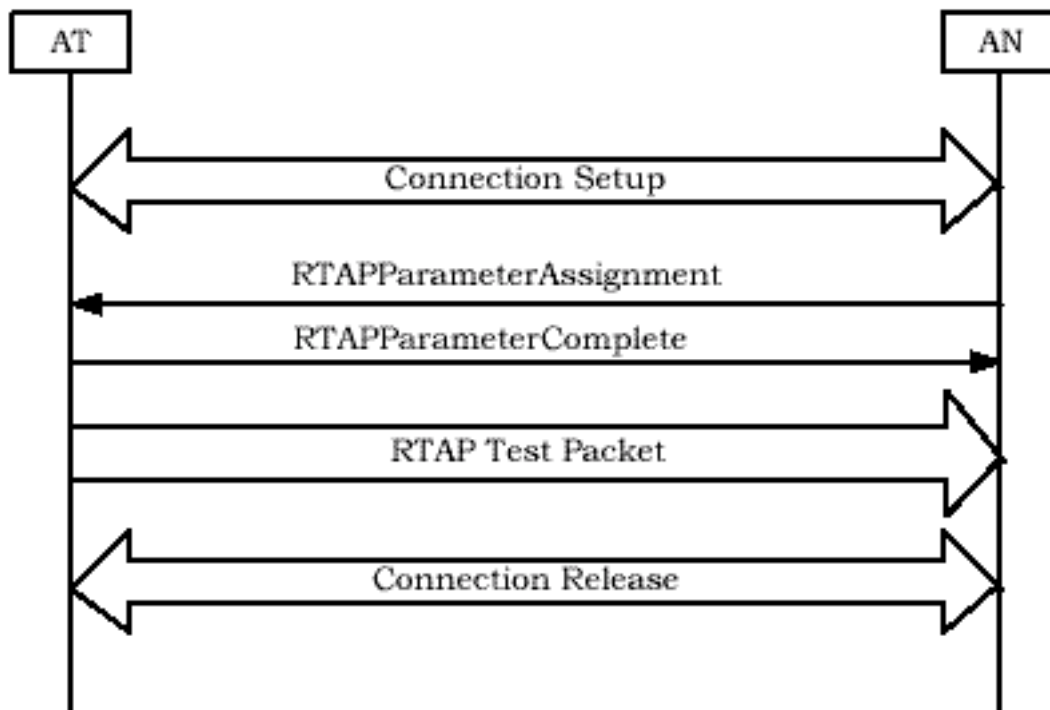
## Reverse Test Application Protocol (RTAP)

The Reverse Test Application Protocol allows testing of the access terminal's transmitter. RTAP provides the procedures and messages used by the access terminal and the access network to:

- Control and configure the Reverse Traffic Channel.
- Generate and transmit RTAP Test Packets on the Reverse Traffic Channel at the configured rate.

Basic procedure:

- TAP connection is opened.
- The AN sends an RTAP Parameter Assignment message, which may include the following attributes:
  - RTAP Test Packet mode: If the RTAP Test Pkt Enable attribute is sent, the AT shall generate an RTAP Test Packet at the beginning of every 16-slot interval aligned to the CDMA System Time (every frame).
  - Configured Packet Rate mode: If the Packet Rate Mode attribute is sent, the AT shall generate RTAP Test Packets at a rate determined by the Min Rate and Max Rate specified.
- The AT sends an RTAP Parameter Complete message to indicate completion of test configurations specified by the RTAP Parameter Assignment message.
- For some AT transmitter tests it is required that the R-ACK channel be active. In this case, the FTAP Parameter Assignment message must be sent by the AN, with the ACK Channel Bit Fixed mode enabled. The AT must then send an FTAP Parameter Complete message.
- If RTAP Test Packet mode is enabled, the AT sends RTAP Test Packets to the AN.



## **Test Application Protocol (TAP)**

### **Related Topics**

[“Limited TAP” on page 162](#)

[“Establishing a Data Connection” on page 125](#)

[“AT Directed Packets” on page 156](#)



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## Color Code

The color code identifies the test set's sector.

Color code is sent in the Quick Config message (see [“Establishing a Data Connection” on page 125](#)).

Color code can be changed at any time.

## Related Topics

GPIB Command: [“CALL\[:CELL\]:CCODE” on page 363](#)

Manual Operation: [“How Do I Change Cell Parameters?” on page 636](#)

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## Control Channel Data Rate

Control channel data rate determines the rate used on the Control Channel.

The access terminal determines the control channel data rate based on the length of the Control Channel packet preamble (see [“MAC Index” on page 175](#) for more information).

Control channel data rate can be changed at any time.

### Related Topics

GPIB Command: [“CALL:CCHannel:DRATE” on page 360](#)

Manual Operation: [“How Do I Change Cell Parameters?” on page 636](#)

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## Country Code

Country code sets the 3-digit BCD encoded representation of the cell country code of the sector, which specifies the country that the sector resides in.

Country code is sent in the Sector Parameters message (see [“Establishing a Data Connection” on page 125](#)).

Country code can be changed at any time and will be sent out in the next overhead message.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:MCCCode” on page 377](#)

Manual Operation: [“How Do I Change Cell Parameters?” on page 636](#)

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## Preferred Control Channel Cycle

Preferred control channel cycle can be disabled (turned off), or enabled (turned on) and set to indicate the Control Channel Cycle in which the access terminal shall transition out of the Sleep State in order to monitor the Control Channel.

Preferred control channel cycle is specified in the Configuration Request message (see [“Establishing a Data Connection” on page 125](#)).

Preferred control channel cycle is a “Configurable Attribute” that is configured during the [“Session Negotiate State”](#). Its value can not be changed when a session is open and [“Call Limit Mode”](#) is on. If preferred control channel cycle is changed when a connection is open, the connection will be closed. You will have to re-open the connection.

### Related Topics

GPIB Command: [“CALL:CCHannel:PCCCycle\[:SNUMBER\]” on page 360](#)

Manual Operation: [“How Do I Change Cell Parameters?” on page 636](#)

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## Sector ID

The sector ID provides the 128 bit (32 hex character) address of the test set's sector.

Sector ID is sent in the Sector Parameters message and Quick Config message (see [“Establishing a Data Connection” on page 125](#)).

Sector ID can be changed at any time.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:PARAMeter:SECTor:IDENtifier” on page 385](#)

Manual Operation: [“How Do I Change Cell Parameters?” on page 636](#)

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## Subnet Mask

The subnet mask parameter indicates the number of consecutive 1's in the subnet mask of the subnet to which the test set's sector belongs.

The subnet mask is a 128 bit number whose binary representation consists of "n" consecutive 1's followed by "128 - n" consecutive 0's. The subnet mask parameter sent by the access network indicates the number of consecutive 1's in the subnet mask; the access terminal can then determine the number of consecutive 0's in the subnet mask, and thus determine the 128 bit subnet mask value.

Subnet mask is sent in the Sector Parameters message (see ["Establishing a Data Connection" on page 125](#)).

Subnet mask can be changed at any time.

### Related Topics

GPIB Command: ["CALL\[:CELL\]:PARAMeter:SECTor:SMASK" on page 385](#)

Manual Operation: ["How Do I Change Cell Parameters?" on page 636](#)

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## ACK Channel Gain

ACK Channel Gain sets the power of the R-ACK Channel relative to the power of the R-Pilot Channel.

The ACK Channel Gain parameter is sent in the Traffic Channel Assignment message (see [“Establishing a Data Connection” on page 125](#)).

ACK Channel Gain can be changed at any time.

### Related Topics

GPIB Command: [“CALL:MS:ACKGain\[:RTPilot\]” on page 379](#)

Manual Operation: [“How Do I Change Channel Gain Parameters?” on page 638](#)

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## DRC Channel Gain

DRC Channel Gain sets the power of the R-DRC Channel relative to the power of the R-Pilot Channel.

The DRC Channel Gain parameter is sent in the Traffic Channel Assignment message (see [“Establishing a Data Connection” on page 125](#)).

DRC Channel Gain can be changed at any time.

### Related Topics

GPIB Command: [“CALL:MS:DRCGain\[:RTPilot\]” on page 380](#)

Manual Operation: [“How Do I Change Channel Gain Parameters?” on page 638](#)



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## Data Offset 9k6 | 19k2 | 38k4 | 76k8 | 153k6

The data offset <rate> parameters include: data offset 9k6, data offset 19k2, data offset 38k4, data offset 76k8, and data offset 153k6, corresponding to the five “RTAP Rate” s of 9.6, 19.2, 38.4, 76.8 and 153.6 kbps, respectively.

The data offset <rate> parameters allow you to specify a rate-specific offset of the R-Data and R-Access Data Channels to the R-Pilot Channel.

The power level of these channels is determined as follows (see “Expected Power” on page 185):

- R-Data (dBm) = R-Pilot (dBm) + “Data Offset Nom” (dB) + Data Offset <rate> (dB) + Gain Correction
- R-Access Data (dBm) = R-Pilot (dBm) + Data Offset 9k6 + 3.75

The data offset <rate> parameters are sent in the Configuration Request message (see “Establishing a Data Connection” on page 125).

The data offset <rate> parameters are “Configurable Attributes” that are configured during the “Session Negotiate State” . Their values can not be changed when a session is open and “Call Limit Mode” is on. If a data offset <rate> parameter is changed when a connection is open, the connection will be closed. You will have to re-open the connection.

### Related Topics

GPIB Command: “CALL:MS:DOFFset<:BPS9600 |:BPS19200 |:BPS38400 |:BPS76800 |:BPS153600>” on page 380

Manual Operation: “How Do I Change Channel Gain Parameters?” on page 638

“Expected Power” on page 185

“Data Offset Nom” on page 142

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## Data Offset Nom

Data offset nom allows you to specify the nominal offset of the R-Data and R-Access Data Channels to the R-Pilot Channel.

The power level of these channels is determined as follows (see [“Expected Power” on page 185](#)):

- R-Data (dBm) = R-Pilot (dBm) + Data Offset Nom (dB) + [“Data Offset 9k6 | 19k2 | 38k4 | 76k8 | 153k6”](#) (dB) + Gain Correction
- R-Access Data (dBm) = R-Pilot (dBm) + Data Offset 9k6 + 3.75

Data offset nom is sent in the Configuration Request message (see [“Establishing a Data Connection” on page 125](#)).

Data offset nom is a “Configurable Attribute” that is configured during the [“Session Negotiate State”](#). Its value can not be changed when a session is open and [“Call Limit Mode”](#) is on. If Data Offset Nom is changed when a connection is open, the connection will be closed. You will have to re-open the connection.

## Related Topics

GPIB Command: [“CALL:MS:DOFFset:NOMinal” on page 379](#)

Manual Operation: [“How Do I Change Channel Gain Parameters?” on page 638](#)

[“Expected Power” on page 185](#)

[“Data Offset 9k6 | 19k2 | 38k4 | 76k8 | 153k6” on page 141](#)

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## Open Loop Adjust

Open loop adjust is the nominal power to be used by the access terminal in the open loop power estimate (see [“Expected Power” on page 185](#)).

Open loop adjust is sent in the Access Parameters message (see [“Establishing a Data Connection” on page 125](#)).

Open loop adjust can be changed at any time and will be sent out in the next overhead message.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APARAmeter:POWer:OLADjust <\[:SELected\] | :IMT2000 | :JCDMa | :KPCS | :NMT450 | :SECondary800 | :USCellular | :USPCs>” on page 350](#)

Manual Operation: [“How Do I Change Access Parameters?” on page 640](#)

[“Expected Power” on page 185](#)

[“Cell Band” on page 159](#)

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## Preamble Length

Preamble length sets the length (in frames) of the access probe preamble.

Preamble length is sent in the Access Parameters message (see [“Establishing a Data Connection”](#) on page 125).

Preamble length can be changed at any time and will be sent out in the next overhead message.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APARAmeter:PREAmble:LENGth”](#) on page 351

Manual Operation: [“How Do I Change Access Parameters?”](#) on page 640

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## Probe Initial Adjust

Probe initial adjust sets the power correction that the access terminal applies to the open loop power estimate to adjust its initial transmission on the Access Channel (when transmitting the initial access probe in an access probe sequence).

Probe initial adjust is sent in the Access Parameters message (see [“Establishing a Data Connection” on page 125](#)).

Probe initial adjust can be changed at any time and will be sent out in the next overhead message.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APARAmeter:PROBe:IADJust” on page 352](#)

Manual Operation: [“How Do I Change Access Parameters?” on page 640](#)

[“Expected Power” on page 185](#)

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## Probe Num Step

Probe num step sets the number of steps (access probes) in a single access probe sequence.

Probe num step is sent in the Access Parameters message (see [“Establishing a Data Connection” on page 125](#)).

Probe num step can be changed at any time and will be sent out in the next overhead message.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APARAmeter:PROBe:STEP:COUNt” on page 353](#)

Manual Operation: [“How Do I Change Access Parameters?” on page 640](#)

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## Probe Power Step

Probe power step (called Power Step in C.S0024), sets the increase in power between access probes in an access probe sequence.

Probe power step is sent in the Access Parameters message (see [“Establishing a Data Connection” on page 125](#)) as a representation of 0.5 dB increments (0 dB to + 7.5 dB is represented by 0 to 15).

Probe power step can be changed at any time and will be sent out in the next overhead message.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APARAmeter:PROBe:POWer:STEP\[:LEVel\]” on page 352](#)

Manual Operation: [“How Do I Change Access Parameters?” on page 640](#)

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## Probe Sequence Max

Probe sequence max represents the maximum number of probes in a single access attempt.

Probe sequence max is sent in the Configuration Request message (see [“Establishing a Data Connection” on page 125](#)).

Probe sequence max is a “Configurable Attribute” that is configured during the [“Session Negotiate State”](#). Its value can not be changed when a session is open and [“Call Limit Mode”](#) is on. If probe sequence max is changed when a connection is open, the connection will be closed. You will have to re-open the connection.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APARAmeter:PROBe:SEQUence\[:MAXimum\]” on page 352](#)

Manual Operation: [“How Do I Change Access Parameters?” on page 640](#)



## Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power

The test set's access network emulator provides control over the following RF power levels:

### Cell Power

$\hat{I}_{or}$  is defined in C.S0033 as the received power spectral density of the Forward Channel as measured at the access terminal antenna connector. The Forward Channel is defined as a CDMA Channel from an access network to access terminals. The Forward Channel is transmitted on a CDMA frequency assignment using a particular pilot PN offset. If you have accounted for path loss (see [“Amplitude Offset” on page 102](#)) between the test set output port and the access terminal antenna connector, then cell power is equivalent to  $\hat{I}_{or}$ .

### AWGN Power

$I_{oc}$  is defined in C.S0033 as the power spectral density of a band-limited white noise source (simulating interference from other cells) as measured at the access terminal antenna connector. If you have accounted for path loss, then AWGN power is equivalent to  $I_{oc}$ .

The test set also reports:

### Total RF Power

Total RF Power is the sum of cell power and AWGN power.  $I_0$  is defined in C.S0033 as the total received power spectral density, including signal and interference, as measured at the access terminal antenna connector. If you have accounted for path loss, then total RF power is equivalent to  $I_0$ .

### $E_b/N_t$

$E_b/N_t$  is the ratio (in dB) of the combined received energy per bit to the effective noise power spectral density for the Control Channel or Forward Traffic Channel at the access terminal antenna connector (assuming you have accounted for path loss). It is calculated as follows:

Traffic  $E_b/N_t$  = Traffic\_Chip\_Bit +  $\hat{I}_{or}/I_{oc}$  (all in dB).

**Table 8. Traffic Chip Bit**

$\hat{O}FTAP Rate\acute{O}$ (kbps)	Slots	Traffic Chip Bit Log (dB)
38.4	16	13.8
76.8	8	10.79
153.6	4	7.78
307.2	2	4.77
614.4	1	1.76
307.2	4	4.86
614.4	2	1.85

## Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power

**Table 8. Traffic Chip Bit**

ØFTAP RateÓ (kbps)	Slots	Traffic Chip Bit Log (dB)
1228.8	1	-1.25
921.6	2	0.09
1843.2	1	-3.01
1228.8	2	-1.16
2457.6	1	-4.26

## Cell Power, AWGN Power and Total RF Power Ranges

The range of values that you can set these power levels to differs from the actual hardware range of the source. This is due to compensation for path loss between the test set output and the access terminal antenna connector (see [“Amplitude Offset” on page 102](#)).

For example, if you enter a value of -30 dBm for desired CW cell power, this indicates that you want -30 dBm of power at the access terminal antenna connector. So, if you have indicated an amplitude offset of -3.5 dB exists between the test set’s RF In/Out port and the access terminal’s antenna connector, the source will actually have to output -26.5 dB in order to deliver -30 dB to the access terminal antenna connector. Thus, with an amplitude offset of -3.5 dB, the settable range of CW cell power is -130.5 dB to -13.5 dB. The actual power range at a given time is defined by adding the value of the associated amplitude offset to the actual hardware range. If you select an invalid combination of power levels and amplitude offsets, an error message will appear.

**Table 9. Range of Power Levels**

Parameter	Actual Hardware Range with Amplitude Offset = 0 (RF In/Out Port)	Actual Hardware Range with Amplitude Offset = 0 (RF Out Only Port)	Setting (or Query) Range
Cell Power (CW)	-127 dBm to -10 dBm	-119 dBm to -2 dBm	-177 dBm to +40 dBm
Cell Power (DIGital856)	-120 dBm/1.23 MHz to -13 dBm/1.23 MHz	-115 dBm/1.23 MHz to -5 dBm/1.23 MHz	-170 dBm/1.23 MHz to +37 dBm/1.23 MHz
AWGN Power (DIGital856)	-120 dBm/1.23 MHz to -15 dBm/1.23 MHz	-115 dBm/1.23 MHz to -7 dBm/1.23 MHz	-170 dBm/1.23 MHz to +35 dBm/1.23 MHz
Total RF Power	-120 dBm/1.23 MHz to -10.88 dBm/1.23 MHz	-115 dBm/1.23 MHz to -2.88 dBm/1.23 MHz	-170 dBm/1.23 MHz to +42 dBm/1.23 MHz
$E_b/N_t$			-24.26 dB to +33.80 dB

**Rules for Setting Power Levels and Amplitude Offsets**

- The difference between cell power and AWGN power must not be more than 20 dB when both powers are ON.
- The total RF power and amplitude offset must not set the source outside its valid hardware range.

**Programming Usage**

The test set includes commands to set the desired cell power and AWGN power levels. You may also query what you've set these desired power levels to, as well as query what the total RF power will be based on your desired cell power and AWGN power levels. See "Command to Set/Query Desired Level" in "RF Power Levels and Noise Ratio Commands" on page 151.

The test set also includes commands to query the current level of cell power, AWGN power, total RF power and  $E_b/N_t$ . See "Command to Query Current Level" in "RF Power Levels and Noise Ratio Commands" on page 151. These CALL:STATUS commands are query only. They return values that indicate the test set's actual hardware settings and hardware status. Actual hardware settings can differ from the desired level you've set if you've broken one of the rules above for setting power levels. If this happens, there will be a persistent error reported by the test set indicating the problem. When no error conditions exist, the commands used to set the desired level will return the same results as the commands used to query current level. For example, "CALL:AWGNoise:POWER?" will return the same value as "CALL:STATUS:AWGNoise:POWER?" when no error conditions exist. Although the CALL:STATUS commands are available for your use, it is a best practice to query the desired power levels instead and include error trapping in your control program to look for errors indicating the desired and current power levels are not equal (see "Error Messages" on page 728).

**Table 10. RF Power Levels and Noise Ratio Commands**

Parameter	Command to Set/Query Desired Level	Command to Query Current Level
Cell Power	"CALL[:CELL]:POWER[:SAMPLitude]<[:SElected]   :CW   :DIGital856>"	"CALL:STATUS:CELL[1]:POWER:[AMPLitude]<[:SElected]   :DIGital856>?"
AWGN Power	"CALL:AWGNoise:POWER[:SAMPLitude]<[:SElected]   :DIGital856>"	"CALL:STATUS:AWGNoise:POWER[:AMPLitude]<[:SElected]   :DIGital856>?"
Total RF Power	"CALL:TOTAL:POWER[:AMPLitude]<[:SElected]   :DIGital856>?" (query only)	"CALL:STATUS:TOTAL:POWER[:AMPLitude]<[:SElected]   :DIGital856>?"
$E_b/N_t$	none	"CALL:STATUS:TRAFFIC[:CELL[1]]:EBNTotal?"

**Related Topics**

- Manual Operation: "How Do I Change Generator Information?" on page 642  
 "Troubleshooting Setting Power Levels" on page 727

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## External Trigger Type

External trigger type selects the trigger that is routed to the rear panel **TRIG OUT** port (see [“Rear Panel Connectors” on page 696](#)). The triggers are based off of the internal clocks/references of the test set and are the same signals that are used to trigger the measurements and data connection processing functionality.

**Table 11. External Trigger Type**

Trigger	Description
1.67 ms (1 slot)	Slot clock
26.67 ms (1 frame)	Frame clock (short sequence rollover)
426.67 ms (16 frames)	Control Channel Cycle
2 s	Even second clock

External trigger type can be changed at any time.

In addition to the user selected external trigger type, there is also a fixed external trigger that is always present at the **BASEBAND I/O** port, which triggers each time a power control bit is generated.

### Related Topics

GPIB Command: [“CALL:TRIGger” on page 409](#)

Manual Operation: [“How Do I Change Generator Information?” on page 642](#)

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## PN Offset

PN offset (called Pilot PN in C.S0024) defines a cell. The PN offset indicates the timing of the cell's short codes relative to system time (PN sequence offset in units of 64 PN chips).

PN offset is sent in the Sync message (see [“Establishing a Data Connection” on page 125](#)).

PN offset can be changed in the [“Idle State”](#) or [“Session Open State”](#). PN offset can be changed during transient states that do not have a traffic channel connection present (see [“Data Connection Processing States” on page 108](#)). Similar to an implicit handoff, (see [“Handoff” on page 121](#)), the test set changes the PN offset without signalling to the access terminal. If PN offset is changed while a session is open, the session timeout (see [“Fixed Settings” on page 168](#)) is restarted to allow time for the access terminal to respond to the change.

PN offset can not be changed in the [“Connected State”](#), or during any transient states that have a traffic channel connection present (such as [“Session Negotiate State” on page 113](#)).

## Related Topics

GPIB Command: [“CALL\[:CELL\[1\]\]:PNOFfest” on page 387](#)

Manual Operation: [“How Do I Change Generator Information?” on page 642](#)

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## ACK Channel Bit Fixed Mode Attribute

ACK channel bit fixed mode attribute can be set to:

- On (ACK Channel Bit Fixed mode enabled) - in this mode, the ACK Channel Bit Fixed Mode attribute is sent in the FTAP Parameter Assignment message. This means the access terminal must send the ACK bit specified by the ACK Channel Bit field (see [“Fixed Settings” on page 168](#)) in every slot. When ACK Channel Bit Fixed Mode Attribute is set to on, the [“Expected Power”](#) is set to expect the R-ACK Channel in every slot.
- Off (ACK Channel Bit Fixed mode not enabled) - in this mode, the ACK Channel Bit Fixed Mode attribute is NOT sent in the FTAP Parameter Assignment message. This means the access terminal acknowledges packets addressed to it as in normal system operation. When ACK Channel Bit Fixed Mode Attribute is set to off, the [“Expected Power”](#) is set to expect that the R-ACK Channel is not on in any slot (to force this, you must set [“AT Directed Packets”](#) to 0%, unless [“Application”](#) is set to RTAP and [“Limited TAP”](#) is on).

ACK channel bit fixed mode attribute can be changed at any time, and an FTAP Parameter Assignment message will immediately be sent by the test set, reflecting the setting.

In order for the R-ACK Channel to be active in all slots, you must set [“ACK Channel Bit Fixed Mode Attribute”](#) to on.

ACK channel bit fixed mode is provided to allow you to disable the R-ACK Channel for the TROLPC measurement (see [“Time Response of Open Loop Power Control \(TROLPC\) Measurement Description” on page 66](#)).

### Related Topics

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

GPiB Command: [“CALL\[:CELL\]:APPLICATION:ACKChannel:BFMAAttribute\[:STATE\]” on page 356](#)

[“Limited TAP” on page 162](#)

[“Test Application Protocol \(TAP\)” on page 129](#)

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## Application

Application determines what Test Application Protocol is used when in the “[Connected State](#)” - RTAP (Reverse Test Application Protocol) or FTAP (Forward Test Application Protocol). The test set always negotiates to Test Application Protocol (0x0003) during the “[Session Negotiate State](#)” (see “[Establishing a Data Connection](#)” on page 125). The Application setting determines if RTAP or FTAP is enabled when the data connection status is in the “[Connected State](#)” .

Application can be set at any time.

See “[Limited TAP](#)” on page 162 for more information about the messages sent and the test set configuration for Application set to RTAP or FTAP.

## Related Topics

GPIB Command: “[CALL\[:CELL\]:APPLication\[:TYPE\]](#)” on page 355

Manual Operation: “[How Do I Change Call Parameters?](#)” on page 644

“[Limited TAP](#)” on page 162

“[Test Application Protocol \(TAP\)](#)” on page 129

“[FTAP Rate](#)” on page 161

“[RTAP Rate](#)” on page 166

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## AT Directed Packets

3GPP2 C.S0033 section 11.4.3.5 specifies:

When the access terminal under test is in the Connected State and a 100% packet activity is required (see [“Fixed Settings” on page 168](#), Forward Packet Activity), the access network equipment shall conform to the following rules for the generation of packets:

- At every slot that a new Forward Traffic Channel packet is to be generated, the access network equipment shall generate a uniformly distributed random number “x” between 0 and 1.
- If  $x > 0.5$ , the Forward Traffic Channel packet shall be directed to the access terminal under test.
- Otherwise, the Forward Traffic Channel packet shall be a filling packet emulating other users’ activity.
- The packets emulating other users must be of the same length as the length of the packets generated for the access terminal under test. The Preamble MAC index used for the filling packets shall be any valid MAC index number different from the one used for the access terminal under test.

The test set implements this requirement but allows for the percentage of packets directed to the AT under test to be varied. The AT Directed Packets parameter specifies what percentage of the packets are directed to the AT under test. This parameter can be set between 0 and 100%, in 1% increments. The default value is 50%.

If the AT under test has enough processing power to receive more than 50% of the valid FTAP Test Packets, you can increase the AT Directed Packets parameter and speed up PER testing, optimizing throughput.

In order for the R-ACK Channel to be active, you must set [“ACK Channel Bit Fixed Mode Attribute”](#) to on, and set [“AT Directed Packets”](#) to a non-zero value.

### Related Topics

Programming: [“Programming a Packet Error Rate \(PER\) Measurement” on page 278](#)

GPIB Command: [“CALL\[:CELL\]:APPLication:ATDPackets” on page 356](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Packet Error Rate \(PER\) Measurement Description” on page 56](#)

[“Test Application Protocol \(TAP\)” on page 129](#)



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## Call Drop Timer

The call drop timer can be enabled (turned on) or disabled (turned off).

Once a data connection is established, if the call drop timer is enabled, the call drop timer is started.

When the call drop timer is turned on, if the test set is unable to correctly decode the reverse link for a period of 5 seconds, the call drop timer expires and the test set drops the data connection without signaling (and transitions to the [“Session Open State”](#)).

If the test set is able to decode the reverse signal, the call drop timer is reset.

### Related Topics

GPIB Command: [“CALL:CONNected:DROP:TIMer\[:STATe\]<\[:SElected\] | :TA856>” on page 367](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

Session Timeout: [“Fixed Settings” on page 168](#)

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## Call Limit Mode

Call limit mode can be enabled (turned on) or disabled (turned off).

When call limit mode is on, the test set will not respond to any access probes from the access terminal (during events such as opening a session or connection, keep alive mechanisms etc.). This forces the access terminal to repeatedly send access probes.

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**IMPORTANT** You can not open a session when call limit mode is on.

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**IMPORTANT** You can not change a parameter which is configured during the “[Session Negotiate State](#)” when a session is open and call limit mode is on.

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## Related Topics

GPIB Command: “[CALL:CONNected:LIMit\[:STATe\]<\[:SELected\] | :TA856>](#)” on page 367

Manual Operation: “[How Do I Change Call Parameters?](#)” on page 644

## Cell Band

The test set's access network emulator provides a selection of cell bands.

**Table 12. Cell Bands**

Cell Band	Programming Mnemonic	C.S0033 Band Class	Forward Link Frequency Range (MHz)	Reverse Link Frequency Range (MHz)
IMT-2000	IMT2000	6	2110-2170	1920-1980
Japan Cellular	JCDMa	3	832-870	887-924
Korean PCS	KPCS	4	1840-1870	1750-1780
NMT-450	NMT450	5	421-489	411-479
Secondary 800	SECondary 800	9	851-867, 935-940	806-824, 896-901
US Cellular	USCellular	0	869-921	824-876
US PCS	USPCs	1	1930-1990	1850-1910

Cell band can be changed at any time. Changing cell band initiates an implicit handoff (see [“Handoff” on page 121](#)).

### Related Topics

GPIB Command: [“CALL:BAND” on page 359](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Channel” on page 160](#)

## Channel

The range of RF channels available varies by band class.

**Table 13. Channel**

Cell Band	Channel Range
IMT-2000	0-1199
Japan Cellular	1-799, 801-1039, 1041-1199, 1201-1600
Korean PCS	0-599
NMT-450	1-300, 539-871, 1039-1473, 1792-2016
Secondary 800	0-919
US Cellular	1-799, 991-1023
US PCS	0-1199

Channel can be changed at any time. Changing channel initiates an implicit handoff (see [“Handoff” on page 121](#)).

### Related Topics

GPIB Command: [“CALL:CHANnel<\[:SElected\] | :DIGital856><\[:SElected\] | :IMT2000 | :JCDMa | :KPCS | :NMT450 | :SECondary800 | :USCellular | :USPCs>” on page 365](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Cell Band” on page 159](#)

## FTAP Rate

FTAP Rate determines the rate (and number of slots) at which FTAP Test Packets are sent by the test set when a connection is established.

**Table 14. FTAP Data Rates**

FTAP Data Rate (kbps)	Slots per Physical Packet	Modulation Format	DRC Value
38.4	16	QPSK	0x1
76.8	8	QPSK	0x2
153.6	4	QPSK	0x3
307.2	2	QPSK	0x4
307.2	4	QPSK	0x5
614.4	1	QPSK	0x6
614.4	2	QPSK	0x7
921.6	2	8-PSK	0x8
1228.8	1	QPSK	0x9
1228.8	2	16-QAM	0xA
1843.2	1	8-PSK	0xB
2457.6	1	16-QAM	0xC

The test set uses the DRC sent by the access terminal to set its forward rate. The test set sends the DRC Value Fixed Mode attribute in the FTAP Parameter Assignment message (this enables DRC Value Fixed mode). The test set sets the DRC Value for this attribute to “[FTAP Rate](#)” (see “[Establishing a Data Connection](#)” on page 125 and “[Limited TAP](#)” on page 162 for more information). This means that the test set tells the access terminal to always request the DRC that corresponds to the current FTAP Rate setting.

FTAP Rate can be changed at any time.

### Related Topics

GPIB Command: “[CALL\[:CELL\]:APPLICATION:FTAPProtocol:DRATe](#)” on page 355

Manual Operation: “[How Do I Change Call Parameters?](#)” on page 644

“[Application](#)” on page 155

“[Limited TAP](#)” on page 162

“[RTAP Rate](#)” on page 166

## Limited TAP

**IMPORTANT** If you are testing an access terminal with Qualcomm DMSS 5500 Release 3.1, you must set Limited TAP to On.

The test set supports the C.S0029 Test Application Specification (TAS) as described in “[Test Application Protocol \(TAP\)](#)” on page 129. The first commercial release of the Qualcomm 1xEV-DO access terminal chipset (DMSS 5500 Release 3.1, AA3150) has only limited support of the TAS functionality.

The Limited TAP setting is provided to accommodate the limited TAS functionality of the first commercial release of the Qualcomm 1xEV-DO access terminal chipset.

The FTAP Parameter Assignment message and RTAP Parameter Assignment message are both sent to the access terminal to configure the Test Application Protocol. The FTAP Parameter Assignment message is always sent first. The following table shows what attributes are included in these messages based on the limited TAP and “[Application](#)” settings.

**Table 15. Test Set Behavior versus Limited TAP and Application Settings**

	Limited TAP = On		Limited TAP = Off	
	Application = FTAP	Application = RTAP	Application = FTAP	Application = RTAP
<b>FTAP Parameter Assignment Message</b>				
DRC Value Fixed mode	DRC Value Fixed Mode attribute is sent (DRC Value Fixed mode is enabled). DRC Value field is set to “ <a href="#">FTAP Rate</a> ” .	DRC Value Fixed Mode attribute is NOT sent (DRC Value Fixed mode is NOT enabled).	DRC Value Fixed Mode attribute is sent (DRC Value Fixed mode is enabled). DRC Value field is set to “ <a href="#">FTAP Rate</a> ” .	
DRC Cover Fixed mode	DRC Cover Fixed Mode attribute is NOT sent (DRC Cover Fixed mode is NOT enabled). Since there is only one sector in the test set, there is no need to fix the DRC Cover. The DRC Cover for the test set is sent in the Traffic Channel Assignment message.			
ACK Channel Bit Fixed mode	If “ <a href="#">ACK Channel Bit Fixed Mode Attribute</a> ” is set to on, then the ACK Channel Bit Fixed Mode attribute is sent (ACK Channel Bit Fixed mode is enabled). The ACK Channel Bit is set to 1 (see “ <a href="#">Fixed Settings</a> ” on page 168). If “ <a href="#">ACK Channel Bit Fixed Mode Attribute</a> ” is set to off, then the ACK Channel Bit Fixed Mode attribute is NOT sent (ACK Channel Bit Fixed mode is NOT enabled).			
Loop Back mode	Loop Back Mode attribute is sent (Loop Back mode is enabled).	Loop Back Mode attribute is NOT sent (Loop Back mode is NOT enabled).	Loop Back Mode attribute is sent (Loop Back mode is enabled).	Loop Back Mode attribute is NOT sent (Loop Back mode is NOT enabled).
<b>RTAP Parameter Assignment Message</b>				

**Table 15. Test Set Behavior versus Limited TAP and Application Settings**

	Limited TAP = On		Limited TAP = Off	
	Application = FTAP	Application = RTAP	Application = FTAP	Application = RTAP
RTAP Test Packet mode	RTAP Test Pkt Enable attribute is NOT sent (RTAP Test Packet mode is NOT enabled).	RTAP Test Pkt Enable attribute is sent (RTAP Test Packet mode is enabled).	RTAP Test Pkt Enable attribute is NOT sent (RTAP Test Packet mode is NOT enabled).	RTAP Test Pkt Enable attribute is sent (RTAP Test Packet mode is enabled).
Configured Packet Rate mode	Packet Rate Mode attribute is NOT sent (Configured Packet Rate mode is NOT enabled).	Packet Rate Mode attribute is sent (Configured Packet Rate mode is enabled). Min Rate and Max Rate fields are set to "RTAP Rate" .	Packet Rate Mode attribute is NOT sent (Configured Packet Rate mode is NOT enabled).	Packet Rate Mode attribute is sent (Configured Packet Rate mode is enabled). Min Rate and Max Rate fields are set to "RTAP Rate" .
Test Set Configuration				
Transmit FTAP Test Packets?	Yes	No	Yes	Yes

**Related Topics**

Programming: [“Step 2: Configure Test Set and Mobile Station Parameters” on page 193](#)

GPIB Command: [“CALL\[:CELL\]:APPLICATION:TAPRotocol:LIMited\[:STATe\]” on page 356](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Test Application Protocol \(TAP\)” on page 129](#)

[“Establishing a Data Connection” on page 125](#)

[“Application” on page 155](#)

[“Troubleshooting Data Connection Processing” on page 726](#)

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## Power Control Step

Power control step (called RPC Step in C.S0024) represents the power control step size the access terminal shall use when controlling the power of its reverse link (by closed loop power control). This setting tells the access terminal how much to increase or decrease its power according to the received power control bit (see [“Reverse Closed Loop Power Control” on page 165](#)).

Power control step is sent in the Configuration Request message (see [“Establishing a Data Connection” on page 125](#)).

Power control step is a “Configurable Attribute” that is configured during the [“Session Negotiate State”](#). Its value can not be changed when a session is open and [“Call Limit Mode”](#) is on. If power control step is changed when a connection is open, the connection will be closed. You will have to re-open the connection.

### Related Topics

GPIB Command: [“CALL\[:CELL\[1\]\]:CLPControl:REVerse:PCSTep” on page 366](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Reverse Closed Loop Power Control” on page 165](#)



## Reverse Closed Loop Power Control

The reverse closed loop power control parameter determines what bits are sent to the access terminal for closed loop power control.

**Table 16. Reverse Closed Loop Power Control**

Setting	Description
Active Bits	The test set actively determines if the access terminal is transmitting at a power level that is too high or too low (based on the expected R-Pilot level, see <a href="#">“Expected Power” on page 185</a> ), and responds by sending the appropriate up or down power control bit.
Alternating Bits	The test set sends alternating “0” (up) and “1” (down) power control bits to the access terminal regardless of its output power.
All Up Bits	The test set sends all “0” (up) power control bits to the access terminal regardless of its output power.
All Down Bits	The test set sends all “1” (down) power control bits to the access terminal regardless of its output power.

### Related Topics

GPIB Command: [“CALL\[:CELL\[1\]\]:CLPControl:REVerse:MODE” on page 366](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Power Control Step” on page 164](#)

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## RTAP Rate

RTAP Rate determines the rate at which RTAP Test Packets are sent by the access terminal when an RTAP connection is established.

**Table 17. RTAP Data Rates**

RTAP Data Rate (kbps)
9.6
19.2
38.4
76.8
153.6

RTAP Rate is sent in the RTAP Parameter Assignment message (see [“Establishing a Data Connection” on page 125](#) and [“Limited TAP” on page 162](#) for more information). When an RTAP connection is first established, the access terminal starts transmitting at 9.6 kbps and then increases its data rate to the RTAP Rate.

RTAP Rate can be changed at any time, if a connection is open, it will be maintained.

### Related Topics

GPIB Command: [“CALL\[:CELL\]:APPLiCation:RTAPProtocol:DRATe” on page 355](#)

Manual Operation: [“How Do I Change Call Parameters?” on page 644](#)

[“Application” on page 155](#)

[“Limited TAP” on page 162](#)

[“FTAP Rate” on page 161](#)

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## System Type

Currently while in [“Active Cell Operating Mode”](#) there is only one system type, IS-856 (programming mnemonic DIGital856). This value can not be changed. The handoff system type is also currently fixed to IS-856 (DIGital856).

While in [“CW Operating Mode”](#) , the only system type is CW.

## Related Topics

[“Cell Band” on page 159](#)

[“Channel” on page 160](#)

## Fixed Settings

In some tests, C.S0003 specifies particular values for parameters that are fixed in the test set. The following table describes the key fixed parameters and what values they are fixed to in the test set.

**Table 18. Fixed Settings**

Setting	Description	Fixed Value
DRC Value Fixed Mode	(See <a href="#">“Limited TAP”</a> on page 162).	On
DRC Cover Fixed Mode	(See <a href="#">“Limited TAP”</a> on page 162).	Off
DRC Length		8 slots
DRC Lock Period		‘1’ (16 slots)
DRC Cover	(See <a href="#">“Limited TAP”</a> on page 162).	001 (3 bits)
Frame Offset		0 slots
ACK Channel Bit	(See <a href="#">“Limited TAP”</a> on page 162).	‘1’ (Nak)
Latitude		686512
Longitude		-1686032
Neighbor Count		16
Neighbor Pilot PN		256, 260, 264, 268, 272, 276, 280, 284, 288, 292, 296, 300, 304, 308, 312, 316, (320)
Protocol Rev		0 (1xEV-DO)
Session Timeout	(See <a href="#">“Session Open State”</a> on page 115).	3 min
Session Configuration Response Timeout	(See <a href="#">“Session Negotiate State”</a> on page 113).	5 s
Session Close Timeout	(See <a href="#">“Session Closing State”</a> on page 124).	5 s
Pilot Drop		-14 dB
Connection Request Timeout	(See <a href="#">“Connection Request State”</a> on page 117)	10 s
Packet Activity		100%
AT Noise Floor		-103 dBm

## Reverse Channel Overview

The following table summarizes the five reverse channels which comprise the access terminal's signal:

**Table 19. Reverse Channel Summary**

Reverse Channel		Walsh Code	Spread Factor	Duration	Description
R-Pilot	Pilot Channel	I:0	16	Last 7/8 of slot	
R-RR1	Reverse Rate Indicator	I:0	16	First 1/8 of slot	Indicates the rate of transmission of the reverse channel (so the access network does not have to perform blind detection).
R-DRC	Data Rate Control	Q:8	16	Full slot (but offset by a 1/2 slot)	Indicates the requested Forward Traffic Channel data rate and serving sector.
R-ACK	ACK Channel	I:4	8	First 1/2 of slot	Informs the access network whether a data packet transmitted on the Forward Traffic Channel was received.
R-Data	Data Channel	Q:2	4	Full slot	

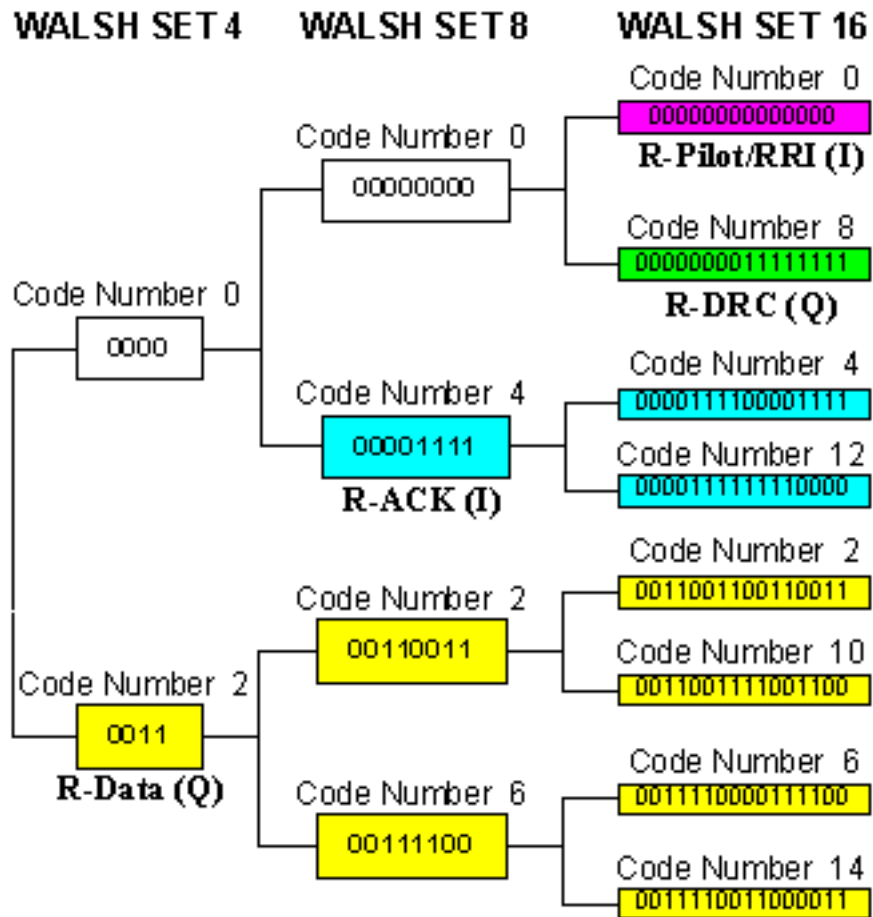
### Spread Factor

Spread Factor (SF) is a term which indicates which Walsh code set the Walsh code belongs to. For example, Walsh code 00000000 belongs to Walsh code set 8, and thus is said to have a spread factor of 8. The spread factor also indicates the length of the Walsh code (spread factor 8 indicates the Walsh code is 8 digits in length).

The diagram below shows the Walsh code distribution of the reverse channels:

## Reverse Channel Overview

**Figure 9. Reverse Channel Walsh Code Distribution**



## Related Topics

[“Expected Power” on page 185](#)

[“Waveform Quality + Code Domain Measurement Description” on page 80](#)

## AT Max Power

“Expected Power” is used to range the test set’s receiver. If the output power of the access terminal is more than 9 dB below the expected power, an under range integrity indicator is returned by the test set. If your settings for cell power, amplitude offset, open loop adjust and other parameters determining the expected power of the access terminal require the AT to output a power above its rated maximum power, then its power will likely be below the expected power. To prevent this from happening, you can specify AT Max Power, which defines an upper limit for the expected power. Expected power tracks the expected power from the access terminal based on the open loop equation, until it reaches AT Max Power. Expected power is then clipped to the AT Max Power value.

AT Max Power can be changed at any time.

**Manual Operation:** AT max power can be set by selecting **F6** on the Call Control 1 of 2 menu from the Call Setup screen. AT max power is reported on the Call Setup screen in the Access Terminal Information (User Entered) window.

The possible settings for AT Max Power are based on the lower limit of the “[3.1.2.3.4 Maximum RF Output Power](#)” minimum standard for each cell band and AT power class.

**Table 20. AT Max Power**

Cell Band	AT Power Class	Max Power Specification, Lower Limit (dBm)
US Cellular, Japan Cellular	I	+31
	II	+27
	III	+23
US PCS, Korean PCS	I	+28
	II	+23
	III	+18
	IV	+13
	V	+8
NMT-450	I	+33
	II	+28
	III	+23
	IV	+18

## AT Max Power

**Table 20. AT Max Power**

Cell Band	AT Power Class	Max Power Specification, Lower Limit (dBm)
IMT-2000 (outside Japan)	I	+28
	II	+23
	III	+18
	IV	+13
	V	+8
IMT-2000 (inside Japan)	I and II	+20
	III	+18
	IV	+13
	V	+8
Secondary 800	I	+27
	II	+23

## Related Topics

GPIB Command: [“CALL:MS:POWER:MAXimum](#)

[<\[:SElected\] | :IMT2000 | :JCDMa | :KPCS | :NMT450 | :SECondary800 | :USCellular | :USPCs>”](#) on page 380



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## Hardware ID

The Hardware ID uniquely identifies the access terminal. The Hardware ID is reported by the access terminal. Hardware ID is displayed by the test set in two formats:

- Hardware ID (Hex) is an 8 character hexadecimal number which corresponds directly to the Hardware ID Value returned by the access terminal.
- Hardware ID (Decimal) provides the interpretation of the Hardware ID Value reported by the access terminal based on the Hardware ID Type reported by the access terminal.

See [“Hardware ID Type” on page 174](#) for more information.

Hardware ID can be queried at any time, but a value will only be returned if a session has been negotiated between the test set and access terminal (see [“Session Negotiate State” on page 113](#)). Hardware ID (Hex) and Hardware ID (Decimal) are displayed on the Call Setup screen in the Access Terminal Information (AT Reported) window.

### Related Topics

GPIB Commands:

- [“CALL:MS:REPorted:HIIdentity:HEX?” on page 382](#)
- [“CALL:MS:REPorted:HIIdentity\[:DECimal\]?” on page 382](#)

[“Hardware ID Type” on page 174](#)

## Hardware ID Type

During the “[Session Negotiate State](#)”, the access network may send a Hardware ID Request message to the access terminal (see “[Establishing a Data Connection](#)” on page 125). The access terminal then sends a Hardware ID Response message which includes Hardware ID Type and Hardware ID Value fields.

The Hardware ID Value field specifies the unique ID assigned to the access terminal by the manufacturer (see “[Hardware ID](#)” on page 173). The Hardware ID Value is an 8 character hexadecimal number.

Hardware ID type specifies how to interpret the Hardware ID Value.

**Table 21. Hardware ID Type**

Value	Meaning	Description	Example: Hardware ID Value = 0x74013C0A
0x010000	Interpret the Hardware ID Value as an Electronic Serial Number (ESN)	Interpret the Hardware ID Value as follows: <ul style="list-style-type: none"> <li>The first 2 hex characters correspond to a 3 digit decimal number (use leading zeros if required) that indicates the manufacturer.</li> <li>The last 6 hex characters correspond to a 6 digit decimal number (use leading zeros if required) that identifies the access terminal.</li> </ul>	Decimal Hardware ID = 116-00080906
0x00NNNN	Interpret the Hardware ID Value as a Hardware ID “NNNN” from IETF RFC 1700 standard	To convert the Hardware ID Value to a decimal number, simply convert the entire 8 hex characters to a decimal number.	Decimal Hardware ID = 194623792
0xFFFFFFFF	Null		
all others	Invalid		

Hardware ID type can be queried at any time, but a value will only be returned if a session has been negotiated between the test set and access terminal (see “[Session Negotiate State](#)” on page 113). Hardware ID Type is displayed on the Call Setup screen in the Access Terminal Information (AT Reported) window.

## Related Topics

GPIB Command: “[CALL:MS:REPorted:HIDentity:TYPE?](#)” on page 382

“[Hardware ID](#)” on page 173

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## MAC Index

There are 64 MAC (Medium Access Control) Indices available for use by the Forward Channel. The MAC indices are numbered from 0 to 63, and each corresponds to a different 64-ary Walsh code.

Transmission on the Forward Traffic Channel is time division multiplexed. At any given time, the channel is either being transmitted or not; and, if it is being transmitted, it is addressed to a single user. When transmitting the Forward Traffic Channel, the access network uses the MAC index to identify the target access terminal.

A preamble sequence is transmitted with each Forward Traffic Channel or Control Channel physical layer packet. The preamble consists of all '0' symbols. The preamble is covered by a 32-chip bi-orthogonal sequence. These sequences are specified in terms of 32-ary Walsh functions which correspond to MAC indices. The 32-chip sequence is repeated several times depending upon the data rate of the packet (2 repetitions for 2457.6 kbps, up to 32 repetitions for 38.4 kbps). The preamble thus ranges from 64 to 1024 chips. The preamble either identifies the packet as a broadcast Control Channel packet (MAC index 2 or 3), or identifies the target access terminal for the Forward Traffic Channel or AT-directed Control Channel packet (MAC index 5 to 63).

Symbols of each MAC Channel (RPC Channel, RA Channel, DRC Lock Channel) are transmitted on one of the 64 Walsh codes (MAC indices).

- MAC index 0 and 1 are not used.
- The Control Channel transmissions have a preamble that is covered by a bi-orthogonal cover sequence with MAC index 2 (for the 76.8 kbps data rate) or 3 (for the 38.4 kbps data rate).
- MAC index 4 is used to transmit the RA Channel symbols (the Reverse Activity (RA) Channel transmits the Reverse Activity Bit (RAB) stream over the MAC Channel with MAC index 4).
- MAC index 5 to 63 are available to be assigned to an access terminal when a connection is opened. The MAC index is used to identify which access terminal the packet is addressed to. The access terminal's assigned MAC index is used to identify the RPC Channel and DRC Lock Channel transmissions directed to it. The access terminal's assigned MAC index is also used to cover the preamble of Forward Traffic Channel transmissions directed at the access terminal.

When a connection is established between the access terminal and test set, the test set assigns a MAC index to the access terminal (in the current implementation, a MAC index of 5 is always assigned to the access terminal).

The MAC index parameter is sent in the Traffic Channel Assignment message (see [“Establishing a Data Connection”](#) on page 125).

MAC index can be queried at any time, but a value will only be returned if the data connection is in the [“Connected State”](#). The MAC index assigned to the access terminal by the test set is displayed on the Call Setup screen in the Access Terminal Information (AN Assigned) window.

## Related Topics

GPIB Command: [“CALL:STATus:MS:MACIndex?”](#) on page 404

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## Session Seed

The session seed is a 32 bit (8 hex character) number which the access network uses to address the access terminal until the access terminal is assigned a UATI.

During the “[UATI Request State](#)”, the access terminal determines the session seed (using a pre-defined random number generator, seeded with a number based on the access terminal’s hardware ID) and sends it to the access network in the UATI Request message (see “[Establishing a Data Connection](#)” on page 125). The AT uses the Session Seed as the Random ATI that is its Transmit ATI, to identify itself to the AN during its UATI Request.

Session seed can be queried at any time, but a value will only be returned if a session is open (see “[Session Open State](#)” on page 115). Session Seed is displayed on the Call Setup screen in the Access Terminal Information (AT Reported) window.

## Related Topics

GPB Command: “[CALL:MS:REPorted:SSEed?](#)” on page 383

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## UATI 024

UATI 024 represents the lower 24 bits of the UATI assigned by the AN to the AT when a UATI Request is processed from the AT.

UATI 024 is sent in the UATI Assignment message (see [“Establishing a Data Connection” on page 125](#)).

UATI 024 can be queried at any time, but a value will only be returned if a session is open (see [“Session Open State” on page 115](#)). The UATI 024 assigned to the access terminal by the test set is displayed on the Call Setup screen in the Access Terminal Information (AN Assigned) window.

### Related Topics

GPIO Command: [“CALL:STATus:MS:UATI024?” on page 404](#)

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## UATI Color Code

UATI color code is the color code associated with the subnet to which the UATI belongs.

UATI color code is sent in the UATI Assignment message (see [“Establishing a Data Connection” on page 125](#)).

UATI color code can be queried at any time, but a value will only be returned if a session is open (see [“Session Open State” on page 115](#)). UATI Color Code is displayed on the Call Setup screen in the Access Terminal Information (AN Assigned) window.

### Related Topics

GPIB Command: [“CALL:STATus:MS:UCCode?” on page 404](#)

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## Operating Mode

The operating mode specifies the fundamental mode of the base station emulator.

If operating mode is set (even to an existing value) while a session is open, the session is dropped without signalling to the access terminal and the test set returns to idle state.

The default setting for operating mode is [“Active Cell Operating Mode” on page 180](#).

**Manual Operation:** Set operating mode by selecting Operating Mode (**F1** on the Call Control 1 of 2 menu, Call Setup screen).

### Related Topics

GPIB Command: [“CALL:OPERating:MODE” on page 384](#)

[“Active Cell Operating Mode” on page 180](#)

[“CW Operating Mode” on page 181](#)

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## Active Cell Operating Mode

Active cell mode is used to emulate a 1xEV-DO access network cell interacting with the access terminal (AT), and is the default operating mode.

The basic features provided by active cell operating mode are:

- Call Processing
  - Start Data Connection
  - End Data Connection
  - Close Session
  - Hard Handoff (Cell Band and Channel)
- Access Network Emulation
  - Cell Power: Pilot, Traffic, Control, and MAC Channels
  - AWGN
  - Cell Bands (see [“Cell Band” on page 159](#))
- Test Application Protocol (TAP) support:
  - Forward Test Application Protocol (FTAP)
  - Reverse Test Application Protocol (RTAP)

### Related Topics

[“Operating Mode” on page 179](#)

[“CW Operating Mode” on page 181](#)



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## CW Operating Mode

CW operating mode provides an unmodulated carrier of adjustable frequency and amplitude, manual adjustment of the measurement receiver and demodulation (uplink) receiver frequencies, and manual setting of the expected CW input power.

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**NOTE** Note: Changing the operating mode affects manual receiver control parameters. See [“Effects on Receiver Control When Changing Operating Mode” on page 184](#).

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When the test set’s operating mode is set to CW:

- No over-the-air signaling is used.
- No demodulation or channel decoding is available.
- An unmodulated RF signal can be generated while analyzing another signal (at the same frequency or at a different frequency). No interaction exists between these controls.
- Expected CW power, measurement receiver frequency, and uplink receiver frequency are available as manual settings only; no automatic control is provided.

## Programming Usage

Use the following commands to control each function for CW operating mode:

- Select CW operating mode: [“CALL:OPERating:MODE” on page 384](#)
- Set the cell power output level to be transmitted by the test set: [“CALL:POWer” on page 388](#)
- Set the RF generator frequency: [“CALL\[:CELL\]:RFGenerator:FREQuency” on page 390](#)
- Set the expected CW power level to be received by the test set: [“RFANalyzer:CW:EXPEcted:POWer” on page 477](#)
- Set the measurement receiver frequency: [“RFANalyzer:MANual:MEASurement\[:MFRequency\]” on page 477](#)

## Related Topics

[“Operating Mode” on page 179](#)

[“Active Cell Operating Mode” on page 180](#)

[“Triggering of Measurements” on page 251](#)

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## Receiver Control

The test set's receiver includes two frequency downconverters:

- Measurement downconverter
- Demodulation downconverter

The Demodulation downconverter is used to establish and maintain the connection (RF link) between the access terminal and test set, while the Measurement downconverter is optimized for measurements.

Refer to the [“Block Diagram” on page 765](#) for a description of the Signal Downconversion paths.

### Automatic Receiver Control

In active cell operating mode, the default receiver control mode is automatic. This means that the test set automatically tunes to the correct frequencies for making measurements and maintaining a connection. Also, the test set automatically adjusts attenuation settings according to the power level that should be present at the RF IN/OUT port given the current settings. This power level is referred to as the expected power, and the current value for expected power is displayed on many of the transmitter power measurement screens.

When operating in automatic receiver power control mode, expected power is derived essentially from the cell power setting according to open loop power control behavior, but expected power is also offset by other settings (see [“Expected Power” on page 185](#)). Tune frequencies are derived from the channel field setting.

In some instances in active cell operating mode, you may want to control the test set's receiver settings manually rather than allowing the test set to automatically control them. This ability is referred to as manual receiver control.

In CW operating mode, you must always specify what frequencies and power the receiver should tune to, there is no automatic receiver control.

### Manual Receiver Control in Active Cell Operating Mode

For front panel operation, see [“Manual Receiver Control in Active Cell or Cell Off Operating Mode”](#) .

#### Manual receiver power

When the Rcvr Power Ctrl field is set to manual (manual receiver power control is selected), an additional field is displayed below Rcvr Power Ctrl. That field is labeled Receiver Power, and when it is displayed automatic receiver power control is disabled. The test set will adjust its attenuation to receive a signal at the level indicated by the Receiver Power field.

Use the following commands for manual receiver power control:

- `“RFANalyzer:CONTRol:POWer:AUTO”` (to set receiver power control to manual)
- `“RFANalyzer:MANual:POWer<[:SELEcted] | :DIGital856>”` (to set the Receiver Power)

When reverse power control (Rvs Power Ctrl) is set to Active bits, closed loop power control will drive the access terminal's transmitted power to the power level set in the Receiver Power field. To effectively disable closed loop power control and inhibit the test set's ability to drive the access terminal's power level to the manually set Receiver Power, select alternating bits in the Rvs Power Ctrl field. With alternating bits is selected in the Rvs Power Ctrl field, cell power level changes will control the access terminal's power level according to open loop power control behavior.

### Measurement downconverter frequency

When a frequency is entered in the Meas Frequency field, the selection labeled Auto is replaced by a manual receiver control tune frequency. The receiver will no longer be tuned according to the channel number entered in the Channel field.

The commands used to manually tune the test set's measurement downconverter input signal path are:

- `"RFANalyzer:MANual:MEASurement[:MFRequency]"` (to specify a receiver measurement frequency and turn manual mode on)
- `"RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO"` (to turn manual receiver measurement frequency mode on/off)
- `"RFANalyzer:MANual:MEASurement:FREQuency"` (to specify a receiver measurement frequency)

### Demodulation downconverter frequency

In Active Cell operating mode, there is no access to manual control of the receiver demodulation frequency. (Refer to the ["Block Diagram"](#) for a description of the Signal Downconversion paths.)

## Manual Receiver Control in CW Operating Mode

For front panel operation, see ["Manual Receiver Control in CW Operating Mode"](#) on page 710.

### Manual receiver power

When the Receiver Control softkey is selected, a menu drops down that includes a setting for Expected CW Power. The test set will adjust its attenuation to receive a signal at the level indicated by the Expected CW Power.

For CW operating mode, the Expected CW Power from the access terminal is set manually using the `"RFANalyzer:CW:EXPected:POWer"` command.

### Measurement downconverter frequency

When the Receiver Control softkey is selected, a menu drops down that includes a setting for Measurement Frequency.

The command used to manually tune the test set's measurement downconverter input signal path is:

- `"RFANalyzer:MANual:MEASurement:FREQuency"` (to specify a receiver measurement frequency)

## Receiver Control

### Demodulation downconverter frequency

When the Receiver Control softkey is selected, a menu drops down that includes a setting for Uplink Frequency.

The command used to manually tune the test set's demodulation downconverter input signal path is:

- [“RFANalyzer:MANual:UPLink:FREQuency”](#) (to specify a receiver demodulation frequency)

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**NOTE** Manual control of the receiver demodulation frequency is rarely needed. If you require control of the receiver's measurement frequency, see [“Measurement downconverter frequency” on page 183](#).

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### Under Range/Over Range Errors

The test set uses the expected power level to establish a range of acceptable input levels into its receivers. If the received signal is above or below the acceptable range, an Over Range or an Under Range message is displayed and the integrity value for the measurement is set to 5 or 6 (respectively). Refer to [“Integrity Indicator” on page 255](#) for details about the integrity values.

You can set the expected power level beyond the capability of the test set's hardware because expected power is intended to reflect the potential range of RF power at the access terminal. This range of RF power is meant to accommodate the use of a gain or loss network between the access terminal and the test set. See [“Amplitude Offset” on page 102](#) for details about amplitude offset.

The upper and lower limits of expected power provide boundaries for the combination of amplitude offset and expected power. If you set expected power to +52 dBm and the amplitude offset to -3 dB, the calculated receiver power will be 49 dBm, but the test set shall be set to +43 dBm, the upper limit of the hardware. If the calculated value of receiver power goes below -25 dB, the lower limit of the hardware, the test set shall be set to -25 dB.

### Effects on Receiver Control When Changing Operating Mode

After selecting the operating mode and setting one or more receiver controls to manual, the receiver control settings remain as you set them until you change operating mode. Changing operating mode (except for CW which defaults to manual) causes some or all receiver parameters to return to automatic control.

### Related Topics

[“Manual Operation: Manual Receiver Control” on page 709](#)

[“Expected Power” on page 185](#)

[“RFANalyzer” on page 474](#)

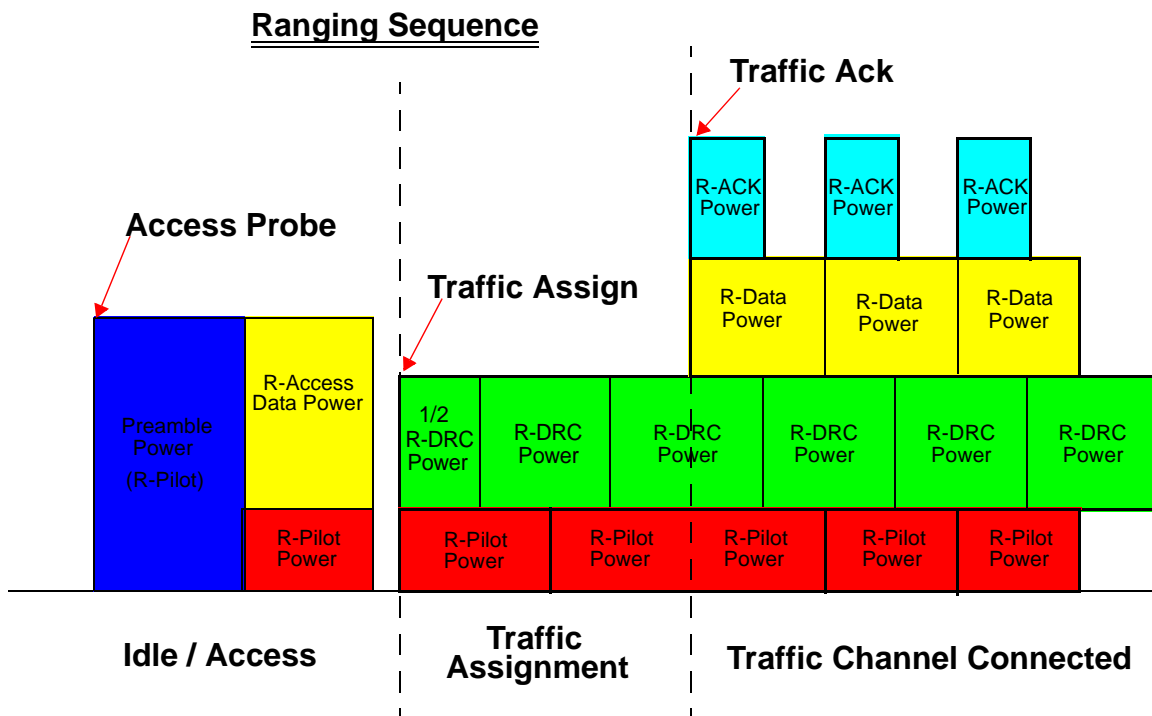
[“CW Operating Mode” on page 181](#)

[“Active Cell Operating Mode” on page 180](#)

## Expected Power

In CW operating mode, you must specify the CW expected power that the test set should range its receiver to (see “Receiver Control” on page 182).

In active cell mode, by default, receiver power control is set to auto (see “Receiver Control” on page 182). In this mode, expected power is used to set the measurement and demodulation receiver powers. Expected power is calculated by the test set, and is displayed on the measurement screen for digital average power, channel power, and access probe power when “Application” is set to RTAP. Expected power is determined by adding the power of all of the reverse channels in the access terminal’s signal (the power in each of the reverse channels is determined by the open loop equation and the settings of parameters such as “Cell Power” and “Probe Initial Adjust”). Which reverse channels contain power varies according to the state of the data connection, as shown below.



The expected power for each of these three states of the data connection is as follows:

- **Idle/Access Probe:**  
Expected Power (dBm) = R-Pilot (dBm) + R-Access Data (dBm)
- **Traffic Assignment:**  
Expected Power (dBm) = R-Pilot (dBm) + R-DRC (dBm)

## Expected Power

- Traffic Channel Connected:

When

- “[ACK Channel Bit Fixed Mode Attribute](#)” is set to on:

$$\text{Expected Power (dBm)} = \text{R-Pilot (dBm)} + \text{R-DRC (dBm)} + \text{R-Data (dBm)} + [\text{R-ACK (dBm)} - 3.01 \text{ dB}]$$

- When “[ACK Channel Bit Fixed Mode Attribute](#)” is set to off:

$$\text{Expected Power (dBm)} = \text{R-Pilot (dBm)} + \text{R-DRC (dBm)} + \text{R-Data (dBm)}$$

When [ACK Channel Bit Fixed Mode Attribute](#) is set to off, the access terminal will still acknowledge any FTAP Test Packets directed to it. The test set still sets its expected power using this formula, even though at time the R-ACK Channel may be present.

The power of each of the reverse channels is calculated as follows:

- R-Pilot (dBm) = - [“[Total RF Power](#)” (dBm) + AT Noise Floor (dBm)] - “[Open Loop Adjust](#)” (dB) + “[Probe Initial Adjust](#)” (dB)  
See “[Fixed Settings](#)” on page 168 for more information on AT Noise Floor.
- R-ACK (dBm) = R-Pilot (dBm) + “[ACK Channel Gain](#)” (dB)
- R-DRC (dBm) = R-Pilot (dBm) + “[DRC Channel Gain](#)” (dB)
- R-Data (dBm) = R-Pilot (dBm) + “[Data Offset Nom](#)” (dB) + “[Data Offset 9k6 | 19k2 | 38k4 | 76k8 | 153k6](#)” (dB) + Gain Correction  
(see “[Data Offset Rate and Gain Correction Values for each R-Data Channel Rate](#)” )
- R-Access Data (dBm) = R-Pilot (dBm) + Data Offset 9k6 + 3.75  
(because the R-Access Data is fixed at 9.6 kbps)

**Table 22. Data Offset Rate and Gain Correction Values for each R-Data Channel Rate**

Data Rate (kbps)	Data Offset 9k6 19k2 38k4 76k8 153k6 (dB)	Gain Correction (dB)
9.6	Data Offset 9k6	3.75
19.2	Data Offset 19k2	6.75
38.4	Data Offset 38k4	9.75
76.8	Data Offset 76k8	13.25
153.6	Data Offset 153k6	18.50

The valid range for expected power is -69 dBm (see “[Input Signal Requirements](#)” on page 101) to “[AT Max Power](#)” .

## Related Topics

GPIO Commands:

- Active cell mode - “[RFANalyzer:AUTO:POWER<\[:SElected\] | :DIGital856>?](#)” on page 475
- CW mode - “[RFANalyzer:CW:EXpected:POWER](#)” on page 477

“[Receiver Control](#)” on page 182

“[Reverse Channel Overview](#)” on page 169

# Programming

# Programming: Getting Started Guide for 1xEV-DO Terminal Test



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## Introduction

The Getting Started Guide is organized around the basic set of tasks a control program normally performs when testing a mobile station in a manufacturing environment.

### Conventions used in this Getting Started Guide

Throughout this Getting Started Guide the term “test set” refers to an Agilent Technologies 8960 Series 10 wireless communications test set with the E1966A 1xEV-DO Terminal Test Application installed.

The variable `Test_set` used in the steps of the Getting Started Guide refers to the test set’s GPIB address.

### How to use this Getting Started Guide

The most effective way to use this Getting Started Guide is with the Programming Flowchart included in the front inside pocket of this guide and the 8960 User Documentation. This documentation is found in two locations:

- the 8960 Family Support Site (updated frequently) on the Internet, or
- the User Documentation CD-ROM shipped with your test application.

Each step on the Programming Flowchart is illustrated with example program code in this guide. Using this Getting Started Guide, the Programming Flowchart, and the on-line information about 8960 programming, you will be able to generate a control program to perform fundamental mobile station manufacturing tests.

### Useful on-line links

Go to the 8960 Family Support Site on either the CD-ROM or the Internet. The CD-ROM should self-launch to its home page. The URL for the website is:

[www.agilent.com/find/8960support/](http://www.agilent.com/find/8960support/)

Navigate to the Programming page for this test application. The illustrations on the back of the Programming Flowchart show you how to navigate to this page.

The following links are under the heading Getting Started on the Programming page:

- Programming: Getting Started Guide
  - This online version of this guide contains links to more detailed information about each step which may be useful as you develop your control program.
- Control Program Examples
  - These examples are for you to download. You may want to use these as templates for your own control program or to execute.
  - The control program explained in the Getting Started Guide is also available here for you to download. It is a fully functional control program.

## Introduction

# About the Programming Examples Presented in this Guide

### Programming Language:

Programming examples presented in this guide are written in the HTBasic for Windows. The use of HTBasic is not an endorsement of the HTBasic product.

### Line Numbers

All of the programming examples in the guide with line numbers are sections from a comprehensive program example available on-line for you to download.

Code that is not part of the downloadable comprehensive program example does not have line numbers. This code may represent an alternate method of performing the task or may illustrate a feature not used by the control program example.

### Syntax used in Programming Examples:

- The programming examples use the unshortened form of the command syntax, simply to make them as readable as possible. You may choose to use the shortened form of the commands to minimize GPIB bus transactions. The shortened form of a command is defined by use of capital letters in the command syntax. For the command syntax:

```
RFANalyzer:CONTrol:MEASurement:FREQuency:AUTO?
```

the shortened form would be:

```
RFAN:CONT:MEAS:FREQ:AUTO?
```

- The programming examples do not include optional nodes. Optional nodes in the command syntax are defined by enclosing the node inside the [ ] brackets. For example, the command syntax:

```
CALL[:CELL]:POWer[:SAMPlitude] -80dBm
```

appears in the programming examples as:

```
CALL:POWer -80dBm
```

- Programming examples make use of compound commands using the ; and the :: separators. Refer to the on-line information for the definition and use of these command separators.

### Complex Commands

Complex commands are used to configure the state and assign values to parameters simultaneously. Complex commands can be used to save programming steps and minimize GPIB bus transactions.

- The syntax below turns the state of the parameter on.

```
OUTPUT Test_set;"SET:CPOW:TIM:STAT ON"
```

- The syntax below is used to assign a value to the parameter.

```
OUTPUT Test_set;"SET:CPOW:TIM:TIME 10 S"
```

- Both of the above actions can be accomplished with one syntax command:

```
OUTPUT Test_set;"SET:CPOW:TIM:STIM 10 S"
```

The command above sets the parameter state to ON and the value of the parameter to 10 seconds. Note that in this example the optional command mnemonic :STIME has been included to clarify that this

complex command was used to set both the state and the value.

- This command can be shortened further by removing the optional command mnemonic :STIME, as shown below.

```
OUTPUT Test_set;"SET:CPOW:TIM 10 S"
```

This is the format that will be used throughout this guide.

## Step 1: Set up the Test Set

The main actions in this step include presetting the test set and accounting for system path loss. Click on the “More Details on this Step” icon below for additional information on this step.

An excerpt from the comprehensive example program is shown below:

```

430 !*****
440 ! STEP 1: SET UP THE TEST SET
450 !*****
460 !
470 !***Turn on GPIB debugger.  Comment out when done debugging program***
480 !
490     OUTPUT Testset;"SYST:COMM:GPIB:DEB:STAT ON"
500     ! Turn debug state on
510 !
520 !***Set system path loss values.  Include cable and coupler losses.***
530 !
540     Loss_frequency$=" 800 MHZ,2000 MHZ"
550     ! Set frequencies for amplitude offset (path loss)
560     Expected_loss$=" -1.5,-1.5"
570     ! Set path loss at frequencies specified
580 !
590     OUTPUT Testset;"SYSTEM:BEEPER:STATE OFF"
600     ! Turn Off System Beeper

2340     OUTPUT Testset;"*RST"
2350     ! Full preset test set
2360     OUTPUT Testset;"*OPC?"
2370     ENTER Testset;Opc$

2450     OUTPUT Testset;"SYST:CORR:FREQ";Loss_frequency$
2460     ! Set the frequencies for amplitude offset
2470     OUTPUT Testset;"SYST:CORR";Expected_loss$
2480     ! Set the amplitude offsets for above frequencies

```

## Step 2: Configure Test Set and Mobile Station Parameters

In this step you set up the parameters which characterize the test set's forward channel signal, the access terminal's reverse channel signal, and the connection between them.

You may choose to configure some of the following parameters during this step:

- Connection parameters - "Limited TAP" , "Cell Band" and "Channel" .
- Parameters which characterize the test set's forward channel - "Color Code" , "Control Channel Data Rate" , "Country Code" , "Preferred Control Channel Cycle" , "Sector ID" , "Subnet Mask" , "PN Offset" and cell power (see "Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power" ).
- Parameters which characterize the access terminal's reverse channel:
  - Gains - "ACK Channel Gain" , "DRC Channel Gain" , "Data Offset Nom" , and "Data Offset 9k6 | 19k2 | 38k4 | 76k8 | 153k6" .
  - Open loop output power and access probes - "Open Loop Adjust" , "Preamble Length" "Probe Initial Adjust" "Probe Num Step" "Probe Power Step" and "Probe Sequence Max"
  - "AT Max Power"

Some of these parameters are set or changed while performing specific C.S0033 tests as discussed in "Step 5: INITiate and FETCh Measurements" on page 200 or during "Step 6: Reconfigure Test Set and Mobile Station Connection Parameters" on page 202.

An excerpt from the comprehensive example program is shown below:

```

620 !*****
630 ! STEP 2: CONFIGURE TEST SET AND ACCESS TERMINAL PARAMETERS
640 !*****
650 !
660 !***Variable declarations for call setup. (AT-specific, change as needed)***
670 !
680     Band$="USC"                ! Set cell band
690     Primary_channel=400        ! Set RF channel for access network
700     Country_code=310          ! Set Access Terminal Country Code
710     Subnet_mask=104           ! Set Sector Subnet mask
720     At_max_power$="DBM23"     ! Set AT Maximum Power
730                               ! (DBM8, DBM13, DBM18, DBM20, DBM23
740                               !  DBM27, DBM28, DBM31, DBM33)
750     Init_cell_power=-50
760     ! Set initial cell power for connection setup

970     OUTPUT Testset;"CALL:APPLICATION:TAPROTOCOL:LIMITED OFF"
980     ! If you are testing an access terminal with Qualcomm
990     ! DMSS 5500 Release 3.1, you must set Limited TAP to On

2560     DISP "Setting up Test Set and Access Terminal Parameters"
2570 !
2580     OUTPUT Testset;"CALL:BAND ";Band$
2590     ! Set Cell Band
2600     OUTPUT Testset;"CALL:CHAN ";Primary_channel

```

## Step 2: Configure Test Set and Mobile Station Parameters

```
2610      ! Set RF Channel for selected Cell Band
2620      OUTPUT Testset;"CALL:POW ";Init_cell_power
2630      ! Set and turns on Cell Power for connection
2640      OUTPUT Testset;"CALL:MS:POWER:MAXIMUM "&At_max_power$
2650      ! Set AT maximum expected power
2660      OUTPUT Testset;"CALL:MCCODE ";Country_code
2670      ! Set AT country code specified
2680      OUTPUT Testset;"CALL:PARAMETER:SECTOR:SMASK ";Subnet_mask
2690      ! Set MS subnet mask specified
```

## Navigation

## Step 3: Set Measurement Parameters

In this step you set up the measurement parameters which are fixed throughout testing, such as measurement timeouts and trigger arm. It is recommended that you set all measurements to single trigger (see [“Trigger Arm \(Single or Continuous\) Description”](#) on page 253).

Click on the “More Details on this Step” icon below for additional information on this step.

You set up other less general measurement parameters while performing specific C.S0033 tests as discussed in [“Step 5: INITiate and FETCh Measurements”](#) on page 200.

An excerpt from the comprehensive example program is shown below:

```

1030 !*****
1040 ! STEP 3: SET MEASUREMENT PARAMETERS
1050 !*****

2780     OUTPUT Testset;"SETUP:CONTINUOUS:OFF"
2790     ! Set all measurements to single trigger

5110     OUTPUT Testset;"SETUP:DOWQ:TIMEOUT 10"
5120     ! Set waveform quality measurement timeout to 10 seconds

5910     OUTPUT Testset;"SETUP:DAPOWER:TIMEOUT 1"
5920     ! Set DIGITAL Power timeout to 1 sec
5930     OUTPUT Testset;"SETUP:CTXS:TIMEOUT 5"
5940     ! Set TX Spur Emissions timeout to 5 sec

7140     OUTPUT Testset;"SETUP:CPOWER:TIMEOUT .5"
7150     ! Set Channel Power timeout to 0.5 sec

8060     OUTPUT Testset;"SETUP:CAPP:TIMEOUT 10"
8070     ! Set access probe power timeout to 10 seconds

9090     OUTPUT Testset;"SETUP:TROP:TIMEOUT 5"
9100     ! Set TROLPC measurement timeout to 5 s

10060    OUTPUT Testset;"SETUP:CPERROR:TIMEOUT 10"
10070    ! Set PER measurement timeout to 10 s

```

## Step 4: Make a connection

In this step you make a connection between the test set and access terminal (AT). To do this you must first open a session from the AT. You may then open a connection from the test set or prompt the user to open a connection from the AT.

- [“Establish a Session from the Access Terminal” on page 196](#)
- [“Open a Connection from the Test Set” on page 197](#)

### Establish a Session from the Access Terminal

A session can only be established from the access terminal. The test set can not open a session.

In this step you:

1. Set the [“Data Connection State Change Detector”](#) timeout.
2. Arm the [“Data Connection State Change Detector”](#).
3. Prompt the user to open a session from the AT and then continue the program execution.
4. Query the session open state of the data connection using the [“CALL:SOPen?”](#) query, to verify a session was opened successfully.

An excerpt from the comprehensive example program is shown below:

```

1140 !*****
1150 ! STEP 4: MAKE A CONNECTION (Open a session)
1160 !*****

1190      ! Open a session with the AT and read AT parameters

2870      OUTPUT Testset;"CALL:DCONNECTED:TIMEOUT 30"
2880      ! Set connection change detector timeout
2890      OUTPUT Testset;"CALL:DCONNECTED:ARM"
2900      ! Arm the connection state change detector
2910 !
2920      BEEP
2930      LINPUT "Connect AT and power on, press ENTER when session open",Keyboard$
2940      DISP "Verifying session is open"
2950 !
2960      OUTPUT Testset;"CALL:SOPEN?"
2970      ! Query the session open state
2980      ENTER Testset;Session_open
2990      IF Session_open=0 THEN
3000      ! If session did not open then end program
3010          BEEP
3020          Print_title("Access Terminal did not open session, check settings")
3030          Print_title("Terminating Testing")
3040          GOTO End_program
3050      END IF
3060 !
3070      DISP "Session Open"

```



```

3080 !
3090 !***Read ACCESS TERMINAL information***
3100 !
3110     OUTPUT Testset;"CALL:MS:REP:SSEED?"
3120     ENTER Testset;Sseed$
3130     OUTPUT Testset;"CALL:MS:REP:HID:TYPE?"
3140     ENTER Testset;Hid_type$
3150     OUTPUT Testset;"CALL:MS:REP:HID:HEX?"
3160     ENTER Testset;Hid_hex$
3170     OUTPUT Testset;"CALL:MS:REP:HID:DEC?"
3180     ENTER Testset;Hid_dec$

14550 Session_check: DEF FNSession_check ! Function to check session open state
14560     COM Testset,Result_file$
14570     OUTPUT Testset;"CALL:SOPEN?"
14580     ! Query the session open state
14590     ENTER Testset;Session_check
14600     RETURN Session_check
14610     ! Function returns 1 for session open, 0 for idle or connected
14620     FNEND

```

## Open a Connection from the Test Set

In this step you first determine the status of the data connection. The data connection must be in the session open state before you can open a connection. If the data connection is in the session open state, then you:

1. Specify whether you would like to open an RTAP or FTAP connection, and at what rate, using the "CALL:APPLiCation" commands.
2. Set the "Data Connection State Change Detector" timeout.
3. Arm the "Data Connection State Change Detector" .
4. Page the access terminal using the "CALL:FUNCTion:DATA:START" command.
5. Query the connected state of the data connection using the "CALL:DCONnected" query to verify a connection was opened successfully.

An excerpt from the comprehensive example program is shown below:

```

1140 !*****
1150 ! STEP 4: MAKE A CONNECTION (Open an RTAP connection)
1160 !*****

3280     DISP "Opening (or Moving to) an RTAP Connection"
3290 !
3300     IF NOT FNConnected THEN
3310         DISP "Connection is not currently open"
3320         ! If the state is NOT connected, then see if it is session open
3330 !
3340         IF NOT FNSession_check THEN
3350             ! If the state is NOT session open, then end program
3360             Print_title("Session is not currently open")
3370             Print_title("Ending Testing")
3380             GOTO End_program

```

## Step 4: Make a connection

```
3390         END IF
3400         ! If the state is session open, then change to RTAP and
3410         ! open a connection
3420         DISP "Session is open, opening an RTAP connection now"
3430 !
3440         OUTPUT Testset;"CALL:APPLICATION RTAP"
3450         ! Set application type to RTAP (for TX testing)
3460         OUTPUT Testset;"CALL:APPLICATION:RTAP:DRATE BPS9600"
3470         ! Set RTAP data rate to 9600 kbps
3480         GOSUB Start_data
3490 !
3500     ELSE
3510         DISP "Connection is currently open, changing to RTAP"
3520         ! If state is connected, then change to RTAP
3530         OUTPUT Testset;"CALL:APPLICATION RTAP"
3540         ! Set application type to RTAP (for TX testing)
3550         OUTPUT Testset;"CALL:APPLICATION:RTAP:DRATE BPS9600"
3560         ! Set RTAP data rate to 9600 kbps
3570 !
3580         IF NOT FNConnected THEN
3590         ! This additional loop is only necessary if Limited TAP is On
3600             DISP "Connection was closed when Application changed"
3610             ! If the state is NOT connected, then see if session open
3620             IF NOT FNSession_check THEN
3630             ! If the state is NOT session open, then end program
3640                 Print_title("Session is not currently open")
3650                 Print_title("Ending Testing")
3660                 GOTO End_program
3670             END IF
3680             ! If the state is session open, then re-open a connection
3690             DISP "Session is open, re-opening an RTAP connection now"
3700             GOSUB Start_data
3710         END IF
3720 !
3730         DISP "RTAP Connection Open"
3740 !
3750     END IF
```

```
4340 Start_data:!
4350 !*****
4360 ! Subroutine: Start data connection and verify it has connected
4370 !*****
4380 !
4390     OUTPUT Testset;"CALL:DCONNECTED:TIMEOUT 10"
4400     ! Set connection change detector timeout
4410     OUTPUT Testset;"CALL:DCONNECTED:ARM"
4420     ! Arm the connection state change detector
4430     OUTPUT Testset;"CALL:FUNCTION:DATA:START"
4440     ! Page the access terminal
4450     OUTPUT Testset;"CALL:DCONNECTED?"
4460     ! Query the connection status
4470     ENTER Testset;Data_started
4480 !
```

## Step 4: Make a connection

```
4490     IF Data_started=0 THEN
4500         Print_title("Data connection could not be opened")
4510         Print_title("Ending Testing")
4520         GOTO End_program
4530     END IF
4540 !
4550     DISP "Data Connection Open"
4560 !
4570     RETURN

14460 Connected: DEF FNConnected ! Function to check connected state
14470         COM Testset,Result_file$
14480         OUTPUT Testset;"CALL:DCONNECTED?"
14490         ! Query the connected status
14500         ENTER Testset;Connected
14510         RETURN Connected
14520         ! Function returns 1 for connected, 0 for idle or session open
14530     FNEND
14540 !
14550 Session_check: DEF FNSession_check ! Function to check session open state
14560         COM Testset,Result_file$
14570         OUTPUT Testset;"CALL:SOPEN?"
14580         ! Query the session open state
14590         ENTER Testset;Session_check
14600         RETURN Session_check
14610         ! Function returns 1 for session open, 0 for idle or connected
14620     FNEND
```

## Navigation

## Step 5: INITiate and FETCh Measurements

In this step you configure any parameters that are required for the test you are performing, then initiate the measurement and fetch the results. You can also use the **“READ”** command to both start the measurement and retrieve the results instead of using the INITiate/FETCh commands.

If the test conditions (cell power, parameter settings, etc.) for any tests are identical, and the required measurements are concurrent (see **“Concurrent Measurements”** on page 246), you can perform the tests simultaneously, saving test time. To do this you must use the INITiate/FETCh commands along with the **“INITiate:DONE?”** command.

---

**NOTE** The INIT:DONE? command is only useful when performing concurrent testing. When initiating only one measurement at a time, simply send the INITiate command immediately followed by the FETCh command to retrieve the results.

---

An excerpt from the comprehensive example program is shown below:

```

5520 !*****
5530 ! Subroutine: Digital Average Power and
5540 !           TX Spurious Emissions Measurements
5550 !           3.1.2.3.4 Maximum RF Output Power
5560 !           3.1.2.4.1 Conducted Spurious Emissions
5570 !*****
5580 !
5590     DISP "Measuring Maximum Power and TX Spurious Emissions"
5600 !
5610 !***Set up test parameters***
5620 !
5630     Ior=-105.5           ! Set cell power for test
5640 !
5650     IF Band$="KPCS" OR Band$="USPCS" OR Band$="IMT2000" THEN
5660     ! Set open loop adjust for test
5670         Ol_adjust=84
5680     ELSE
5690         Ol_adjust=81
5700     END IF
5710 !
5720     OUTPUT Testset;"CALL:APPLICATION:RTAP:DRATE BPS153600"
5730     ! Set RTAP data rate to 153600
5740     OUTPUT Testset;"CALL:APAR:POWER:OLADJUST ";Ol_adjust
5750     ! Set Open Loop Adjust
5760     OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 15"
5770     ! Set Probe Initial Adjust
5780     OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 15"
5790     ! Set Probe Num Steps
5800     !OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 15"
5810     ! Set Probe Sequence Max - this parameter setting is required
5820     ! by C.S0033 but does not affect test results. It is a legacy
5830     ! parameter setting from IS-98. Changing this parameter drops
5840     ! the connection, as required by C.S0024. It is recommended not

```

## Step 5: INITiate and FETCh Measurements

```
5850      ! to send this command.
5860      OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 7.5"
5870      ! Set Probe Step

5960 !***Set test conditions***
5970 !
5980      OUTPUT Testset;"CALL:POW ";Ior
5990      ! Set Cell Power for Test
6000      OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE UP"
6010      ! Start transmission of All Up (0) power control bits
6020      WAIT 1
6030      ! Settling time to allow mobile power to slew up to maximum power
6040 !
6050 !***Obtain measurement results***
6060 !
6070      OUTPUT Testset;"INITIATE:DAPOWER;CTXS"
6080      ! Initiate digital average power and
6090      ! TX spurious emissions measurements
6100 !
6110      LOOP
6120          OUTPUT Testset;"INIT:DONE?"
6130          ! Determine if a measurement is done
6140          ENTER Testset;Meas_done$
6150          ! Obtain measurement results as they are ready
6160 !
6170          SELECT Meas_done$
6180          CASE "DAP"
6190              OUTPUT Testset;"FETCh:DAPOWER?"
6200              ENTER Testset;Integrity,Avg_power_dbm
6210          CASE "CTXS"
6220              OUTPUT Testset;"FETCh:CTXS?"
6230              ENTER Testset;Ctxs_integ,Ctxs_pf,Low_adj,Upp_adj,Low_alt,Upp_alt
6240          END SELECT
6250 !
6260          EXIT IF Meas_done$="NONE"
6270          ! Exit loop when all measurements are complete
6280          END LOOP
6290          ! If Meas_done$="WAIT" then loop continues until "NONE"
```

## Navigation

## Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

There are several ways you may want to reconfigure the connection between the test set and access network when you reach this step.

- [“Move to RTAP/FTAP Connection to Allow Transmitter/Receiver Testing” on page 202](#)
- [“Hand Off to a New Channel or Band” on page 202](#)

### Move to RTAP/FTAP Connection to Allow Transmitter/Receiver Testing

You must have an RTAP connection open to test the access terminal's transmitter, or an FTAP connection open to perform receiver testing. In this step, you thus may need to change the **“Application”** parameter so that you may test the access terminal's transmitter or receiver.

If **“Limited TAP”** is on when you change the **“Application”** parameter, the connection is closed (the session is maintained) and you must re-open the connection. If Limited TAP is off when you change the Application parameter, the connection is maintained.

The programming example in Step 4: Make a Connection, **“Open a Connection from the Test Set”** provides logic to accommodate Limited TAP off or on when changing the Application parameter.

### Hand Off to a New Channel or Band

In this step you may choose to move to a new band and/or channel for testing. To do this you:

1. Specify the handoff band and/or channel using the **“CALL:SETup”** commands.
2. Initiate a handoff using the **“CALL:HANDoff”** command.
3. Query the data connection state to verify it is still connected, using either the **“CALL:DCONnected”** or **“CALL:STATus[:STATe]:DATA?”** query.

An excerpt from the comprehensive example program is shown below:

```

1750 !*****
1760 ! STEP 6: RECONFIGURE TEST SET AND ACCESS TERMINAL CONNECTION PARAMETERS
1770 !         (Perform a handoff to a new channel)
1780 !*****

1440     Handoff_band$="USPCS"
1450     ! Only specify handoff band when performing interband HO

1810 !     Handoff_chan=1023           ! Hand off to "high" channel for test

4640 !***Set up a hard handoff***
4650 !
4660     OUTPUT Testset;"CALL:SETUP:BAND "&Handoff_band$
4670     ! Specify the cell band to hand off to
4680     OUTPUT Testset;"CALL:SETUP:CHANNEL ";Handoff_chan
4690     ! Specify the channel number to hand off to
4700 !
4710 !***Perform a hard handoff***

```

## Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

```
4720 !
4730     OUTPUT Testset;"CALL:HANDOFF"
4740     ! Initiate a hard handoff
4750 !
4760     IF NOT FNConnected THEN
4770     ! Verify connection is still open after handoff
4780         DISP "Handoff attempt failed, program stopped"
4790         GOTO End_program
4800     ELSE
4810         PRINT
4820         Print_results("Handoff completed to channel: ",Handoff_chan,"")
4830         PRINT "Call connected"
4840         PRINT
4850         Current_chan=Handoff_chan
4860         Band$=Handoff_band$
4870 !
4880     END IF

14460 Connected: DEF FNConnected ! Function to check connected state
14470     COM Testset,Result_file$
14480     OUTPUT Testset;"CALL:DCONNECTED?"
14490     ! Query the connected status
14500     ENTER Testset;Connected
14510     RETURN Connected
14520     ! Function returns 1 for connected, 0 for idle or session open
14530     FNEND
```

## Navigation

## Step 7: End the Connection

In this step you end the connection between the access terminal and test set, as well as prepare the test set to test the next access terminal.

To end the connection you must first close the connection. You may then choose to close the session.

To prepare to test the next access terminal, you should then partially preset the test set.

- [“Close the Connection” on page 204](#)
- [“Close the Session” on page 205](#)
- [“Partially Preset the Test Set” on page 205](#)

### Close the Connection

To close the connection, you:

1. Set the [“Data Connection State Change Detector”](#) timeout.
2. Arm the [“Data Connection State Change Detector”](#).
3. Send the [“CALL:FUNCTION:DATA:STOP”](#) command.
4. Query the state of the data connection using the [“CALL:DCONNECTED”](#) or [“CALL:SOPen?”](#) query.

An excerpt from the comprehensive example program is shown below:

```

2120 !*****
2130 ! STEP 7: END THE CONNECTION
2140 !*****

12910     DISP "Closing data connection"
12920 !
12930     OUTPUT Testset;"CALL:DCONNECTED?"
12940     ! Checks connection status
12950     ENTER Testset;Data_stopped
12960 !
12970     IF Data_stopped=0 THEN
12980         DISP "Data connection closed"
12990 !
13000     ELSE
13010         OUTPUT Testset;"CALL:DCONNECTED:TIMEOUT 10"
13020         ! Set connection change detector timeout
13030         OUTPUT Testset;"CALL:DCONNECTED:ARM"
13040         ! Arm the connection state change detector
13050         OUTPUT Testset;"CALL:FUNCTION:DATA:STOP"
13060         ! Close the data connection
13070         OUTPUT Testset;"CALL:DCONNECTED?"
13080         ! Query the data connection status
13090         ENTER Testset;Data_stopped
13100 !
13110     IF Data_stopped=1 THEN
13120         Print_title("Data connection could not be closed")

```



```
13130          Print_title("Ending Testing")
13140          GOTO End_program
13150      END IF
13160 !
13170          DISP "Data connection closed"
13180      END IF
```

## Close the Session

You may choose to close the session at this point using the **“CALL:SClose”** command.

You may also simply disconnect the access terminal from the test set. The test set’s session timer will then expire (see **“Fixed Settings” on page 168**) and the data connection will return to the idle state.

## Partially Preset the Test Set

Partially presetting the test set using the **“SYSTEM:PRESet3”** command will also return the data connection to the idle state, as well as stop any measurements in progress.

## Navigation

---

## Step 1: Set Up the Test Set

The following information provides additional details on Step 1 of the Programming Flowchart. This information is applicable to all test applications.

### Description

In this step you initialize the test set and set up the general operating conditions.

### Contents

- “Initialize the Test Set”
- “Set Up General Operating Conditions”

### Initialize the Test Set

- Fully Preset the Test Set

It is important to get the test set to a known state before each production session.

Sending the \*RST command fully presets the test set, which ends all call processing and measurement processes and restores all values to defaults.

- Clear the Error Queue

Before each production session, it is useful to clear the error queue of any old messages. That way, you know that any messages logged are relevant to the current production session.

Sending the \*CLS command clears the error queue.

### Set Up General Operating Conditions

- Turn Debugger On

While developing your code, it is very useful to enable the GPIB debugger using the SYST:COMM:GPIB:DEB ON command. When the debugger is on, the test set alerts you when you send an incorrect command, and it also tells you which symbol or letter in the command is incorrect.

---

**NOTE** You should turn the debugger off once you have finished development and your code is stable.

---

- Set Operating Mode

The test set contains a base station emulator (BSE), whose primary purpose is to provide enough call processing to allow parametric measurements of a mobile station's RF signal.

An important characteristic of the test set's base station emulator is its operating mode. The operating mode sets the way in which the base station emulator interacts with the mobile station.

Active cell mode is used when emulating a normal cell. Active cell mode allows active signaling between the mobile station and BSE. The mobile station camps to the BSE signal, and an actual call is established.

In test mode, the mobile station synchronizes to the BSE signal and transmits an appropriate signal which the test set analyzes.

The test set's operating mode is set using the following command:

**Command to Set the Test Set's Operating Mode**

Command	Example
CALL:OPER:MODE <operating mode>	CALL:OPER:MODE CALL

- **Set Amplitude Offsets**

To achieve accurate measurement results, it is important to account for losses in the cabling and fixturing between the mobile station and test set. You must determine what the losses are for your test setup and then specify the appropriate frequency-dependent amplitude offset values.

You can specify amplitude offsets for up to 20 frequencies using the following commands:

**Commands to Set Amplitude Offsets**

Command	Example
SYST:CORR:FREQ <freq1>, <freq2>, <freq3>	SYST:CORR:FREQ 800MHz, 1800MHz, 1900MHz
SYST:CORR[:SGain] <offset1>, <offset2>, <offset3>	SYST:CORR -0.7, -1.0, -1.2

- **Set Display Mode**

To achieve a slightly faster test execution speed, you can disable the front panel display on the test set using the DISP:MODE FAST command.

## Step 2: Configure Test Set and Mobile Station Parameters

The following information provides additional details on Step 2 of the Programming Flowchart. This information is applicable to all test applications.

### Description

In this step you configure the parameters that allow a connection to be made between the test set and mobile station. This mainly involves setting up channels and power levels.

### Contents

- “Set Up Channels”
- “Set Cell Power”
- “Set Mobile Station Transmit Power”
- “Set Up Additional Connection Parameters”

### Set Up Channels

Setting up channels involves specifying the channel associated with every band and channel type (for example, analog or digital), and then setting the active band and channel type.

- Specify Channel Numbers

All of the test set’s test applications can test in more than one frequency band (for example, US Cellular, US PCS, or Korean PCS). To produce the most efficient code, you should configure the channel information for each band in advance. Then, to move to a new band during testing, you only need to send the command to change bands. You do not need to also specify the channel of the new band. This reduces test time.

To set up the channel number for the various bands, use one of the following commands (depending upon which test application you are using):

#### Commands to Set the Channel for a Band

Command	Example
CALL:<channel mnemonic>:<band mnemonic> <num value>	CALL:TCH:EGSM 124
CALL:SET:<channel type mnemonic>:<band mnemonic> <num value>	CALL:SET:DTC:PCS 777
CALL:CHAN:<channel type mnemonic>:<band mnemonic> <num value>	CALL:CHAN:DIG2000:K PCS 384

This practice also applies to test applications which test both analog and digital channel types. In this case you should specify the channel for the analog and digital channel types in advance. Then, switching between them requires only one command to initiate the change, and not an additional change to specify the channel of the new channel type.

## Step 2: Configure Test Set and Mobile Station Parameters

If you specify channels in advance as described, the only time you need to specify a channel during testing is if you move to a new channel within the same band and channel type.

- **Set Active Band and Mode**

Once you have specified the channel information for each band and channel type, you must set the active band using one of the following commands (depending upon which test application you are using):

### Commands to Set the Active Band

Command	Example
CALL:<channel mnemonic>:BAND <band mnemonic>	CALL:TCH:BAND EGSM
CALL:SET:<channel type mnemonic>:BAND <band mnemonic>	CALL:SET:DTC:BAND PCS
CALL:BAND:<channel mnemonic> <band mnemonic>	CALL:BAND:DIG2000 KPCS

If the test application you are using supports testing of both analog and digital channel types, then you must also set the channel type using the following command:

### Command to Set the Active Channel Type

Command	Example
CALL:<channel mnemonic>:TYPE <channel type mnemonic>	CALL:TCH:TYPE DTC

- **Active Cell and Test Mode Considerations**

The function of the CALL commands differ depending upon whether you are in active cell or test mode.

In active cell mode, when you use the CALL commands to set the channel numbers, the test set's output frequency and receiver frequency are set. A message is also sent to the mobile station to set its frequency.

However, in test mode, since the BSE does not send call processing information to the mobile station, the CALL commands only configure the test set's output frequency and receiver frequency. You need to also send the appropriate test mode commands to the mobile station to set it to the correct frequency.

In test mode, instead of using the CALL commands to configure the test set's frequencies, you may prefer to manually control the RF generator and RF analyzer using the CALL:RFG and RFAN commands, respectively. In either case, you must still send the appropriate test mode commands to the mobile station to move it to the proper frequency.

## Step 2: Configure Test Set and Mobile Station Parameters

### Set Cell Power

To set the output power of the test set, use the following command:

#### Command to Set Cell Power

Command	Example
CALL:POW <num value>	CALL:POW -75

- Active Cell and Test Mode Considerations

You can use the CALL:POW command to set the cell power in both active cell and test mode. However, in test mode you may prefer to manually control the output power of the test set using the CALL:RFG commands.

### Set Mobile Station Transmit Power

In active cell mode, use one of the following commands to set the mobile station transmit power level (depending upon which test application you are using):

#### Commands to Set Mobile Station Transmit Power

Command	Example
CALL:MS:TXL:<band mnemonic> <num value>	CALL:MS:TXL:DCS <num value>
CALL:SET:MS:<channel type mnemonic>:TXL:<band mnemonic> <num value>	CALL:SET:MS:DIG:TXL:PCS <num value>
CALL:<channel mnemonic>:MS:TXL:<band mnemonic>:BURS <num value>	CALL:PDTCH:MS:TXL:DCS: BURS <num value>

In addition to setting the mobile station transmit level, these commands also automatically configure the test set's receiver at the expected input level, whether in active cell or test mode. However, in test mode, you must also send the appropriate test mode commands to the mobile station to command it to output at the correct level. This is due to the fact that the BSE is not transmitting call processing commands to the mobile station.

- Manually Setting Expected Power

Sending the CALL commands in [Table , "Commands to Set Mobile Station Transmit Power,"](#) automatically sets the expected input level of the test set's receiver. However, there is another option for setting the receiver's input level in both active cell and test mode. It is often beneficial to manually set the expected input power level using the RFAN commands, rather than using the CALL commands.

When you set the expected power manually, you tell the test set exactly what power level to expect. Whereas the CALL commands simply tell the test set the range of input level to expect, based on the definition of the mobile station power level (for example, an AMPS/136 mobile station transmitting at power level 3 has an output level in the range of +20 dBm to +26 dBm).

## **Step 2: Configure Test Set and Mobile Station Parameters**

### **Set Up Additional Connection Parameters**

Depending upon the test application you are using, there may be other connection parameters to specify, such as timeslot, timing advance, vocoder, or data rates and types.

In active cell mode, you may also choose to set up network parameters, such as base station identifier numbers (for example, SID) and color codes.

All of these parameters are configured using the CALL subsystem.

---

## Step 3: Set Measurement Parameters

The following information provides additional details on Step 3 of the Programming Flowchart. This information is applicable to all test applications.

### Description

In this step you set up the conditions under which the measurements operate. You do this by configuring measurement parameters.

### Contents

- [“Measurement Parameters Overview”](#)
- [“Generic Measurement Parameters”](#)
- [“Measurement-Specific Measurement Parameters”](#)

### Measurement Parameters Overview

There are two different types of measurement parameters:

- Generic Measurement Parameters
- Measurement-Specific Measurement Parameters

The SETup subsystem is used to configure measurement parameters. Each individual measurement parameter can be set and queried using the associated SETup subsystem command. The general hierarchy of the SETup subsystem command structure is as follows:

```
SETup:<measurement mnemonic>:<measurement parameter> <parameter setting/value>
```

---

**NOTE** Not all measurements use all measurement parameters. Refer to the GPIB syntax listing for the detailed list of measurement parameters for individual measurements.

---

### Generic Measurement Parameters

There are three types of generic measurement parameters:

- Measurement Count (used by most measurements)
  - Measurement Count State
  - Measurement Count Number
- Measurement Timeout (used by all measurements)
  - Measurement Timeout State
  - Measurement Timeout Time



- Measurement Trigger (used by most measurements)  
 Trigger Arm (used by all measurements)  
 Trigger Source (not applicable to analog measurements)  
 Trigger Delay (not applicable to analog measurements)

**Measurement Count Parameters**

The measurement count parameters control measurement averaging. The STATE command turns averaging on or off, and the NUMBER command determines the number of averages. The SNUMBER command is a complex command which allows you to turn averaging on and set the number of averages in one command.

**Statistical Measurement Results Parameters**

Parameter	Command Syntax
Measurement Count State	SETup:<meas-mnemonic>:COUNT:STATE <ON 1 OFF 0>
Measurement Count Number	SETup:<meas-mnemonic>:COUNT:NUMBER <numeric value>
Measurement Count Number and State	SETup:<meas-mnemonic>:COUNT[:SNUMBER] <numeric value>

**Example 1. Programming Example:**

```
OUTPUT Test_set;"SET:DTXP:COUN 10"
```

sets the multi-measurement count state to ON and set the number of averages to 10 for the digital transmit power measurement.

**Measurement Timeout Parameters** Measurement timeout parameters control the maximum time that a measurement executes. TIME sets the amount of time and STATE determines if the timeout is in use. The STIME command is a complex command which enables you to set both parameters in one command.

**Measurement Timeout Parameters**

Parameters	Command Syntax
Measurement Timeout Time and State	SETup:<meas-mnemonic>:TIMEout[:STIME] <numeric value>[<suffix>]
Measurement Timeout State	SETup:<meas-mnemonic>:TIMEout:STATE <ON 1 OFF 0>
Measurement Timeout Time	SETup:<meas-mnemonic>:TIMEout:TIME <numeric value>[<suffix>]

**Example 2. Programming Example:**

```
OUTPUT Test_set;"SET:DTXP:TIM 10"
```

sets the measurement timeout state to ON and set the measurement timeout time to 10 seconds for the digital transmit power measurement.

### Step 3: Set Measurement Parameters

**Measurement Trigger Parameters** There are three measurement trigger parameters. They control the arming of a measurement, the source of the trigger, and the trigger's delay.

- The trigger arm parameter determines whether the test set makes one measurement and then stops (single), or automatically re-arms upon completion of one measurement and repeats the process (continuous). The recommended setting when writing a control program is single (CONTInuous OFF).
- The trigger source parameter selects the source of the measurement trigger signal. The recommended Trigger Source setting when writing a control program is AUTO.

---

**NOTE** Trigger source is always IMMEDIATE for analog measurements and cannot be changed by the user.

---

- The trigger delay parameter controls the delay between the trigger event (the point in time at which the trigger signal is received) and the start of sampling. Negative values indicate that the sampling should occur prior to the trigger event.

---

**NOTE** Trigger delay is not applicable to analog measurements.

---

### Measurement Trigger Parameters

Parameter	Command Syntax
Trigger Arm	SETup:<meas-mnemonic>:CONTInuous <ON 1 OFF 0>
Trigger Source	SETup:<meas-mnemonic>:TRIGger:SOURce <AUTO IMMEDIATE PROTOCOL RISE>
Trigger Delay	SETup:<meas-mnemonic>:TRIGger:DELay <numeric value>[<suffix>]

---

**NOTE** You can set the Trigger Arm for all measurements to single (CONTInuous OFF) using the following command syntax:

```
SETup[:ALL]:CONTInuous:OFF
```

---

#### Example 3. Programming Example:

```
OUTPUT Test_set;"SET:CONT:OFF"
```

sets the trigger arm to single for all measurements.

#### Example 4. Programming Example:

```
OUTPUT Test_set;"SET:DTXP:TRIG:SOUR AUTO"
```

sets the trigger source to AUTO for the digital transmit power measurement.

#### Example 5. Programming Example:

```
OUTPUT Test_set;"SET:DTXP:TRIG:DEL 10 US"
```

sets the trigger delay to 10 microseconds for the digital transmit power measurement.

**Measurement-Specific Measurement Parameters**

Measurement-specific measurement parameters set up operating conditions for a specific measurement. For example:

- Setting the channel power measurement speed in IS-2000
- Setting ORFS frequency offsets in GPRS
- Setting number of bits for the FBER measurement in GSM

Refer to the GPIB syntax listing for the detailed list of measurement parameters for individual measurements.

**Example 6. Programming Example:**

```
OUTPUT Test_set;"SET:CPOW:MSP FAST"
```

sets the IS-2000 channel power measurement speed to fast.

**Example 7. Programming Example:**

```
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ 400 KHZ"
```

sets the first ORFS offset to 400 kHz.

**Example 8. Programming Example:**

```
OUTPUT Test_set;"SET:FBER:COUN 10000"
```

sets the number of fast BER bits to test to 10,000 bits.

**Example 9. Program Example Setting Both Generic and Measurement-Specific Measurement Parameters**

```
! Set trigger arm to single for all measurements:
!
OUTPUT Test_set;"SET:CONT:OFF"
!
! *****
! Configure Modulation Accuracy Measurement:
!
OUTPUT Test_set;"SET:MACC:COUN 5"
! Example of using a complex command to set both the
! measurement count state and number at the same time.
!
OUTPUT Test_set;"SET:MACC:TRIG:SOUR AUTO"
! Sets trigger source to auto.
!
OUTPUT Test_set;"SET:MACC:TIM 15"
! Sets timeout state to ON and time to 15 sec.
!
OUTPUT Test_set;"SET:MACC:EVM10:STAT ON"
! Turns the EVM10 State ON
!
! *****
! Configure Digital TX Power Measurement:
```

### Step 3: Set Measurement Parameters

```
!  
OUTPUT Test_set;"SET:DTXP:COUN 5"  
OUTPUT Test_set;"SET:DTXP:TRIG:SOUR AUTO"  
OUTPUT Test_set;"SET:DTXP:TIM 5"  
!  
! *****  
! Configure Frequency Stability Measurement:  
!  
OUTPUT Test_set;"SET:FST:COUN 3"  
OUTPUT Test_set;"SET:FST:TIM 10"  
!  
! *****  
! Configure Analog TX Power Measurement:  
!  
OUTPUT Test_set;"SET:ATXP:COUN 5"  
OUTPUT Test_set;"SET:ATXP:TRIG:SOUR AUTO"  
OUTPUT Test_set;"SET:ATXP:TIM 15"
```

## Step 4: Make Connection

The following information provides additional details on Step 4 of the Programming Flowchart. This information is applicable to all test applications.

### Description

In this step you make a connection between the mobile station and test set. How you do this depends upon whether you are in active cell or test mode. In active cell mode you establish a phone call between the test set and mobile station. In test mode, you command the mobile station to synchronize to the test set's signal and begin transmitting back an appropriate signal.

### Contents

- [“Establish a Call in Active Cell Mode”](#)
- [“Make a Test Mode Connection”](#)

### Establish a Call in Active Cell Mode

To test a mobile station in active cell mode, you must first establish a call between the test set and mobile station. Your control program must issue the commands necessary to initiate the call connection process, either to the test set (for a base station originated call) or to the mobile station (for a mobile station originated call). Your control program must then determine when the call has successfully connected so that it can proceed to testing. The control program must also determine if the call has not been successfully connected so that it can take appropriate action.

**Call States** At any instant in time a call can be in a stable state such as the idle or the connected state, or in one of many transitory states such as alerting, handoff, registering, releasing or paging. These are referred to as transitory states because the amount of time which the call can spend in any of these states is limited by the mobile station's protocol. The call is not allowed to stay in a transitory state indefinitely.

---

**NOTE** If repeat paging or repeat registration are on, it is possible for the call process to stay in one of the transitory states beyond the time specified by the mobile station's protocol timers.

---

**Call Connection Synchronization Commands** The test set has a set of commands designed specifically for call connection and release synchronization.

#### Call Connection Synchronization Commands

Synchronization Command	Command Syntax
Call-Connected-State Query	CALL:CONNected[:STATe]?
Call-State-Change Detector Arm	CALL:CONNected:ARM[:IMMediate]
Call-State-Change Detector Timeout	CALL:CONNected:TIMEout

## Step 4: Make Connection

- Call-Connected-State Query

The CALL:CONN? query allows the control program to determine if a call is in the connected state or in the idle state.

### Responses Returned by the CALL:CONN? Query

Response	Meaning
1	The call is in the connected state.
0	The call is in the idle state.

If the call is in one of the transitory states, the query waits until the call reaches the idle state or connected state before returning a value.

- Call-State-Change Detector Arm Command

The test set has a call-state-change detector which can be used to temporarily hold the response to a CALL:CONN? query until the call state has moved from idle to connected or vice versa.

Without the call-state-change detector, the CALL:CONN? query only hangs if the call is in a transitory state. Otherwise, it immediately returns a 1 or 0. Therefore, if a call connection process is started and the CALL:CONN? query is sent before the call state has transitioned from idle to one of the transitory states, the query immediately returns a 0. This indicates that the call is in the idle state (and therefore that the connection attempt failed). In reality, the call likely connected, but not until after the CALL:CONN? query immediately returned a 0.

When the call-state-change detector is armed during a connection attempt, if the CALL:CONN? query is sent while the call state is still idle, the query waits until the state changes to connected, and then returns a 1.

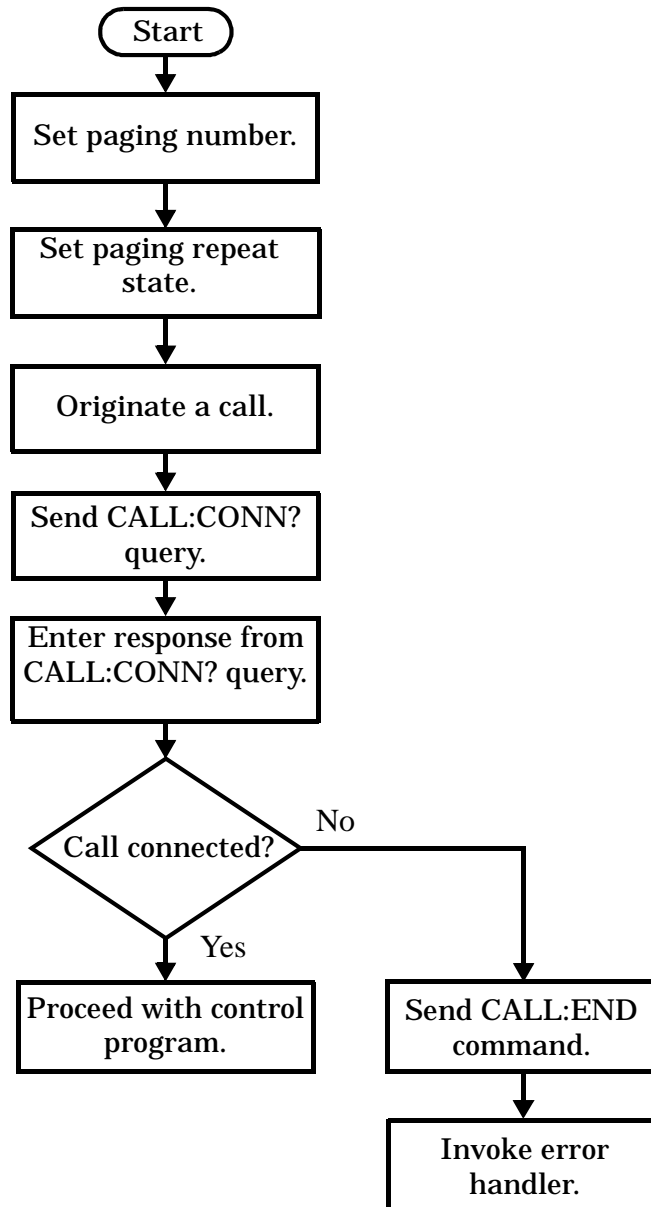
The CALL:CONNected:ARM[:IMMediate] command is used to arm this call-state-change detector.

- Call-State-Change Detector Timeout Command

If the call-state-change detector is armed and a call connection is attempted but the call state never changes from the idle state, the CALL:CONN? query hangs the bus. This easily happens if the mobile is badly broken, the mobile is not connected to the test set, or no one pushes the send button on the mobile.

The CALL:CONNected:TIMEout command is used to set the timeout value for the call-state-change detector.

The timeout timer is started whenever the call-state-change detector is armed, and should be set to the maximum amount of time the control program should wait between arming the detector and the beginning of the connection process (when the call state moves from the idle state). If the timer expires before the call state has moved from the idle or connected state, the call-state-change detector is disarmed, which releases the CALL:CONN? query if it is currently hanging.

**Process for Making a Base Station Originated Call Figure 10. Process for Making a Base Station Originated Call**

---

**NOTE** It is not necessary for you to send the CALL:CONN:TIM and CALL:CONN:ARM commands as they are automatically sent by the test set during a base station originated call or base station release.

---

## Step 4: Make Connection

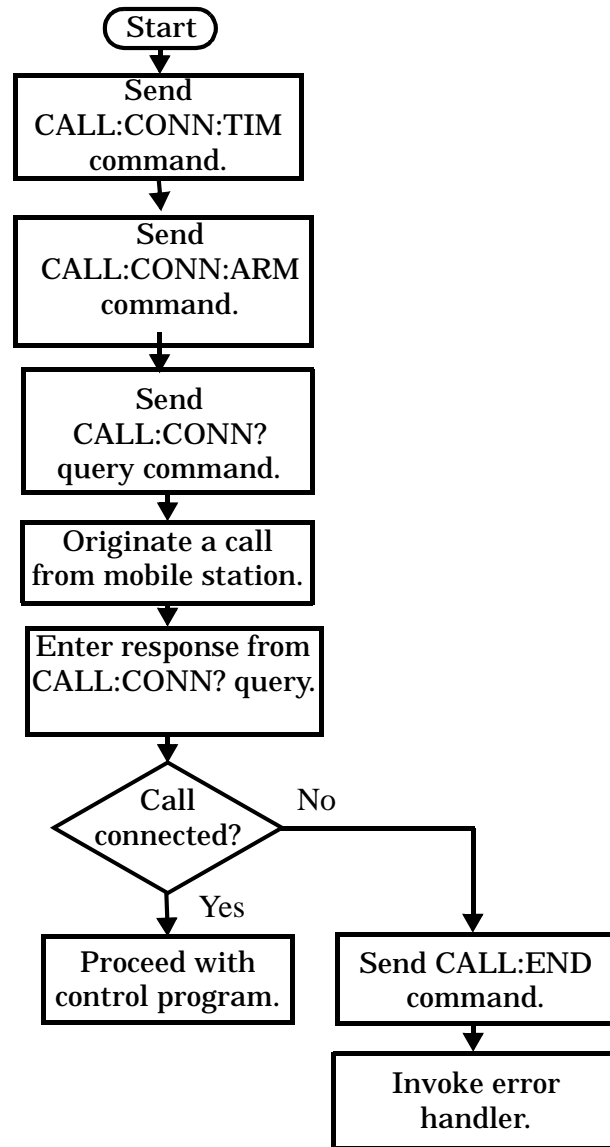
### Example 10. Programming Example

```
OUTPUT Test_set;"CALL:PAG:PNUM `0000574016`"! Set paging number
OUTPUT Test_set;"CALL:PAG:REP ON" ! Set paging repeat state
OUTPUT Test_set;"CALL:ORIG" ! Start a base station originated call
OUTPUT Test_set;"CALL:CONN?" ! Hanging GPIB query
ENTER Test_set;Call_connected      ! Program hangs here until
                                   ! origination passes or fails

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```



**Process for Making a Mobile Station Originated Call Figure 11. Process for Making a Mobile Station Originated Call**

**NOTE**

The test set cannot originate a call from the mobile station. You must physically dial a number on the mobile station and press send, or send commands to a test bus built into the mobile station. For mobile station originated calls where the call is originated by physically dialing a number (as opposed to using a test bus) ensure that the call-state-change detector timeout time is long enough to allow the number to be dialed.

## Step 4: Make Connection

### Example 11. Programming Example

```
OUTPUT Test_set;"CALL:CONN:TIM 10"           ! Set timeout time to 10 seconds
OUTPUT Test_set;"CALL:CONN:ARM"             ! Arm the change detector
DISP "Initiate a call from the mobile"
OUTPUT Test_set;"CALL:CONN?"                ! Initiate a call connected state query
ENTER Test_set;Call_connected                ! Program hangs here until
                                           ! origination passes or fails

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected. Proceed with the control program.
```

### Make a Test Mode Connection

To make a connection between the test set and mobile station in test mode, you must send the appropriate test mode commands to the mobile station to command it to synchronize to the test set's signal and begin transmitting.

You may also want to make a quick power measurement to ensure that the connection has been made.

---

## Step 5: INITiate and FETCh Measurements

The following information provides additional details on Step 5 of the Programming Flowchart. This information is applicable to all test applications.

### Description

This step involves making measurements on the mobile station.

The test set has multiple signal paths and processors, which means you can make measurements concurrently and reduce test time. Making concurrent measurements involves starting a group of measurements, fetching the results of the measurements as they complete, and then verifying that the results are valid.

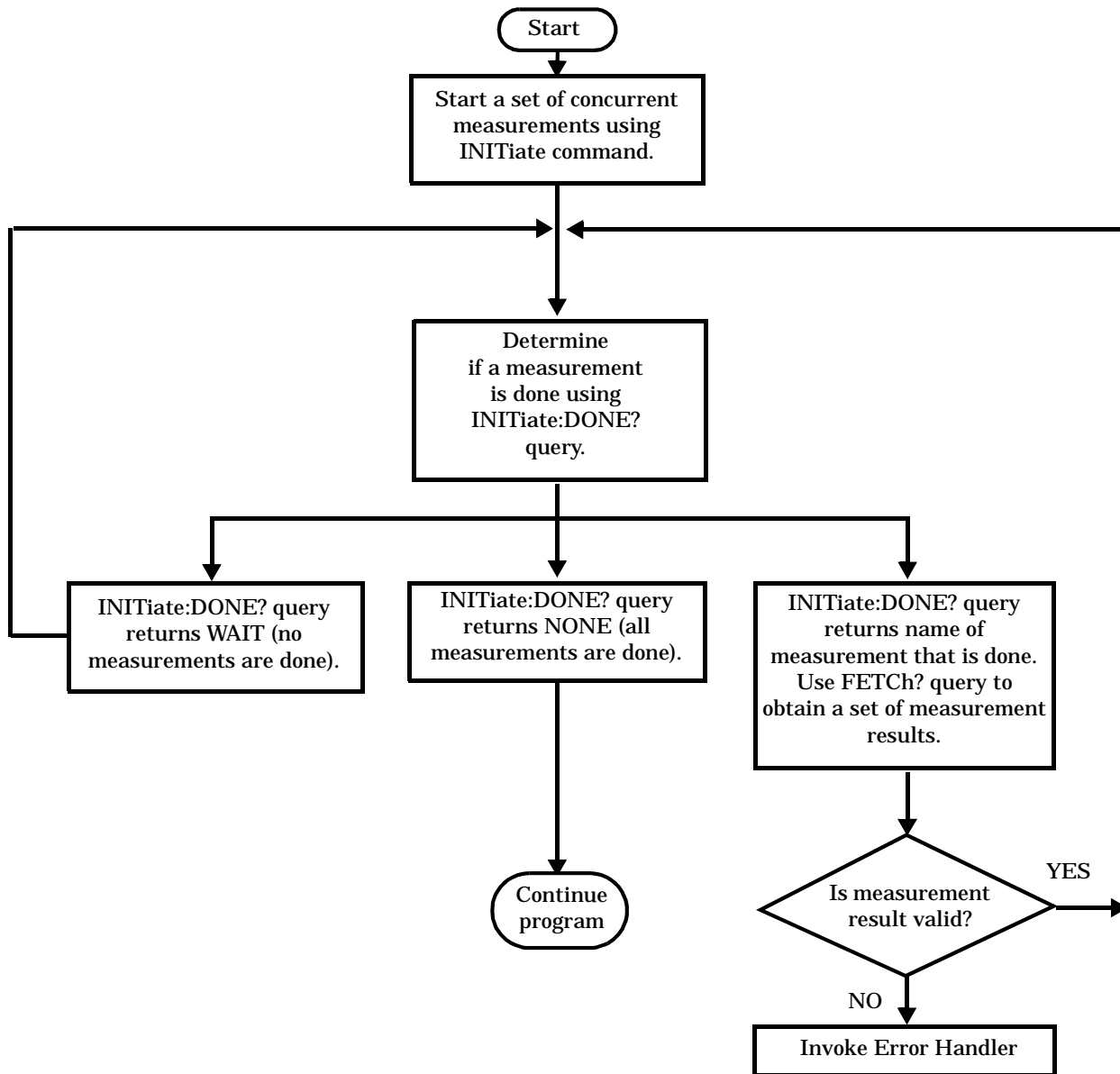
### Contents

- [“Concurrent Measurement Process”](#)
- [“Alternative Measurement Process”](#)

## Step 5: INITiate and FETCh Measurements

### Concurrent Measurement Process

Figure 12. Process for Making Concurrent Measurements



**Start a Set of Concurrent Measurements** The INITiate command is used to start measurements. Each individual measurement can be started using the INITiate command. For starting measurements, the syntax of the INITiate command is as follows:

```
INITiate:<measurement mnemonic>[:ON]
```

## Step 5: INITiate and FETCh Measurements

More than one measurement can be started using a single INITiate command. For example:

```
OUTPUT Test_set;"INIT:TXP;PFER"
```

starts the transmit power measurement and the phase and frequency error measurement. These measurements then run concurrently.

**Determine if a Measurement Is Done** Use the INITiate:DONE? query command to determine which measurement has completed.

This command is a query only and returns only one response per query. The responses returned and their meanings are shown in the following table:

**Table 23. Responses Returned from INITiate:DONE? Query**

Response String	Meaning
<MEASUREMENT1 mnemonic>	MEASUREMENT1 is done.
<MEASUREMENT2 mnemonic>	MEASUREMENT2 is done.
WAIT	There are one or more measurements that are in progress, but none of those measurements are done yet.
NONE	No measurements are in progress.

Once a measurement is reported as being complete via the INITiate:DONE? query it is removed from the done list (it is not reported again). To use the INITiate:DONE? query properly, your control program should immediately fetch a measurement's results once it is reported as being complete.

**Obtain a Set of Measurement Results** In order to minimize bus traffic and reduce test time, the test set's measurements are designed to return multiple measured values in response to a single measurement request.

For example, if a transmit power measurement with averaging is initiated there are five measurement results available. These are:

1. Measurement integrity value
2. Average value
3. Minimum value
4. Maximum value
5. Standard deviation value

The test set can return the measurement results in a variety of formats to suit your needs using the FETCh? subsystem. The general structure of the FETCh? command is as follows:

```
FETCh:<measurement mnemonic>:<result format>?
```

For example, the transmitter power measurement results can be returned as:

### Example FETCh? Result Formats

Command	Results Returned
FETC:TXP?	Measurement integrity and average value

## Step 5: INITiate and FETCh Measurements

### Example FETCh? Result Formats

Command	Results Returned
FETC:TXP:POW:ALL?	Minimum, maximum, average and standard deviation values
FETC:TXP:POW:AVER?	Average value only
FETC:TXP:POW:MIN?	Minimum value only
FETC:TXP:POW:MAX?	Maximum value only
FETC:TXP:POW:SDEV?	Standard deviation value only
FETC:TXP:INT?	Measurement integrity value only

### Example 12. Concurrent Measurement Process Programming Example

```
! Start a Set of Concurrent Measurements:
!
OUTPUT Test_set;"INIT:TXP;PFER"
!
! Determine if a Measurement Is Done:
!
LOOP
  OUTPUT Test_set;"INIT:DONE?"
  ENTER Test_set;Meas_done$
!
! Obtain a Set of Measurement Results:
!
  SELECT Meas_done$
    CASE "TXP"
      OUTPUT Test_set;"FETC:TXP:POW?"
      ENTER Test_set;Avg_tx_power
    CASE "PFER"
      OUTPUT Test_set;"FETC:PFER:RMS?"
      ENTER Test_set;Max_rms_phas_er
  END SELECT
EXIT IF Meas_done$="NONE"
END LOOP
```

**Validate Measurement Results** Validating measurement results is extremely important. The test set returns a result if it is capable of making a measurement, even if this result is obtained under adverse conditions.

The measurement integrity indicator is a measurement result and therefore is queried using the FETCh subsystem. A value of 0 indicates that the measurement is valid. A value other than 0 indicates that an error occurred during the measurement process.

**Example Integrity Indicators**

Value Returned	Description (message also appears on test set)
0	Normal
1	No Result Available
2	Measurement Timeout
5	Over Range
6	Under Range

**Example 13. Programming Example**

```
OUTPUT Test_set;"FETC:DTXP?"
ENTER Test_set;Integrity,Avg_dig_pow
IF Integrity=0 THEN
    PRINT "AVG DIG POW= ";Avg_dig_pow
ELSE
    PRINT "DTXP Measurement Error"
    PRINT "DTXP Measurement Integrity is ";Integrity
END IF
```

**Alternative Measurement Process**

You may choose to test in a sequential way rather than use the concurrent measurement process.

For instance, instead of using the INIT:DONE? query to determine when a measurement is complete, you may choose to initiate a set of measurements and then simply fetch them sequentially.

**Example 14. Programming Example**

```
OUTPUT Test_set; "INIT:DTXP;MACC"
OUTPUT Test_set; "FETC:DTXP:POW?"
ENTER Test_set;Avg_dig_pow
OUTPUT Test_set; "FETC:MACC:EVM[1]?"
ENTER Test_set;Max_EVM1
```

In this example, the test set starts both measurements at the same time. However, if the MACC measurement finishes first, the results are not fetched until the DTXP measurement finishes. Therefore, this process requires that you understand the order in which measurements will complete in order to optimize your testing speed.

## Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

The following information provides additional details on Step 6 of the Programming Flowchart. This information is applicable to all test applications.

### Description

After performing a set of measurements on the mobile station using the configuration established in step 2, you may want to change this configuration and test the mobile station again. This step involves changing testing conditions such as channel, mobile station transmit power level, or cell power.

### Contents

- [“Change Channels”](#)
- [“Change Other Connection Parameters”](#)

### Change Channels

In a manufacturing environment it is common to test a mobile station on more than one channel. Some or all of the tests may be performed on multiple channels, to verify the mobile station’s performance in a range of operating frequencies.

#### Perform a Handoff (Handover) in Active Cell Mode

If you are operating in active cell mode, to change channels you perform a handoff (handover) to the new channel. The control program sends the commands to initiate the handoff (handover), and then determines whether the transition was successfully completed. This is accomplished using the CALL:STATus? query.

The CALL:STATus? query immediately returns the state of the call at the time the query is received.

#### Example Responses Returned from the CALL:STAT? Query

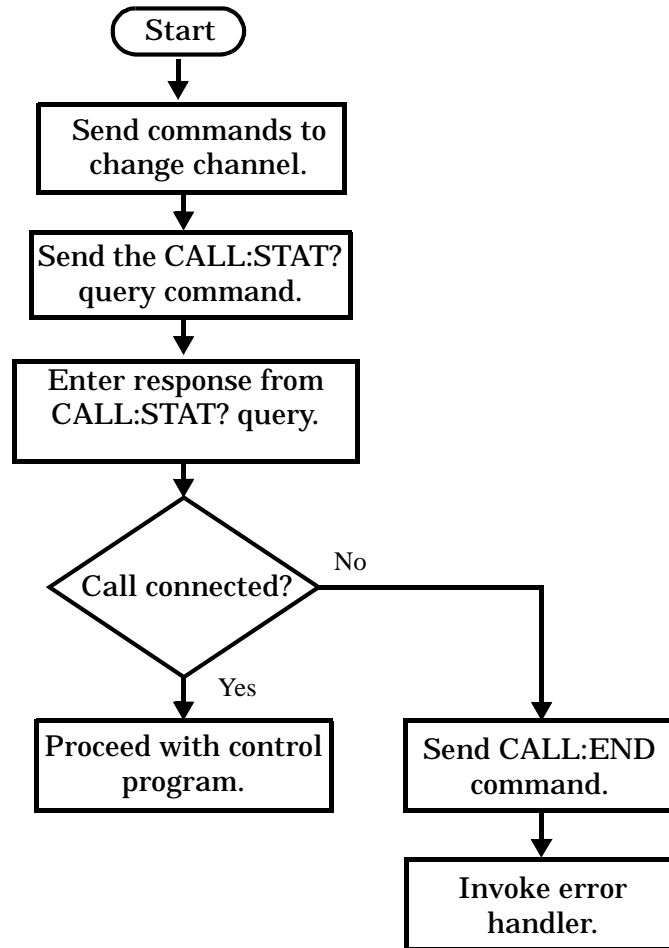
Response	Meaning
IDLE	The call is in the Idle state
ALER	The call is in the Alerting transitory state.
HAND	The call is in the Handoff transitory state.
PAG	The call is in the Paging transitory state.
CONN	The call is in the Connected state.

After issuing the commands to perform a handoff (handover), you should send the CALL:STAT? query to verify that the call is still connected before resuming testing.



## Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

Figure 13. Process for Performing a Handoff (Handover)



**Test Mode Considerations** In test mode, you can either change the test set's frequencies by using the handoff (handover) commands, or directly control the RF generator and RF analyzer.

In either case, you must also send the appropriate test mode commands to the mobile station to move it to the new channel.

### Change Other Connection Parameters

You may also choose to change the mobile station transmit power level or cell power, or other connection parameters such as timeslot or timing advance.

---

## Step 7: End Connection

The following information provides additional details on Step 7 of the Programming Flowchart. This information is applicable to all test applications.

### Description

In this step you release the call (in active cell mode) or end the mobile station transmission (in test mode).

### Contents

- [“Release the Call in Active Cell Mode”](#)
- [“End the Mobile Station Test Mode Transmission”](#)
- [“Partially Preset the Test Set”](#)

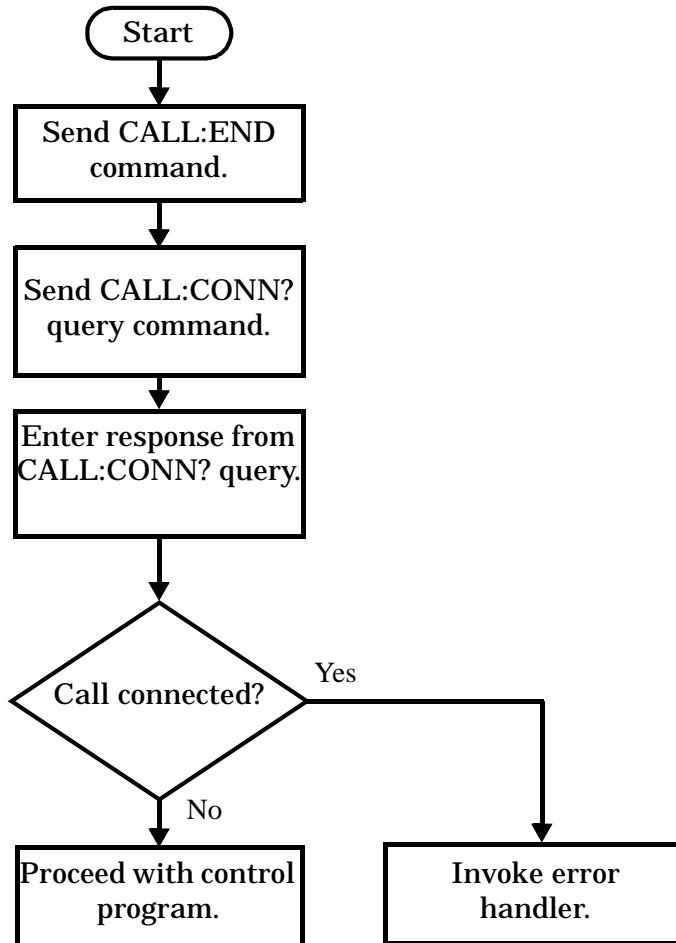
### Release the Call in Active Cell Mode

In active cell mode, you can release the call with the mobile station in one of two ways:

- Release from the Base Station
- Release from the Mobile Station

## Releasing an Active Call from the Base Station

**Figure 14. Process for Releasing an Active Call from the Base Station**



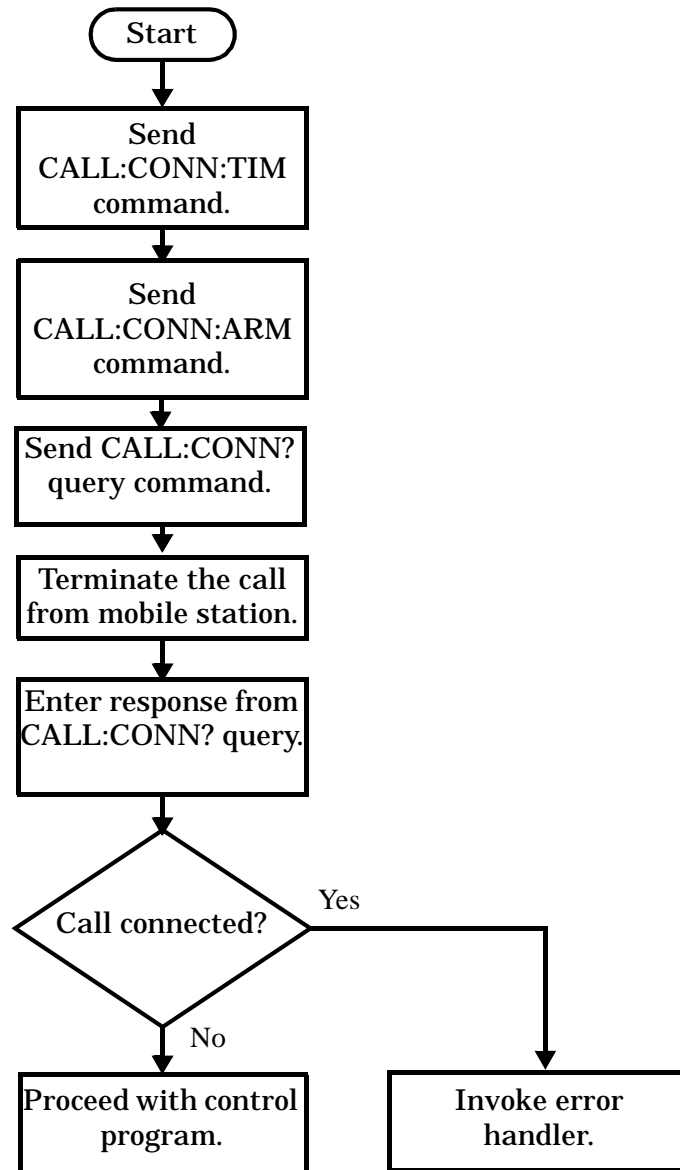
### Example 15. Programming Example

```

OUTPUT Test_set;"CALL:END"           ! Initiate a base station release.
OUTPUT Test_set;"CALL:CONN?"        ! Send call connected state query.
ENTER Test_set;Call_connected        ! Program hangs here until state
                                     ! change or timer expires.
IF Call_connected THEN               ! Check if disconnection successful
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
  
```

## Step 7: End Connection

### Releasing an Active Call from the Mobile Station **Figure 15. Process for Terminating an Active Call from the Mobile Station**



---

**NOTE** The test set cannot initiate a call disconnection from the mobile station. You must manually push the end button on the mobile station or send commands to a test bus built into the mobile station. For a mobile station release where the call is terminated by physically pushing a button on the phone (as opposed to using a test bus) ensure that the call-state-change-detector timeout time is long enough to allow the end button to be pushed.

---

**Example 16. Programming Example**

```
OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Test_set;"CALL:CONN:ARM"   !Arm the change detector.
DISP "Terminate the call from the mobile station."
OUTPUT Test_set;"CALL:CONN?" !Initiate call connected state query.
ENTER Test_set;Call_connected    !Program hangs here until state
                                !change or timer expires.
IF Call_connected THEN          !Check if disconnection successful.
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

**End the Mobile Station Test Mode Transmission**

In test mode, you must send the necessary test mode commands to end the mobile station transmission.

**Partially Preset the Test Set**

At this point, it is good practice to partially preset the test set by sending the SYST:PRES3 command. This command stops all measurement and call processing processes, but does not reset all values to default.

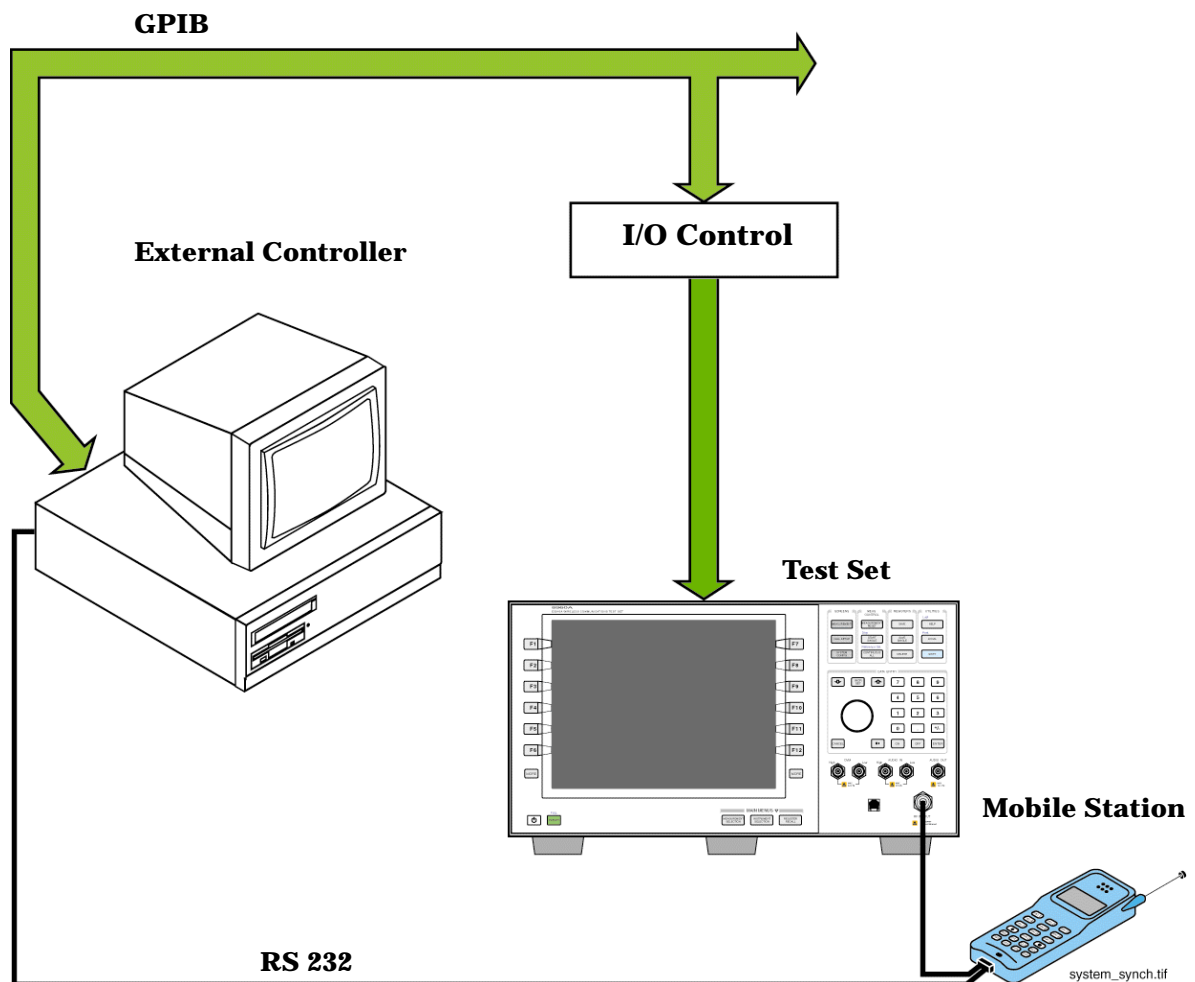
## Test System Synchronization Overview

### Description

Typical test systems include an external controller with a GPIB connection to the test set, an RF (and possible AF) connection between the test set and a mobile station under test, and a serial connection between the mobile station and the external controller.

Synchronizing an external controller with the test set and a mobile station under test ensures that no device does something before it is supposed to, which can cause errors, or does something well after it could have, which wastes time.

**Figure 16. Test System**



## Sequential versus overlapped commands

The test set uses both sequential and overlapped commands:

- Sequential commands must finish executing before the next command starts to execute.
- Overlapped commands do not finish executing before the next command starts to execute.

Overlapped commands are more difficult to synchronize because an overlapped operation that started several commands earlier may still be executing as subsequent commands are being parsed out from the input buffer and executed. This can present a problem unless the external controller is properly synchronized to the test set's execution of commands.

Overlapped commands allow the test set to use its internal resources as efficiently as possible.

## Methods for synchronization

The test set's GPIB command set supports the following methods to achieve synchronization for overlapped commands. In some cases, combinations of these methods will provide the best results:

Methods one and two do not require the external controller to query the test set, nor to perform any branching or decision-making associated with information acquired from the test set.

Methods three through six rely on responses from the test set to an external controller, indicating that some event has occurred. The external controller can then make decisions based on these responses to control the flow of commands to the test set and other devices in the test system.

1. Force the test set to execute overlapped commands sequentially.
2. Force the test set to wait until an overlapped command is done executing before executing any more commands.
3. Query the test set to determine when a command has finished executing.
4. Query the test set to determine when all commands sent to it have at least begun executing.
5. Query the test set to determine the current call or data connection processing state.
6. Program the test set to generate a service request when an operation has completed or the test set is in a certain state.

## Commands used for synchronization:

- **:SEQ**  
This specialized command can be appended to data connection processing overlapped commands to support synchronization method one. See [“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 238](#).
- **:WAIT**  
This specialized command can be appended to data connection processing overlapped commands to support synchronization method two. See [“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 238](#)
- **:DONE?** and **:OPC?**  
These specialized commands can be appended to data connection processing overlapped commands to support synchronization method three. See [“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 238](#).
- **:INITiate:DONE?**  
This specialized command causes the test set to return a mnemonic indicating if a measurement is done. If not, the returned mnemonic will indicate if the measurement is still executing. This command supports synchronization method three. See [“INITiate:DONE?” on page 460](#) and [“Measurement Event Synchronization” on page 244](#).

## Test System Synchronization Overview

- **CALL:STATus**  
This command queries the test set's current data connection processing state. This command supports synchronization method five. See [“CALL:STATus\[:STATe\]:DATA?” on page 403](#) and [“Data Connection State Synchronization” on page 240](#).
- **CALL:IDLE:DATA?**, **CALL:SOPen?**, **CALL:DCONnected?**  
These commands determine the idle/session open/connected state of the data connection. A feature called the change detector provides the user with a way to hold off the response to these queries until a data connection processing state transition has taken place. These commands support synchronization method five. See [“CALL:IDLE:DATA?” on page 375](#), [“CALL:SOPen?” on page 396](#), [“CALL:DCONnected\[:STATe\]?” on page 369](#), and [“Data Connection State Synchronization” on page 240](#).
- **SYSTem:SYNChronized**  
This specialized command puts a 1 in the test set's output queue. The test set responds to the query by sending a 1 to the external controller indicating that all prior sequential commands have completed, and all prior overlapped commands have at least begun execution. The condition bit is set then cleared. This command supports synchronization four and six. See [“SYSTem:SYNChronized” on page 625](#). See [“STATus:OPERation Condition Register Bit Assignments” on page 550](#).
- **STATus:<register>**  
Status bits in the [“STATus:OPERation:CALL Condition Register Bit Assignment” on page 552](#) register are provided to indicate the test set's data connection processing state. These bits support synchronization methods five and six.  
Status bits in the [“STATus:OPERation:NMRReady Condition Register Bit Assignments” on page 560](#) are provided to indicate when a measurement is ready to be fetched. These bits support synchronization method three and six.  
Many other status bits are provided in the GPIB status subsystem that are useful for synchronization. See [“STATus Subsystem” on page 542](#).
- **\*OPC** on page 630, **\*OPC?** on page 630, and **\*WAI** on page 631 (not recommended)  
Note: These commands look at all of the test set's operations collectively. Because multiple processes are likely to be executing at the same time, it is recommended that the other commands above be used instead.

## Related Topics

[“Data Connection Processing Event Synchronization” on page 237](#)

[“Data Connection State Synchronization” on page 240](#)

[“Measurement Event Synchronization” on page 244](#)



## Data Connection Processing Event Synchronization

### Description

Using the call processing subsystem overlapped command synchronization commands, you can query the test set to find out when an overlapped command operation is done (:DONE?, :OPC?), force the test set to not execute any more commands until an overlapped command operation has completed (:WAIT), or simply force an overlapped command to behave as a sequential command (:SEQ).

### Pending Operation Flags

Associated with each overlapped command, the test set maintains a binary indicator known as a pending operation flag. A pending operation flag is set true when the operation started by the overlapped command is executing, and is set false when the operation is no longer executing.

---

**NOTE** In addition to the call processing subsystem overlapped commands, the test set also provides the measurement-related INITiate <measurement> overlapped commands.

---

## Data Connection Processing Event Synchronization

### Call Processing Subsystem Overlapped Command Synchronization Commands

**Table 24. Overlapped Commands**

Command	Purpose Of Command	Example
:DONE?	Returns a 0 if the associated command's pending operation flag is true, or a 1 if it is false.	<pre>10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 REPEAT 50 OUTPUT 714;"CALL:TCH:DONE?" 60 ENTER 714;Process_done 70 UNTIL Process_done 80 OUTPUT 714;INIT:TXP;PFER" 90 END</pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :DONE? command is used to find out if the handover is finished</p>
:SEQuential	Forces an overlapped command to execute in a sequential manner. No subsequent commands will be executed until the pending operation flag for this operation is false.	<pre>OUTPUT 714;"CALL:TCH:SEQ 65"</pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and to not execute any more commands until the pending operation flag associated with the CALL:TCH command is false.</p>
:WAIT	Forces the test set to wait until the associated command's pending operation flag is false before executing any more commands.	<pre>10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 OUTPUT 714;"CALL:TCH:WAIT" 50 OUTPUT 714;"INIT:TXP;PFER" 60 END</pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :WAIT command is sent to prevent the test set from executing the INITiate command until the handover is finished.</p>

**Table 24. Overlapped Commands**

Command	Purpose Of Command	Example
:OPComplete?	Places a 1 in the test set's output queue when the associated command's pending operation flag goes false. Controlling program hangs on this query until the 1 is retrieved.	<pre> 10 OUTPUT 714; "CALL:TCH 65" 20 OUTPUT 714; "SETUP:TXP:CONT OFF" 30 OUTPUT 714; "SETUP:PFER:CONT OFF" 40 OUTPUT 714; "CALL:TCH:OPC?" 50 ENTER 714;Op_complete 60 OUTPUT 714; "INIT:TXP;PFER" 70 END </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :OPC? command is sent to hang program execution until a 1 is put in the test set's output queue, satisfying the ENTER statement and allowing program execution to continue with the INITiate command.</p>

**Operating Considerations**

When using the call processing subsystem overlapped command synchronization commands, check the conditions that set the operation's pending operation flag (POF) false to avoid unexpected results.

**Call Processing Subsystem Overlapped Commands**

**Table 25. Overlapped Commands**

Call Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
<a href="#">"CALL:FUNCTION:DATA:START" on page 373</a>	Attempts to open the connection.	The data connection state is any non-transitory state (that is, idle, session open, or connected).
<a href="#">"CALL:DCONNECTED:ARM[:IMMEDIATE]" on page 371</a>	Arms the data connection state change detector.	The call control status change detector has been disarmed.  See <a href="#">"Data Connection State Change Detector" on page 241</a> .

**Related Topics**

- ["Test System Synchronization Overview" on page 234](#)
- ["Data Connection State Synchronization" on page 240](#)
- ["Measurement Event Synchronization" on page 244](#)

## Data Connection State Synchronization

One of the most important and difficult aspects of synchronizing the external controller, test set and DUT is synchronizing the movement between data connection states. There are several specialized commands available to help you determine the state of the data connection, and verify that data connection processing events were successful.

### Data Connection Queries

- [“CALL:STATus\[:STATe\]:DATA?”](#) on page 403
- [“CALL:IDLE\[:STATe\]:DATA?”](#) on page 375
- [“CALL:SOPen\[:STATe\]?”](#) on page 397
- [“CALL:DCONnected\[:STATe\]?”](#) on page 369

The latter 3 queries are most useful in conjunction with the [“Data Connection State Change Detector”](#) on page 241.

### Data Connection Query Summary

The suggested usage of these four queries is as follows:

**Table 26. Data Connection Query Usage**

Query	Description	Suggested Usage	Programming Example
<a href="#">“CALL:STATus[:STATe]:DATA?”</a>	Queries the status of the data connection. Immediately returns the state: CCL   CNEG   CREQ   DCON   HAND   IDLE   PAG   SCL   SNEG   SOP   UREQ.	Use after a handoff to verify the data connection state is still “connected”.	<a href="#">“Hand Off to a New Channel or Band”</a> on page 202
<a href="#">“CALL:IDLE[:STATe]:DATA?”</a>	Queries whether or not the data connection is in the idle state. Immediately returns 1 or 0, or waits for a state change if the <a href="#">“Data Connection State Change Detector”</a> is armed.	Use with the <a href="#">“Data Connection State Change Detector”</a> to verify that your attempt to close the session was successful.	<a href="#">“Close the Session”</a> on page 205
<a href="#">“CALL:SOPen[:STATe]?”</a>	Queries whether or not the data connection is in the session open state. Immediately returns 1 or 0, or waits for a state change if the <a href="#">“Data Connection State Change Detector”</a> is armed.	Use with the <a href="#">“Data Connection State Change Detector”</a> to verify that your attempt to open a session was successful, or to verify your attempt to close a connection (and preserve the session) was successful.	<a href="#">“Establish a Session from the Access Terminal”</a> on page 196, or <a href="#">“Close the Connection”</a> on page 204

**Table 26. Data Connection Query Usage**

Query	Description	Suggested Usage	Programming Example
<a href="#">“CALL:DCONnected[:STATe]?”</a>	Queries whether or not the data connection is in the connected state. Immediately returns 1 or 0, or waits for a state change if the <a href="#">“Data Connection State Change Detector”</a> is armed.	Use with the <a href="#">“Data Connection State Change Detector”</a> to verify that your attempt to open a connection was successful.	<a href="#">“Open a Connection from the Test Set” on page 197</a>

## Data Connection State Change Detector

The data connection state change detector is useful when you expect a change in the data connection state, and want to know when it is complete. The change detector is used in conjunction with the three data connection queries ([CALL:IDLE:DATA?](#), [CALL:SOPen?](#), and [CALL:DCONnected?](#)). When the change detector is armed, the behavior of these queries changes.

If the change detector is not armed when any of these three queries are sent:

- If the data connection is in a non-transitory state (idle, session open, or connected), the test set immediately returns 1 or 0.
- If the data connection is in a transitory state, the test set waits until the data connection reaches a non-transitory state, and then returns 1 or 0.

(See [“Data Connection Processing Lifecycle” on page 109](#) for more information about which data connection states are transitory and non-transitory.)

The queries' behavior is different when the change detector is armed. When you arm the change detector, the test set notes what the initial data connection state is. Then, when any of the three queries are sent, the test set does not return the state of the data connection until there has been a change from the initial state to a new non-transitory state. The change detector “holds off” the data connection queries to wait for a change from the initial state to a non-transitory state that is different from the initial state.

### Arming the Data Connection State Change Detector

The data connection state change detector is automatically armed by the test set when data connection processing operations originating from the test set are requested. The operations that can be originated from the test set are as follows:

- open a connection using the command: [“CALL:FUNcTION:DATA:START” on page 373](#)
- close a connection using the command: [“CALL:FUNcTION:DATA:STOP” on page 373](#)
- close a session using the command: [“CALL:SClose” on page 391](#)

So, you only need to arm the change detector to hold off the data connection queries when you are opening or closing a session or connection from the AT.

Arm the change detector using the [“CALL:DCONnected:ARM\[:IMMediate\]”](#) command.

## Data Connection State Synchronization

### Data Connection State Change Detector Timeout

The data connection state change detector includes a timeout that you can set to limit the amount of time that the test set will wait for a change in the data connection state. The timer begins when the change detector is armed or rearmed when already armed. The duration of this timeout is set using the `CALL:DCONnected:TIMEout` command and should be greater than the maximum amount of time the control program needs to wait between arming the data connection state change detector and the data connection operation starting. Once the process starts and the data connection state has moved to one of the transitory states, the protocol timers take over and prevent the data channel's state from staying in a transitory state forever. If the timer expires, the change detector is disarmed, and the data connection query returns 1 or 0 as soon as any non-transitory state is reached. The timeout is user-settable, but the user setting is only applied during AT originated data connection processing operations. For test set originated operations, the timeout is automatically set to 60 seconds by the test set.

### Disarming the Data Connection State Change Detector

In summary, the change detector is disarmed by:

- a change from the initial non-transitory state to a new non-transitory state
- a change from the initial transitory state to any non-transitory state
- the change detector timeout expiring
- one of the test set's fixed timers expiring (see ["Fixed Timer Messages" on page 730](#))

When the change detector is disarmed, the query returns 1 or 0 as soon as a non-transitory state is reached.

### Example 17. Access Terminal Session Establishment - Arming the Change Detector

The following example illustrates the use of the data connection state change detector along with the `CALL:SOPen?` query to synchronize a controlling application with a data connection processing state change during an AT-initiated session establishment.

When the `CALL:DCONnected:ARM` command is received by the test set, the change detector becomes armed and configures the test set to hold off on returning a result for the `CALL:SOPen?` query until the detector is disarmed by one of the four events described above.

```
10  OUTPUT 714;"CALL:DCONnected:TIMEout 10S" ! Sets the change detector
20                                     ! timeout to 10 seconds.
30  OUTPUT 714;"CALL:DCONnected:ARM" ! Arm the change detector
35                                     ! (initial state is noted, timeout timer starts).
40  DISP "Establish a session from the access terminal. Continue when done."
50  PAUSE
60  OUTPUT 714;"CALL:SOPen?" ! The session open query.
70  ENTER 714;Session_open
80  IF Session_open=1 THEN
90      DISP "Session is open."
100     WAIT 2
110  ELSE
120     DISP "Session is not open."
130     WAIT 2
140  END IF
150  END
```

**Related Topics**

[“Test System Synchronization Overview” on page 234](#)

[“Data Connection Processing Event Synchronization” on page 237](#)

[“Measurement Event Synchronization” on page 244](#)

[“Instrument Status Area” on page 707](#)

---

## Measurement Event Synchronization

### Description

Measurement event synchronization saves time by controlling the communication between the controller, the test set, and the mobile station, so that no device does something before it is supposed to (which can cause errors or do something well after it could have). Because some measurements can run concurrently, it is necessary that the control program know when individual measurement results are available.

Measurement event synchronization is accomplished using the INITiate subsystem's command INITiate:DONE? or the STATus:OPERation:NMRReady status registers.

### INITiate:DONE?

The INITiate:DONE? query returns a string that indicates which, if any, measurements have completed since the last INITiate command was received. This query is useful when performing measurements concurrently, and is generally used within a loop, with a loop exit when all measurements have been obtained. The INITiate:DONE? query returns a measurement name, "WAIT," or "NONE" after each pass through the loop. See ["INITiate:DONE?" on page 460](#) and ["INITiate Programming Examples \(how INIT commands are used\)" on page 456](#) for more details about this query.

---

**NOTE** The INIT:DONE? command is only useful when performing concurrent testing. When initiating only one measurement at a time, simply send the INITiate command immediately followed by the FETCH command to retrieve the results.

---

### STATUS:OPERATION:NMRREADY

The STATus:OPERation:NMRReady command allows the program to immediately branch to the next operation or command without continuing through a loop as in INITiate:DONE?. See ["STATus:OPERation:NMRReady Condition Register Bit Assignments" on page 560](#) for more details about this command.

You must enable the following so that as soon as the enabled NMRReady bit is true the program moves on.

- Positive or negative transition filter. See ["Transition Filters" on page 317](#).
- STATus:OPERation:NMRReady bit for the measurement desired
- STATus:OPERation bit (512 for NMRReady). See ["Status Subsystem Overview" on page 300](#).
- Service Request Enabling (\*SRE 128 for NMRReady). See ["Status Subsystem Overview" on page 300](#).

The ["STATus:OPERation:NMRReady Condition Register Bit Assignments" on page 560](#) status register provides status reporting on the cdma2000 measurements.

---

**NOTE** The following program uses the E1960A GSM Mobile Test Application Bit Error Rate measurement for the example. Refer to ["STATus:OPERation:NMRReady Condition Register Bit Assignments" on page 560](#) for bit assignments for other Test Applications.

---



**Example 18. Generating a Service Request (SRQ) Interrupt - Bit Error Rate NMR**

The following example illustrates the use of the STATUS subsystem to generate a service request when a BERR measurement has completed. This code assumes a call is already connected and the BERR measurement is setup (mobile station must be in loopback type A or B).

```

10  OUTPUT 714;"STATUS:OPERATION:NMRREADY:PTR 256" !Enable positive transition
20                                     !filter on fast BER bit.
30  OUTPUT 714;"STATUS:OPERATION:NMRREADY:ENABLE 256" !Enable the fast BER Bit to
40                                     !generate a summary message.
50  OUTPUT 714;"STATUS:OPERATION:ENABLE 512" !Enable the Operation summary bit to
60                                     !generate a summary message.
70  OUTPUT 714;"*SRE 128" !Enable the service request enable register to generate SRQ.
80  OUTPUT 714;"*CLS" !Clear all status data structures.
90  ON INTR 7,15 CALL Meas_complete !Define interrupt-initiated branch with a priority
100                                     !of 15 (highest)
110 ENABLE INTR 7;2 !Enable interrupt on interface card 7 with a bit mask
120                                     !(for interface's interrupt-enable register) of 2.
130 OUTPUT 714;"SETUP:FBER:CONTINUOUS OFF;:INITIATE:FBERROR" !Initiate a single
140                                     !fast BER test.
150 LOOP
160 DISP "Waiting for BERR test to complete"
170 WAIT .1 !"Dummy" loop
180 END LOOP
190 !Instead of a "dummy" loop, controlling application could be performing setups,
200 !making measurements, etc.
210 END
220 SUB Meas_complete
230 DISP "BER test complete, OK to FETCh results now"
240 Clear_interrupt=SPOLL(714) !Clear the RQS message in the status byte register.
250 STOP
260 SUBEND

```

**Operating Considerations**

Only one indicator is returned per query.

All active measurements must be set to single trigger mode. This ensures that when a measurement completes it remains in the "DONE" state rather than restarting. Sending the "\*RST" command at the beginning of your test code or using the "SETup:CONTInuous:OFF" command during measurement setup are ways to set trigger to single for all measurements.

**Related Topics**

["Test System Synchronization Overview" on page 234](#)

["Data Connection Processing Event Synchronization" on page 237](#)

["Data Connection State Synchronization" on page 240](#)

---

## Concurrent Measurements

### Description

A number of measurements can be initiated (with the INITiate command) while other measurements are being made, and the test set will perform as many operations simultaneously as its architecture allows. This technique is referred to as concurrency. Performing measurements concurrently can greatly improve test throughput.

### Operating Considerations

The test set has three parallel signal paths to improve measurement throughput.

- Demodulation downconverter path.
- Measurement downconverter path.
- Power detector path.

Since measurements are DSP (digital signal processor) based, and there are four A/D converters available to digitize or “sample” the input signal for analysis by the DSP, the test set will always have the capability to perform one transmitter measurement, one receiver measurement, and maintain the radio link concurrently. The test set’s ability to perform multiple transmitter, or multiple receiver tests concurrently will depend on the availability of resources within the test set and availability of the signal to be tested.

## 1xEV-DO Terminal Test Application Measurement Concurrency

**Table 27. Measurement Concurrency**

Measurement	Concurrency
<i>Transmitter Measurements</i>	
Tx Spurious Emissions	Concurrent with Packet Error Rate (however, access terminals do not allow concurrent transmitter and receiver measurements, see “ <a href="#">1xEV-DO Concurrent Testing</a> ” on page 248), Channel Power, Digital Average Power and Waveform Quality + Code Domain Power.
Channel Power	Concurrent with Packet Error Rate (however, access terminals do not allow concurrent transmitter and receiver measurements, see “ <a href="#">1xEV-DO Concurrent Testing</a> ” on page 248), Tx Spurious Emissions, Digital Average Power and Waveform Quality + Code Domain Power.
Digital Average Power	Concurrent with Packet Error Rate (however, access terminals do not allow concurrent transmitter and receiver measurements, see “ <a href="#">1xEV-DO Concurrent Testing</a> ” on page 248), and all other transmitter measurements except TROLPC.
Waveform Quality + Code Domain	Concurrent with Packet Error Rate (however, access terminals do not allow concurrent transmitter and receiver measurements, see “ <a href="#">1xEV-DO Concurrent Testing</a> ” on page 248), Tx Spurious Emissions, Channel Power, and Digital Average Power.
Time Response of Open Loop Power Control (TROLPC)	Not concurrent with any measurements. When TROLPC is initiated, the test set turns all other measurements off.
Access Probe Power	Not concurrent with any measurements except Digital Average Power. When Access Probe Power is awaiting a probe, all other measurements except Digital Average Power hang.
<i>Receiver Measurements</i>	
Packet Error Rate	Concurrent with Tx Spurious Emissions, Channel Power, Digital Average Power and Waveform Quality + Code Domain Power (however, access terminals do not allow concurrent transmitter and receiver measurements, see “ <a href="#">1xEV-DO Concurrent Testing</a> ” on page 248).

### Concurrent Testing

In order to be able to perform tests concurrently, the measurements required to perform the test must be concurrent. However, that is not the only requirement to allow concurrent testing - the test conditions required for the tests must also be identical. For example, the test conditions for “[3.1.2.3.4 Maximum RF Output Power](#)” and “[3.1.2.4.1 Conducted Spurious Emissions](#)” are identical, and the measurements required for these tests are concurrent. Thus, these tests can be performed concurrently (see “[Step 5: INITiate and FETCh Measurements](#)” )

## Concurrent Measurements

### 1xEV-DO Concurrent Testing

To perform receiver tests on a 1xEV-DO access terminal, the access terminal must send FTAP Loop Back Packets on the Reverse Traffic Channel to indicate whether the test set's FTAP Test Packets were successfully received. To perform transmitter tests on a 1xEV-DO access terminal, the access terminal must send RTAP Test Packets on the Reverse Traffic Channel. (See [“Test Application Protocol \(TAP\)” on page 129](#) for more details).

Currently, access terminals are not able to send both FTAP Loop Back Packets and RTAP Test Packets simultaneously. Therefore, although many of the test set's receiver and transmitter measurements are concurrent, 1xEV-DO transmitter and receiver tests can not be performed concurrently.

### Related Topics

[“Block Diagram” on page 765](#)

[“Test Adherence to Standards” on page 35](#)

[“Measurement Event Synchronization” on page 244](#)

---

## Statistical Measurement Results

### Description

Most measurements have a setup window that provides for the entry of a multi-measurement count value. This specifies how many measurements the test set will perform to obtain a set of values from which to calculate the following statistical measurement results:

- Average (arithmetic mean) of measurement set
- Minimum value from measurement set
- Maximum value from measurement set
- Standard Deviation of measurement set

### Operating Considerations

The advantages of using the multi-measurement feature to obtain statistical measurement data include: reduced time associated with GPIB bus traffic, and reduced time configuring hardware. This is because the number of measurements specified in the multi-measurement count value are performed during one measurement cycle.

### Programming Example

```
OUTPUT 714;"SETUP:DAPOWER:COUNT 10" !Enters a Digital Average Power count
                                         !of 10, and turns the Digital Average Power
                                         !multi-measurement state on.
```

### Related Topics

["Measurement Progress Report" on page 259](#)

---

## Timeouts

### Description

The primary use of measurement timeouts is to regain control of the test set's GPIB in cases where the bus could potentially "hang."

The time normally required for a measurement to complete may vary greatly depending on the individual measurement, its settings, its multiple measurement count value, and so forth. Because of this, you may need to set the timeout longer than the default for measurements where a large number of multiple measurements are requested or where measurement triggers may be infrequent.

Be careful when setting a timeout that is shorter than the default. It is possible to specify a timeout that is so short the measurement does not even have a chance to begin. Measurement timeouts should always be at least several seconds long.

Timeout units default to S (seconds). The seconds suffix is an optional part of the command. If you want MS (milliseconds), US (microseconds) or NS (nanoseconds), you must specify these units in the suffix.

### Timeout Values

All measurements in the 1xEV-DO Terminal Test Application default to a timeout value of 10 seconds, except PER (see "[Packet Error Rate \(PER\) Measurement Description](#)" on page 56). The PER measurement timeout default is 267 seconds.

### Related Topics

["Integrity Indicator"](#) on page 255

["SETup Subsystem"](#) on page 482

---

## Triggering of Measurements

### Description

- “Trigger Source Description”
- “Triggering Process Description”
- “Trigger Arm (Single or Continuous) Description”
- “Trigger Delay Description”
- “Trigger Qualifier Description”

### Trigger Source Description

A measurement trigger causes hardware (for example, a sampler) to capture data which is used by a measurement algorithm to produce a measurement result. Not all of the trigger source choices are available in every measurement, or every test application.

**RF Rise Trigger Source:** When RF rise triggering is selected, a measurement dependent threshold is used to define the trigger point on the envelope of the signal being measured. The envelope amplitude must fall below this threshold and remain there for a measurement-dependent period of time before the trigger is armed. After the trigger is armed, a trigger will occur as the envelope amplitude increases and passes through the threshold.

**Protocol Trigger Source:** When protocol triggering is selected, a data capture is triggered by a protocol generated signal. The test set's protocol engine knows when the DUT's signal should be present and generates a trigger signal for use by the measurement to trigger the data capture.

**External Trigger Source:** When external triggering is selected, the user supplies an external trigger signal via the rear panel TRIG IN connector in order to trigger data capture. The trigger will occur on the rising edge of this signal.

**Immediate Trigger Source:** When immediate triggering selected, the trigger occurs as soon as any pre-trigger samples required by the measurement algorithm are taken. Data capture is triggered when the measurement is initiated.

**Auto Trigger Source:** When auto triggering is selected, the test set automatically chooses the best trigger source for that measurement. This trigger source setting is convenient because the measurement trigger doesn't need to be changed when switching parameters. Auto trigger source is the best choice for most users.

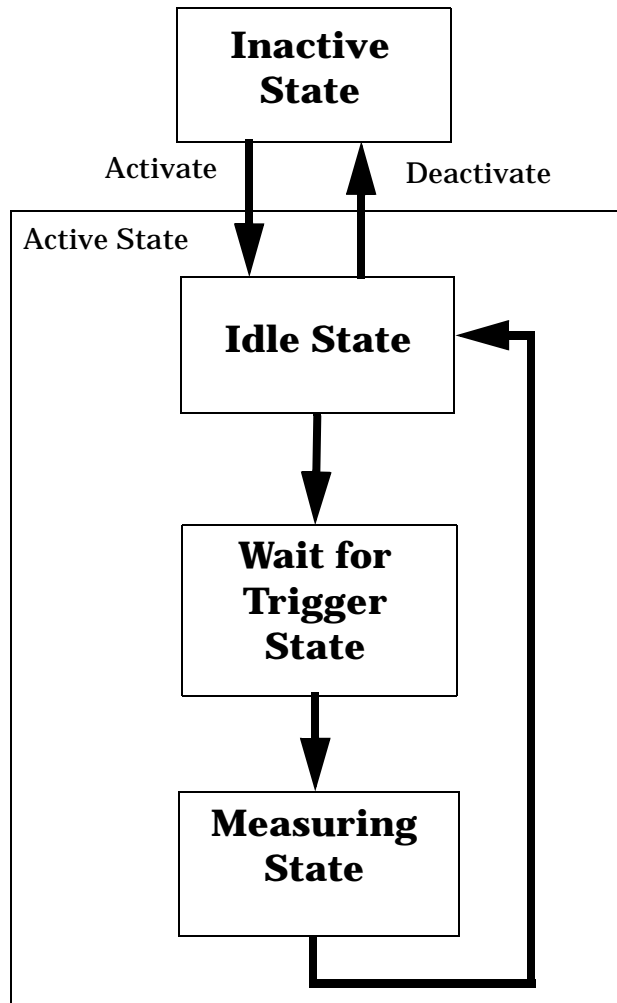
### Triggering Process Description

The triggering process controls the present and future states of the test set during the measurement cycle. Triggers are set up using the SETup commands and can be set up when a measurement is in the inactive state. A measurement is activated (selected) with an INITiate command. If a measurement is initiated while in its measurement cycle, it will terminate that measurement and restart it. The active state is not a single state but a collection of any state other than the inactive state. Deactivating (de-selecting) the measurement is accomplished through an INITiate:<MEAS>:OFF command.

## Triggering of Measurements

Manually, a measurement is activated by selecting it from the Measurement Selection menu. A measurement is deactivated by pressing the Measurement Selection key, scrolling to measurement in the Measurement Selection menu, and then pressing F4 (Close Measurement).

**Figure 17. The Test Set's Measurement States**



## Measurement States

The following examples describe states of the test set under various conditions. Refer to [Figure 17. on page 252.](#)

### Example 19. Inactive State

If the test set has just been powered on, or any form of preset has been performed, then the measurement state is inactive.

### Example 20. Wait for Trigger State

If a measurement has been initiated with the INITiate command but has not been triggered, or a measurement has been selected from the Measurement Selection menu but has not been triggered, then the



measurement state is wait for trigger.

### Example 21. Measuring and Idle States (Trigger Arm Single)

If the trigger arm is set to single, the trigger source is available, and the trigger qualifier (optional) is satisfied, the measurement state transitions to measuring and measurement results are now available to the user. The state then transitions to idle (awaiting another INITiate).

### Example 22. Measuring State (Trigger Arm Continuous)

If the trigger arm is set to continuous, the trigger source is available, and the trigger qualifier (optional) is satisfied, the measurement state transitions to measuring and measurement results are now available to the user. The measurement is continually triggered until the measurement is deactivated. Measurement results are only available after the measurement completes and before it rearms. The measurement is deactivated using the INITiate:<MEAS>:OFF. or Close Measurement.

### Trigger Arm (Single or Continuous) Description

Trigger arm determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).

---

#### NOTE

When operating the test set remotely, the recommended setting for the trigger arm parameter is single. This ensures proper operation of the INIT:DONE? query which is used to control the retrieval of measurement results when measurements are initiated concurrently.

When a continuously armed measurement gets a result, it is available to any currently pending (waiting, hanging) FETCh? query. Then another measurement cycle is started immediately. At this point the results are no longer valid. The INIT:DONE? query is used to determine when there is a completed measurement with valid results that can be fetched. If you look for a continuously armed measurement with valid results that can be fetched using INIT:DONE? then you are unlikely to get anything but WAIT. Each time the Test Set is queried, it is 99% likely to be making another measurement. Even if it did return a measurement name, by the time the control program determines which FETCh? query to send, it is too late to fetch the results and the FETCh? query just hangs until the next measurement cycle is done, nullifying the efficiency provided by the INIT:DONE? query.

---

Pressing the Start Single key on the front panel will cause all currently active measurements with trigger arm set to single to arm and make the measurement.

Pressing Shift, Start Single (Stop) causes all measurements with trigger arm set to single to abort the measurement.

## Triggering of Measurements

It is unnecessary for you to arm a measurement if the trigger arm is set to continuous. When in continuous mode, the measurement is automatically rearmed after completing a measurement.

**Table 28. Trigger Arm Default Settings**

Action	Trigger Arm Default Setting
Power up of test set	Continuous
Manual Full Preset	Continuous
*RST (Remote) Full Preset	Single
Partial Preset	No change

## Trigger Delay Description

Trigger delay controls the delay time between the trigger and the start of sampling. Resolution is 1 nanosecond per measurement and the units are in seconds. A negative value indicates the sampling should occur prior to the trigger. The default is zero seconds which is preferred for most measurements.

## Trigger Qualifier Description

When the trigger qualifier is on, the test set samples the input signal when a trigger is received. It then determines if the input signal was valid by looking at its power level. If the power level during sampling did not meet the requirements of a valid signal, the state returns to wait for trigger without processing the samples. Trigger qualifier is available for GSM/GPRS TX Power and Phase Frequency Error measurements only.

If a valid signal is present, then it is qualified, and the samples are processed.

## Related Topics

[“Integrity Indicator”](#)

## Integrity Indicator

### Description

The test set can evaluate its own performance and make a determination as to the validity of a measurement result. The test set evaluates the conditions surrounding a measurement and reports to the user its evaluation of these conditions in a parameter called the measurement integrity indicator. A measurement integrity indicator value is returned for every completed measurement. It is recommended that the user take advantage of this feature in every measurement.

The returned value defines whether or not a problem was encountered by the measurement process. It is not, however, guaranteed to be the only or root cause of the measurement problem. This is because some of the conditions surrounding a measurement may interact, and the test set may have insufficient information to determine the root cause of the measurement problem. However, in most cases, the value returned is the most likely cause of the problem.

Not all of the integrity indicator values are available for each measurement or test application, if a value doesn't apply it will not be available.

Example: Questionable Result for PGSM (15) and Questionable Result Due To Channel Mode (16) are GSM only integrity indicator values.

---

**NOTE** GSM, GPRS and EGPRS measurements return integrity indicators (8, 9, 11) when the measurement synchronization is set to midamble.

---

**Table 29.**

Integrity Indicator Number	Integrity Indicator Message
0	Normal: Indicates the measurement completed successfully without error and the result is accurate.
1	No Result Available: Indicates that there is no measurement result and returns NAN (not a number).
2	Measurement Timeout: Indicates that a measurement has timed out. The measurement timeout state must be set to ON.
3	Hardware Not Installed: Indicates that a piece of hardware is not installed in the test set, or the hardware has failed in a way which leads the instrument controller to believe it isn't installed.
4	Hardware Error: Indicates that a hardware failure has occurred. These include failures such as a phase lock loop out-of-lock, defective DSP samplers, or power detectors that can not be calibrated.
5	Over Range: Indicates that the input signal is over range. The amplitude of the device-under test's (DUT's) signal is causing the voltage at a DSP sampler to be above its maximum input level or the frequency is too high or the voltage measured is beyond the maximum voltmeter range, either positive or negative.

## Integrity Indicator

**Table 29.**

Integrity Indicator Number	Integrity Indicator Message
6	Under Range: Indicates that the input signal is under range. The amplitude of the DUT's signal is not high enough for the DSP sampler to produce accurate results with the measurement algorithm.
7	Burst Short: Indicates that the burst duration is too short, or part of the burst was not sampled due to improper triggering.
8	Trigger Early or Fall Early: Indicates that the DUT's burst amplitude fell prematurely or, due to an early trigger (early relative to a transmitted burst) the measurement sampling operation terminated before the falling edge of the burst.
9	Trigger Late or Rise Late: Indicates that either the rising edge of the DUT's burst was late or, due to a late trigger (late relative to a transmitted burst) the measurement sampling operation didn't start until after the rising edge of the transmitted burst.
10	Signal Too Noisy: Indicates that the measurement algorithm has found the signal measured to be too noisy to provide accurate results.
11	Sync Not Found: Indicates that the midamble was not found therefore the measurement was not synchronized.
12	Oven Out of Range: Indicates that a temperature controlled oven (other than the internal timebase oven) is outside of its operating range. The power meter's oven is checked and its condition reported with this value. (The internal timebase generates a temporary error message (out of lock) that is sent to the system error queue and the display. This is not an integrity indicator value, it is an error message.)
13	Unidentified Error: Indicates errors which are not covered by the other integrity values. Examples include: parameter errors, algorithm memory errors (too many measurements), measurements unavailable (unable to control), autorange unable to converge, default calibration data used.
14	PCM Full Scale Warning: Indicates that the PCM signal has reached plus or minus full scale. The measurement made will be accurate on the PCM signal but would typically indicate an overdriven or oscillating element in the DUT.
15	Questionable Result for PGSM: Indicates that the user attempted to make an FBER measurement in a phase 1 system. FBER is only possible in a phase 2 GSM system. This indicator is available only when the selected broadcast band is PGSM.
16	Questionable Result Due To Channel Mode: Indicates that the channel mode was set to Enhanced Full Rate Speech while a Decoded Audio measurement was active. Decoded Audio is not supported for EFR Speech.

Table 29.

Integrity Indicator Number	Integrity Indicator Message
17	<p>Can not Correlate: Indicates that the test sets internally generated reference signal does not correlate with the received signal.</p> <p>Some conditions that could cause this integrity indicator result include the following:</p> <ul style="list-style-type: none"> <li>• an input signal that is corrupted</li> <li>• the input signal is extremely distorted</li> <li>• the input signal is off by more than 10 ms.</li> <li>• the frequency of the input signal deviates more than allowed</li> <li>• something is wrong with the long-code mask coming from the mobile ID</li> </ul>
18	<p>Frequency Out Of Range: Indicates that a Channel Power Measurement was attempted at a frequency for which there is no calibration data. The test set display will indicate 4 dashes.</p>
19	<p>Uncalibrated Due To Temperature: Indicates that the current temperature of the test set is different than the calibration data temperature by more than <math>\pm 10</math> degrees C, when attempting a Channel Power Measurement.</p>
20	<p>Potential Receiver Saturation: Indicates that an input signal immediately prior to the measured input was high enough to potentially saturate the receiver hardware.</p>
21	<p>Parameter Error: Indicates that a measurement setup parameter has been set in a way that gives invalid measurement results.</p>
22	<p>Unsupported Configuration: Indicates that some parameter, other than a measurement setup parameter has been set so that it causes an invalid measurement result. Typically this would be a base station emulator parameter.</p>
23	<p>Call Processing Operation Failed: Indicates that a call processing operation, (base station emulator) needed in the course of making the measurement could not complete.</p>

## Example Program

```

10 OUTPUT 714;"INITiate:DAPower" !Start Digital Average measurement
20 OUTPUT 714;"FETCH:DAPower?" !Request measurement results.
30 ENTER 714;Integrity,Ave_power !Read measurement results.
40 IF Integrity = 0 THEN !Permits measurement to be printed if integrity indicator
50             !indicates a successful measurement
60 PRINT "Digital Average Power =";Ave_power!if 0 then measurement was successful
70 ELSE
80 PRINT "Measurement integrity questionable, integrity value = ";Integrity !If
90                                     !integrity
100                                    !not zero
110                                    !then print
120                                    !integrity
130                                    !value.

```

## **Integrity Indicator**

```
140 END IF  
150 END
```

## **Related Topics**

[“Error Messages” on page 728](#)

[“How Do I Make Measurements?” on page 653](#)

---

# Measurement Progress Report

## Description

The measurement progress report is a query of how far along a multi-measurement cycle has progressed. When the multi-measurement count is greater than one, the measurement progress report will indicate the number of measurements that have completed. The returned value will be the last update and not the actual number, because the value is updated periodically and not for each multi-measurement cycle. Every measurement has the measurement progress report available.

## Example

```
OUTPUT 714;"FETCH:DAPOWER:ICOUNT?" !Returns the approximate number of
                                     !multi-measurement cycles completed during a
                                     !multi-measurement count cycle
```

## Related Topics

["Statistical Measurement Results" on page 249](#)

---

## Invalid Measurement Results

### Description

Invalid measurement results are returned by the test set when conditions such as signal level are not within the present measurement range. Three different invalid measurement results are provided in order to help you understand the condition that caused the invalid result.

- $9.9E+37$  = INFinity (Infinity)
- $-9.9E+37$  = NINF (Negative Infinity)
- $9.91E+37$  = NAN (Not A Number)

#### **9.9E+37 (INFinity)**

$9.9E+37$  is returned by the test set when the measurement is out of range and results are far above the present measurement range.

#### **-9.9E+37 (NINFinity)**

$-9.91E+37$  is returned by the test set when the measurement is out of range and results are far below the present measurement range.

#### **9.91E+37 (NAN)**

$9.91E+37$  is returned by the test set when the measurement is out of range but it can not be determined if measurement results are far above, or far below the measurement range.

If a measurement exceeds its measurement timeout value before a valid result is determined,  $9.91E+37$  is returned.

### **FETCH? and READ? Invalid Results**

When a FETCH? or READ? query is performed on a measurement with invalid results, the integrity indicator returns a value of 1, indicating No Result Available.

### **Manual Users Invalid Results**

Manual users will generally see four dashes, "----" on the test set display. When the measurement timeout value has been exceeded, "Measurement Timeout" is displayed as well as the four dashes.



## Programming an Access Probe Power Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Set up the access parameters as needed using the [“CALL:APARAmeter”](#) commands.
3. Set up the access probe power measurement parameters as needed using the [“SETUp:CAPPower”](#) commands.
4. Turn on call limit mode so the test set does not acknowledge the access terminal's access attempt, using the [“CALL:CONNected:LIMit\[:STATe\]<\[:SELEcted\] | :TA856>”](#) command. You must set all parameters that are configured during the Session Negotiate state (such as [“Probe Sequence Max”](#)) before turning call limit mode on (see [“Call Limit Mode” on page 158](#) for more information).
5. Set cell power as needed using the [“CALL:POWER”](#) command.
6. Page the access terminal (to initiate access probes) using the [“CALL:FUNcTION:DATA:START”](#) command.
7. Initiate the access probe power measurement using the [“INITiate:<measurement mnemonic>\[:ON\]”](#) command. The <measurement mnemonic> for the access probe power measurement is CAPPower.
8. Use the [“FETCh:CAPPower”](#) commands to obtain the measurement results. (You can also replace steps 7 and 8 with a single command - [“READ:CAPPower\[:ALL\]?”](#)).
9. Use the [“CALL:FUNcTION:DATA:STOP”](#) command to stop paging the access terminal.

### Programming Example: 3.1.2.3.1 Range of Open Loop Output Power

```

10 ! 3.1.2.3.1 Range of Open Loop Output Power
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in the session open state.
40 !
50     Testset=714
60 !
70     DISP "Testing Range of Open Loop Power"
80 !
90 !***Set up test parameters***
100 !
110     Ior1=-25
120     ! First level for test
130     Ior2=-65
140     ! Second level for test
150     Ior3=-93.5
160     ! Ior for test 3 Band Class 0, AT Class III
170     Ol_adjust=78
180     ! Set Open Loop Adjust for Band Class 0
190 !
200     OUTPUT Testset;"CALL:APAR:POWER:OLADJUST ";Ol_adjust

```

## Programming an Access Probe Power Measurement

```
210      ! Set Open Loop Adjust
220      OUTPUT Testset;"CALL:APAR:PREAMBLE:LENGTH 7"
230      ! Set preamble length in frames
240      OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 0"
250      ! Set Probe Initial Adjust
260      OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 1"
270      ! Set Probe Num Steps
280      OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 1"
290      ! Set Probe Sequence Max
300      ! This must be done BEFORE call limit mode is turned on
310      OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 0"
320      ! Set Probe Power Step
330      !
340      !***Set up measurement parameters***
350      !
360      OUTPUT Testset;"SETUP:CAPPPOWER:CONTINUOUS OFF"
370      ! Set measurement to single trigger
380      OUTPUT Testset;"SETUP:CAPP:TIMEOUT 10"
390      ! Set access probe power timeout to 10 seconds
400      !
410      !***Set test conditions***
420      !
430      OUTPUT Testset;"CALL:CONNECTED:LIMIT:STATE 1"
440      ! Turn on call limit mode so connection is not established
450      ! This must be done AFTER probe sequence max is set
460      !
470      !***Obtain measurement results***
480      !
490      OUTPUT Testset;"CALL:POW ";Ior1
500      ! Set cell power for test 1
510      WAIT .1
520      ! Settling time for access terminal output power to slew
530      OUTPUT Testset;"CALL:FUNCTION:DATA:START"
540      ! Page access terminal
550      OUTPUT Testset;"READ:CAPP?"
560      ! Read access probe power
570      ENTER Testset;Integrity1,Test1
580      OUTPUT Testset;"CALL:FUNCTION:DATA:STOP"
590      ! Stop data connection paging before repaging at next level
600      !
610      OUTPUT Testset;"CALL:POW ";Ior2
620      ! Set cell power for test 2
630      WAIT .1
640      ! Settling time for mobile output power to slew
650      OUTPUT Testset;"CALL:FUNCTION:DATA:START"
660      ! Page access terminal
670      OUTPUT Testset;"READ:CAPP?"
680      ! Read access probe power
690      ENTER Testset;Integrity2,Test2
700      OUTPUT Testset;"CALL:FUNCTION:DATA:STOP"
710      ! Stop data connection paging before repaging at next level
720      !
730      OUTPUT Testset;"CALL:POW ";Ior3
```

## Programming an Access Probe Power Measurement

```
740      ! Set cell power for test 3
750      WAIT .1
760      ! Settling time for mobile output power to slew
770      OUTPUT Testset;"CALL:FUNCTION:DATA:START"
780      ! Page access terminal
790      OUTPUT Testset;"READ:CAPP?"
800      ! Read access probe power
810      ENTER Testset;Integrity3,Test3
820      OUTPUT Testset;"CALL:FUNCTION:DATA:STOP"
830      ! Stop data connection paging
840      !
850      !***Print measurement results***
860      !
870      CLEAR SCREEN
880      PRINT "Range of Open Loop Output Power Test Results:"
890      PRINT
900      PRINT "Test 1 Integrity/Result = ";Integrity1,Test1
910      PRINT "Test 2 Integrity/Result = ";Integrity2,Test2
920      PRINT "Test 3 Integrity/Result = ";Integrity3,Test3
930      PRINT
940      PRINT "Range of Open Loop Output Power Test Complete"
950      !
960      !***Post test clean up***
970      !
980      OUTPUT Testset;"CALL:CONNECTED:LIMIT:STATE 0"
990      ! Turn off call limit mode
1000     ! Must do BEFORE can change probe max sequence
1010     OUTPUT Testset;"CALL:POW -55"
1020     ! Set Cell Power to default
1030     ! Do this before reconfiguring other parms so signaling
1040     ! is successful (don't want cell power too low for signaling)
1050     OUTPUT Testset;"CALL:APAR:PREAMBLE:LENGTH 7"
1060     ! Set preamble length in frames
1070     OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 0"
1080     ! Set Probe Initial Adjust
1090     OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 3"
1100     ! Set Probe Num Steps
1110     OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 1"
1120     ! Set Probe Sequence Max
1130     OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 3"
1140     ! Set Probe Step
1150     !
1160     OUTPUT Testset;"INIT:CAPP:OFF"
1170     ! Set access probe power meas off
1180     DISP ""
1190     !
1200     END
```

## **Programming an Access Probe Power Measurement**

### **Related Topics**

[“Access Probe Power Measurement Description” on page 38](#)

Manual Operation: [“Measuring Access Probe Power” on page 659](#)

[“Access Probe Power Troubleshooting” on page 712](#)

[“3.1.2.3.1 Range of Open Loop Output Power” on page 41](#)

[“Programming: Getting Started Guide for 1xEV-DO Terminal Test” on page 188](#)

## Programming an Audio Frequency Measurement

This section provides an example of how to make an audio frequency measurement with the Audio Analyzer (AFANalyzer) via GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connectors. See [“Audio Analyzer Measurement Description” on page 42](#).

1. Configure audio analyzer measurement parameters using the SETup subsystem. When more than one audio frequency signal may be present, use the 100 Hz bandpass filter to isolate the desired signal for measurement (see the Programming Example below).
2. Start the audio analyzer measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain audio analyzer measurement results.

### Programming Example

```

10 OUTPUT 714;"SETup:AFANalyzer:CONTinuous OFF" !Set the audio analyzer
20                                     !measurements to single trigger mode.
30 ! OUTPUT 714;"SETup:AFANalyzer:PEAK:VOLTage 3V" !Set the Expected peak voltage
40                                     !for the audio input level in Vpeak.
50 OUTPUT 714;"SETup:AFANalyzer:FREQuency:STATe ON" !Enable audio frequency measurement.
60 OUTPUT 714;"SETup:AFANalyzer:FILTer TBPass" !Select the 100 Hz bandpass filter.
70 OUTPUT 714;"SETup:AFANalyzer:FILTer:TBPass 6000 Hz" !Set the 100 Hz bandpass
80     !filter's center frequency to 6 kHz (example; to measure SAT frequency).
90 OUTPUT 714;"SETup:AFANalyzer:TIMEout 3S" !Set a timeout value of 3 seconds
100                                     !in case the measurement cannot be made.
110 OUTPUT 714;"INITiate:AFANalyzer" !Start the AF Analyzer measurement.
120 OUTPUT 714;"FETCh:AFANalyzer:FREQuency?" !Fetch the Audio Frequency result.
130 ENTER 714;Audio_frequency !Enter the returned value into a variable.
140 END

```

### Related Topics

[“Audio Frequency Measurement Description” on page 46](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“Audio Analyzer Measurement Description” on page 42](#)

[“INITiate” on page 458](#)

[“SETup:AFANalyzer” on page 484](#)

[“FETCh:AFANalyzer” on page 415](#)

## Programming an Audio Level Measurement

This section provides an example of how to make an audio level measurement with the Audio Analyzer (AFANalyzer) via GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connectors. See [“Audio Analyzer Measurement Description” on page 42](#).

1. Configure audio analyzer measurement parameters using the SETup subsystem. Even though default settings exist for each parameter, it is a good idea to deliberately set each parameter to make sure the setting is correct for the specific audio analyzer measurement you are making.
2. Start the audio analyzer measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain audio analyzer measurement results.

### Programming Example

```

10 OUTPUT 714;"SETup:AFANalyzer:CONTinuous OFF" !Set the audio analyzer
20                                     !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AFANalyzer:PEAK:VOLTage 3V" !Set the Expected Amplitude level for
40                                     !audio input voltage in Vpeak.
50 OUTPUT 714;"SETup:AFANalyzer:SDIStortion:STATe OFF" !Turn off the SINAD and
60                                     !distortion measurements since
70                                     !they are not being used.
80 OUTPUT 714;"SETup:AFANalyzer:FILTer NONE" !Bypass all audio filters.
90 OUTPUT 714;"SETup:AFANalyzer:DEMphasis:STATe OFF" !Turn off de-emphasis.
100 OUTPUT 714;"SETup:AFANalyzer:EXPandor:STATe OFF" !Turn off the expandor.
110 OUTPUT 714;"SETup:AFANalyzer:DETEctor RMS" !Specify the RMS detector for the
120                                     !audio measurement.
130 OUTPUT 714;"SETup:AFANalyzer:TIMEout 3S" !Set a timeout value of 3 seconds
140                                     !in case the measurement cannot be made.
150 OUTPUT 714;"INITiate:AFANalyzer" !Start the AF Analyzer measurement.
160 OUTPUT 714;"FETCh:AFANalyzer:VOLTage?" !Fetch the Audio Level result.
170 ENTER 714;Audio_level !Enter the returned value into a variable.
180 END

```

### Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator (0 means a successful measurement with no errors). See [“Integrity Indicator” on page 255](#).
- `Audio_level` returns the analog audio level in volts rms.

**Related Topics**

[“Audio Analyzer Measurement Description” on page 42](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“INITiate” on page 458](#)

[“SETup:AFANalyzer” on page 484](#)

[“FETCh:AFANalyzer” on page 415](#)

## Programming a Distortion Measurement

This section provides an example of how to make distortion measurements via GPIB. It is patterned after TIA/EIA IS-137, Audio Harmonic Distortion (section 2.2.2.5).

SINAD and Distortion measurements are affected by the same STATE and INITiate commands, so both measurements are enabled and triggered at the same time. However, measurement results are queried separately. See [“Audio Analyzer Measurement Description” on page 42](#).

The following procedure assumes that the mobile's audio output is connected to the AUDIO IN connectors and the mobile is on an analog voice channel (AVC). The AVC is being modulated with a 1004 Hz tone at  $\pm 8$  kHz peak deviation, and a 6000 Hz SAT at  $\pm 2$  kHz peak deviation. It is also assumed that the Cell Power from the test set is set to -50 dBm (IS-137 standard).

1. Configure audio analyzer measurement parameters using the SETup subsystem.
2. Start the audio analyzer measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain audio analyzer measurement results.

### Programming Example

```

10  OUTPUT 714;"SETup:AFANalyzer:CONTinuous OFF" !Set the audio analyzer
20                                     !measurements to single trigger mode.
30  OUTPUT 714;"SETup:AFANalyzer:PEAK:VOLTage 3V" !Set the Expected Amplitude level for
40                                     !audio input voltage in Vpeak.
50  OUTPUT 714;"SETup:AFANalyzer:SDISTortion:STATE ON" !Turn on the SINAD and
60                                     !distortion measurements.
70  OUTPUT 714;"SETup:AFANalyzer:SDISTortion:FREQuency 1004 HZ" !Specify the audio
80                                     !frequency to use for the measurements.
90  OUTPUT 714;"SETup:AFANalyzer:FILTer CMessage" !Select the c-message filter.
100 OUTPUT 714;"SETup:AFANalyzer:DEMPHasis:STATE OFF" !Turn off de-emphasis.
110 OUTPUT 714;"SETup:AFANalyzer:EXPandor:STATE OFF" !Turn off the expander.
120 OUTPUT 714;"SETup:AFANalyzer:TIMEout 3S" !Set a timeout value of 3 seconds
130                                     !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:AFANalyzer" !Start the AF Analyzer measurement.
150 OUTPUT 714;"FETCh:AFANalyzer:INTEgrity?" !Query the integrity indicator to
160                                     !verify that a reliable measurement was made.
170 ENTER 714;Integrity !Enter the returned value into a variable for comparison
180                                     !with possible integrity indicator values (not shown here).
190 IF Integrity=0 THEN !Only fetch measurement result if integrity indicator is 0.
200 OUTPUT 714;"FETCh:AFANalyzer:DISToRTion?" ! Fetch the Distortion result.
210 ENTER 714;Distortion !Enter the returned value into a variable.
220 END IF
230 END

```



### Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator; 0 means a successful measurement with no errors. See [“Integrity Indicator” on page 255](#).
- `Distortion` returns the Distortion measurement value in percent (%).

### Related Topics

[“Audio Analyzer Measurement Description” on page 42](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“Distortion Measurement Description” on page 48](#)

[“INITiate” on page 458](#)

[“SETup:AFANalyzer” on page 484](#)

[“FETCh:AFANalyzer” on page 415](#)

## Programming a SINAD Measurement

This section provides an example of how to make SINAD measurement via GPIB. It is patterned after TIA/EIA IS-137, Analog RF Sensitivity (section 2.3.1.1).

SINAD and Distortion measurements are affected by the same STATE and INITiate commands, so both measurements are enabled and triggered at the same time. However, measurement results are queried separately. See [“Audio Analyzer Measurement Description” on page 42](#).

The following procedure assumes that the mobile's audio output is connected to the AUDIO IN connectors and the mobile is on an analog voice channel (AVC) that is being modulated with a 1004 Hz tone at  $\pm 8$  kHz peak deviation. It is also assumed that the Cell Power from the test set is set to a minimum usable level (typically about -116 dBm).

1. Configure audio analyzer measurement parameters using the SETup subsystem.
2. Start the audio analyzer measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain audio analyzer measurement results.

### Programming Example

```

10 OUTPUT 714;"SETup:AFANalyzer:CONTinuous OFF" !Set the audio analyzer
20                                     !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AFANalyzer:PEAK:VOLTage 3V" !Set the Expected Amplitude level for
40                                     !audio input voltage in Vpeak.
50 OUTPUT 714;"SETup:AFANalyzer:SDISTortion:STATE ON" !Turn on the SINAD and
60                                     !distortion measurements.
70 OUTPUT 714;"SETup:AFANalyzer:SDISTortion:FREQuency 1004 HZ" !Specify the audio
80                                     !frequency to use for the measurements.
90 OUTPUT 714;"SETup:AFANalyzer:FILTer CMESsage" !Select the c-message filter.
100 OUTPUT 714;"SETup:AFANalyzer:DEMPHasis:STATE OFF" !Turn off de-emphasis.
110 OUTPUT 714;"SETup:AFANalyzer:EXPandor:STATE OFF" !Turn off the expander.
120 OUTPUT 714;"SETup:AFANalyzer:TIMEout 3S" !Set a timeout value of 3 seconds
130                                     !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:AFANalyzer" !Start the AF Analyzer measurement.
150 OUTPUT 714;"FETCh:AFANalyzer:INTEgrity?" !Query the integrity indicator to
160                                     !verify that a reliable measurement was made.
170 ENTER 714;Integrity !Enter the returned value into a variable for comparison
180                                     !with possible integrity indicator values (not shown here).
190 IF Integrity=0 THEN !Only fetch measurement result if integrity indicator is 0.
200 OUTPUT 714;"FETCh:AFANalyzer:SINAD?" !Fetch the SINAD result.
210 ENTER 714;Sinad !Enter the returned value into a variable.
220 END IF
230 END

```

### Returned Values

The results returned by this program are:

- `Integrity` returns the integrity indicator (0 means a successful measurement with no errors). See [“Integrity Indicator” on page 255](#).
- `SINAD` returns the SINAD value in dB.

### Related Topics

[“Audio Analyzer Measurement Description” on page 42](#)

[“Audio Analyzer Troubleshooting” on page 714](#)

[“INITiate” on page 458](#)

[“SETup:AFANalyzer” on page 484](#)

[“FETCh:AFANalyzer” on page 415](#)

## Programming a Channel Power Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Prompt the user to establish an RTAP data connection. See [“Step 4: Make a connection” on page 196](#) for more details.
3. If you will be measuring very low access terminal power levels, turn the [“Call Drop Timer”](#) off to prevent dropping the connection, using the [“CALL:CONNECTed:DROP:TIMer\[:STATe\]<\[:SELEcted\] |:TA856>”](#) command.
4. Set up the channel power measurement parameters as needed using the [“SETup:CPOWer”](#) commands.
5. Set cell power as needed using the [“CALL:POWer”](#) command.
6. Set the [“Reverse Closed Loop Power Control”](#) mode as needed using the [“CALL\[:CELL\[1\]\]:CLPControl:REVerse:MODE”](#) command.
7. Initiate the channel power measurement using the [“INITiate:<measurement mnemonic>\[:ON\]”](#) command. The <measurement mnemonic> for the channel power measurement is CPOWER.
8. Use the [“FETCh:CPOWer”](#) commands to obtain the measurement results. (You can also replace steps 7 and 8 with a single command - [“READ:CPOWer\[:ALL\]?”](#)).

### Programming Example: 3.1.2.3.5 Minimum Controlled Output Power

```

10 ! 3.1.2.3.5 Minimum Controlled Output Power
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 9.6 kbps
40 ! RTAP data connection.
50 !
60     Testset=714
70 !
80     DISP "Measuring Minimum Power"
90 !
100 !***Set up test parameters***
110 !
120     Ior=-25
130     ! Cell power for test
140 !
150     OUTPUT Testset;"CALL:CONNECTED:DROP:TIMER:STATE 0"
160     ! Turn the call drop timer off
170 !
180 !***Set up measurement parameters***
190 !
200     OUTPUT Testset;"SETUP:CPOWER:CONTINUOUS OFF"
210     ! Set measurement to single trigger

```

## Programming a Channel Power Measurement

```
220     OUTPUT Testset;"SETUP:CPOWER:TIMEOUT .5"
230     ! Set Channel Power timeout to 0.5 sec
240 !
250 !***Set test conditions***
260 !
270     OUTPUT Testset;"CALL:POW ";Ior
280     ! Set cell power for test
290     OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE DOWN"
300     ! Start transmission of All Down (1) power control bits
310     WAIT 1
320     ! Settling time for mobile output power to slew down
330 !
340 !***INITiate and FETCh measurements***
350 !
360     OUTPUT Testset;"INITIATE:CPOWER"
370     ! Initiate a channel power measurement
380     OUTPUT Testset;"FETCh:CPOWER?"
390     ! Fetch channel power measurement results
400     ENTER Testset;Integrity,Channel_power
410     ! Read Integrity bit and channel power result
420 !
430 !***Print measurement results***
440 !
450     CLEAR SCREEN
460     PRINT "Minimum Power Test Results:"
470     PRINT
480     PRINT "Integrity Indicator          = ",Integrity
490     PRINT "Minimum Power (dBm/1.23 MHz) = ",Channel_power
500     PRINT
510     PRINT "Minimum Controlled Output Power Test Complete"
520 !
530 !***Post test clean up***
540 !
550     OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE ACTIVE"
560     ! Return to active power control bits
570     OUTPUT Testset;"CALL:POW -55"
580     ! Set cell power back to initial level
590     OUTPUT Testset;"CALL:CONNECTED:DROP:TIMER:STATE 1"
600     ! Return call drop timer to ON
610     OUTPUT Testset;"INIT:CPOW:OFF"
620     ! Turn channel power off
630     DISP ""
640 !
650     END
```

## **Programming a Channel Power Measurement**

### **Related Topics**

[“Channel Power Measurement Description” on page 50](#)

Manual Operation: [“Measuring Channel Power” on page 662](#)

[“Channel Power Measurement Troubleshooting” on page 715](#)

[“3.1.2.3.5 Minimum Controlled Output Power” on page 52](#)

[“Programming: Getting Started Guide for 1xEV-DO Terminal Test” on page 188](#)

## Programming a Digital Average Power Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Prompt the user to establish an RTAP data connection. See [“Step 4: Make a connection” on page 196](#) for more details.
3. Set up the access parameters as needed using the [“CALL:APARameter”](#) commands.
4. Set up the digital average power measurement parameters as needed using the [“SETup:DAPower”](#) commands.
5. Set cell power as needed using the [“CALL:POWer”](#) command.
6. Set the [“Reverse Closed Loop Power Control”](#) mode as needed using the [“CALL\[:CELL\[1\]\]:CLPControl:REVerse:MODE”](#) command.
7. Initiate the digital average power measurement using the [“INITiate:<measurement mnemonic>\[:ON\]”](#) command. The <measurement mnemonic> for the digital average power measurement is DAPower.
8. Use the [“FETCh:DAPower”](#) commands to obtain the measurement results. (You can also replace steps 7 and 8 with a single command - [“READ:DAPower\[:ALL\]?”](#) ).

### Programming Example: 3.1.2.3.4 Maximum RF Output Power

```

10 ! 3.1.2.3.4 Maximum RF Output Power
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 153.6 kbps
40 ! RTAP data connection.
50 !
60     Testset=714
70 !
80     DISP "Measuring Maximum Power"
90 !
100 !***Set up test parameters***
110 !
120     Ior=-105.5
130     ! Set cell power for test
140     Ol_adjust=84
150     ! Set Open Loop Adjust for Band Class 4
160 !
170     OUTPUT Testset;"CALL:APAR:POWER:OLADJUST ";Ol_adjust
180     ! Set Open Loop Adjust
190     OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 15"
200     ! Set Probe Initial Adjust
210     OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 15"
220     ! Set Probe Num Steps

```

## Programming a Digital Average Power Measurement

```
230      !OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 15"
240      ! Set Probe Sequence Max - this parameter setting is required
250      ! by C.S0033 but does not affect test results. It is a legacy
260      ! parameter setting from IS-98. Changing this parameter drops
270      ! the connection, as required by C.S0024. It is recommended not
280      ! to send this command.
290      OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 7.5"
300      ! Set Probe Step
310 !
320 !***Set up measurement parameters***
330 !
340      OUTPUT Testset;"SETUP:DAPOWER:CONTINUOUS OFF"
350      ! Set measurement to single trigger
360      OUTPUT Testset;"SETUP:DAPOWER:TIMEOUT 1"
370      ! Set DIGITAL Power timeout to 1 sec
380 !
390 !***Set test conditions***
400 !
410      OUTPUT Testset;"CALL:POW ";Ior
420      ! Set Cell Power for Test
430      OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE UP"
440      ! Start transmission of All Up (0) power control bits
450      WAIT 1
460      ! Settling time to allow mobile power to slew up to maximum power
470 !
480 !***Obtain measurement results***
490 !
500      OUTPUT Testset;"INITIATE:DAPOWER"
510      ! Initiate digital average power measurement
520 !
530      OUTPUT Testset;"FETCh:DAPOWER?"
540      ! Fetch the digital average power measurement results
550      ENTER Testset;Integrity,Avg_power_dbm
560 !
570      Avg_power_dbw=Avg_power_dbm-30
580      ! Convert dBm to dBW
590 !
600 !***Print Max Power Test Results***
610 !
620      CLEAR SCREEN
630      PRINT "Max Power Test Results:"
640      PRINT
650      PRINT "Integrity Indicator = ",Integrity
660      PRINT "Maximum Power (dBm) = ",Avg_power_dbm
670      PRINT "Maximum Power (dBW) = ",Avg_power_dbw
680      PRINT
690      PRINT "Maximum Output Power Test Complete"
700 !
710 !***Post test clean up***
720 !
730      OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE ACTIVE"
740      ! Return to active power control bits
750      OUTPUT Testset;"CALL:POW -55"
```



## Programming a Digital Average Power Measurement

```
760      ! Set cell power back to initial level
770      ! Do this before reconfiguring other parms so signaling
780      OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 0"
790      ! Set Access parameters for test
800      OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 5"
810      ! Set Access parameters for test
820      !OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 1"
830      ! Set Access parameters for test (not necessary if commented
840      ! out command before test)
850      OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 1"
860      ! Set Access paramters for test
870      OUTPUT Testset;"INIT:DAP:OFF"
880      ! Turn digital ave power off
890      DISP ""
900 !
910      END
```

### Related Topics

["Digital Average Power Measurement Description" on page 53](#)

[Manual Operation: "Measuring Digital Average Power" on page 664](#)

["Digital Average Power Troubleshooting" on page 717](#)

["3.1.2.3.4 Maximum RF Output Power" on page 55](#)

["Programming: Getting Started Guide for 1xEV-DO Terminal Test" on page 188](#)

## Programming a Packet Error Rate (PER) Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Prompt the user to establish an FTAP data connection. See [“Step 4: Make a connection” on page 196](#) for more details.
3. Set up the PER measurement parameters as needed using the **“SETup:CPERror”** commands.
4. Set **“AT Directed Packets”** using the **“CALL[:CELL]:APPLication:ATDPackets”** command.
5. Set cell power as needed using the **“CALL:POWer”** command.
6. Set the **“FTAP Rate”** as needed using the **“CALL[:CELL]:APPLication:FTAPProtocol:DRATe”** command.
7. Set the AWGN level as needed using the **“CALL:AWGNoise:POWer[:SAMPlitude]<[:SElected] | :DIGital856>”** command.
8. Initiate the PER measurement using the **“INITiate:<measurement mnemonic>[:ON]”** command. The **<measurement mnemonic>** for the PER measurement is **CPERror**.
9. Use the **“FETCh:CPERror”** commands to obtain the measurement results. (You can also replace steps 8 and 9 with a single command - **“READ:CPERror[:ALL]?”** ).

### Programming Example: 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN

```

10 ! 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN,
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in an FTAP data connection.
40 !
50     Testset=714
60     OPTION BASE 1
70     DIM Awgn_per_data$(18,3)[12]
80     ! Declare array to hold data AWGN PER test
90 !
100     DISP "Testing Demod of Traffic Channel in AWGN"
110 !
120 !***Set up test parameters***
130 !
140     Ior=-55
150     ! Cell power for test
160 !
170 !***Set up measurement parameters***
180 !
190     Max_packets=10000
200     ! Maximum packets

```

## Programming a Packet Error Rate (PER) Measurement

```
210 !
220     OUTPUT Testset;"SETUP:CPERROR:COUNT ";Max_packets
230     ! Set MAXIMUM PACKETS for test
240     OUTPUT Testset;"SETUP:CPERROR:CONTINUOUS OFF"
250     ! Set measurement to single trigger
260     OUTPUT Testset;"SETUP:CPERROR:TIMEOUT 25"
270     ! Set measurement timeout to 25 s
280 !
290 !***Set test conditions***
300 !
310     OUTPUT Testset;"CALL:APPLICATION:ATDPACKETS 50"
320     ! Set AT Directed Packets to 50%
330     OUTPUT Testset;"CALL:POW ";Ior
340     ! Set cell power for test
350 !
360 ! Read test data into array.
370 ! Values are Ioc (AWGN), FTAP data rate, and PER requirement for
380 ! 18 tests (C.S0033 tests 6 and 10 are not performed because
390 ! settings are duplicates)
400 !
410     RESTORE
420     DATA -70.4,"S01K2458",1,-68.4,"S01K2458",1,-65.8,"S01K1843",1
430     DATA -65.1,"S01K1843",1,-60.9,"S02K1229",3,-61.0,"S02K1229",.5
440     DATA -58.1,"S02B921600",3,-58.2,"S02B921600",.5,-60.5,"S01K1229",1
450     DATA -55.5,"S02B614400",1,-52.5,"S04B307200",1,-55.6,"S01B614400",5
460     DATA -55.7,"S01B614400",1,-55.8,"S01B614400",.5,-52.5,"S02B307200",1
470     DATA -49.4,"S04B153600",1,-46.4,"S08B76800",1,-43.6,"S16B38400",1
480 !
490     READ Awgn_per_data$(*)
500 !
510     CLEAR SCREEN
520 !
530     FOR I=1 TO 18
540     ! Loop to set parameters and measure PER for 18 tests
550 !
560         OUTPUT Testset;"SETUP:CPERROR:CONF:REQ "&Awgn_per_data$(I,3)
570         ! Set CONFIDENCE LIMIT
580         OUTPUT Testset;"CALL:APPLICATION:FTAP:DRATE "&Awgn_per_data$(I,2)
590         ! Set FTAP data rate
600         OUTPUT Testset;"CALL:AWGN:POW "&Awgn_per_data$(I,1)
610         ! Set AWGN POWER level
620         WAIT .1
630 !
640 !***Obtain measurement results***
650 !
660         OUTPUT Testset;"INITIATE:CPERROR"
670         ! Initiate a packet error rate measurement
680         DISP "Measuring PER"
690         OUTPUT Testset;"FETCh:CPERROR?"
700         ! Query the test set for packet error rate results
710         ENTER Testset;Integrity,Per_test,Per_ratio,Per_count,Packets_tested
720 !
730         SELECT Per_test
```

## Programming a Packet Error Rate (PER) Measurement

```
740      ! Assign pass/fail results to a string
750      CASE 0
760          Pass_fail$="PASS"
770      CASE 1
780          Pass_fail$="FAIL"
790      CASE 2
800          Pass_fail$="MAX PACKETS"
810      CASE 3
820          Pass_fail$="UNKNOWN"
830      END SELECT
840 !
850 !***Print measurement results***
860 !
870      PRINT
880      PRINT "Results PER with AWGN, "&Awgn_per_data$(I,2)&" Rate"
890      PRINT
900      PRINT "Integrity indicator          = ",Integrity
910      PRINT "PER Test Results              = ",Pass_fail$
920      PRINT "PER Ratio (%)                      = ",Per_ratio
930      PRINT "PER Errors Count (Packets) = ",Per_count
940      PRINT "Packets Tested                    = ",Packets_tested
950      PRINT
960 !
970      NEXT I
980 !
990      PRINT "PER with AWGN Tests Complete"
1000 !
1010 !***Post test clean up***
1020 !
1030      OUTPUT Testset;"CALL:AWGN:POW:STATE OFF"
1040      ! Turn off AWGN
1050      OUTPUT Testset;"INIT:CPER:OFF"
1060      ! Turn off PER measurement
1070      OUTPUT Testset;"CALL:POW -55"
1080      ! Set cell power back to normal level
1090      DISP ""
1100 !
1110      END
```

## Programming Example: 3.1.1.3.1 Receiver Sensitivity

```
10 ! 3.1.1.3.1 Receiver Sensitivity
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 307.2 kbps
40 ! (2-slot version) FTAP data connection.
50 !
60      Testset=714
70 !
80      DISP "Testing Receiver Sensitivity"
90 !
100 !***Set up test parameters***
110 !
120      Ior=-105.5
```

## Programming a Packet Error Rate (PER) Measurement

```
130      ! Cell power for sensitivity test
140 !
150 !***Set up measurement parameters***
160 !
170      Max_packets=10000
180      ! Maximum packets
190      Conf_limit=.5
200      ! 0.5% confidence limit
210 !
220      OUTPUT Testset;"SETUP:CPERROR:COUNT `";Max_packets
230      ! Set MAXIMUM PACKETS FOR TEST
240      OUTPUT Testset;"SETUP:CPERROR:CONF:REQ `";Conf_limit
250      ! Set CONFIDENCE LIMIT
260      OUTPUT Testset;"SETUP:CPERROR:CONTINUOUS OFF"
270      ! Set measurement to single trigger
280      OUTPUT Testset;"SETUP:CPERROR:TIMEOUT 10"
290      ! Set measurement timeout to 10 s
300 !
310 !***Set test conditions***
320 !
330      OUTPUT Testset;"CALL:APPLICATION:ATDPACKETS 50"
340      ! Set AT Directed Packets to 50%
350      OUTPUT Testset;"CALL:POW `";Ior
360      ! Set Cell Power for Test
370      WAIT .5
380      ! Settling time for access terminal power to slew
390 !
400 !***Obtain measurement results***
410 !
420      OUTPUT Testset;"INITIATE:CPERROR"
430      ! Initiate a packet error rate measurement
440      DISP "Measuring PER"
450      OUTPUT Testset;"FETCh:CPERROR?"
460      ! Query the test set for packet error rate measurement results
470      ENTER Testset;Integrity,Per_test,Per_ratio,Per_count,Packets_tested
480 !
490      SELECT Per_test
500      ! Assign pass/fail results to a string
510      CASE 0
520          Pass_fail$="PASS"
530      CASE 1
540          Pass_fail$="FAIL"
550      CASE 2
560          Pass_fail$="MAX PACKETS"
570      CASE 3
580          Pass_fail$="UNKNOWN"
590      END SELECT
600 !
610 !***Print measurement results***
620 !
630      CLEAR SCREEN
640      PRINT "Sensitivity Test Results:"
650      PRINT
```

## Programming a Packet Error Rate (PER) Measurement

```
660      PRINT "Integrity Indicator          = ", Integrity
670      PRINT "PER Test Result              = ", Pass_fail$
680      PRINT "PER Ratio (%)"              = ", Per_ratio
690      PRINT "PER Error Count (Packets)    = ", Per_count
700      PRINT "Packets Tested               = ", Packets_tested
710      PRINT
720      PRINT "Sensitivity Test complete"
730 !
740 !***Post test clean up***
750 !
760      OUTPUT Testset;"INIT:CPER:OFF"
770      ! Turn off PER measurement
780      OUTPUT Testset;"CALL:POW -55"
790      ! Set cell power back to normal level
800      DISP ""
810 !
820      END
```

## Programming Example:

```
10 ! 3.1.1.3.1 Dynamic Range
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 2457.6 kbps
40 ! (1-slot version) FTAP data connection.
50 !
60      Testset=714
70 !
80      DISP "Testing Dynamic Range"
90 !
100 !***Set up test parameters***
110 !
120      Ior=-25
130      ! Level for dynamic range test
140 !
150 !***Set up measurement parameters***
160 !
170      Max_packets=10000
180      ! Maximum packets
190      Conf_limit=.5
200      ! 0.5% confidence limit
210 !
220      OUTPUT Testset;"SETUP:CPERROR:COUNT ";Max_packets
230      ! Set MAXIMUM PACKETS FOR TEST
240      OUTPUT Testset;"SETUP:CPERROR:CONF:REQ ";Conf_limit
250      ! Set CONFIDENCE LIMIT
260      OUTPUT Testset;"SETUP:CPERROR:CONTINUOUS OFF"
270      ! Set measurement to single trigger
280      OUTPUT Testset;"SETUP:CPERROR:TIMEOUT 10"
290      ! Set measurement timeout to 10 s
300 !
310 !***Set test conditions***
320 !
330      OUTPUT Testset;"CALL:APPLICATION:ATDPACKETS 50"
```

## Programming a Packet Error Rate (PER) Measurement

```
340      ! Set AT Directed Packets to 50%
350      OUTPUT Testset;"CALL:POW ";Ior
360      ! Set Cell Power for Test
370      WAIT .5
380      ! Settling time for access terminal power to slew
390      !
400      !***Obtain measurement results***
410      !
420      OUTPUT Testset;"INITIATE:CPERROR"
430      ! Initiate a packet error rate measurement
440      DISP "Measuring PER"
450      OUTPUT Testset;"FETCh:CPERROR?"
460      ! Query the test set for packet error rate measurement results
470      ENTER Testset;Integrity,Per_test,Per_ratio,Per_count,Packets_tested
480      !
490      SELECT Per_test
500      ! Assign pass/fail results to a string
510      CASE 0
520          Pass_fail$="PASS"
530      CASE 1
540          Pass_fail$="FAIL"
550      CASE 2
560          Pass_fail$="MAX PACKETS"
570      CASE 3
580          Pass_fail$="UNKNOWN"
590      END SELECT
600      !
610      !***Print measurement results***
620      !
630      CLEAR SCREEN
640      PRINT "Dynamic Range Test Results:"
650      PRINT
660      PRINT "Integrity Indicator          = ",Integrity
670      PRINT "PER Test Results                    = ",Pass_fail$
680      PRINT "PER Ratio (%)                       = ",Per_ratio
690      PRINT "PER Errors Count (Packets)         = ",Per_count
700      PRINT "Packets Tested                      = ",Packets_tested
710      PRINT
720      PRINT "Dynamic Range Test complete"
730      !
740      !***Post test clean up***
750      !
760      OUTPUT Testset;"INIT:CPER:OFF"
770      ! Turn off PER measurement
780      OUTPUT Testset;"CALL:POW -55"
790      ! Set cell power back to normal level
800      DISP ""
810      !
820      END
```

## **Programming a Packet Error Rate (PER) Measurement**

### **Related Topics**

[“Packet Error Rate \(PER\) Measurement Description” on page 56](#)

Manual Operation: [“Measuring Packet Error Rate \(PER\)” on page 667](#)

[“Packet Error Rate Measurement Troubleshooting” on page 719](#)

[“3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN” on page 59](#)

[“3.1.1.3.1 Receiver Sensitivity and Dynamic Range” on page 60](#)

[“Programming: Getting Started Guide for 1xEV-DO Terminal Test” on page 188](#)



## Programming the Spectrum Monitor

This section provides an example of how to use the Spectrum Monitor via the GPIB.

The following procedure assumes that the mobile station's antenna output is connected to the RF IN/OUT connector, and that the mobile station is transmitting an uplink signal.

1. Configure the Spectrum Monitor parameters using the SETup subsystem.
2. Start the Spectrum Monitor using the INITiate subsystem.
3. Use the INITiate:DONE? command to determine if Spectrum Monitor results are available.
4. Use the FETCh? commands to obtain Spectrum Monitor results.
5. Use the CALCulate commands to set and query the Spectrum Monitor markers.

### Programming Example

```

10 REAL Amplitudes(400) ! Set up array to hold amplitude results (trace data)
20 OUTPUT 714;"SETUP:SMONITOR:CONTINUOUS OFF" !Configures the Spectrum Monitor to
30                                     !single trigger mode.
40 OUTPUT 714;"SETUP:SMONITOR:COUNT:NUMBER 20" !Configures a multi-measurement
50                                     !of 20.
60 OUTPUT 714;"SETUP:SMONITOR:TRIGGER:SOURCE AUTO" !Configure trigger source
70                                     !to auto.
80 OUTPUT 714;"SETUP:SMONITOR:FREQUENCY:SPAN 20 MHz" !Set frequency span
90 OUTPUT 714;"INITIATE:SMONITOR" !Start the Spectrum Monitor
100 REPEAT
110     OUTPUT 714;"INIT:DONE?"
120     ENTER 714;Meas_complete$
130     UNTIL Meas_complete$="SMON"
140 OUTPUT 714;"FETCH:SMONITOR:INTEGRITY?" !Fetch SMON Integrity
150 ENTER 714;Integrity
160 PRINT "Spectrum Monitor Integrity: ";Integrity
170 IF Integrity=0 THEN                                     !Fetch results if SMON
180     OUTPUT 714;"FETCH:SMONITOR:TRACE?" !has valid integrity.
190     ENTER 714;Amplitudes(*) !Load valid results into array
200     PRINT "Trace Data Amplitude Results (dB):"
210     PRINT "-----"
220     PRINT Amplitudes(*)
230     PRINT "-----"
240 ELSE
250     PRINT "Bad Integrity value =";Integrity
260     STOP
270 END IF
280 ! Move the marker to the signal peak and query the frequency and level
290 OUTPUT 714;"CALCULATE:SMONITOR:MARKER1:PEAK:MAXIMUM"
300 OUTPUT 714;"CALCULATE:SMONITOR:MARKER1:FREQUENCY?"
310 ENTER 714;Peak_frequency
320 PRINT "Maximum Peak Frequency (MHz): ";Peak_frequency
330 OUTPUT 714;"CALCULATE:SMONITOR:MARKER1:AMPLITUDE?"
340 ENTER 714;Peak_amplitude

```

## Programming the Spectrum Monitor

```
350 PRINT "Maximum Peak Amplitude (dBm): ";Peak_amplitude
360 END
```

## Returned Values

The results returned by this program are:

- `Integrity` returns the Spectrum Monitor [“Integrity Indicator” on page 255](#) (0 means that the Spectrum Monitor completed with no errors).
- `Amplitudes()` returns 401 points representing the amplitude results (in dBm) of the trace data.
- `Peak_frequency` returns the frequency in MHz at marker 1. In this case, marker 1 is positioned at the highest peak value.
- `Peak_amplitude` returns the amplitude in dBm at marker 1. In this case, marker 1 is positioned at the highest peak value.

## Related Topics

[“Spectrum Monitor Description” on page 61](#)

[“SETup:SMONitor” on page 530](#)

[“INITiate” on page 458](#)

[“FETCh:SMONitor” on page 453](#)

[“CALCulate:SMONitor” on page 343](#)

## Programming a Swept Audio Measurement

This section provides an example of how to make swept audio measurements via the GPIB.

The following example assumes that some device under test is connected between the test set's AUDIO OUT and AUDIO IN ports. The default audio level measurement, and the optional SINAD and distortion measurements, are performed at each frequency point in the sweep.

1. Configure the swept audio measurement using the SETup subsystem.
2. Start the measurement using the INITiate subsystem.
3. Use the FETCh subsystem to obtain the audio analyzer's results for all points in the sweep.

### Programming Example

```

10  OUTPUT 714;"SETup:SAUDio:FREQuency:STARt 300 Hz" !Start the frequency
20                                     !sweep at 300 Hz.
30  OUTPUT 714;"SETup:SAUDio:FREQuency:STOP 4 kHz" !Stop the frequency
40                                     !sweep at 4 kHz.
50  OUTPUT 714;"SETup:SAUDio:FREQuency:POINts 5"  !Make measurements at 5 frequencies
60                                     !spaced evenly between the start and stop frequencies.
70  OUTPUT 714;"SETup:SAUDio:SETTling 1.5 ms" !Set a settling time of
80                                     !1.5 milliseconds.
90  OUTPUT 714;"SETup:SAUDio:VOLTage:AMPLitude 1 V" !SET the audio generator
100                                     !voltage to 1 volt peak.
110 OUTPUT 714;"SETup:SAUDio:DETEctor PEAK" !Select the peak detector for
120                                     !the audio analyzer.
130 OUTPUT 714;"SETup:SAUDio:FILTer TBPass" !Select the AF analyzer's 100 Hz bandwidth
140 !band pass filter for making the measurements. The center frequency for the filter
150 !automatically tracks the AF generator's frequency.
160 OUTPUT 714;"SETup:SAUDio:PEAK:VOLTage 1 V" !Set the expected peak voltage
170                                     !at the AUDIO IN port.
180 OUTPUT 714;"SETup:SAUDio:SDISTortion:STATe ON" !Turn on the SINAD
190                                     !and distortion measurements.
200 OUTPUT 714;"SETup:SAUDio:CONTinuous OFF" !Set the swept audio
210                                     !measurement to single trigger mode.
220 OUTPUT 714;"SETup:SAUDio:TIMEout 5 S" !Set a measurement timeout of
230                                     !5 seconds in case the measurement cannot be made.
240 OUTPUT 714;"INITiate:SAUDio" !Start the swept audio measurements.
250 OUTPUT 714;"FETCh:SAUDio?" !Query the audio level and distortion results.
260 ENTER 714;Integrity,Lev1,Dist1,Lev2,Dist2,Lev3,Dist3,Lev4,Dist4,Lev5,Dist5 !Enter the
270                                     !returned integrity value, and the level and distortion values
280                                     !for each of the five measurement points, into variables.
290 OUTPUT 714;"FETCh:SAUDio:SINAD?" !Query the SINAD results.
300 ENTER 714;Sinad1,Sinad2,Sinad3,Sinad4,Sinad5 !Enter the 5 returned SINAD values
310                                     !into variables.
320  END

```

## Programming a Swept Audio Measurement

### Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator (see [“Integrity Indicator” on page 255](#)); 0 means a successful measurement with no errors.
- `Lev1` through `Lev5` return the audio level (voltage) at each of the five measurement points. In this example, the value is returned in volts peak because the peak detector was specified.
- `Dist1` through `Dist5` return the distortion value at each of the five measurement points.
- `Sinad1` through `Sinad5` return the SINAD value at each of the five measurement points.

### Related Topics

[“Swept Audio Measurement Description” on page 63](#)

[“Swept Audio Measurement Troubleshooting” on page 721](#)

[“INITiate” on page 458](#)

[“SETup:SAUDio” on page 521](#)

[“FETCh:SAUDio” on page 448](#)

## Programming a Time Response of Open Loop Power Control (TROLPC) Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Prompt the user to establish an RTAP data connection. See [“Step 4: Make a connection” on page 196](#) for more details.
3. Set up the TROLPC measurement parameters as needed using the **“SETup:TROPower”** commands.
4. Disable the R-ACK Channel by turning **“CALL[:CELL]:APPLication:ACKChannel:BFMAAttribute[:STATe]”** to off and setting **“CALL[:CELL]:APPLication:ATDPackets”** to 0%.
5. Set cell power using the **“CALL:POWer”** command. (Set cell power to -60 dBm/1.23 MHz when performing C.S0033 test 3.1.2.3.2).
6. Specify the direction of the step change in cell power using the **“SETup:TROPower:STEP”** command. When the measurement is initiated, the test set will change its cell power in the direction indicated by this command.
7. Initiate the TROLPC measurement using the **“INITiate:<measurement mnemonic>[:ON]”** command. The <measurement mnemonic> for the TROLPC measurement is TROPower. When the TROLPC measurement is initiated, the test set will change its cell power by 20 dB, and then measure the access terminal power for 100 ms.
8. Use the **“FETCh:TROPower[:ALL]?”** command to obtain the measurement results. (You can also replace steps 7 and 8 with a single command - **“READ:TROPower[:ALL]?”**).
9. You must repeat steps 6 - 8 to test each 20 dB step change.
10. A pass or fail indication is returned for each measurement.
11. In addition to retrieving the pass/fail result, you can retrieve data points representing the access terminal output power trace using the **“FETCh:TROPower:TRACe?”** command. You can then compare the data points to the equations for the mask (see [“3.1.2.3.2 Time Response of Open Loop Power Control”](#)) to determine any failure points.

### Programming Example: 3.1.2.3.2 Time Response of Open Loop Power Control

```

10 ! 3.1.2.3.2 Time Response of Open Loop Power Control
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 9.6 kbps
40 ! RTAP data connection.
50 !
60     Testset=714
70 !
80     DISP "Testing Time Response of Open Loop Power Control"

```

## Programming a Time Response of Open Loop Power Control (TROLPC) Measurement

```
90 !
100 !***Set up test parameters***
110 !
120     Ior=-60
130     ! Start Level for test
140 !
150 !***Set up measurement parameters***
160 !
170     OUTPUT Testset;"SETUP:TROP:TIMEOUT 5"
180     ! Set measurement timeout to 5 s
190 !
200 !***Set test conditions***
210 !
220     OUTPUT Testset;"CALL:APPLICATION:ACKCHANNEL:BFMATATTRIBUTE OFF"
230     ! Turn off ACK Channel Bit Fixed Mode Attribute
240     OUTPUT Testset;"CALL:APPLICATION:ATDPACKETS 0"
250     ! Set AT Directed Packets to 0 to disable R-ACK Channel
260     OUTPUT Testset;"CALL:POW ";Ior
270     ! Set cell power for Test
280     WAIT .1
290     ! Open Loop Time Response settling time after cell power change
300 !
310     CLEAR SCREEN
320     PRINT "Time Response of Open Loop Power Test Results:"
330 !
340     FOR J=1 TO 4
350     ! Loop to measure power after 4 step changes in cell power
360         SELECT J
370         ! Set step direction for each measurement
380         CASE 1
390             Test_number=J
400             Step$="UP20"
410         CASE 2
420             Test_number=J
430             Step$="DOWN20"
440         CASE 3
450             Test_number=J
460             Step$="DOWN20"
470         CASE 4
480             Test_number=J
490             Step$="UP20"
500         END SELECT
510 !
520 !***Obtain measurement results***
530 !
540     OUTPUT Testset;"SETUP:TROP:STEP "&Step$
550     ! Set step direction for measurement
560     OUTPUT Testset;"READ:TROP?"
570     ! Initiate Time Response of Open Loop measurement,
580     ! which automatically induces step change in direction
590     ! set by SETUP:TROP:STEP, then fetch results
600     ENTER Testset;Integrity,Pass_fail
610 !
```

## Programming a Time Response of Open Loop Power Control (TROLPC) Measurement

```
620      SELECT Pass_fail
630      ! Assign pass/fail results to a string
640      CASE 0
650          Pass_fail$="PASS"
660      CASE 1
670          Pass_fail$="FAIL"
680      CASE ELSE
690          Pass_fail$="ERROR"
700      END SELECT
710 !
720 !***Print measurement results***
730 !
740      PRINT
750      PRINT "Test Number "&VAL$(Test_number)
760      PRINT "Integrity Indicator = ",Integrity
770      PRINT "TROLPC Test Result  = ",Pass_fail$
780 !
790      NEXT J
800 !
810      PRINT
820      PRINT "Test 1 is +20 dB change"
830      PRINT "Test 2 is -20 dB change"
840      PRINT "Test 3 is -20 dB change"
850      PRINT "Test 4 is +20 dB change"
860      PRINT
870      PRINT "Time Response of Open Loop Power Control Test Complete"
880 !
890 !***Post test clean up***
900 !
910      OUTPUT Testset;"INIT:TROP:OFF"
920      ! Turn off measurement
930      OUTPUT Testset;"CALL:APPLICATION:ACKCHANNEL:BFMATATTRIBUTE ON"
940      ! Turn ACK Channel Bit Fixed Mode Attribute back on
950      OUTPUT Testset;"CALL:APPLICATION:ATDPACKETS 50"
960      ! Set AT Directed Packets back to default value of 50%
970      OUTPUT Testset;"CALL:POW -55"
980      ! Set cell power back to initial level
990      DISP ""
1000 !
1010      END
```

## Related Topics

["Time Response of Open Loop Power Control \(TROLPC\) Measurement Description" on page 66](#)

[Manual Operation: "Measuring Time Response of Open Loop Power Control \(TROLPC\)" on page 670](#)

["Time Response of Open Loop Power Control Troubleshooting" on page 722](#)

["3.1.2.3.2 Time Response of Open Loop Power Control" on page 71](#)

["Programming: Getting Started Guide for 1xEV-DO Terminal Test" on page 188](#)

## Programming a Tx Spurious Emissions Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Prompt the user to establish an RTAP data connection. See [“Step 4: Make a connection” on page 196](#) for more details.
3. Set up the access parameters as needed using the [“CALL:APARameter”](#) commands.
4. Set up the TX spurious emissions measurement parameters as needed using the [“SETup:CTXSpurious”](#) commands.
5. Set cell power as needed using the [“CALL:POWer”](#) command.
6. Set the [“Reverse Closed Loop Power Control”](#) mode as needed using the [“CALL\[:CELL\[1\]\]:CLPControl:REVerse:MODE”](#) command.
7. Initiate the TX spurious emissions measurement using the [“INTIate:<measurement mnemonic>\[:ON\]”](#) command. The <measurement mnemonic> for the TX spurious emissions measurement is CTXSpurious.
8. Use the [“FETCh:CTXSpurious”](#) commands to obtain the measurement results. (You can also replace steps 7 and 8 with a single command - [“READ:CTXS purious\[:ALL\]?”](#) ).

### Programming Example: 3.1.2.4.1 Conducted Spurious Emissions

```

10 ! 3.1.2.4.1 Conducted Spurious Emissions
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 153.6 kbps
40 ! RTAP data connection.
50 !
60     Testset=714
70 !
80     DISP "Measuring TX Spurious Emissions"
90 !
100 !***Set up test parameters***
110 !
120     Ior=-105.5
130     ! Set cell power for test
140     Ol_adjust=84
150     ! Set Open Loop Adjust for Band Class 4
160 !
170     OUTPUT Testset;"CALL:APAR:POWER:OLADJUST ";Ol_adjust
180     ! Set Open Loop Adjust
190     OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 15"
200     ! Set Probe Initial Adjust
210     OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 15"
220     ! Set Probe Num Steps

```



## Programming a Tx Spurious Emissions Measurement

```
230      !OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 15"
240      ! Set Probe Sequence Max - this parameter setting is required
250      ! by C.S0033 but does not affect test results. It is a legacy
260      ! parameter setting from IS-98. Changing this parameter drops
270      ! the connection, as required by C.S0024. It is recommended not
280      ! to send this command.
290      OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 7.5"
300      ! Set Probe Step
310      !
320      !***Set up measurement parameters***
330      !
340      OUTPUT Testset;"SETUP:CTXSPURIOUS:CONTINUOUS OFF"
350      ! Set measurement to single trigger
360      OUTPUT Testset;"SETUP:CTXS:TIMEOUT 5"
370      ! Set TX Spur Emissions timeout to 5 sec
380      !
390      !***Set test conditions***
400      !
410      OUTPUT Testset;"CALL:POW ";Ior
420      ! Set Cell Power for Test
430      OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE UP"
440      ! Start transmission of All Up (0) power control bits
450      WAIT 1
460      ! Settling time to allow mobile power to slew up to maximum power
470      !
480      !***Obtain measurement results***
490      !
500      OUTPUT Testset;"INITIATE:CTXS"
510      ! Initiate TX spurious emissions measurement
520      !
530      OUTPUT Testset;"FETCH:CTXS?"
540      ! Fetch TX spurious emissions results
550      ENTER Testset;Ctxs_integ,Ctxs_pf,Low_adj,Upp_adj,Low_alt,Upp_alt
560      !
570      SELECT Ctxs_pf
580      ! Assign CTXS pass/fail results to a string
590      CASE 0
600          Pass_fail$="PASS"
610      CASE 1
620          Pass_fail$="FAIL"
630      END SELECT
640      !
650      !***Print TX Spurious Test Results
660      !
670      CLEAR SCREEN
680      PRINT "TX Spurious Emissions Test Results:"
690      PRINT
700      PRINT "Integrity Indicator          = ",Integrity
710      PRINT "TX Spurious Emissions Test Result = ",Pass_fail$
720      PRINT "Lower Adjacent Power (dBc)          = ",Low_adj
730      PRINT "Upper Adjacent Power (dBc)          = ",Upp_adj
740      PRINT "Lower Alternate Power (dBc)         = ",Low_alt
750      PRINT "Upper Alternate Power (dBc)         = ",Upp_alt
```

## Programming a Tx Spurious Emissions Measurement

```
760      PRINT
770      PRINT "TX Spurious Emissions Test Complete"
780 !
790 !***Post test clean up***
800 !
810      OUTPUT Testset;"CALL:CLPCONTROL:REVERSE:MODE ACTIVE"
820      ! Return to active power control bits
830      OUTPUT Testset;"CALL:POW -55"
840      ! Set cell power back to initial level
850      ! Do this before reconfiguring other parms so signaling
860      OUTPUT Testset;"CALL:APAR:PROBE:IADJUST 0"
870      ! Set Access parameters for test
880      OUTPUT Testset;"CALL:APAR:PROBE:STEP:COUNT 5"
890      ! Set Access paramters for test
900      !OUTPUT Testset;"CALL:APAR:PROBE:SEQUENCE 1"
910      ! Set Access paramters for test (not necessary if commented
920      ! out command before test)
930      OUTPUT Testset;"CALL:APAR:PROBE:POWER:STEP 1"
940      ! Set Access paramters for test
950      OUTPUT Testset;"INIT:CTXS:OFF"
960      ! Turn TX spurious emissions off
970      DISP ""
980 !
990      END
```

## Related Topics

["TX Spurious Emissions Measurement Description" on page 74](#)

Manual Operation: ["Measuring TX Spurious Emissions" on page 674](#)

["Tx Spurious Emissions Measurement Troubleshooting" on page 724](#)

["3.1.2.4.1 Conducted Spurious Emissions" on page 78](#)

["Programming: Getting Started Guide for 1xEV-DO Terminal Test" on page 188](#)

## Programming a Waveform Quality/Code Domain Measurement

### General Programming Procedure

1. Prompt the user to connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. Instruct the user that if the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“Establish a Session from the Access Terminal” on page 196](#) for more details.
2. Prompt the user to establish an RTAP data connection. See [“Step 4: Make a connection” on page 196](#) for more details.
3. Set up the waveform quality + code domain measurement parameters as needed using the [“SETup:DOWQuality”](#) commands. See [“Waveform Quality + Code Domain Measurement Parameters” on page 81](#) for information on setting slots to measure to the proper value for your test.
4. Set cell power as needed using the [“CALL:POWer”](#) command.
5. Initiate the waveform quality + code domain power measurement using the [“INITiate:<measurement mnemonic>\[:ON\]”](#) command. The <measurement mnemonic> for the waveform quality + code domain measurement is DOWQuality.
6. Use the [“FETCh:DOWQuality”](#) commands to obtain the measurement results. (You can also replace steps 5 and 6 with a single command - [“READ:DOWQuality\[:ALL\]?”](#) ).

### Programming Example

```

10 ! 3.1.2.2.2 Waveform Quality and Frequency Accuracy
20 ! This programming example assumes the access terminal
30 ! is connected to the test set and in a 9.6 kbps
40 ! RTAP data connection.
50 !
60     Testset=714
70 !
80     DISP "Measuring Waveform Quality"
90 !
100 !***Set up test parameters***
110 !
120     Ior=-75
130     ! Cell power for test
140 !
150     OUTPUT Testset;"CALL:POW ";Ior
160     ! Set cell power
170 !
180 !***Set up measurement parameters***
190 !
200     OUTPUT Testset;"SETUP:DOWQUALITY:CONTINUOUS OFF"
210     ! Set measurement to single trigger
220     OUTPUT Testset;"SETUP:DOWQ:TIMEOUT 10"
230     ! Set waveform quality measurement timeout to 10 seconds
240     OUTPUT Testset;"SETUP:DOWQ:SLOT:COUNT 1"

```

## Programming a Waveform Quality/Code Domain Measurement

```
250      ! Set slots to measure to 1
260 !
270 !***INITiate and FETCh measurement results***
280 !
290      OUTPUT Testset;"INITIATE:DOWQUALITY"
300      ! Initiate a waveform quality + code domain measurement
310      OUTPUT Testset;"FETCh:DOWQUALITY?"
320      ! Query the test set for waveform quality measurement results
330      ENTER Testset;Integrity,Rho,F_err,T_err,C_feed,P_err,M_err,Evm
340 !
350 !***Print Waveform Quality results***
360 !
370      CLEAR SCREEN
380      PRINT "Waveform Quality Test Results:"
390      PRINT
400      PRINT "Integrity Indicator          = ",Integrity
410      PRINT "Rho                          = ",Rho
420      PRINT "Frequency Error (Hz)                = ",F_err
430      PRINT "Time Error (s)                      = ",T_err
440      PRINT "Carrier Feedthrough (dBc)          = ",C_feed
450      PRINT "Phase Error (degrees)              = ",P_err
460      PRINT "Magnitude Error (%)                 = ",M_err
470      PRINT "EVM (%)                             = ",Evm
480      PRINT
490      PRINT "Waveform Quality Test Complete"
500 !
510 !***Post test clean up***
520 !
530      OUTPUT Testset;"INIT:DOWQ:OFF"
540      OUTPUT Testset;"CALL:POW -55"
550      ! Set cell power back to initial level
560      DISP ""
570 !
580      END
```

## Related Topics

[“Waveform Quality + Code Domain Measurement Description” on page 80](#)

Manual Operation: [“Testing 3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 681](#)

[“Waveform Quality Measurement Troubleshooting” on page 725](#)

[“3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 93](#)

[“Programming: Getting Started Guide for 1xEV-DO Terminal Test” on page 188](#)

## Preset Descriptions

### Description

The test set is capable of accepting several different preset commands.

At no time during a preset operation, does transmit power exceed the last user setting of the transmit power. The input power is not set to any value lower than the last user setting of the input power. This is to avoid power spikes on the output and possible receiver damage on the input during transitions associated with preset operations.

### Partial Preset

Partial preset saves setup time because measurement setup parameters remain unchanged. This is the recommended way to place the test set in a known condition.

When you fast switch between formats in a fast switching test application the test set behaves as if a partial preset has occurred. The table below lists some key partial preset results.

#### Example

```
OUTPUT 714;"SYSTEM:PRESET3" !Command for a partial preset when user in
!remote operation.
```

SYSTEM:PRESET3 is the recommended command for a partial preset operation. The SYSTEM:PRESET[1] command is not recommended for use at this time.

Press the green Preset key on the front panel to perform a partial preset.

**Table 30. Partial Preset Behavior**

Function	Partial Preset Result
Trigger Arm	no change
Measurement parameters	no change
Calibration data	no change
Enable registers	no change
Positive Transition Filter registers	no change
Negative Transition Filter registers	no change
Contents of RAM	no change
Contents of output queue	no change
Contents of error queue	no change
Maskable Message Display State	no change

## Preset Descriptions

**Table 30. Partial Preset Behavior**

Function	Partial Preset Result
Operating Mode	Active Cell
Measurements	aborted and inactivated
Measurement results	NAN
Measurement integrity indicator	1 = no result available
Transmit Power State	ON
Cell Activated State	ON
Call in progress	aborted
Call Control Status	Idle
Call Counters	cleared
Call Error Counters	cleared
SACCH	cleared
Pending Service request	not cleared

### Full Preset

A full preset requires you to select new measurements and configure their parameters. If measurement parameters do not need to be changed, use a partial preset to save time.

#### Example

```
OUTPUT 714;"*RST" !Recommended command for a full preset, sets trigger arm to single.
```

```
OUTPUT 714;"SYSTEM:PRESET2" !Command for a full preset, sets trigger arm to continuous.
```

The \*RST common command is the recommended command for a full preset operation.

---

**NOTE** Transmit power is not set to OFF during a full preset, transmit power is set to the default value.

---

**Table 31. Full Preset Behavior**

Function	Full Preset Result
Trigger Arm	Continuous (manual operation full preset or SYSTEM:PRESET2 command)
Trigger Arm	Single (remote operation full preset, *RST command)

**Table 31. Full Preset Behavior**

Function	Full Preset Result
Measurement Parameters	all set to defaults
Maskable Message Display State	On (manual operation full preset)
Maskable Message Display State	Off (remote operation full preset)

**Status Preset**

The STATUS:PRESET command sets the status system as defined in “SCPI 1995 Volume 2: Command Reference” section 20.7. All of the enable registers are set to 0, all PTR registers are set to 1, and all NTR registers are set to 0.

**Example**

```
OUTPUT 714;"STATUS:PRESET" !Presets the STATUS subsystem.
```

**Related Topics**

[“SYSTEM:PRESet” on page 620](#)

---

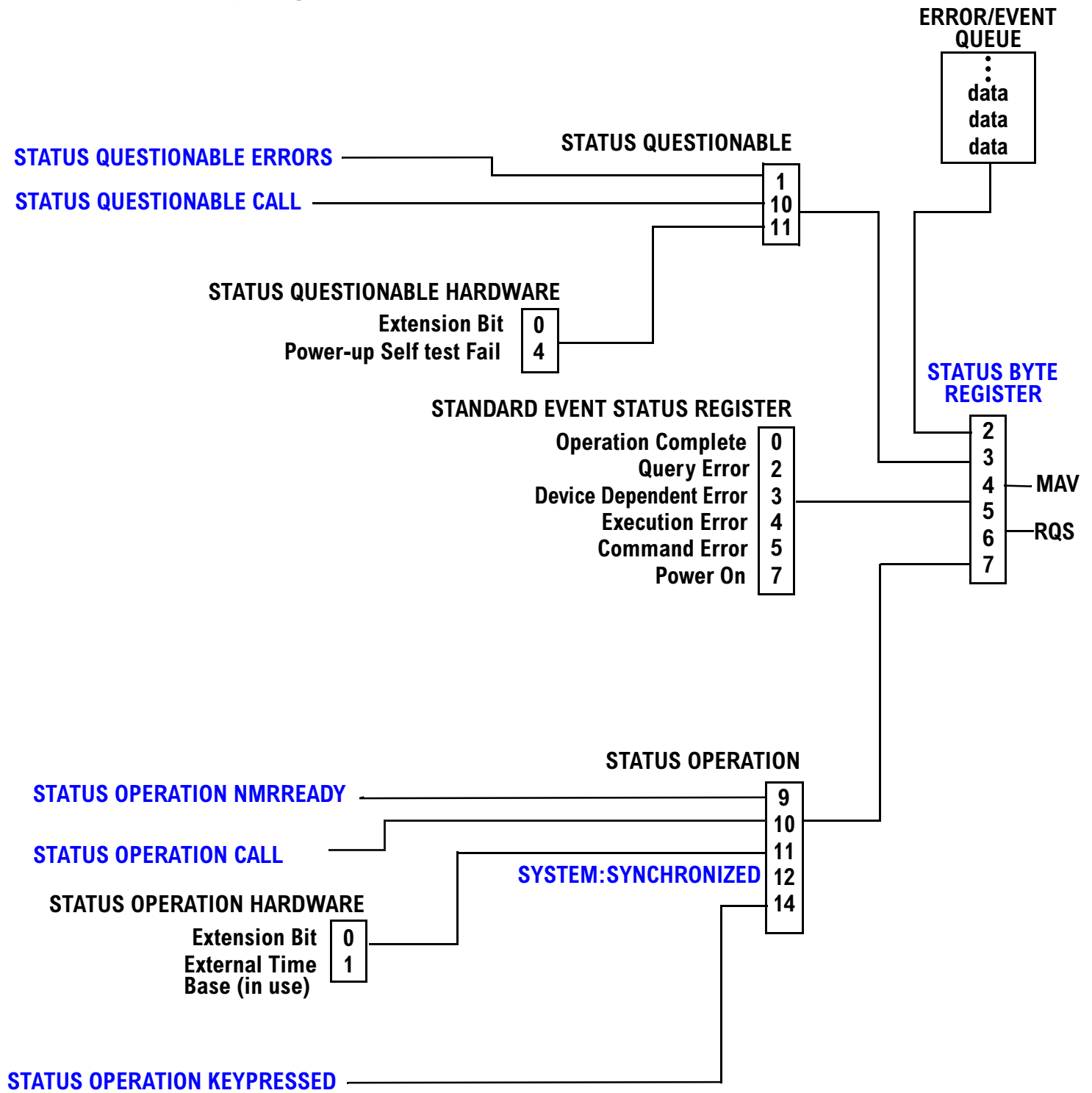
## Status Subsystem Overview

The following pages present an overview of the entire status subsystem, including test applications which may or may not be loaded in your test set.



## Description

### Overview of STATUS Reporting Structure



## Status Subsystem Overview

### Status Reporting Structure For STATUS QUESTIONABLE and STATUS OPERATION

#### STATUS QUESTIONABLE CALL

Extension Bit	0	
COMMon Summary	1	
GSM Summary	2	
AMPS Summary	3	
DIGital 136 Summary	4	Bit 10 STATUS QUESTIONABLE
TA136 Summary	5	
DIGital 95 Summary	6	
DIGital 2000 Summary	7	
CDMA Summary	8	
TA 2000 Summary	9	
GPRS Summary	12	

#### STATUS QUESTIONABLE ERRORS

Extension Bit	0	
COMMon Summary	1	
GSM Summary	2	
AMPS Summary	3	
DIGital 136 Summary	4	Bit 1 STATUS QUESTIONABLE
TA136 Summary	5	
DIGital 95 Summary	6	
DIGital 2000 Summary	7	
CDMA Summary	8	
TA 2000 Summary	9	
FDD Summary	10	
WCDMA Summary	11	
GPRS Summary	12	

Some status registers are not functional at this time.

#### STATUS OPERATION CALL

Extension Bit	0	
COMMon Summary	1	
GSM Summary	2	
AMPS Summary	3	
DIGital 136 Summary	4	Bit 10 STATUS OPERATION
TA136 Summary	5	
DIGital 95 Summary	6	
DIGital 2000 Summary	7	
CDMA Summary	8	
TA 2000 Summary	9	

#### STATUS OPERATION NMRREADY

Extension Bit	0	
COMMon Summary	1	
GSM Summary	2	
AMPS Summary	3	
DIGital 136 Summary	4	Bit 9 STATUS OPERATION
TA136 Summary	5	
DIGital 95 Summary	6	
DIGital 2000 Summary	7	
CDMA Summary	8	
TA 2000 Summary	9	
FDD Summary	10	
WCDMA Summary	11	
GPRS Summary	12	

Status Reporting Structure For STATus OPERation KEYPressed Register

STATUS OPERATION KEYPRESSED

F1 softkey	0	Bit 14 STATUS OPERATION
F2 softkey	1	
F3 softkey	2	
F4 softkey	3	
F5 softkey	4	
F6 softkey	5	
F7 softkey	6	
F8 softkey	7	
F9 softkey	8	
F10 softkey	9	
F11 softkey	10	
F12 softkey	11	

## Status Subsystem Overview

### Status Reporting Structures for the COMMON Registers

#### STATUS QUESTIONABLE ERRORS COMMON

Extension Bit	0
+100 Messages	1
+200 Messages	2
+300 Messages	3
+400 Messages	4
+500 Messages	5
+600 Messages	6
+700 Messages	7
+800 Messages	8
+900 Messages	9
RUI Maskable Messages	14

Bit 1  
STATUS  
QUESTIONABLE  
ERRORS

#### STATUS OPERATION CALL COMMON

Extension Bit	0
Call Control Status Idle	1
Call Control Status Connected	2
Call Control Status Alerting	3
Call Control Status Registering	4
Call Control Status Handover	5
Call Control Status Changing	6
BS Originating	7
Reserved	8
Registering (BS Initiated)	9
Call Control Status Paging	10
Call Control Status Releasing	11
Call Control Status Set Up Request	12
Call Control Status Access Probe	13
Data Summary	14

Bit 1  
STATUS  
OPERATION  
CALL

#### STATUS OPERATION CALL COMMON DATA

Extension Bit	0
Data Connection Status Idle	1
Data Connection Status Attached	2
Data Connection Status Transferring	3
Data Connection Status Data Connected	4
Data Connected Status Off	5
Data Connected Control Status Changing	6
Starting Data Connection	7
PDP Active State	8

Bit 14  
STATUS  
OPERATION  
CALL COMMON

#### STATUS OPERATION NMRREADY COMMON

Extension Bit	0
Audio Analyzer	1
Swept Audio	2
Spectrum Monitor	3

Bit 1  
STATUS  
OPERATION  
NMRREADY

Status Reporting Structure for the GSM Registers

STATUS QUESTIONABLE CALL GSM

Extension Bit	0
Date Link Failure	1
Radio Link Failure	2
Immediate Assignment Failure	3
Channel Assignment Failure	4
Handover Failure	5
No Response to Page	6
Channel Assignment > Frames Identification Failure	7
Channel Mode Not Supported	8
	9

Bit 2  
STATUS  
QUESTIONABLE

STATUS QUESTIONABLE ERRORS GSM

Extension Bit	0
+100 Messages	1
+200 Messages	2
+300 Messages	3
+400 Messages	4
+500 Messages	5
+600 Messages	6
+700 Messages	7
+800 Messages	8
+900 Messages	9

Bit 2  
STATUS  
QUESTIONABLE  
ERRORS

STATUS OPERATION NMRREADY GSM

Extension Bit	0
Tx Power	1
Power vs. Time	2
Phase/Freq Error	3
Output RF Spectrum	4
Analog Audio	5
Decoded Audio	6
Fast Bit Error Rate	7
Bit Error	8
I/Q Tuning	9
Dynamic Power	10

Bit 2  
STATUS  
OPERATION  
NMRREADY

STATUS OPERATION CALL GSM

Extension Bit	0
Idle	1
Connected	2
Alerting	3
BCH Changing	4
TCH Changing	5
Control Status Changing	6
BS Originating	7
BS Disconnecting	8

Bit 2  
STATUS  
OPERATION  
CALL

## Status Subsystem Overview

### Status Reporting Structure For the GPRS Registers

#### STATUS QUESTIONABLE CALL GPRS

Extension Bit	0	Bit 12 STATUS QUESTIONABLE CALL
Attach Failure	1	
Detach Failure	2	
Routing Area Update Failure	3	
Start Data Connection Failure	4	
No Data Received Recently	5	
Downlink Timed Out	6	
Uplink Immediate Assignment Failure	7	
Downlink Immediate Assignment Failure	8	
MS Unexpectedly Ended TBF	9	
End Data Connection Failure	10	

#### STATUS QUESTIONABLE ERRORS GPRS

Extension Bit	0	Bit 12 STATUS QUESTIONABLE ERRORS
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	

#### STATUS OPERATION NMRREADY GPRS

Extension Bit	0	Bit 12 STATUS OPERATION NMRREADY
Transmit Power	1	
Power versus Time	2	
Phase and Frequency Error	3	
Output RF Spectrum	4	
Reserved for future use	5	
Reserved for future use	6	
Reserved for future use	7	
Reserved for future use	8	
Reserved for future use	9	
Reserved for future use	10	
Bit Error Rate	11	
Block Error Rate	12	
EGPRS Transmit Power	13	

Status Reporting Structure for the AMPS Registers

**STATUS QUESTIONABLE ERRORS AMPS**

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 3 STATUS QUESTIONABLE ERRORS
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	
Reserved for future use	10	
Reserved for future use	11	
Reserved for future use	12	
Reserved for future use	13	
MUI Maskable Message	14	

**STATUS OPERATION NMRREADY AMPS**

Extension Bit	0	
Analog Transmit Power	1	
Frequency Stability	2	Bit 3 STATUS OPERATION NMRREADY
Frequency Modulation	3	

## Status Subsystem Overview

### Status Reporting Structure for the DIGital136 Registers

#### STATUS QUESTIONABLE ERRORS DIGITAL 136

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 4 STATUS QUESTIONABLE ERRORS
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	

#### STATUS OPERATION NMRREADY DIGITAL 136

Extension Bit	0	
Digital Transmit Power	1	
Modulation Accuracy	2	
Adjacent Channel Power	3	
Loopback BER	4	Bit 4 STATUS OPERATION NMRREADY
Digital IQ Adjust	5	
Digital Dynamic Power	6	



Status Reporting Structures for the TA136 Registers

STATUS QUESTIONABLE ERRORS TA136

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 5 STATUS QUESTIONABLE ERRORS
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	

Status Reporting Structure for the DIGital95 Registers

STATUS QUESTIONABLE ERRORS DIGITAL 95

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	
+600 Messages	6	Bit 6 STATUS QUESTIONABLE ERRORS
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	
Reserved for future use	10	
Reserved for future use	11	
Reserved for future use	12	
Reserved for future use	13	
MUI Maskable Message	14	

## Status Subsystem Overview

### Status Reporting Structure for the DIGital 2000 Registers

#### STATUS QUESTIONABLE ERRORS DIGITAL 2000

Extension Bit	0	Bit 7 STATUS QUESTIONABLE ERRORS
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	
Reserved for future use	10	
Reserved for future use	11	
Reserved for future use	12	
Reserved for future use	13	
MUI Maskable Message	14	

#### STATUS OPERATION CALL DIGITAL 2000

Extension Bit	0	Bit 7 STATUS OPERATION CALL
F-SCH Synchronized	1	

#### STATUS OPERATION NMRREADY DIGITAL 2000

Extension Bit	0	Bit 7 STATUS OPERATION NMRREADY
Handoff Waveform Quality	1	
Code Channel Time and Phase	2	
TDSO Frame Error Rate	3	

Status Reporting Structure for the CDMA Registers

STATUS QUESTIONABLE ERRORS CDMA

Extension Bit	0
+100 Messages	1
+200 Messages	2
+300 Messages	3
+400 Messages	4
+500 Messages	5
+600 Messages	6
+700 Messages	7
+800 Messages	8
+900 Messages	9
Reserved for future use	10
Reserved for future use	11
Reserved for future use	12
Reserved for future use	13
MUI Maskable Message	14

Bit 8  
STATUS  
QUESTIONABLE  
ERRORS

STATUS QUESTIONABLE CALL CDMA

Extension Bit	0
Traffic channel preamble not received	1
Service Option or Radio Configuration rejected by MS	2
Service connect completion not received	3
Call drop timer timed out	4
Reserved for future use	5
Reserved for future use	6
Reserved for future use	7
Reserved for future use	8
Reserved for future use	9
Reserved for future use	10
Reserved for future use	11
Reserved for future use	12
Reserved for future use	13
MUI Maskable Message	14

Bit 8  
STATUS  
QUESTIONABLE  
CALL

## Status Subsystem Overview

### STATUS OPERATION NMRREADY CDMA

Extension Bit	0	
DA Power	1	
WQuality	2	Bit 8
C Power	3	STATUS
CFERror	4	OPERATION
CAPPower	5	NMRREADY
TROPwer	6	
GPOWER	7	
CTXSpurious	8	

Status Reporting Structure for the TA 2000 Registers

STATUS QUESTIONABLE ERRORS TA 2000

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 9 STATUS QUESTIONABLE ERRORS
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	
Reserved for future use	10	
Reserved for future use	11	
Reserved for future use	12	
Reserved for future use	13	
MUI Maskable Message	14	

STATUS QUESTIONABLE CALL TA 2000

Extension Bit	0	
Release order not received	1	Bit 9 STATUS QUESTIONABLE CALL
Handoff completion not received	2	
Carrier not detected on new channel	3	
MS reject order received	4	
Reserved for future use	5	
Reserved for future use	6	
Reserved for future use	7	
Reserved for future use	8	
Reserved for future use	9	
Reserved for future use	10	
Reserved for future use	11	
Reserved for future use	12	
Reserved for future use	13	
MUI Maskable Message	14	

## Status Subsystem Overview

### STATUS OPERATION NMRREADY TA 2000

Reserved for future use  
Reserved for future use  
Reserved for future use  
Reserved for future use

0

1

2

3

Bit 9  
STATUS  
OPERATION  
NMRREADY

Status Reporting Structure for the FDD Registers

STATUS QUESTIONABLE ERRORS FDD

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 2 STATUS QUESTIONABLE ERRORS
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	
MUI Maskable Error	14	

STATUS OPERATION NMRREADY FDD

Extension Bit	0	
Thermal Power	1	Bit 2 STATUS OPERATION NMRREADY
Adjacent Channel Leakage	2	
Waveform Quality	3	
Channel Power	4	
Bit Error	5	
Spectrum Emissions Mask	6	
Occupied Bandwidth	7	
Code Domain Power	8	

## Status Subsystem Overview

### Status Reporting Structure for the WCDMA Registers

#### STATUS QUESTIONABLE ERRORS FDD

Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 2
+600 Messages	6	STATUS
+700 Messages	7	QUESTIONABLE
+800 Messages	8	ERRORS
+900 Messages	9	
MUI Maskable Error	14	

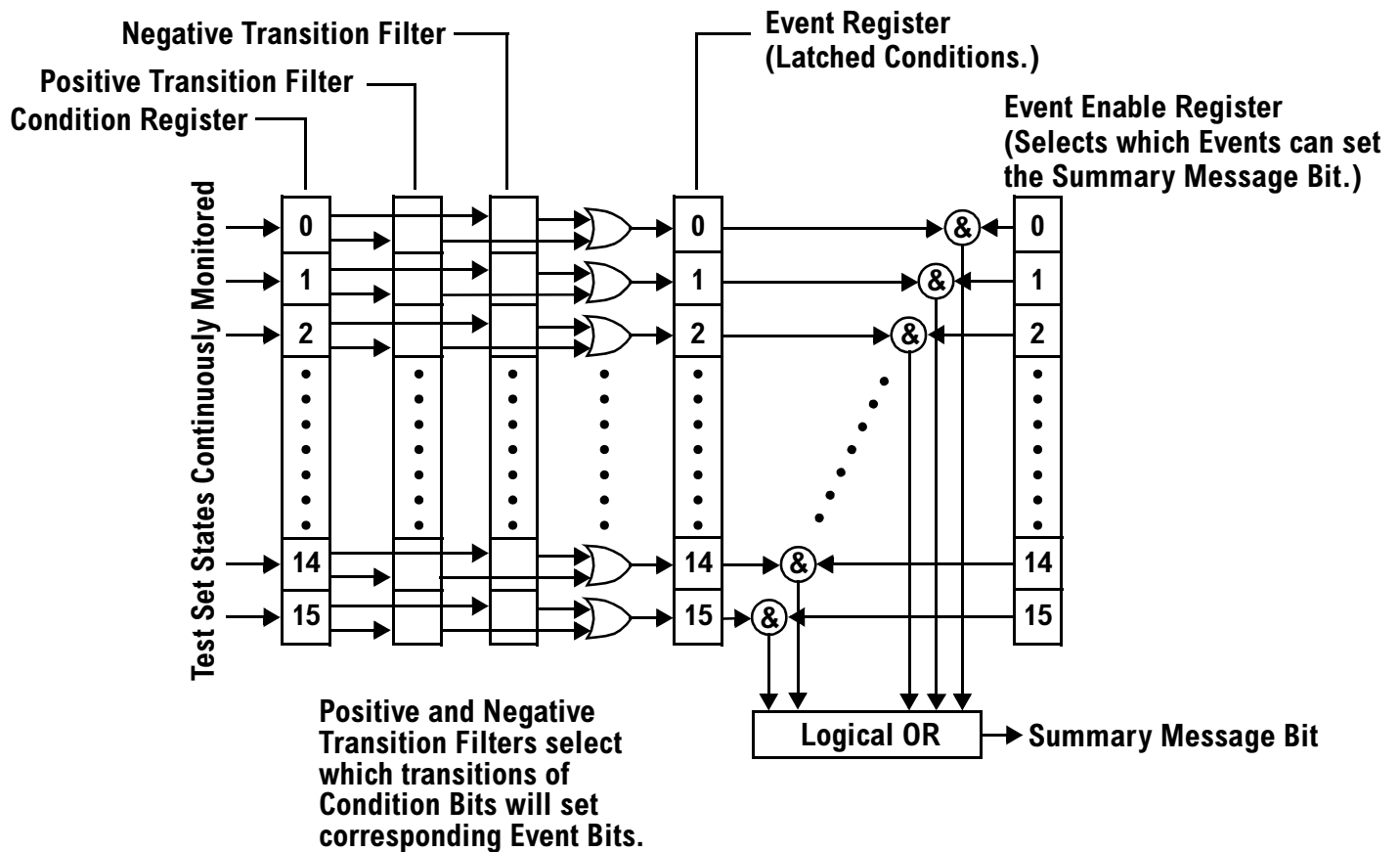
#### STATUS OPERATION NMRREADY WCDMA

No bits are defined at this time	0	
	1	Bit 2
	2	STATUS
	3	OPERATION
	4	NMRREADY
	5	
	6	



### Status Data Structure - Register Model

The generalized status register model consists of a Condition Register, Transition Filters, an Event Register, an Enable Register, and a Summary Message Bit.



### Condition Register

A condition is a test set state that is either TRUE or FALSE (a GPIB command error has occurred or a GPIB command error has not occurred). Each bit in a Condition Register is assigned to a particular test set state. A Condition Register continuously monitors the hardware and firmware states assigned to it. There is no latching or buffering of any bits in a Condition Register; it is updated in real time. Condition Registers are read-only. Condition Registers in the test set are 16 bits long and may contain unused bits. All unused bits return a zero value when read.

**Transition Filters** In the test set, the Transition Filters are implemented as two registers: a 16-bit positive transition (PTR) register and a 16-bit negative transition (NTR) register.

For each bit in the Condition Register, a Transition Filter bit determines the state transitions which will set a corresponding bit in the Event Register. Transition Filters may be set to pass positive transitions (PTR), negative transitions (NTR) or either (PTR or NTR). A positive transition refers to a condition bit which has changed from 0 to 1. A negative transition refers to a condition bit which has changed from 1 to 0.

A positive transition of a bit in the Condition register will be latched in the Event Register if the corresponding bit in the positive transition filter is set to 1. A positive transition of a bit in the Condition register will not be

## Status Subsystem Overview

latched in the Event Register if the corresponding bit in the positive transition filter is set to 0.

A negative transition of a bit in the Condition register will be latched in the Event Register if the corresponding bit in the negative transition filter is set to 1. A negative transition of a bit in the Condition register will not be latched in the Event Register if the corresponding bit in the negative transition filter is set to 0. Either transition (PTR or NTR) of a bit in the Condition Register will be latched in the Event Register if the corresponding bit in both transition filters is set to 1. No transitions (PTR or NTR) of a bit in the Condition Register will be latched in the Event Register if the corresponding bit in both transition filters is set to 0.

Transition Filters are read-write.

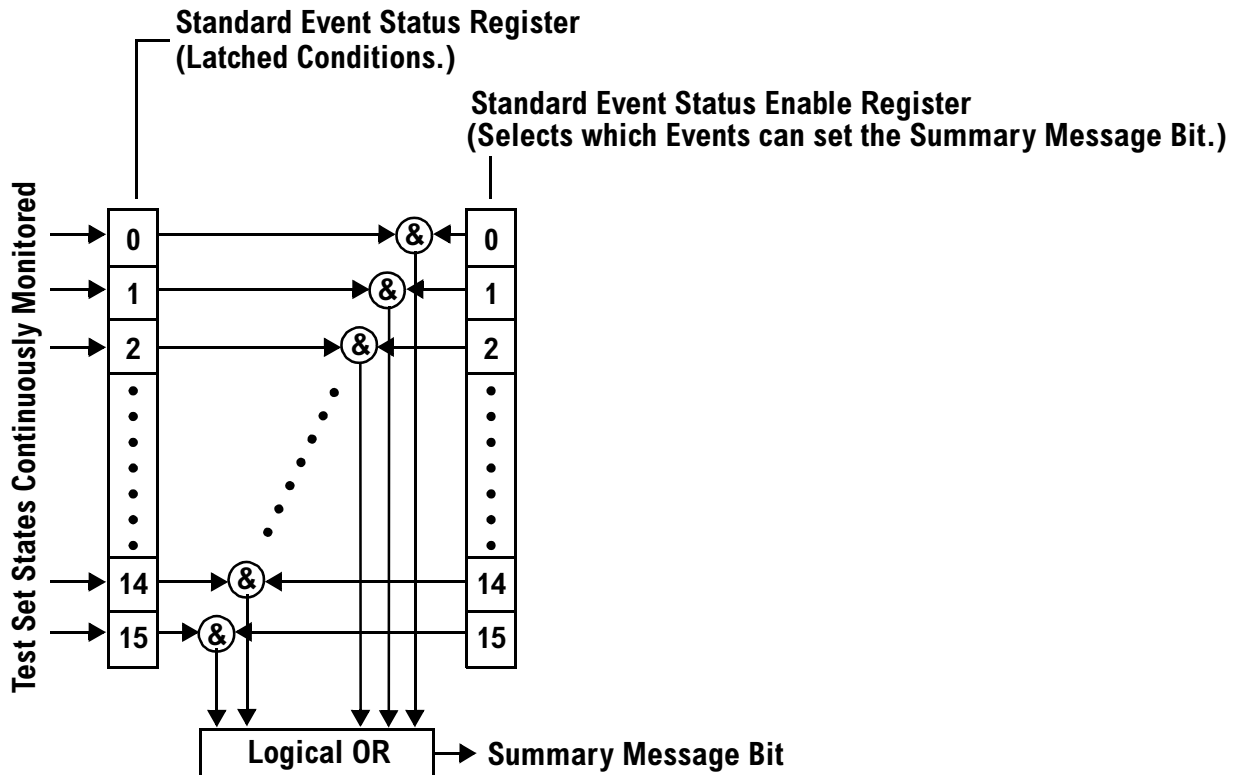
Transition Filters are unaffected by a \*CLS (clear status) command.

Transitions Filters are set to pass positive transitions (all 16 bits of the PTR register are set to 1 and all 16 bits of the NTR register are set to 0) at power on or after receiving the \*RST (reset) command.

**Event Register** The Event Register captures bit-state transitions in the Condition Register as defined by the Transition Filters. Each bit in the Event Register corresponds to a bit in the Condition Register. Bits in the Event Register are latched, and, once set, they remain set until cleared by a query of the Event Register or a \*CLS (clear status) command. This guarantees that the application can't miss a bit-state transition in the Condition Register. There is no buffering; so while an event bit is set, subsequent transitions in the Condition Register corresponding to that bit are ignored. Event Registers are read-only. Event Registers in the test set are 16 bits long and may contain unused bits. All unused bits return a zero value when read.

**Event Enable Register** The Event Enable Register defines which bits in the Event Register will be used to generate the Summary Message. Each bit in the Enable Register has a corresponding bit in the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By using the enable bits the application program can direct the test set to set the Summary Message to the 1 or TRUE state for a single event or an inclusive OR of any group of events. Enable Registers are read-write. Enable Registers in the test set are 16 bits long and may contain unused bits which correspond to unused bits in the associated Event Register. All unused bits return a zero value when read and are ignored when written to. Enable Registers are unaffected by a \*CLS (clear status) command or queries.

**Standard Event Status Register Model**



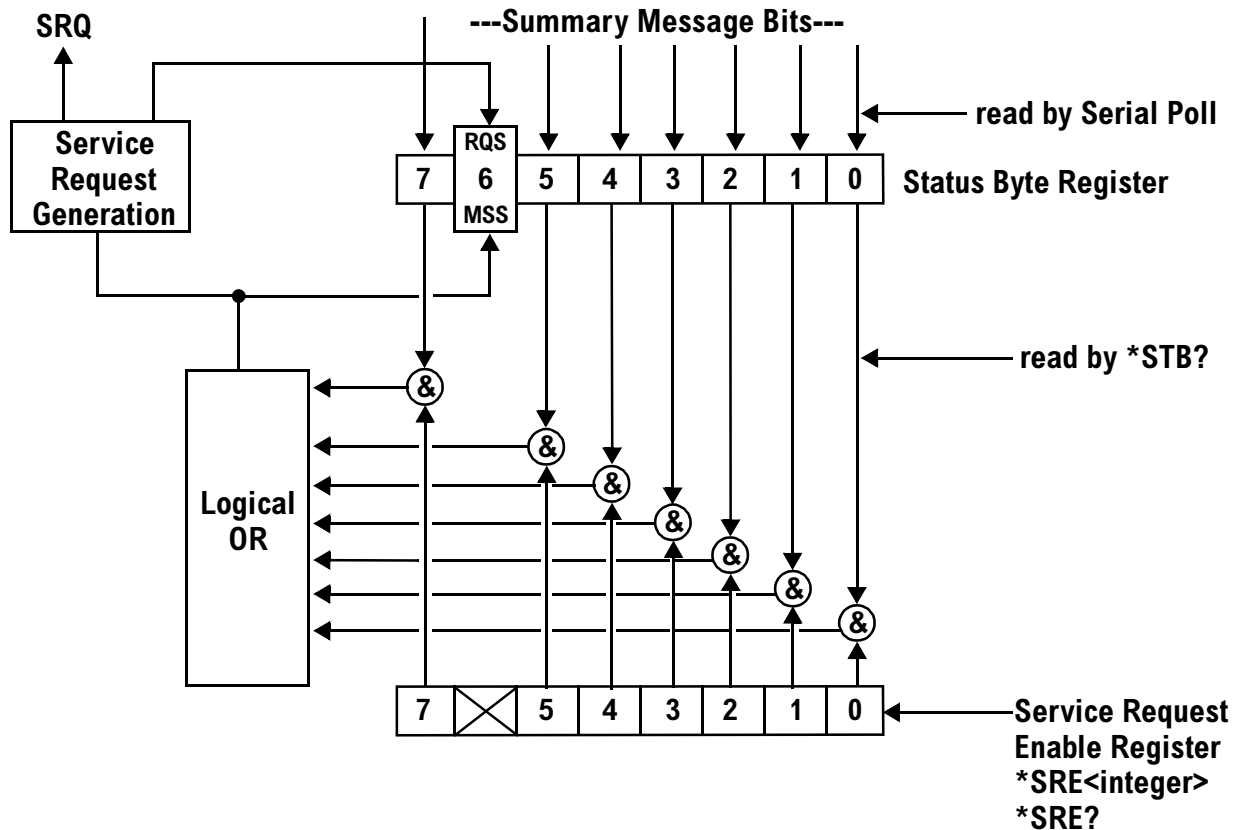
**Summary Message Bit** The Summary Message is a single-bit message which indicates whether or not one or more of the enabled events have occurred since the last reading or clearing of the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By use of the enable bits, the application program can direct the test set to set the Summary Message to the 1, or TRUE, state for a single event or an inclusive OR of any group of events.

The Summary Message is TRUE, logic 1, if the register contains some information and an enabled event in the Event Register is set TRUE.

The Summary Message is FALSE, logic 0, if the queue is empty and no enabled events are TRUE. Registers can be cleared by reading all the information from the queue. Registers can also be cleared using the \*CLS (clear status) command.

## Status Subsystem Overview

### Service Request Enabling Register Model



**Status Byte Register** The Status Byte Register is an 8 bit register that provides single bit summary messages, each summary message summarizes and overlaying status data structure. Summary messages always track the current status of the associated status data structure. Service request enabling determines if one or more of the summary messages will generate a message. Device status reporting is defined in IEEE 488.2-1992, 11.1.

The Status Byte Register contains the STB and RQS (or MSS) messages from the test set. The Status Byte Register can be read with either a serial poll or the \*STB? common query. The value for bit 6 is dependent on which method used.

When reading with a serial poll the status byte and the RQS message are returned as a single data byte. The RQS message indicates if the SRQ is TRUE. The Status Byte Register is not affected by a serial poll, the RQS is set to FALSE when polled.

The \*STB? query allows you to read the status byte and the MSS. The response represents the sum of the binary weighted values of the Status Byte Register from bit 0-5 and 7.

The Master Summary Status (MSS) message from bit 6 indicates when there is at least one reason for requesting service.

The Message Available (MAV) summary message from bit 4 is TRUE when there is a message in the output queue.

The Status Byte Register is cleared with the \*CLS common command. The output queue and the MAV are not affected by the \*CLS command.

**Service Request Enable Register** The Service Request Enable Register is an 8 bit register that enables corresponding summary messages in the Status Byte Register. Enabling the service request with the \*SRE command allows you to choose which bits in the Status Byte Register will trigger a service request.

The Service Request Enable Register is read with the \*SRE? query. The returned value is the sum of the binary weighted values of the Service Request Enable Register, with a range of 0 through 63 or 128 through 191.

The value of the unused bit 6 will always be zero.

**System Synchronization Bit** Bit 12 of the status operation condition register is “pulsed” when the SYSTem:SYNChronized command is sent. This allows the status system to indicate that:

- the input buffer is synchronized to the point where this command is parsed
- all prior sequential commands are completed
- all prior overlapped commands have started

### Related Topics

[“STATus Subsystem” on page 542](#)

## Dealing With Semicolon Separated Response Data Lists

### Description

In accordance with IEEE 488.2-1992 Section 8.4.1 the test set uses the semicolon (;) as the response message unit separator (RMUS). The RMUS separates sequential response message unit elements from one another when multiple response message unit elements are sent in a response message. This condition would occur when combining multiple queries into a single GPIB transaction.

### Query Response Data Types Used By Test Set

The test set can return the following data types in response to queries:

- character data (char): ASCII characters A-Z (65-90 decimal), underscore (95 decimal), digits (48-57 decimal).
- string data: ASCII characters enclosed in quotes (for example, "5551212" or "PGSM")
- numeric response data (nr1): numeric data in the form +/- dddddddd
- numeric response data (nr3): numeric data in the form +/- ddd.ddd E +/- dddd

### Semicolon Separated Response Data Lists Containing Mixed Data Types

Problems can occur when trying to enter semicolon separated response data lists containing mixed data types.

For example: If the following command string is sent to the test set, the test set will respond by constructing a response message which contains multiple response message unit elements (that is, one response message unit element for each query item contained in the command string). Some response message unit elements are string data type, some are character data type and some are nr3 data type.

```
OUTPUT 714;"CALL:MS:REP:IMSI?;PCL?;REV?;SBAN?;ONUM?;MCC?;MNC?;LAC?"
```

An example response message generated by the test set in response to the above OUTPUT statement would be:

```
"001012345678901";+4.00000000E+000;PHAS1;"PGSM";"5551212";9.91E37;9.91E37;9.91E37
```

Constructing the following data entry statement will account for multiple responses from the query:

```
ENTER 714;Imsi$,Pcl,Rev$,Sban$,Onum$,Mcc,Mnc,Lac
```

In the Basic programming environment the above ENTER statement will fail with an 'Insufficient data for ENTER' error. Some programming languages, Basic for example, cannot use the semicolon character as a data item terminator for string variables. In this example Basic will attempt to enter data into Imsi\$ until it sees a LF (line feed) data item terminator. The test set does not send the LF until all the data has been sent.

Consequently when Basic sees the LF it terminates entry of data into Imsi\$ and starts to look for data to enter into Pcl. Since the test set is no longer sending any data the error message 'Insufficient data for ENTER' is generated.

## Dealing With Semicolon Separated Response Data Lists

One possible workaround is to enter all the data into a single string variable, replace all semicolons with line feeds and then enter the data from the string into the individual data items. For example:

```
DIM Response$[500]
!
!
OUTPUT 714;"CALL:MS:REP:IMSI?;PCL?;REV?;SBAN?;ONUM?;MCC?;MNC?;LAC?"
ENTER 714;Response$
Semicolon=POS(Response$,";")
WHILE Semicolon
Response$[Semicolon,Semicolon]=CHR$(10)
Semicolon=POS(Response$,";")
END WHILE
ENTER Response$;Imsi$,Pcl,Rev$,Sban$,Onum$,Mcc,Mnc,La
```

### Semicolon Separated Response Data Lists Containing Only Numeric Data Types

Semicolon separated response data lists containing only numeric data types do not present the types of problem associated with semicolon separated response data lists containing mixed data types. The number building routines in most languages will use any non-numeric character (that is, anything other than +/- 0123456789 E .) as the data item terminator. Consequently when the number building routines encounter the semicolon the data item is terminated. The following example illustrates this:

```
OUTPUT 714;"FETCH:TXP:INT?;POW:MIN?;MAX?"
ENTER 714;Integrity,Min_power,Max_power
```

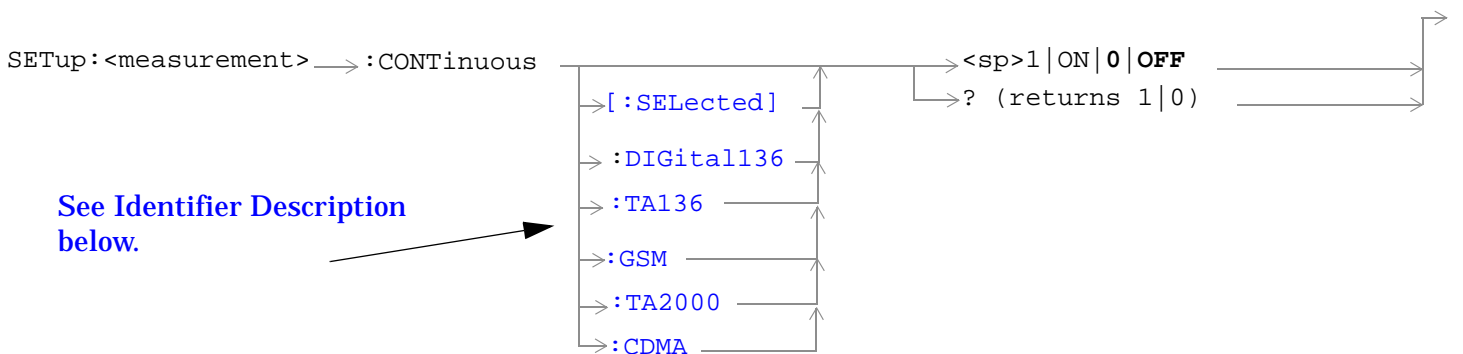
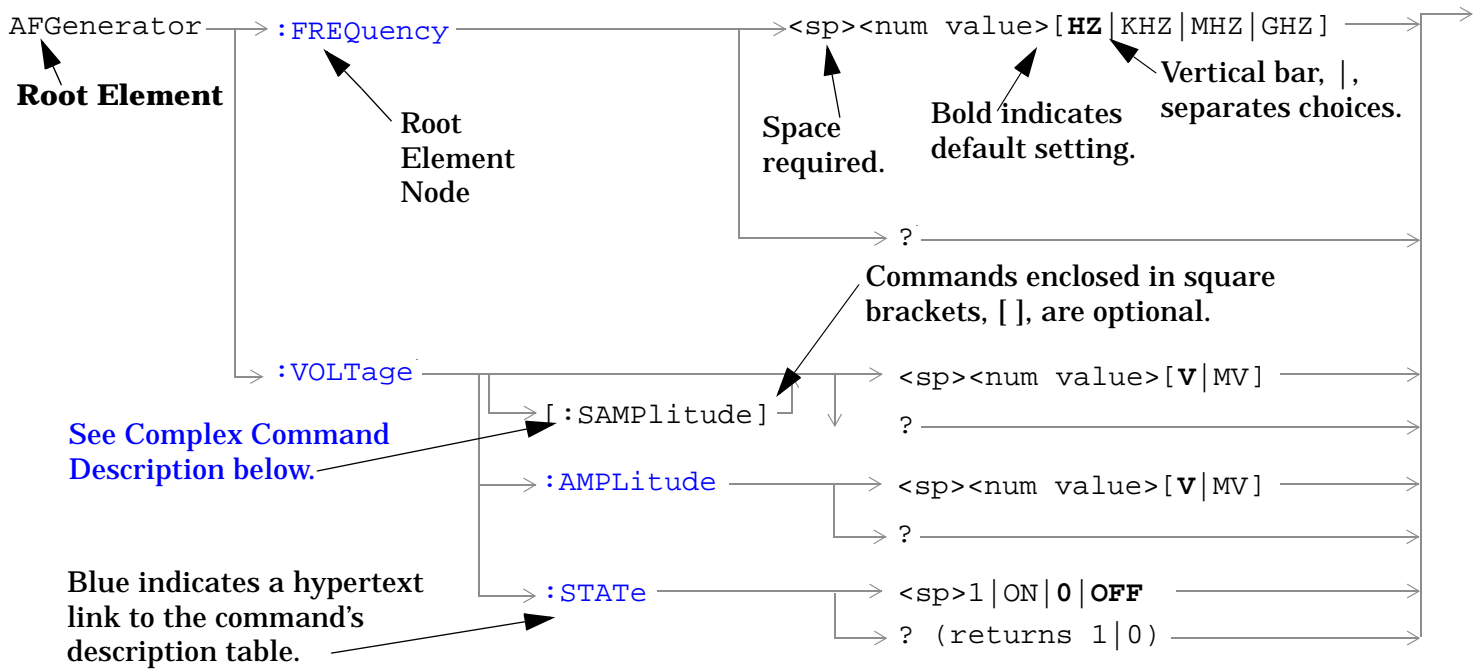
## Dealing With Semicolon Separated Response Data Lists



# GPIB Command Syntax

## Diagram Conventions

### Description



### Diagram Description

Statement elements are connected by lines. Each line can be followed in only one direction, as indicated by the arrow at the end of the line. Any combination of statement elements that can be generated by starting at the **Root Element** and following the line the **direction of the arrow** is syntactically correct. The drawings show the proper use of spaces. Where spaces are required they are indicated by **<sp>**, otherwise no spaces are allowed between statement elements.

## Complex Command Description

A complex command sets the state of the parameter to ON, and is used to set a value for that parameter. These parameters; amplitude, frequency, gain, number, time, and value can be used as a complex command. Refer to the specific command for the parameter that applies.

## Identifier Description

Some test applications are able to test more than one radio format. There may be commands/queries that are shared by more than one radio format in the some of these test applications. Identifiers are used to specify the radio format for the command/query. The command/query is sent to the active radio format if you don't use an identifier. An identifier must be used when sending commands to the inactive radio format.

## Developing Code

It is recommended that you set the Test Set's operating environment to debug. To set the Test Set debug mode to "ON" use the following syntax:

```
SYSTem:COMMunicate:GPIB:DEBug ON
```

## Units-of-Measure

Amplitude (linear)	V
Frequency	Hz
Power (logarithmic)	dBm
Time	s

---

## ABORt Subsystem

### Description

The ABORt command causes a measurement cycle in progress to stop. If the measurement is not being continuously armed (trigger arm set to single) , the measurement will remain in the idle state after this event. If the measurement is being continuously armed (trigger arm set to continuous), a new measurement cycle will begin after ABORt. If an ABORt command is issued from any measurement state other than measuring, the command is ignored.

### Other Commands that Execute an ABORt Action

INITiate:<meas> will execute an ABORt:<meas> as part of the INITiate:<meas> command.

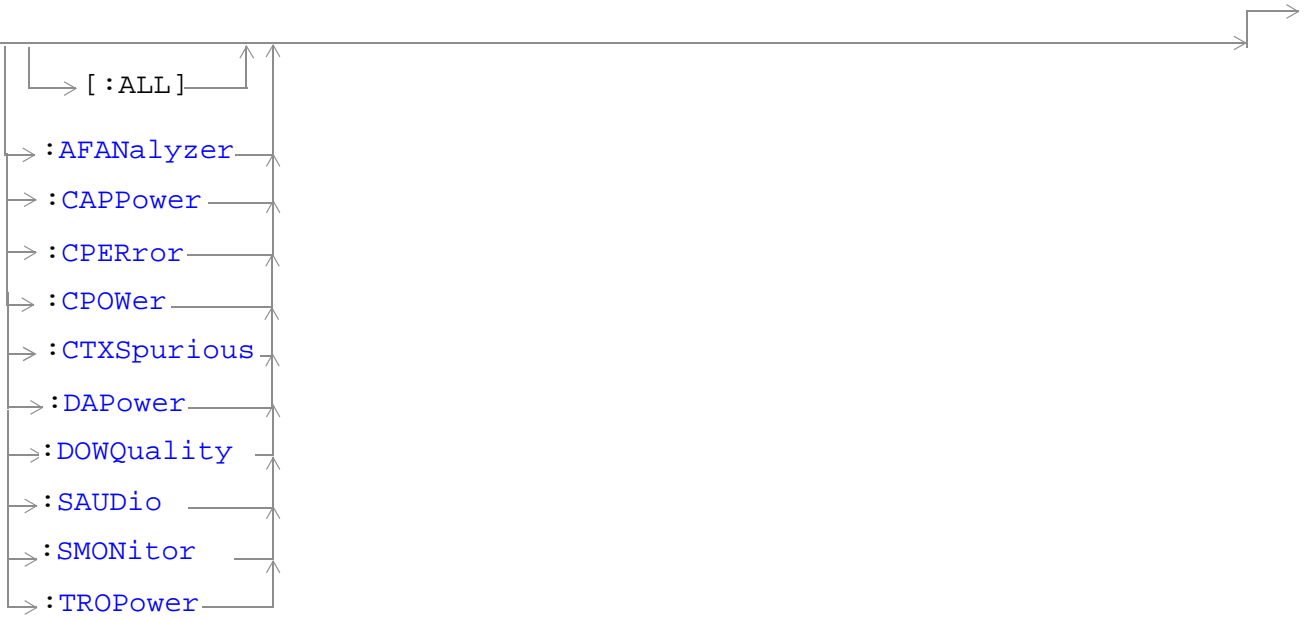
READ:<meas>? will execute an ABORt:<meas> action that aborts just one trigger sequence and then combines the INITiate and FETCh? commands.

### Syntax Diagram and Command Descriptions

“ABORt”

# ABORt

ABORt



“Diagram Conventions” on page 326

## ABORt

### ABORt[:ALL]

Function	Stops all measurements that are active. If the trigger arm is set to single, the measurements will go to the idle state. If the trigger arm is set to continuous, the measurements will re-arm and initiate again. See <a href="#">“Measurement States” on page 252.</a>
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> OUTPUT 714;"ABORt" ! Aborts all active measurements in progress.	

### ABORt:<measurement mnemonic>

Function	This command stops the specified measurement if it is active: <ul style="list-style-type: none"><li>• AFANalyzer - Audio Frequency Analyzer measurement</li><li>• CAPPower - Access Probe Power measurement</li><li>• CPERror - Packet Error Rate measurement</li><li>• CPOWer - Channel Power measurement</li><li>• CTXSpurious - TX Spurious Emissions measurement</li><li>• DAPower - Digital Average Power measurement</li><li>• DOWQuality - Waveform Quality measurement</li><li>• SAUDio - Swept Audio measurement</li><li>• SMONitor - Spectrum Monitor</li><li>• TROPower - Time Response of Open Loop Power Control measurement</li></ul> If the trigger arm is set to single, the measurements will go to the idle state. If the trigger arm is set to continuous the measurements will re-arm and initiate again. See <a href="#">“Measurement States” on page 252.</a>
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> OUTPUT 714;"ABORt:DOWQuality" ! Aborts the waveform quality measurement	

## AFGenerator Subsystem

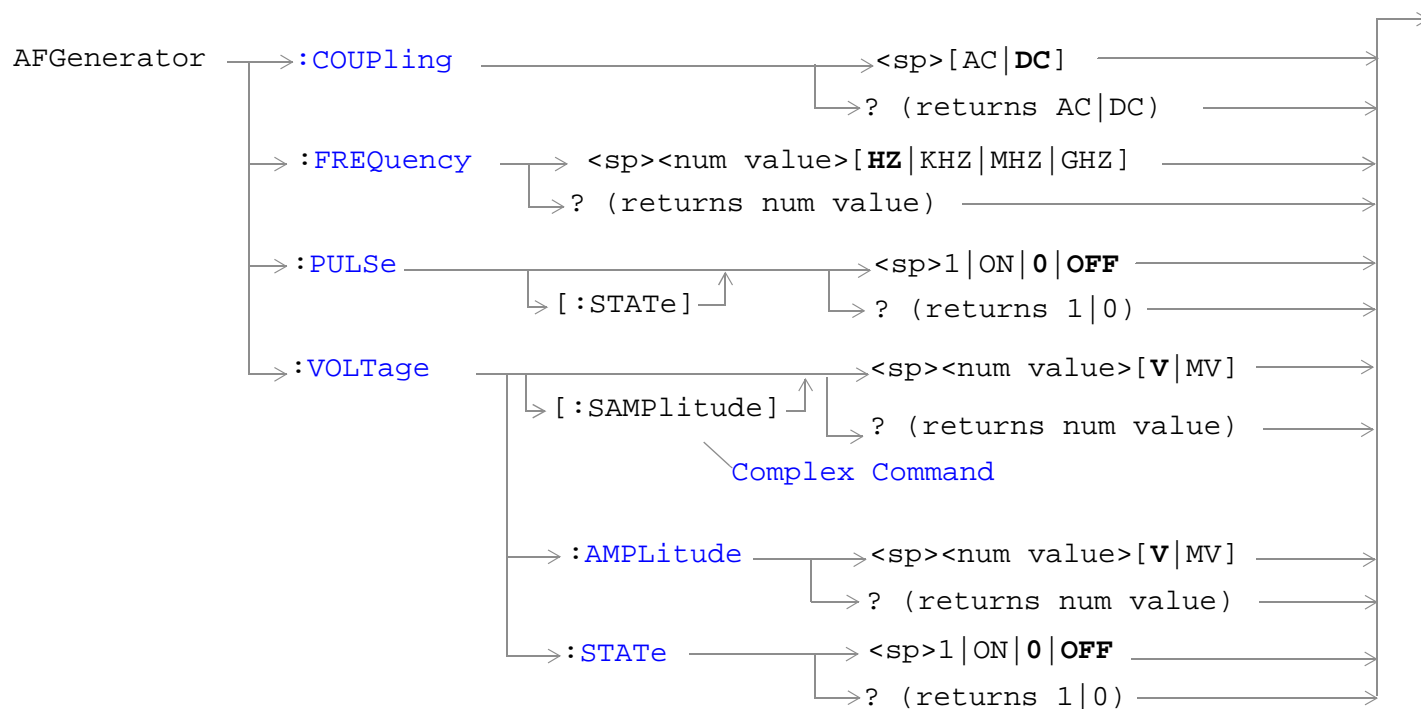
### Description

The AFGenerator subsystem is used to control the audio source that is available at the Audio Output connector.

### Syntax Diagram and Command Descriptions

[“AFGenerator” on page 332](#)

## AFGenerator



[“Diagram Conventions” on page 326](#)



**AFGenerator:COUPling**

Function	Sets the output of the audio generator to be ac or dc coupled to the front-panel AUDIO OUT port.
Setting	Range: AC or DC
Query	Range: AC   DC
*RST setting	DC
<b>Programming Example</b>	
OUTPUT 714;"AFGENERATOR:COUPling AC" !Sets the audio generator coupling to AC.	

**AFGenerator:FREQuency**

Function	Sets/queries the frequency of the audio generator. The units (HZ   KHZ   MHZ   GHZ) are optional. If no units are specified, then units default to HZ.
Setting	Range: 1 Hz to 20 kHz Resolution:0 .1 HZ
Query	Range: 1 Hz to 20 kHz Resolution: 0.1 Hz
*RST setting	1 kHz
<b>Programming Example</b>	
OUTPUT 714;"AFGENERATOR:FREQUENCY 1000" !Sets the audio generator frequency to 1000 Hz.	

**AFGenerator:PULSe[:STAtE]**

Function	Sets/queries the audio generator pulse state.  The pulse state must be on when the test set's audio generator is used for audio stimulation during a decoded audio measurement.  When the state is on, the audio signal from the test set is pulsed at a 10 Hz rate with a 50% duty cycle.
Setting	Range: 0   OFF   1   ON
Query	Range: 0   1
*RST setting	0 (off)
<b>Programming Example</b>	
OUTPUT 714;"AFGENERATOR:PULSE ON" !Sets the audio generator pulse to ON.	

## AFGenerator

### AFGenerator:VOLTage[:SAMPlitude]

Function	Sets /queries the amplitude of the audio generator in volts and turns the state to on. The units (V   mV) are optional. If no units are specified, then units default to V.
Setting	Range: 0 to 9 V pk. Resolution: <ul style="list-style-type: none"><li>• 0.5 mV pk. &lt;= 1 V pk. output</li><li>• 5 mV pk. &gt; 1 V pk. output</li></ul>
Query	Range: 0 to 9 V pk. Resolution: <ul style="list-style-type: none"><li>• 0.5 mV pk. &lt;= 1 V pk. output</li><li>• 5 mV pk. &gt; 1 V pk. output</li></ul>
*RST setting	0 V
<b>Programming Example</b> OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output !voltage to 2.1 volts.	

### AFGenerator:VOLTage:AMPLitude

Function	Sets/queries the amplitude for the audio generator when the audio generator state is on. The units (V   mV) are optional. If no units are specified, then units default to V.
Setting	Range: 0 to 9 V pk. Resolution: <ul style="list-style-type: none"><li>• 0.5 mV pk. &lt;= 1 V pk. output</li><li>• 5 mV pk. &gt; 1 V pk. output</li></ul>
Query	Range: 0 to 9 V pk. Resolution: <ul style="list-style-type: none"><li>• 0.5 mV pk. &lt;= 1 V pk. output</li><li>• 5 mV pk. &gt; 1 V pk. output</li></ul>
*RST setting	0 V
<b>Programming Example</b> OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output !voltage to 1.414 volts peak.	

**AFGenerator:VOLTage:STATe**

Function	Sets/queries the audio generator state
Setting	0   OFF   1   ON
Query	0   1
*RST setting	0 (off)
<b>Programming Example</b>	
OUTPUT 714;"AFGENERATOR:VOLTAGE:STATE ON" !Set the audio generator state to ON.	

## **CALibration Subsystem**

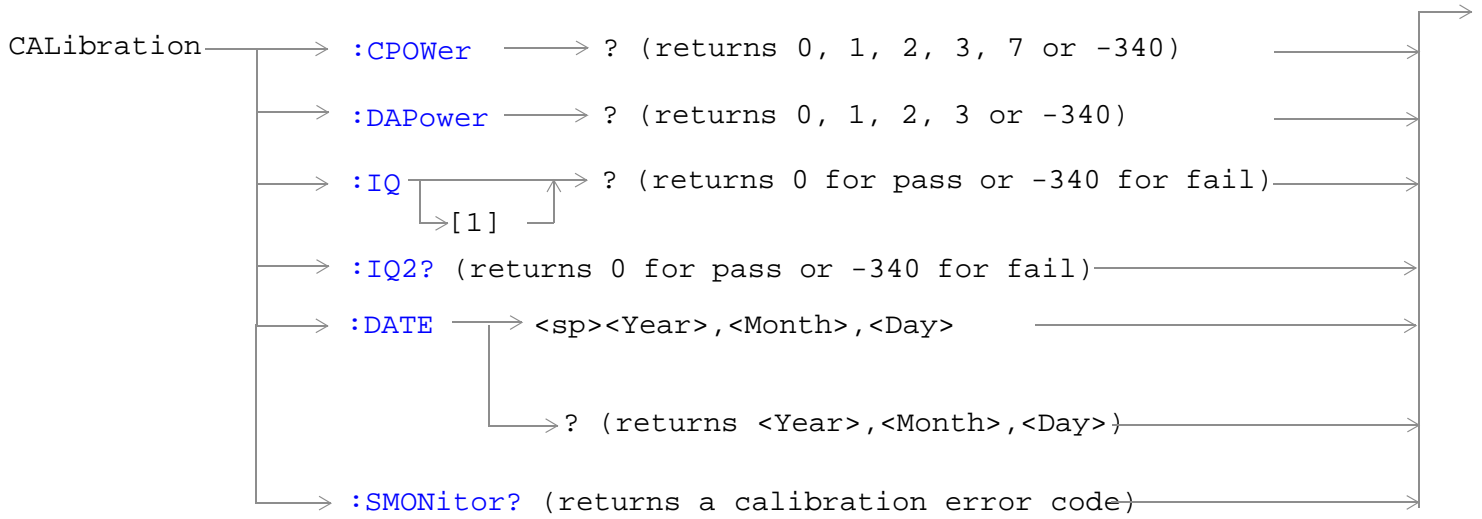
### **Calibration Strategy**

Various calibration routines must be run to ensure measurement accuracy. The type of calibration and appropriate intervals for performing calibrations vary with each application. See [“Calibrating the Test Set” on page 98](#) for more information.

### **Syntax Diagram and Command Descriptions**

[“CALibration” on page 337](#)

## CALibration



[“Diagram Conventions” on page 326](#)

## CALibration

### CALibration:CPOWer?

Function	Initiates IF level calibration used by access probe power and channel power measurements. No other GP-IB commands are processed until this calibration has completed.
Query	Range <ul style="list-style-type: none"><li>• 0 = Calibration passed</li><li>• 1 = Channel power calibration failed due to temperature drift. Wait for temperature to stabilize.</li><li>• 2 = Channel power calibration failed due to oven temperature out of range.</li><li>• 3 = Channel power calibration failed due to loopback switch problem.</li><li>• 7 = Channel power calibration failed due to source level problem.</li><li>• -340 = Calibration failed</li></ul>
<b>Programming Example</b> <pre>OUTPUT 714;"CALibration:CPOWer?" !Initiates the IF level calibration process and queries the pass/fail result.</pre>	

### CALibration:DAPower?

Function	Initiates digital average power measurement calibration. RF power must not be applied to the test set's front panel RF IN/OUT connector during calibration. Digital average power measurement calibration will take about 10 minutes. Power must be cycled when digital average power measurement calibration has completed. No other GP-IB commands are processed until this calibration has completed.
Query	Range <ul style="list-style-type: none"><li>• 0 = Calibration passed</li><li>• 1 = Digital average power calibration failed due to temperature drift. Wait for temperature to stabilize.</li><li>• 2 = Digital average power calibration failed due to oven temperature out of range.</li><li>• 3 = Digital average power calibration failed due to loopback switch problem.</li><li>• -340 = Calibration failed</li></ul>
<b>Programming Example</b> <pre>OUTPUT 714;"CALibration:DAPower?" !Initiates the digital average power measurement calibration process and queries the pass/fail result.</pre>	

**CALibration:IQ[:1]?**

Function	Sets/queries the calibration of the IQ modulator for RF generator 1. It takes some time to complete calibration and can't be aborted except by cycling the power switch. <ul style="list-style-type: none"> <li>• Calibrates the IQ modulator for RF generator 1.</li> <li>• Returns a value indicating success or failure of calibration.</li> </ul>
Query	Range <ul style="list-style-type: none"> <li>• 0 = Pass</li> <li>• -340 = Fail</li> </ul>
<b>Programming Example</b> OUTPUT 714;"CALibration:IQ1?" !Performs a calibration of the IQ modulator for RF generator 1 and returns 0 or -340	

---

**NOTE** When the the calibration is done the test set display will display:  
IQ Calibration completed successfully for modulator 1.

---

**CALibration:IQ2?**

Function	Sets/queries the calibration of the IQ modulator for RF generator 2. It takes some time to complete calibration and can't be aborted except by cycling the power switch. <ul style="list-style-type: none"> <li>• Calibrates the IQ modulator for RF generator 2.</li> <li>• Returns a value indicating success or failure of calibration.</li> </ul>
Query	Range <ul style="list-style-type: none"> <li>• 0 = Pass</li> <li>• -340 = Fail</li> </ul>
<b>Programming Example</b> OUTPUT 714;"CALibration:IQ2?" !Performs a calibration of the IQ modulator for RF generator 2 and returns 0 or -340	

---

**NOTE** When the the calibration is done the test set display will display:  
IQ Calibration completed successfully for modulator 2.

---

**CALibration:DATE**

Function	Sets/queries the date of the last system calibration done to the test set; not the IQ calibration date. Returns a comma separated list YYYY,MM,DD in that order.
----------	--

## CALibration

Setting	Sets the system calibration date. Range <ul style="list-style-type: none"><li>• Year = 0000 to 9999</li><li>• Month = 01 to 12</li><li>• Day = 01 to 31</li></ul>
Query	Returns the date when system calibration was performed. Range <ul style="list-style-type: none"><li>• Year = 0000 to 9999</li><li>• Month = 1 to 12</li><li>• Day = 1 to 31</li></ul>
<b>Programming Example</b> <pre>OUTPUT 714;"CALibration:DATE 1999,01,04" !Sets the date of the last system calibration year, month and day.</pre>	



## CALibration:SMONitor

Function	<p>Starts the spectrum monitor calibration routine.</p> <p>It is important that no power is applied to the RF IN/OUT connector during calibration.</p>
Query	<p>Range: 0 through 10, and -340</p> <ul style="list-style-type: none"> <li>• 0 (Spectrum Monitor calibration completed successfully)</li> <li>• 1 (Spectrum Monitor calibration failed due to temperature drift. Wait for temperature to stabilize)</li> <li>• 2 (Spectrum Monitor calibration failed due to oven out of range)</li> <li>• 3 (Spectrum Monitor calibration failed due to loopback switch problem)</li> <li>• 4 (Spectrum Monitor calibration failed due to under range condition)</li> <li>• 5 (Spectrum Monitor calibration failed due to over range condition)</li> <li>• 6 (Spectrum Monitor calibration failed due to correlation problem)</li> <li>• 7 (Spectrum Monitor calibration failed due to source level problem)</li> <li>• 8 (Spectrum Monitor calibration failed due to IF filter coefficient problem)</li> <li>• 9 (Spectrum Monitor calibration failed due to IF frequency response problem)</li> <li>• 10 (Spectrum Monitor calibration failed due to waveform quality problem)</li> <li>• -340 (Spectrum Monitor calibration failed)</li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALibration:SMONitor?" !Queries the spectrum monitor calibration.</pre>	

---

## CALCulate Subsystem

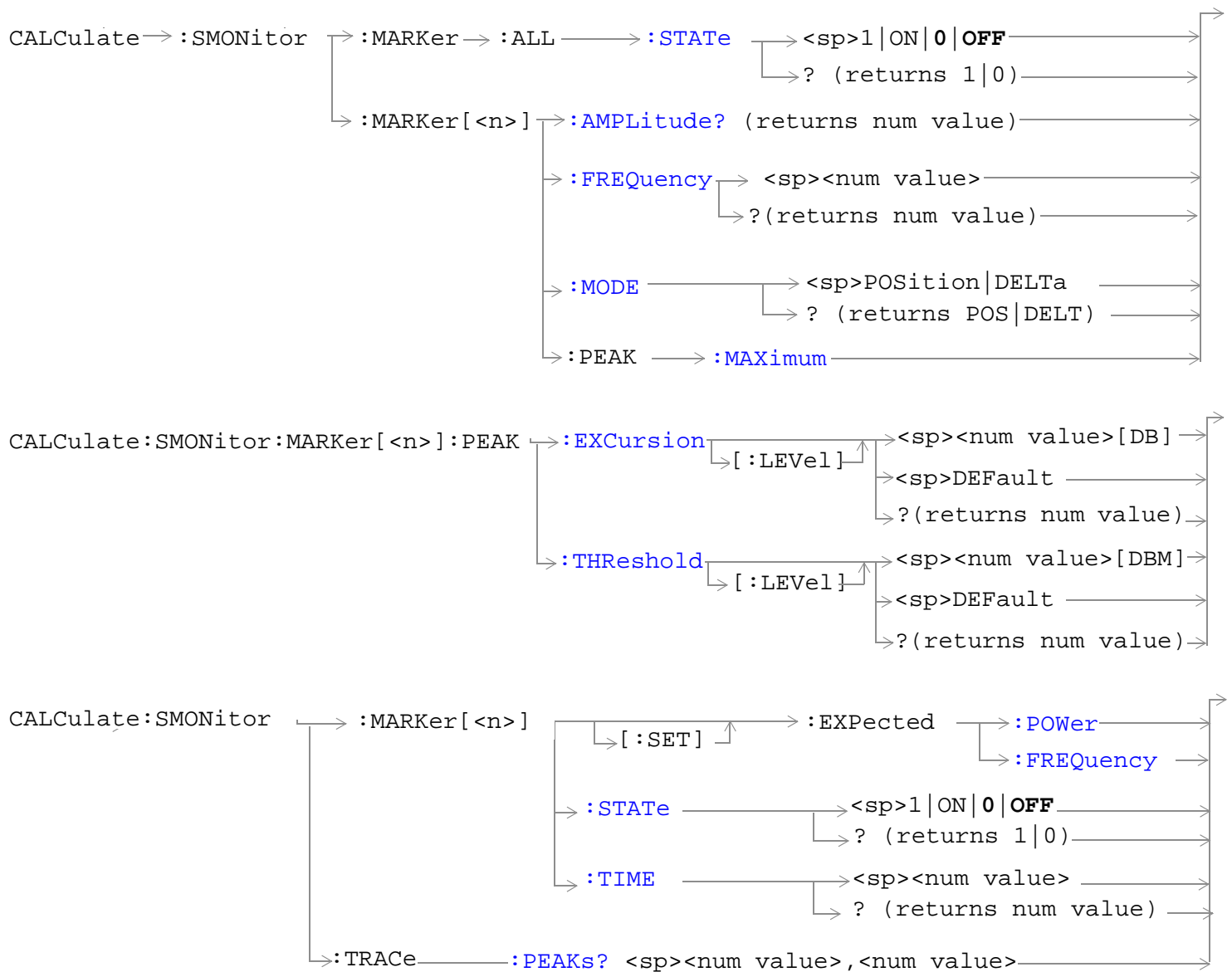
### Description

The CALCulate subsystem is used to perform data processing on the measurement results. For example in the Spectrum Monitor the CALCulate subsystem uses the markers to find the peaks and read back their values.

### Syntax Diagram and Command Descriptions

“CALCulate:SMONitor”

## CALCulate:SMONitor



“Diagram Conventions” on page 326

## CALCulate:SMONitor

### CALCulate:SMONitor:MARKer:ALL:STATe

Function	This command determines whether all markers are turned on or turned off.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   ON   0   OFF
*RST Setting	OFF
<b>Programming Example</b> OUTPUT 714;"CALCulate:SMONitor:MARKer:ALL:STATe 1" !Turns on all markers.	

### CALCulate:SMONitor:MARKer[<n>]:AMPLitude?

Function	This query returns the amplitude for marker <n>, where <n> is a number 1 through 3. When no marker number is specified, marker 1 is used.  If you are using delta marker mode, the result is the delta marker amplitude result. (See " <a href="#">CALCulate:SMONitor:MARKer[&lt;n&gt;]:MODE</a> " .)
Query	Range <ul style="list-style-type: none"><li>• Position Mode: -180 dBm to +37 dBm</li><li>• Delta Mode: -200 dB to +200 dB</li></ul> Resolution: 0.01 dB
<b>Programming Example</b> OUTPUT 714;"CALCulate:SMONitor:MARKer2:AMPLitude?" !Returns the amplitude of marker 2.	

## CALCulate:SMONitor:MARKer[&lt;n&gt;]:FREQuency

Function	<p>This command sets/queries the frequency of marker &lt;n&gt;. where &lt;n&gt; is a number 1 through 3. When no marker number is specified, marker 1 is used.</p> <p>If you are using delta marker mode, this command sets/queries the offset frequency of the delta marker. (See "CALCulate:SMONitor:MARKer[&lt;n&gt;]:MODE" .)</p>
Query	<p>Range:</p> <ul style="list-style-type: none"> <li> <b>Position Mode</b>            Range: This is dependent on the settings of the center frequency and the frequency span. The markers frequency range is therefore equal to the center frequency +/- half the frequency span.            Resolution: 0.001 MHz         </li> <li> <b>Delta Mode:</b>            Range: The range is dependent on the center frequency, the frequency span and the position of the reference marker.            Resolution: 0.001 MHz         </li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALCulate:SMONitor:MARKer:FREQuency?" !Queries the frequency of marker 1.</pre>	

## CALCulate:SMONitor:MARKer[&lt;n&gt;]:MODE

Function	<p>This command sets the mode of the marker.</p> <p>Position mode activates a single frequency marker at the center frequency.</p> <p>Delta mode freezes the marker at its current location and uses it as a reference marker. A second marker is created at the position of the reference marker and is used a delta marker.</p>
Setting	Range: POSition   DELTa   OFF
Query	Range: POS   DELT   OFF
*RST Setting	Off
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALCulate:SMONitor:MARKer:MODE DELT" !Sets a reference marker and creates a delta marker.</pre>	

## CALCulate:SMONitor

### CALCulate:SMONitor:MARKer:PEAK:EXCursion[:LEVel]

Function	This command sets the peak excursion level. A peak is identified by using the peak threshold and peak excursion value. A point is only marked as a peak if it rises and falls more than the peak excursion value from the peak threshold value. Setting this command to DEFault sets it to 6 dB.
Setting	Range: 1 to 100 dB   DEFault Resolution: 0.1 dB
Query	Range: 1 to 100 dB Resolution: 0.1 dB
*RST Setting	6 dB
<b>Programming Example</b> OUTPUT 714;"CALCulate:SMONitor:MARKer:PEAK:EXCursion 20DB" !Sets the peak excursion level to 20 dB.	

### CALCulate:SMONitor:MARKer[<n>] :PEAK:MAXimum

Function	This command moves the specified marker <n> (1 to 3) to the highest peak value. If no marker <n> is specified, then marker 1 is moved.  An error message is returned if no peaks were found in the trace.
<b>Programming Example</b> OUTPUT 714;"CALCulate:SMONitor:MARKer2:PEAK:MAXimum" !Moves marker 2 to the highest peak value on the selected trace.	

### CALCulate:SMONitor:MARKer:PEAK:THReshold[:LEVel]

Function	This command sets peak threshold level. A peak is identified by using the peak threshold and peak excursion value. A point is only marked as a peak if it rises and falls more than the peak excursion value from the peak threshold value. Setting this command to DEFault sets it to -90 dBm.
Setting	Range: -120 to +37 dBm   DEFault Resolution: 0.1
Query	Range: -120 to +37 dBm Resolution: 0.1
*RST Setting	-90 dBm
<b>Programming Example</b> OUTPUT 714;"CALCulate:SMONitor:MARKer:PEAK:THReshold:LEVel 10DBM"	

**CALCulate:SMONitor:MARKer[<n>] [:SET]:EXPEcted:POWer**

Function	This command sets the base station emulator's expected power to the amplitude of the specified marker.  There are three markers <n> (1 to 3) that can be set. If no <n> is specified, marker 1 is used.
Programming Example	
OUTPUT 714;"CALCulate:SMONitor:MARKer2:EXPEcted:POWer"	

**CALCulate:SMONitor:MARKer[<n>] [:SET]:EXPEcted:FREQuency**

Function	This command sets the base station emulator's expected frequency to the frequency of the specified marker.  There are three markers <n> (1 to 3) that can be set. If no <n> is specified, marker 1 is used.
Programming Example	
OUTPUT 714;"CALCulate:SMONitor:MARKer3:EXPEcted:FREQuency"	

**CALCulate:SMONitor:MARKer[<n>]:STATe**

Function	This command sets which markers are turned on.  There are three markers <n> (1 to 3) that can be set. If no <n> is specified, marker 1 is used.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   ON   0   OFF
*RST Setting	OFF
Programming Example	
OUTPUT 714;"CALCulate:SMONitor:MARKer2:STATe 1" !Turns on marker 2.	

**CALCulate:SMONitor:MARKer[<n>]:TIME**

Function	This command sets/queries the time at marker <n>. where <n> is a number 1 through 3. When no marker number is specified, marker 1 is used.  If you are using delta marker mode, this command sets/queries the delta offset time. (See " <a href="#">CALCulate:SMONitor:MARKer[&lt;n&gt;]:MODE</a> " .)
Setting	Range: -50 ms to 10070 ms Resolution: 0.25 us
Query	Range: -50 ms to 10070 ms Resolution: 0.25 us
*RST Setting	5 ms
Programming Example	
OUTPUT 714;"CALCulate:SMONitor:MARKer2:TIME 30" !Places marker 2 at 30 ms.	

## CALCulate:SMONitor

### CALCulate:SMONitor:TRACe:PEAKs?

Function	This query expects two input parameters, excursion and threshold. This query returns an integer value followed by list of floating point numbers. The integer value represents the number of peaks that are reported in the list. The list of peaks consists of two values for each peak: the peak frequency in Hz and the peak amplitude in dBm.
Setting	<ul style="list-style-type: none"><li>Excursion: Range: 1 dB to 100 dB Resolution: 0.1 dB</li><li>Threshold: Range: -120 dBm to +37 dBm Resolution: 0.1 dBm</li></ul>
Query	<ul style="list-style-type: none"><li>Number of peaks Range: 0 to 200 Resolution: 1</li><li>Peak Frequency Range: This is dependent on the settings of the center frequency and the frequency span. The peak frequency range is therefore equal to the center frequency +/- half the frequency span. Resolution: 0.001 MHz</li><li>Peak Amplitude Range: -180 dBm to +37 dBm Resolution: 0.01 dBm</li></ul>
<b>Programming Example</b> OUTPUT 714;"CALCulate:SMONitor:TRACe:PEAKs?"	



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## CALL Subsystem

### Description

The CALL subsystem handles all setup, control and query functions for data connection processing. This includes access terminal (AT) and access network (AN) functions.

### Syntax Diagrams and Command Descriptions

[“CALL:APARAmeter” on page 350](#)

[“CALL:APPLIcation” on page 354](#)

[“CALL:AWGNoise” on page 357](#)

[“CALL:BAND” on page 359](#)

[“CALL:CCHannel” on page 360](#)

[“CALL:CCODE” on page 363](#)

[“CALL:CHANnel” on page 364](#)

[“CALL:CLPControl” on page 366](#)

[“CALL:CONNected” on page 367](#)

[“CALL:DCONnected” on page 368](#)

[“CALL:FUNCTIon:DATA” on page 373](#)

[“CALL:HANDoff” on page 374](#)

[“CALL:IDLE:DATA?” on page 375](#)

[“CALL:MCCode” on page 377](#)

[“CALL:MS” on page 378](#)

[“CALL:OPERating:MODE” on page 384](#)

[“CALL:PARAmeter:SECTor” on page 385](#)

[“CALL:PNOFfset” on page 387](#)

[“CALL:POWer” on page 388](#)

[“CALL:RFGenerator” on page 390](#)

[“CALL:SClose” on page 391](#)

[“CALL:SETup” on page 392](#)

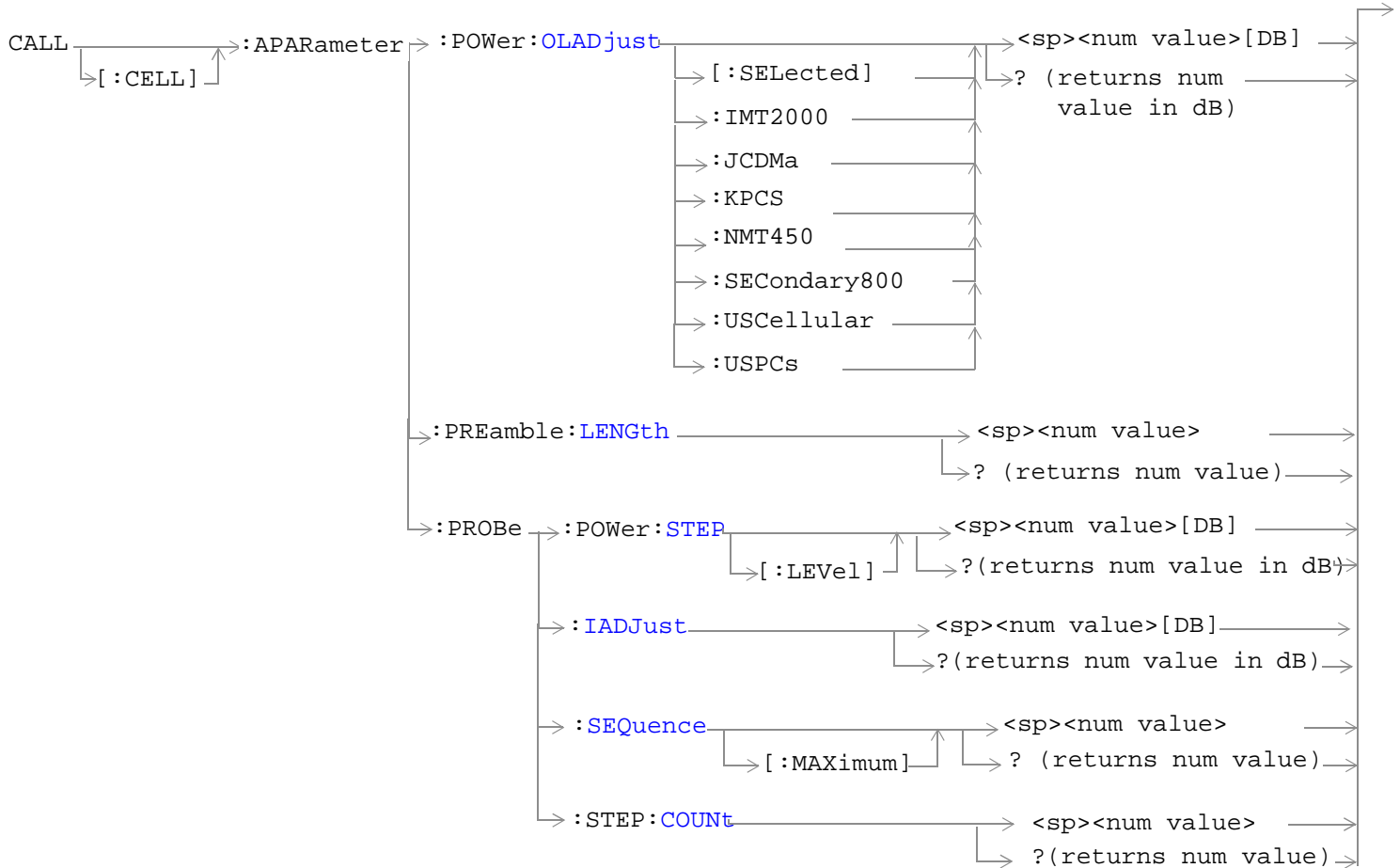
[“CALL:SOPen?” on page 396](#)

[“CALL:STATus” on page 399](#)

[“CALL:TOTal:POWer” on page 407](#)

[“CALL:TRIGger” on page 409](#)

## CALL:APARAmeter



[“Diagram Conventions” on page 326](#)

**CALL[:CELL]:APARAmeter:POWER:OLADjust**

## &lt;[:SElected]:IMT2000|:JCDMa|:KPCS|:NMT450|:SECondary800|:USCellular|:USPCs&gt;

Function	Sets/queries the Open Loop Adjust for the specified cell band. See <a href="#">“Open Loop Adjust” on page 143</a> . The optional [:SElected] keyword in this command specifies that the Open Loop Adjust being set or queried applies to the current cell band (see <a href="#">“Cell Band” on page 159</a> ).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 255 dB Resolution: 1 dB
Query	Same as setting
*RST Setting	[:SElected]: 81 dB (because *RST causes the band to be set to US PCS) IMT2000, KPCS, USPCs: 81 dB JCDMa, USCellular, NMT450, SECondary800: 78 dB
<b>Programming Example</b> OUTPUT 714;"CALL:APARAmeter:POWer:OLADjust 85" ! Sets the Open Loop Adjust for the currently selected band to 85 dB. OUTPUT 714;"CALL:APARAmeter:POWer:OLADjust:KPCS 82" ! Sets the Open Loop Adjust for Korean PCS band to 82 dB.	

## CALL[:CELL]:APARAmeter:PREAmble:LENGth

Function	Sets/queries the Preamble Length. See <a href="#">“Preamble Length” on page 144</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 7 frames Resolution: 1 frame
Query	Same as setting
*RST Setting	2 frames
<b>Programming Example</b> OUTPUT 714;"CALL:APARAmeter:PREAmble:LENGth 5" ! Sets the preamble length to 5 frames.	

## CALL:APARAmeter

### CALL[:CELL]:APARAmeter:PROBe:POWer:STEP[:LEVel]

Function	Sets/queries the Power Step. See <a href="#">“Probe Power Step” on page 147</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 7.5 dB per step Resolution: 0.5 dB
Query	Same as setting
*RST Setting	1.0 dB
<b>Programming Example</b> OUTPUT 714;"CALL:APARAmeter:PROBe:POWer:STEP 5.5" ! Sets the power step size to 5.5 dB per step.	

### CALL[:CELL]:APARAmeter:PROBe:IADJust

Function	Sets/queries the Probe Initial Adjust. See <a href="#">“Probe Initial Adjust” on page 145</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: -15 to +16 dB Resolution: 1 dB
Query	Same as setting
*RST Setting	0 dB
<b>Programming Example</b> OUTPUT 714;"CALL:APARAmeter:PROBe:IADJust -10" ! Sets the initial probe power adjustment to -10 dB.	

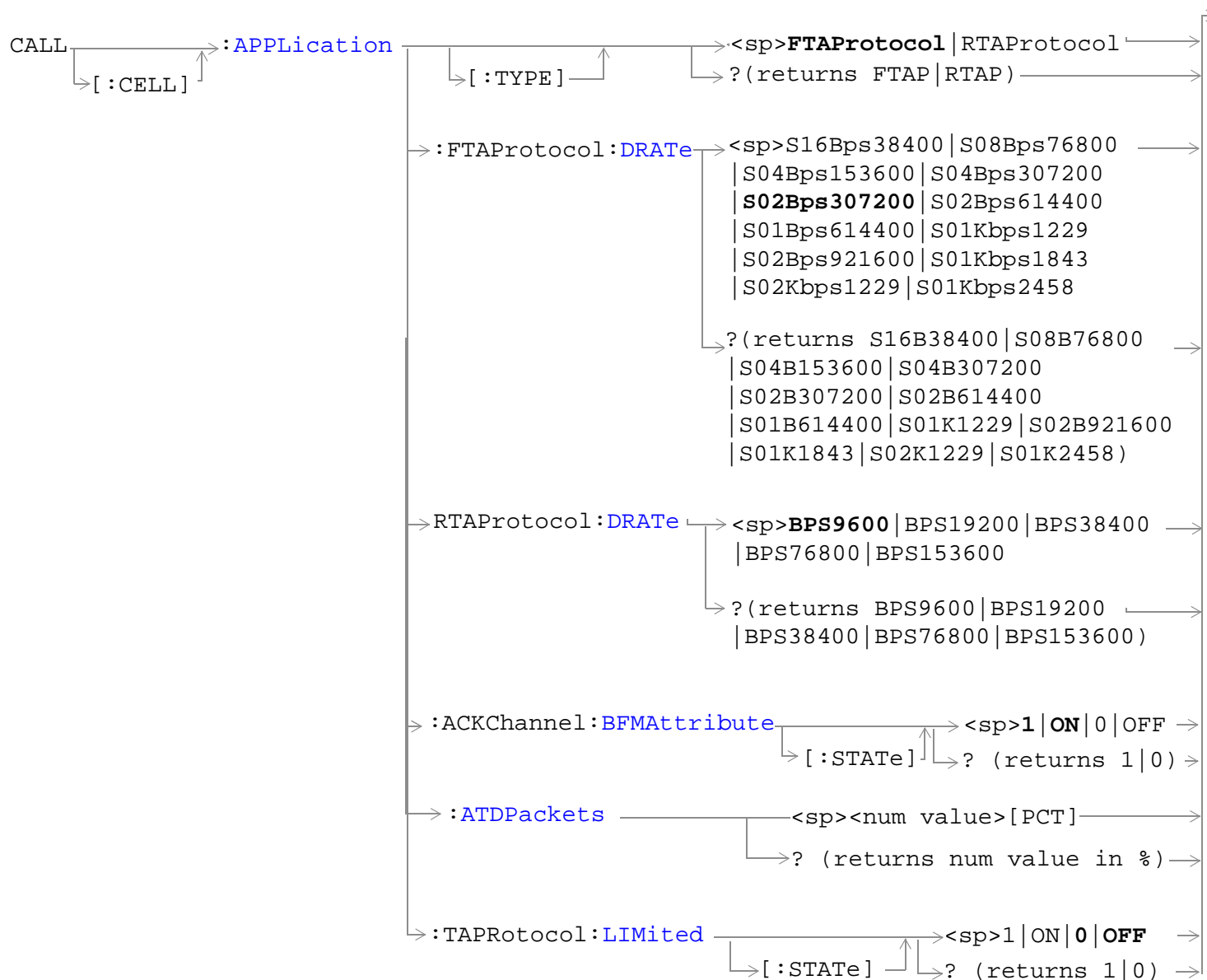
### CALL[:CELL]:APARAmeter:PROBe:SEQuence[:MAXimum]

Function	Sets/queries the Probe Sequence Maximum. See <a href="#">“Probe Sequence Max” on page 148</a> . This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode” on page 158</a> ).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 15 Resolution: integer
Query	Same as setting
*RST Setting	1
<b>Programming Example</b> OUTPUT 714;"CALL:APARAmeter:PROBe:SEQuence 5" ! Sets the Probe Sequence Maximum to 5.	

## CALL[:CELL]:APARAmeter:PROBe:STEP:COUNt

Function	Sets/queries the Probe Num Step. See <a href="#">“Probe Num Step”</a> on page 146.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 15 Resolution: integer
Query	Same as setting
*RST Setting	5
<b>Programming Example</b> OUTPUT 714;"CALL:APARAmeter:PROBe:STEP:COUNt 7" ! Sets the Probe Num Step to 7.	

## CALL:APPLICATION



“Diagram Conventions” on page 326

## CALL[:CELL]:APPLiCation[:TYPE]

Function	Sets/queries which test application protocol is used in the data connection connected state, Forward Test Application Protocol (FTAP) or Reverse Test Application Protocol (RTAP). See <a href="#">"Application" on page 155</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: FTAPProtocol   RTAPProtocol
Query	Range: FTAP   RTAP
*RST Setting	FTAP
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:APPLiCation RTAPProtocol" ! Sets the application type to Reverse Test Application Protocol</pre>	

## CALL[:CELL]:APPLiCation:FTAPProtocol:DRATe

Function	Sets/queries the data rate and number of slots used to transmit the forward test packets when the Application is FTAP. See <a href="#">"FTAP Rate" on page 161</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: S16Bps38400   S08Bps76800   S04Bps153600   S04Bps307200   S02Bps307200   S02Bps614400   S01Bps614400   S01Kbps1229   S02Bps921600   S01Kbps1843   S02Kbps1229   S01Kbps2458
Query	Range: S16B38400   S08B76800   S04B153600   S04B307200   S02B307200   S02B614400   S01B614400   S01K1229   S02B921600   S01K1843   S02K1229   S01K2458
*RST Setting	S02B307200
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:APPLiCation:FTAPProtocol:DRATe S16B38400" ! Sets the FTAP data rate to 38.4 kbps, 16 slots/packet</pre>	

## CALL[:CELL]:APPLiCation:RTAPProtocol:DRATe

Function	Sets the rate at which the reverse test packets are sent when the Application is RTAP. See <a href="#">"RTAP Rate" on page 166</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: BPS9600   BPS19200   BPS38400   BPS76800   BPS153600
Query	Same as setting
*RST Setting	BPS9600
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:APPLiCation:RTAPProtocol:DRATe BPS19200" ! Sets the RTAP data rate to 19.2 kbps</pre>	

## CALL:APPLication

### CALL[:CELL]:APPLication:ACKChannel:BFMAtribute[:STATE]

Function	Sets/queries the ACK Channel Bit Fixed Mode Attribute state. See <a href="#">“ACK Channel Bit Fixed Mode Attribute” on page 154.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	1 (On)
<b>Programming Example</b>  OUTPUT 714; "CALL:APPLication:ACKChannel:BFMAtribute OFF" ! Turns ACK Channel Bit Fixed Mode Attribute state to off.	

### CALL[:CELL]:APPLication:ATDPackets

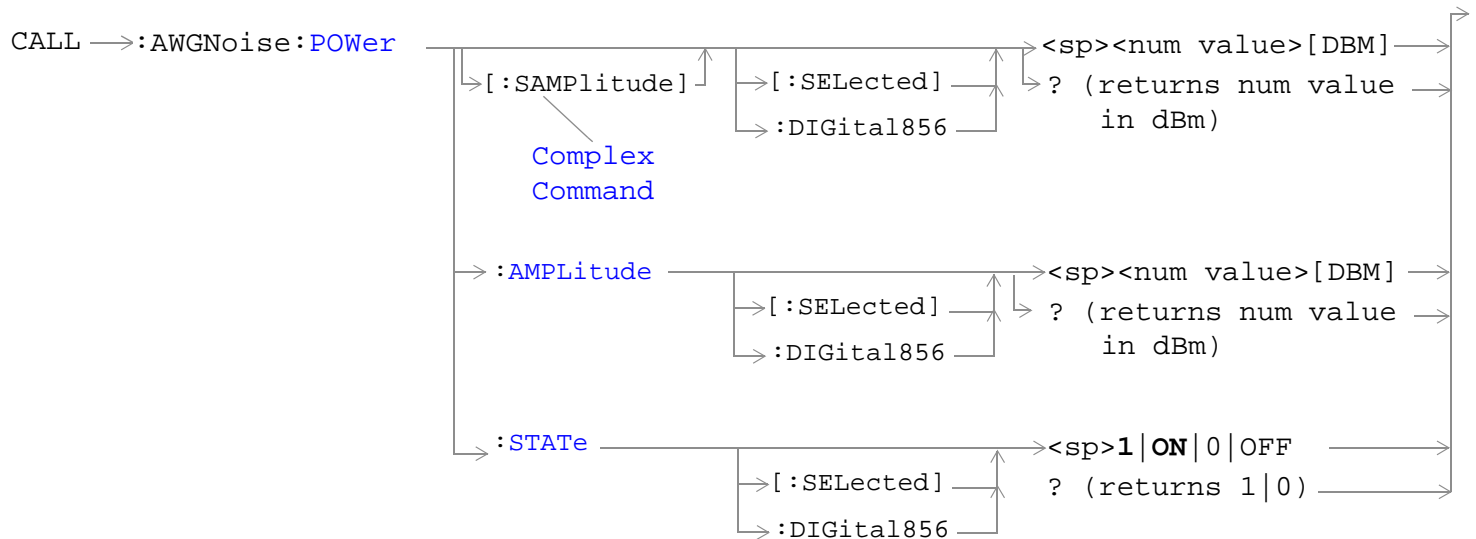
Function	Sets/queries AT Directed Packets. See <a href="#">“AT Directed Packets” on page 156.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 100% Resolution: 1%
Query	Same as setting
*RST Setting	50
<b>Programming Example</b>  OUTPUT 714; "CALL:APPLication:ATDPackets 100" ! Sets AT Directed Packets to 100%	

### CALL[:CELL]:APPLication:TAPRotocol:LIMited[:STATE]

Function	Sets/queries the Limited TAP state. See <a href="#">“Limited TAP” on page 162.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (Off)
<b>Programming Example</b>  OUTPUT 714; "CALL:APPLication:TAPRotocol:LIMited ON" ! Turns Limited TAP on.	



## CALL:AWGNoise



“Diagram Conventions” on page 326

### CALL:AWGNoise:POWer[:SAMPLitude]<[:SElected]][:DIGital856]>

Function	The setting form of this command performs two functions: (1) sets the additive white gaussian noise (AWGN) level and (2) turns the AWGN on/off state to on. The query form returns the desired AWGN power level. (See “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for more information about desired versus current power levels).  The optional [:SElected] keyword in this command specifies that the cell power level being set or queried applies to the current system type (see “System Type” on page 167).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: see “CALL:AWGNoise:POWer:AMPLitude<[:SElected]][:DIGital856]>”
Query	Range/Resolution: see “CALL:AWGNoise:POWer:AMPLitude<[:SElected]][:DIGital856]>”
*RST Setting	ON, and see “CALL:AWGNoise:POWer:AMPLitude<[:SElected]][:DIGital856]>”

#### Programming Example

```

OUTPUT 714;"CALL:AWGNoise:POWer -30"
! Sets AWGN power state to ON and
! sets desired AWGN power level to -30 dBm/1.23 MHz for the current system type.
OUTPUT 714;"CALL:AWGNoise:POWer:DIGital856 -54"
! Sets AWGN power state to ON and
! sets AWGN power level to -54 dBm/1.23 MHz for the DIGital856 system type.
  
```

## CALL:AWGNoise

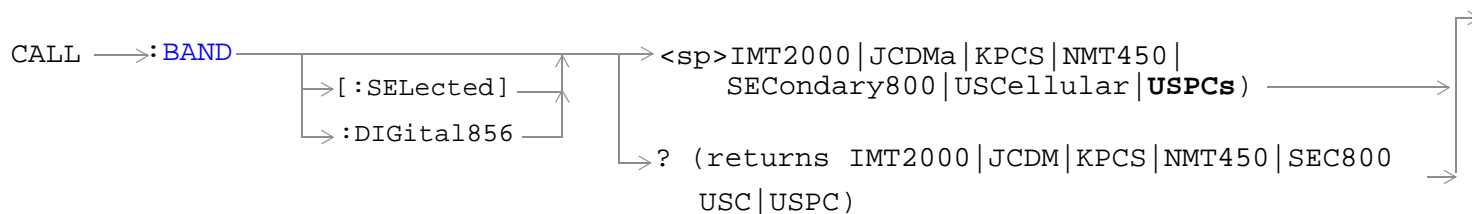
### CALL:AWGNoise:POWER:AMPLitude<[:SElected]:DIGital856>

Function	Sets/queries the desired additive white gaussian noise (AWGN) level. (See “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for more information about desired versus current power levels).  The optional [:SElected] keyword in this command specifies that the AWGN power level being queried applies to the current system type (see “System Type” on page 167).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: -120 dBm/1.23 MHz to -15 dBm/1.23 MHz (this is the range of settings accepted, see “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for the actual hardware range of the source)  Resolution: 0.01 dB
Query	Same as setting
*RST Setting	-54 dBm/1.23 MHz
<b>Programming Example</b>  OUTPUT 714;"CALL:AWGNoise:POWER:AMPLitude -30" ! Sets the desired AWGN power level to -30 dBm/1.23 MHz for the current system type.	

### CALL:AWGNoise:POWER:STATE<[:SElected]:DIGital856>

Function	Sets/queries the additive white gaussian noise (AWGN) state.  The optional [:SElected] keyword in this command specifies that the AWGN power level being queried applies to the current system type (see “System Type” on page 167).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	OFF
<b>Programming Example</b>  OUTPUT 714;"CALL:AWGNoise:POWER:STATE ON" ! Turns on AWGN for the current system type.	

## CALL:BAND

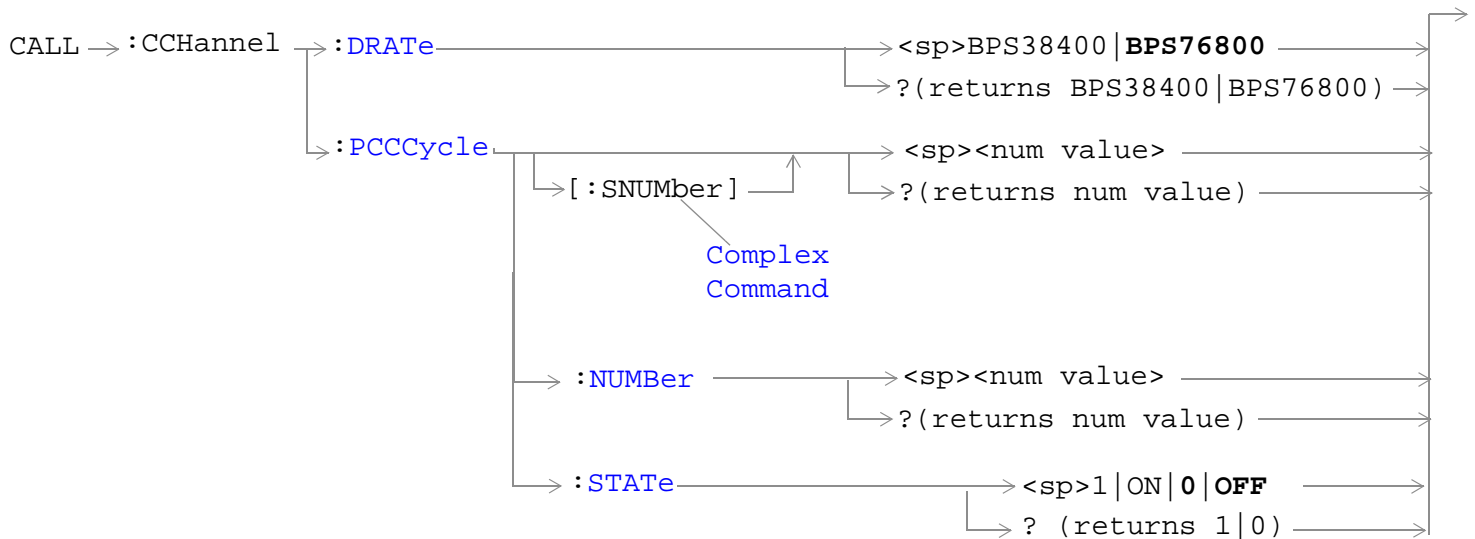


[“Diagram Conventions” on page 326](#)

### CALL:BAND<[:SElected]][:DIGital856]>

Function	Sets/queries the cell band (see <a href="#">“Cell Band” on page 159</a> ). The optional [:SElected] keyword in this command specifies that the cell band being set/queried applies to the current system type (see <a href="#">“System Type” on page 167</a> ).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: IMT2000   JCDMa   KPCS   NMT450   SECondary800   USCellular   <b>USPCs</b>
Query	Range: IMT2000   JCDM   KPCS   NMT450   SEC800   USC   USPC
*RST Setting	USPC
<b>Programming Example</b> OUTPUT 714;"CALL:BAND KPCS" ! Selects the Korean PCS cell band.	

## CALL:CCHannel



[“Diagram Conventions” on page 326](#)

### CALL:CCHannel:DRATe

Function	Sets/queries the rate used on the Control Channel. See <a href="#">“Control Channel Data Rate” on page 134</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <ul style="list-style-type: none"> <li>BPS38400: 38.4 kbps</li> <li>BPS76800: 76.8 kbps</li> </ul>
Query	Same as setting
*RST Setting	BPS76800
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:CCHannel:DRATe BPS38400" ! Sets the Control Channel data rate to 38.4 kbps. </pre>	

### CALL:CCHannel:PCCCycle[:SNUMber]

Function	<p>The setting form of this command performs two functions: (1) sets the Preferred Control Channel Cycle and (2) turns the Preferred Control Channel Cycle state to on (Preferred Control Channel Cycle enabled). The query form returns the Preferred Control Channel Cycle. (See <a href="#">“Preferred Control Channel Cycle” on page 136</a>.)</p> <p>This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode” on page 158</a>).</p>
----------	--

Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: see <a href="#">"CALL:CCHannel:PCCCycle:NUMBer" on page 362.</a>
Query	Range/Resolution: see <a href="#">"CALL:CCHannel:PCCCycle:NUMBer" on page 362.</a>
*RST Setting	OFF, and see <a href="#">"CALL:CCHannel:PCCCycle:NUMBer" on page 362.</a>
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:CCHannel:PCCCycle 9000" ! Sets the Preferred Control Channel Cycle state to ON and ! sets Preferred Control Channel Cycle to 9000. </pre>	

## CALL:CCHannel

### CALL:CCHannel:PCCCycle:NUMBER

Function	Sets/queries the Preferred Control Channel Cycle. (See <a href="#">“Preferred Control Channel Cycle” on page 136.</a> ) This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode” on page 158.</a> )
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 32767 Resolution: 1 cycle
Query	Same as setting
*RST Setting	8096
<b>Programming Example</b> OUTPUT 714;"CALL:CCHannel:PCCCycle:NUMBER 9000" ! Sets the Preferred Control Channel Cycle to 9000.	

### CALL:CCHannel:PCCCycle:STATe

Function	Sets/queries the Preferred Control Channel Cycle state. ON = Preferred Control Channel Cycle enabled. (See <a href="#">“Preferred Control Channel Cycle” on page 136.</a> ) This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode” on page 158.</a> )
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	OFF
<b>Programming Example</b> OUTPUT 714;"CALL:CCHannel:PCCCycle:STATe ON" ! Enables Preferred Control Channel Cycle.	

## CALL:CCODE

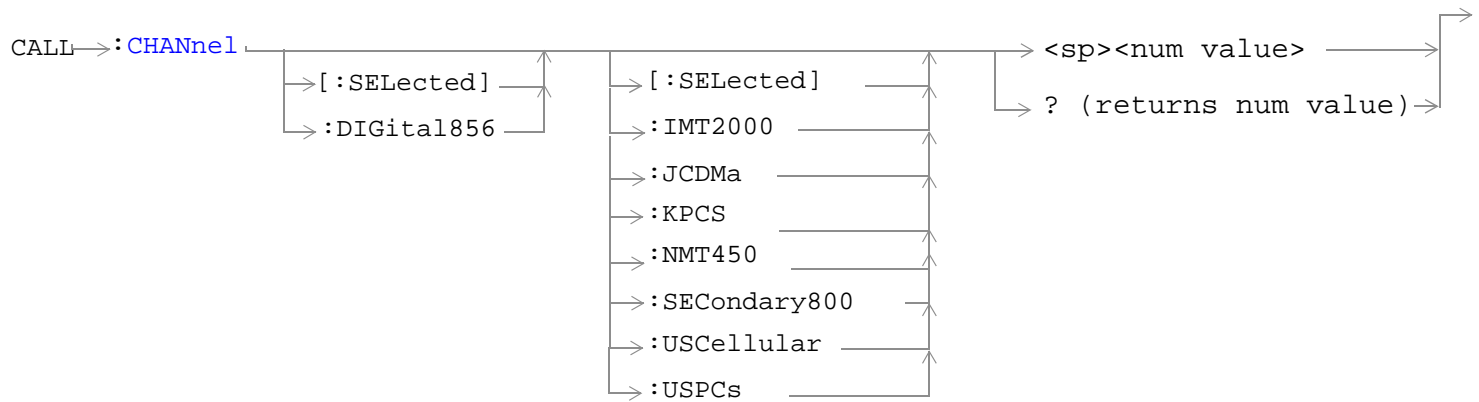


[“Diagram Conventions” on page 326](#)

### CALL[:CELL]:CCODE

Function	Sets/queries the Color Code. See <a href="#">“Color Code” on page 133</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 255 Resolution: integer
Query	Same as setting
*RST Setting	64
<b>Programming Example</b> OUTPUT 714;"CALL:CCODE 80" ! Sets the Color Code to 80	

## CALL:CHANnel



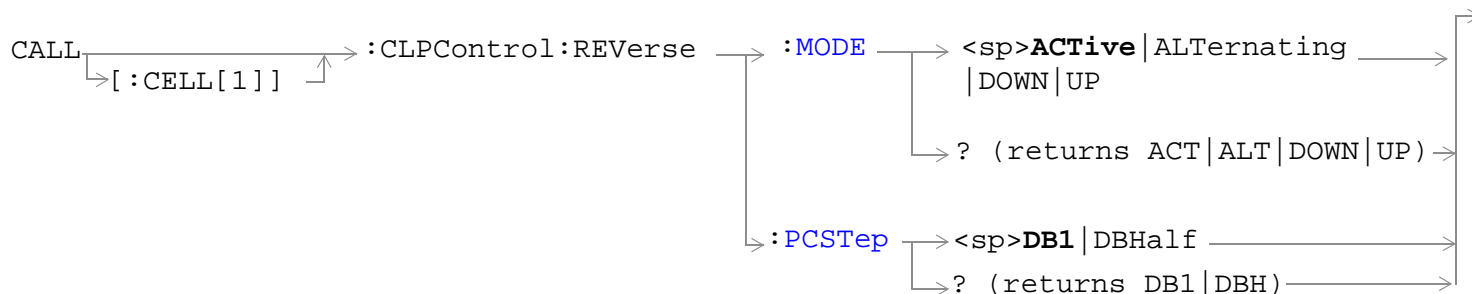
[“Diagram Conventions” on page 326](#)



**CALL:CHANnel<[:SElected]:DIGital856>**  
**<[:SElected]:IMT2000|:JCDMa|:KPCS|:NMT450|:SECondary800|:USCellular|:USPCs>**

Function	<p>Sets/queries the physical channel number for the specified system type and specified cell band.</p> <p>The first optional [:SElected] keyword in this command specifies that the channel being set/queried applies to the current system type (see “System Type” on page 167).</p> <p>The second optional [:SElected] keyword in this command specifies that the channel being set/queried applies to the current cell band (see “Cell Band” on page 159).</p> <p>Specifying a non-current band when setting a channel number will cause the test set to store the channel number for use when the specified band is made current. Also, specifying a non-current band when querying a channel number will return a stored channel number that is not the current channel the test set is transmitting.</p> <p>To set (make current) a cell band or query the current cell band, use the “CALL:BAND” command.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	<p>Range:</p> <ul style="list-style-type: none"> <li>• IMT2000: 0 to 1199</li> <li>• JCDMa: 1 to 799, 801 to 1039, 1041 to 1199, 1201 to 1600</li> <li>• KPCS: 0 to 599</li> <li>• NMT450: 1 to 300, 539 to 871, 1039 to 1473, 1792 to 2016</li> <li>• SECondary800: 0 to 919</li> <li>• USCellular: 1 to 799, 991 to 1023</li> <li>• USPCs: 0 to 1199</li> </ul> <p>Resolution: integer</p>
Query	Same as setting
*RST Setting	<ul style="list-style-type: none"> <li>• [:SElected]: 525 (because *RST causes the band to be set to US PCS)</li> <li>• IMT2000: 525</li> <li>• JCDMa: 76</li> <li>• KPCS: 325</li> <li>• NMT450: 210</li> <li>• SECondary800: 820</li> <li>• USCellular: 384</li> <li>• USPCs: 525</li> </ul>
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"CALL:CHANNEL?" ! Queries the channel number of the current system and band.  OUTPUT 714;"CALL:CHANNEL 384" ! Sets the channel number of the current system and band to 384.  OUTPUT 714;"CALL:CHANNEL:DIGital856:KPCS 384" ! Sets the channel number for the Digital 856 system and Korean PCS band to 384. If this system and ! band are not current, the value 384 is stored and will be transmitted when Digital856 and Korean ! PCS are current. </pre>	

## CALL:CLPControl



[“Diagram Conventions” on page 326](#)

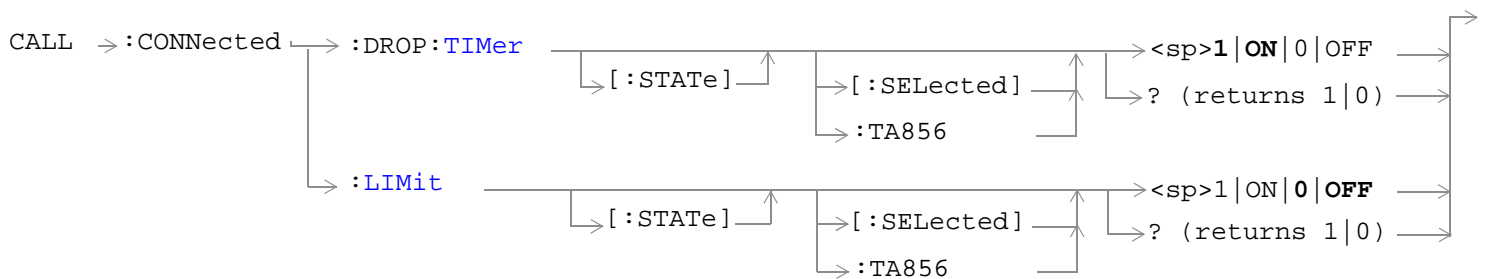
### CALL[:CELL[1]]:CLPControl:REverse:MODE

Function	Sets/queries the reverse closed loop power control mode. See <a href="#">“Reverse Closed Loop Power Control” on page 165</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: ACTIVE   ALternating   DOWN   UP
Query	Range: ACT   ALT   DOWN   UP
*RST Setting	ACT
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:CLPControl:REverse:MODE ALT" ! Sets the closed loop power control mode to alternating up/down bits.           </pre>	

### CALL[:CELL[1]]:CLPControl:REverse:PCSTep

Function	Sets/queries the reverse closed loop power control step size. See <a href="#">“Power Control Step” on page 164</a> .  This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode” on page 158</a> ).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <ul style="list-style-type: none"> <li>• DB1: 1 dB</li> <li>• DBHalf: 0.5 dB</li> </ul>
Query	Range: DB1   DBH
*RST Setting	DB1
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:CLPControl:REverse:PCSTep DBHalf" ! Sets the closed loop power control step size to 0.5 dB.           </pre>	

## CALL:CONNEcted



[“Diagram Conventions” on page 326](#)

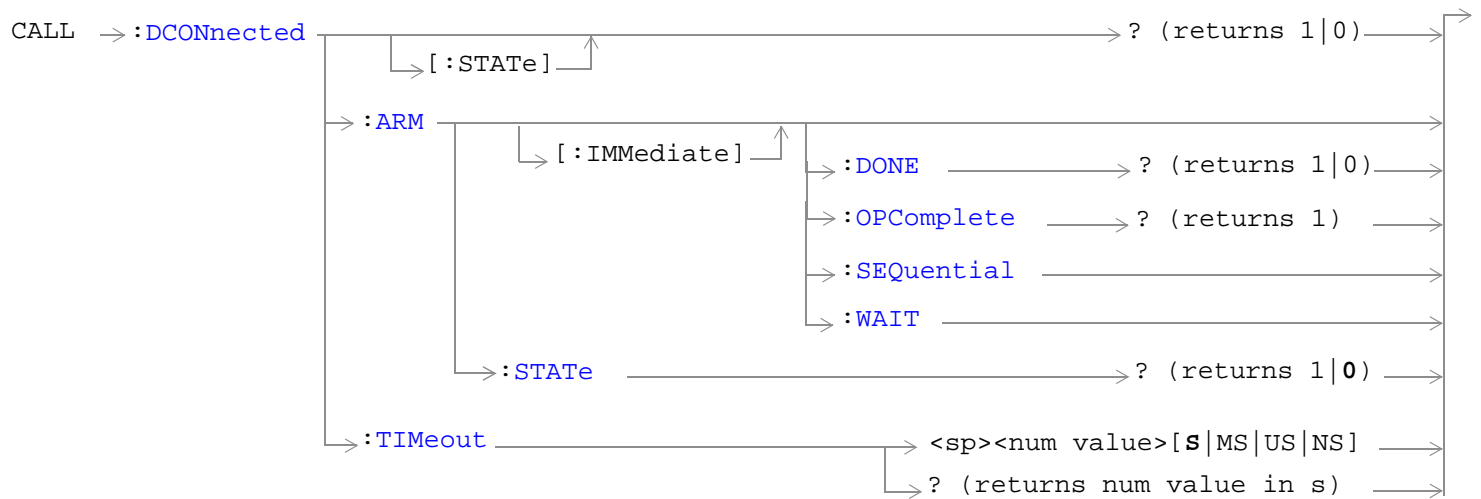
### CALL:CONNEcted:DROP:TIMer[:STATE]<[:SELEcted]][:TA856]>

Function	Sets/queries the call drop timer state (turns the call drop timer on/off, or queries whether it's on/off). See <a href="#">“Call Drop Timer” on page 157</a> .
Requirements	Test Application Revision: A.01.20
Setting	Range: 1   <b>ON</b>   0   OFF
Query	Range: 1   0
*RST Setting	ON
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CONNEcted:DROP:TIMer 0" ! Turns the call drop timer off</pre>	

### CALL:CONNEcted:LIMit[:STATE]<[:SELEcted]][:TA856]>

Function	Sets/queries the call limit mode state (turns call limit mode on/off, or queries whether it's on/off). See <a href="#">“Call Limit Mode” on page 158</a> .
Requirements	Test Application Revision: A.01.20
Setting	Range: 1   ON   <b>0</b>   OFF
Query	Range: 1   0
*RST Setting	OFF
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CONNEcted:LIMit 1" ! Turns call limit mode on</pre>	

## CALL:DCONNECTED



[“Diagram Conventions” on page 326](#)

CALL:DCONnected[:STATe]?

<p>Function</p>	<p>This command queries whether or not the data connection is in the connected state (see <a href="#">“Connected State” on page 120</a> for a description of this data connection state).</p> <p>When the query is sent:</p> <ul style="list-style-type: none"> <li>• If the data connection is in the connected state, the query immediately returns a 1.</li> <li>• If the data connection is in any other non-transitory state, the query immediately returns a 0 (see <a href="#">“Data Connection Processing Lifecycle” on page 109</a> for information about which states are non-transitory).</li> <li>• If the data connection is in a transitory state, the query waits until the data connection reaches a non-transitory state, and then returns a 1 if the state is connected or a 0 if the state is any other non-transitory state.</li> </ul> <div style="text-align: center; border: 1px solid black; padding: 10px;"> <pre> graph TD     A[CALL:DCONnected?] --&gt; B[data connection state]     B -- "(idle or session open)" --&gt; C[query returns 0]     B -- "(connected)" --&gt; D[query returns 1]     B -- "(UATI request, session negotiate, session closing, paging, connection request, connection negotiate, connection closing or handoff)" --&gt; E[ ]     E --&gt; A     </pre> </div> <hr/> <p><b>NOTE</b> The query will hang as long as the data connection is in a transitory state. However, the AT includes protocol timers which limit the time it may stay in a transitory state. So, the AT should force the connection to return to a non-transitory state after its protocol timers expire, and so the query will not hang forever.</p>
-----------------	---

## CALL:DCONnected

	<p>The query behaves differently if the data connection state change detector (see <a href="#">“Data Connection State Change Detector” on page 241</a>) is armed when the query is sent:</p> <ul style="list-style-type: none"><li>• If the data connection is in a non-transitory state, the query hangs until the data connection state reaches a different non-transitory state, then returns a 1 if the state is connected or a 0 if the state is any other non-transitory state. For example, if the data connection is in the connected state when the query is sent, the query hangs until the data connection leaves the connected state, reaches another non-transitory state such as idle or session open, and then returns a 0.</li><li>• If the data connection is in a transitory state, the query hangs until the data connection reaches a non-transitory state, and then returns a 1 if the state is connected or a 0 if the state is any other non-transitory state.</li></ul> <hr/> <p><b>NOTE</b> If the data connection state change detector timeout (see <a href="#">“Data Connection State Change Detector” on page 241</a>) expires before the data connection moves to a different non-transitory state, then the change detector is disarmed, which releases the query. The query will then immediately return a 1 for connected, 0 for idle or session open, or hang until any non-transitory state is reached or the AT protocol timers expire.</p> <hr/> <p>Using the CALL:DCONnected? query in conjunction with the data connection state change detector is useful in determining whether an attempt to open a connection has been successful. See <a href="#">“Open a Connection from the Test Set” on page 197</a> and <a href="#">“Data Connection State Synchronization” on page 240</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1 0
*RST Setting	0
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:DCONnected:STATE?" ! Queries whether the data connection state is connected.</pre>	

**CALL:DCONnected:ARM[:IMMediate]**

Function	Arms the data connection state change detector. See <a href="#">“Data Connection State Change Detector” on page 241</a> .  This is an overlapped command, and therefore has a Pending Operation Flag (POF) associated with it. The POF is set when the change detector is armed, and cleared when the change detector is disarmed. See <a href="#">“Data Connection Processing Event Synchronization” on page 237</a> for more information about the behavior of overlapped commands.
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:DCONnected:ARM" ! Arms the data connection state change detector.</pre>	

**CALL:DCONnected:ARM:STATe?**

Function	Queries the arm state of the data connection state change detector.  This command never hangs and immediately returns a one if the detector is armed, or a zero if the detector is not armed. See <a href="#">“Data Connection State Change Detector” on page 241</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1 0
*RST Setting	0
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:DCONnected:ARM:STATe?" ! Returns the arm state of the data connection state change detector.</pre>	

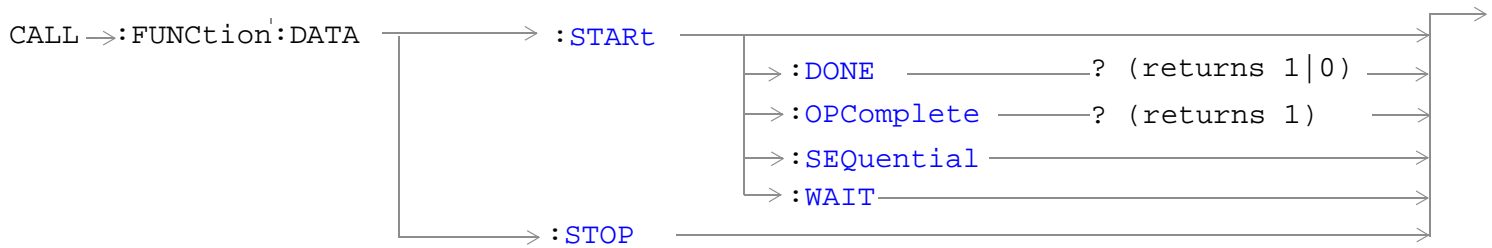
## CALL:DCONnected

### CALL:DCONnected:TIMEout

Function	Sets/queries the maximum time the test set will wait for the data connection state change detector to become disarmed (see <a href="#">“Data Connection State Change Detector” on page 241</a> ). Default setting units are seconds. To set timeout time in units other than seconds, include an optional unit specifier in the command string.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 100 seconds Resolution: 0.1 seconds
Query	Same as setting
*RST Setting	10 seconds
<b>Programming Example</b>  OUTPUT 714;"CALL:DCONnected:TIMEout 3" ! Sets the CALL:DCONnected:STATE? query timeout time to 3 seconds.  OUTPUT 714;"CALL:DCONnected:TIMEout 500 MS" ! Sets the Sets the CALL:DCONnected:STATE? query timeout time to 500 milliseconds.	



## CALL:FUNCTION:DATA



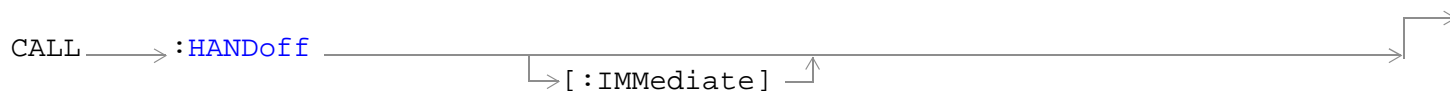
### CALL:FUNCTION:DATA:START

Function	Start Data causes the AN to Page the AT (when there is an active session open). This starts a data connection. See <a href="#">“Paging State”</a> .  This is an overlapped command, and therefore has a Pending Operation Flag (POF) associated with it. See <a href="#">“Data Connection Processing Event Synchronization” on page 237</a> for more information about the behavior of overlapped commands.
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> OUTPUT 714;“CALL:FUNCTION:DATA:START” ! Starts a data connection.	

### CALL:FUNCTION:DATA:STOP

Function	End Data causes the AN to close the currently active data connection. See <a href="#">“Connection Closing State”</a> .
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> OUTPUT 714;“CALL:FUNCTION:DATA:STOP” ! Ends the data connection.	

## CALL:HANDoff

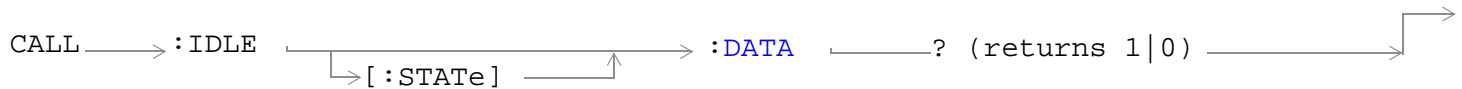


[“Diagram Conventions” on page 326](#)

### CALL:HANDoff[:IMMEDIATE]

Function	Initiates a handoff to: <ul style="list-style-type: none"> <li>the handoff system type (see <a href="#">“System Type” on page 167</a>).</li> <li>the handoff cell band selected by the CALL:SETup:BAND command (see <a href="#">“CALL:SETup”</a>).</li> <li>the handoff physical channel selected by the CALL:SETup:CHANnel command (see <a href="#">“CALL:SETup”</a>).</li> </ul> See <a href="#">“Handoff” on page 121</a> for more information about handoffs.
Requirements	Test Application Revision: A.01.20
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:HANDoff" !initiates a handoff to the current handoff cell band and current handoff channel.           </pre>	

## CALL:IDLE:DATA?



“Diagram Conventions” on page 326

### CALL:IDLE[:STATE]:DATA?

<p>Function</p>	<p>This command queries whether or not the data connection is in the idle state (see “Idle State” on page 111 for a description of this data connection state).</p> <p>When the query is sent:</p> <ul style="list-style-type: none"> <li>• If the data connection is in the idle state, the query immediately returns a 1.</li> <li>• If the data connection is in any other non-transitory state, the query immediately returns a 0 (see “Data Connection Processing Lifecycle” on page 109 for information about which states are non-transitory).</li> <li>• If the data connection is in a transitory state, the query waits until the data connection reaches a non-transitory state, and then returns a 1 if the state is idle or a 0 if the state is any other non-transitory state.</li> </ul> <div style="text-align: center;"> <pre> graph TD     Call[CALL:IDLE:DATA?] --&gt; State[data connection state]     State -- "(session open or connected)" --&gt; Q0[query returns 0]     State -- "(idle)" --&gt; Q1[query returns 1]     State -- "(UATI request, session negotiate, session closing, paging, connection request, connection negotiate, connection closing or handoff)" --&gt; State   </pre> </div>
<p>NOTE</p>	<p>The query will hang as long as the data connection is in a transitory state. However, the AT includes protocol timers which limit the time it may stay in a transitory state. So, the AT should force the connection to return to a non-transitory state after its protocol timers expire, and so the query will not hang forever.</p>

## CALL:IDLE:DATA?

	<p>The query behaves differently if the data connection state change detector (see <a href="#">“Data Connection State Change Detector” on page 241</a>) is armed when the query is sent:</p> <ul style="list-style-type: none"><li>• If the data connection is in a non-transitory state, the query hangs until the data connection state reaches a different non-transitory state, then returns a 1 if the state is idle or a 0 if the state is any other non-transitory state. For example, if the data connection is in the idle state when the query is sent, the query hangs until the data connection leaves the idle state, reaches another non-transitory state such as session open or connected, and then returns a 0.</li><li>• If the data connection is in a transitory state, the query hangs until the data connection reaches a non-transitory state, and then returns a 1 if the state is idle or a 0 if the state is any other non-transitory state.</li></ul> <hr/> <p><b>NOTE</b>      If the data connection state change detector timeout (see <a href="#">“Data Connection State Change Detector” on page 241</a>) expires before the data connection moves to a different non-transitory state, then the change detector is disarmed, which releases the query. The query will then immediately return a 1 for idle, 0 for session open or connected, or hang until any non-transitory state is reached or the AT protocol timers expire.</p> <hr/> <p>Using the CALL:IDLE:DATA? query in conjunction with the data connection state change detector is useful in determining whether an attempt to close a session has been successful. See <a href="#">“Close the Session” on page 205</a> and <a href="#">“Data Connection State Synchronization” on page 240</a>.</p>
Requirements	Test Application Revision: A.01.20
Query	Range: 1   0
*RST Setting	1
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:IDLE:DATA?" !Queries whether the Data Connection state is idle.</pre>	

## CALL:MCCode

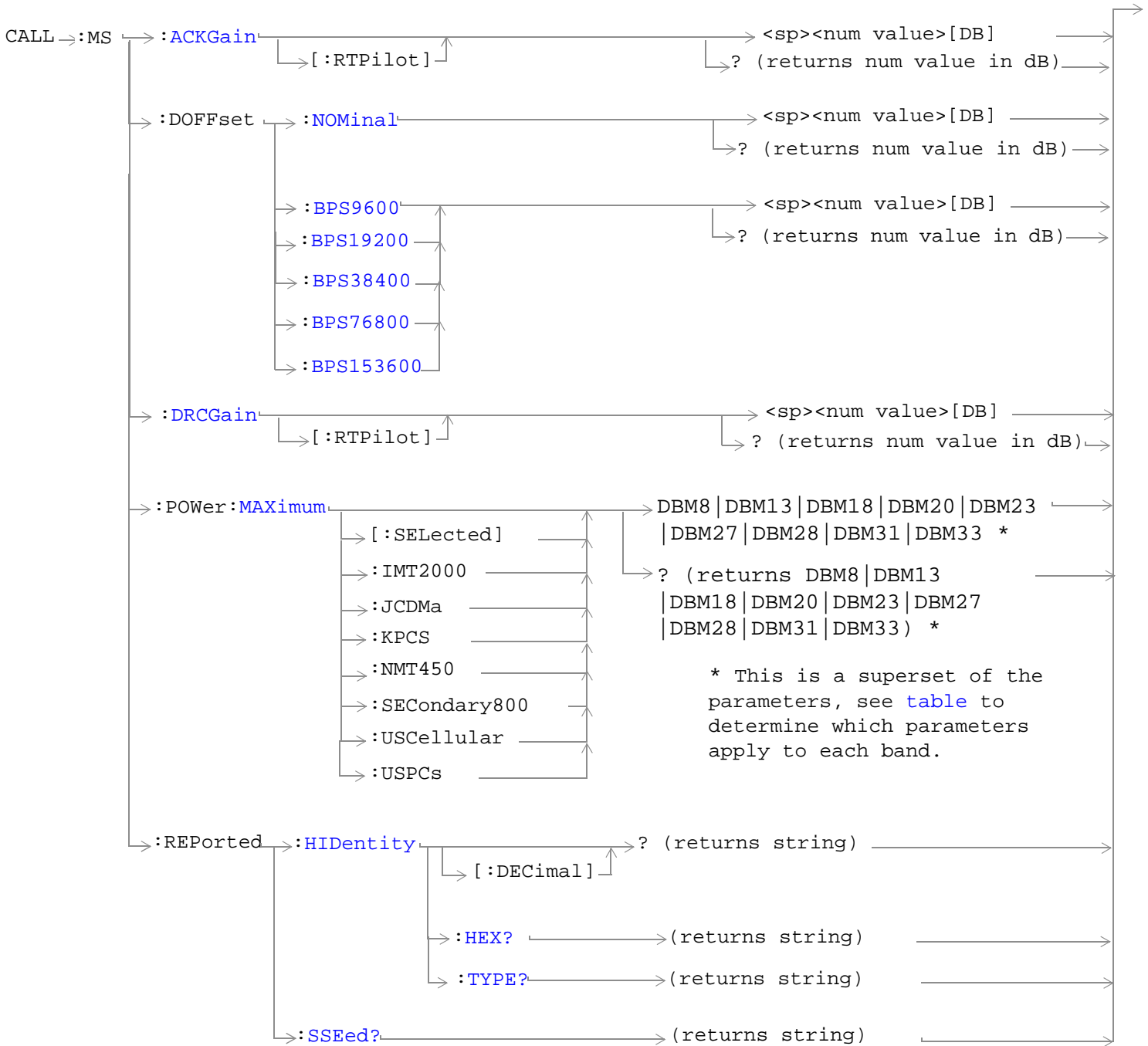


[“Diagram Conventions” on page 326](#)

### CALL[:CELL]:MCCode

Function	Sets/queries the country code. See <a href="#">“Country Code” on page 135</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 999 Resolution: integer
Query	Same as setting
*RST Setting	310
<b>Programming Example</b> OUTPUT 714;"CALL:MCCode 320" ! Sets the country code to 320.	

# CALL:MS



“Diagram Conventions” on page 326

**CALL:MS:ACKGain[:RTPilot]**

Function	Sets/queries Ack Channel Gain. See <a href="#">“ACK Channel Gain” on page 139</a> .
Requirements:	Test Application Revision: A.01.20 and above
Setting	Range: -3 to +6 dB Resolution: 0.5 dB
Query	Same as setting
*RST Setting	3 dB
<b>Programming Example</b> OUTPUT 714;"CALL:MS:ACKGain 4" ! Sets the Ack Channel gain to +4 dB.	

**CALL:MS:DOFFset:NOMinal**

Function	Sets/queries Data Offset Nom. See <a href="#">“Data Offset Nom” on page 142</a> . This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode” on page 158</a> ).
Requirements:	Test Application Revision: A.01.20 and above
Setting	Range: -3.5 to +4.0 dB Resolution: 0.5 dB
Query	Same as setting
*RST Setting	0 dB
<b>Programming Example</b> OUTPUT 714;"CALL:MS:DOFFset:NOMinal -2.5" ! Sets the nominal offset to -2.5 dB.	

## CALL:MS

**CALL:MS:DOFFset<:BPS9600|:BPS19200|:BPS38400|:BPS76800|:BPS153600>**

Function	Sets/queries Data Offset <rate>. See <a href="#">“Data Offset 9k6   19k2   38k4   76k8   153k6”</a> on page 141. This is a “Configurable Attribute” that is set during session negotiation. Its value can not be changed while call limit mode is on (see <a href="#">“Call Limit Mode”</a> on page 158).
Requirements:	Test Application Revision: A.01.20 and above
Setting	Range: -1.75 to +2.0 dB Resolution: 0.25 dB
Query	Same as setting
*RST Setting	0 dB
<b>Programming Example</b> OUTPUT 714;"CALL:MS:DOFFset:BPS38400 -1.5" ! Sets the Data Offset 38k4 to -1.5 dB.	

**CALL:MS:DRCGain[:RTPilot]**

Function	Sets/queries the DRC Channel gain. See <a href="#">“DRC Channel Gain”</a> on page 140.
Requirements:	Test Application Revision: A.01.20 and above
Setting	Range: -9 to +6 dB Resolution: 0.5 dB
Query	Same as setting
*RST Setting	3 dB
<b>Programming Example</b> OUTPUT 714;"CALL:MS:DRCGain 4" ! Sets the DRC Channel gain to +4 dB.	

**CALL:MS:POWer:MAXimum**

**<[:SElected]|:IMT2000|:JCDMa|:KPCS|:NMT450|:SECondary800|:USCellular|:USPCs>**

Function	Sets/queries the maximum power expected from the AT for the specified band. See <a href="#">“AT Max Power”</a> on page 171. The optional [:SElected] keyword in this command specifies that the maximum power being set or queried applies to the current cell band (see <a href="#">“Cell Band”</a> on page 159).
Requirements:	Test Application Revision: A.01.20 and above



Setting	<p>Range: (DBM8 = +8 dBm, for example)</p> <ul style="list-style-type: none"> <li>• IMT2000: DBM8   DBM13   <b>DBM18</b>   DBM20   DBM23   DBM28</li> <li>• JCDMa: <b>DBM23</b>   DBM27   DBM31</li> <li>• KPCS: DBM8   DBM13   DBM18   <b>DBM23</b>   DBM28</li> <li>• NMT450: DBM18   <b>DBM23</b>   DBM28   DBM33</li> <li>• SECondary800: <b>DBM23</b>   DBM27</li> <li>• USCellular: <b>DBM23</b>   DBM27   DBM31</li> <li>• USPCs: DBM8   DBM13   DBM18   <b>DBM23</b>   DBM28</li> </ul>
Query	Same as setting
*RST Setting	<ul style="list-style-type: none"> <li>• [:SElected]: DBM23 (because *RST causes the IS-856 Band to be set to US PCS)</li> <li>• IMT2000: DBM18</li> <li>• JCDMa, KPCs, NMT450, SECondary800, USCellular, USPCs: DBM23</li> </ul>
<p><b>Programming Example</b></p> <p>OUTPUT 714;"CALL:MS:POWer:MAXimum DBM28"  ! Sets the AT Max Power for the currently selected band to +28 dBm.</p> <p>OUTPUT 714;"CALL:MS:POW:MAXimum:KPCS DBM13"  ! Sets the AT Max Power for Korean PCS band to +13 dBm.</p>	

## CALL:MS

### CALL:MS:REPorted:HIdeNtity[:DECimal]?

Function	Queries the Decimal Hardware ID. See <a href="#">“Hardware ID” on page 173</a> .
Requirements:	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• ” (Null) (when a Hardware ID is not reported)</li><li>• 12 characters in the form ‘xxx-xxxxxxx’ where the “x”s are characters from the set 0123456789 (when Hex Hardware ID Type = 0x010000 for ESN)</li><li>• ‘0’ to ‘4294967295’ (1 to 10 characters from the set 0123456789) (when Hex Hardware ID Type is not 0x010000)</li></ul>
*RST Setting	” (Null)
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPorted:HIdeNtity?" ! Queries the Decimal Hardware ID.	

### CALL:MS:REPorted:HIdeNtity:HEX?

Function	Queries the lower 32 bits of the HardwareIDValue reported by the AT in hexadecimal format. See <a href="#">“Hardware ID” on page 173</a> .
Requirements:	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• ” (Null)</li><li>• ‘0x00000000’ to ‘0xFFFFFFFF’ (0x plus 8 characters from the set 0123456789ABCDEF)</li></ul>
*RST Setting	” (Null)
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPorted:HIdeNtity:HEX?" ! Queries the Hex Hardware ID.	

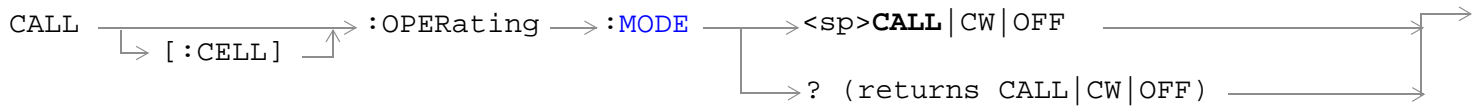
### CALL:MS:REPorted:HIdeNtity:TYPE?

Function	Queries the Hardware ID Type received from the AT. See <a href="#">“Hardware ID Type” on page 174</a> .
Requirements:	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• ” (Null)</li><li>• ‘0x000000’ to ‘0FFFFFFF’ (0x plus 6 characters from the set 0123456789ABCDEF)</li></ul>
*RST Setting	” (Null)
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPorted:HIdeNtity:TYPE?" ! Queries Hardware ID Type	

**CALL:MS:REPorted:SSEed?**

Function	Queries the Session Seed. See <a href="#">"Session Seed" on page 176</a> .
Requirements:	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"> <li>• " (0 characters), or</li> <li>• 0x followed by 8 characters from the set 0123456789ABCDEF (example: '0x00123ABC')</li> </ul>
*RST Setting	" (0 characters)
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPorted:SSEed?" ! Queries the Session Seed.	

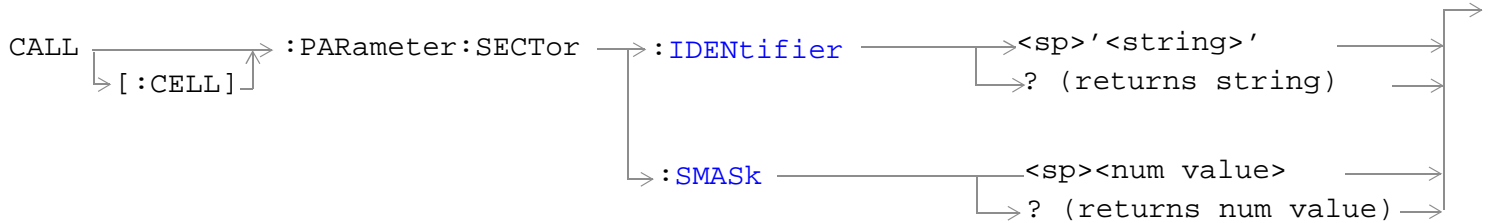
## CALL:OPERating:MODE



“Diagram Conventions” on page 326

### CALL[:CELL]:OPERating:MODE

Function	Sets/queries the operating mode of the access network emulator (see “ <a href="#">Operating Mode</a> ” on page 179).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <ul style="list-style-type: none"> <li>• <b>CALL</b>: Active Cell Mode (see “<a href="#">Active Cell Operating Mode</a>” on page 180).</li> <li>• <b>CW</b>: CW Mode (see “<a href="#">CW Operating Mode</a>” on page 181).</li> <li>• <b>OFF</b>: The test set turns off the cell RF power and puts the data connection processing state machines into an inactive state.</li> </ul>
Query	Same as setting
*RST Setting	CALL
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:OPERating:MODE CW" ! Selects CW operating mode.</pre>	

**CALL:PARAMeter:SECTor**

[“Diagram Conventions” on page 326](#)

**CALL[:CELL]:PARAMeter:SECTor:IDENTifier**

Function	Sets/queries the Sector ID. See <a href="#">“Sector ID” on page 137</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0' to 'FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF' (1 to 32 characters from the set 0123456789aAbBcCdDeEf, enclosed by quotes).
Query	Range: 0x00000000000000000000000000000000' to 0xFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF' (The return string is always 34 characters: 0x plus 32 characters from the set 0123456789ABCDEF)
*RST Setting	0xFEa00000000000000000000000000001'
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:PARAMeter:SECTor:IDENTifier 'FEa00000000000000000000000000002'" ! Sets the Sector ID to FEa00000000000000000000000000002 </pre>	

**CALL[:CELL]:PARAMeter:SECTor:SMASK**

Function	Sets/queries the sector's Subnet Mask. See <a href="#">“Subnet Mask” on page 138</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0 to 128 Resolution: integer
Query	Same as setting
*RST Setting	104
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:PARAMeter:SECTor:SMASK 100" ! Sets the sector's Subnet Mask to 100 </pre>	

**CALL:PARAmeter:SECTor**

# CALL:PNOffset

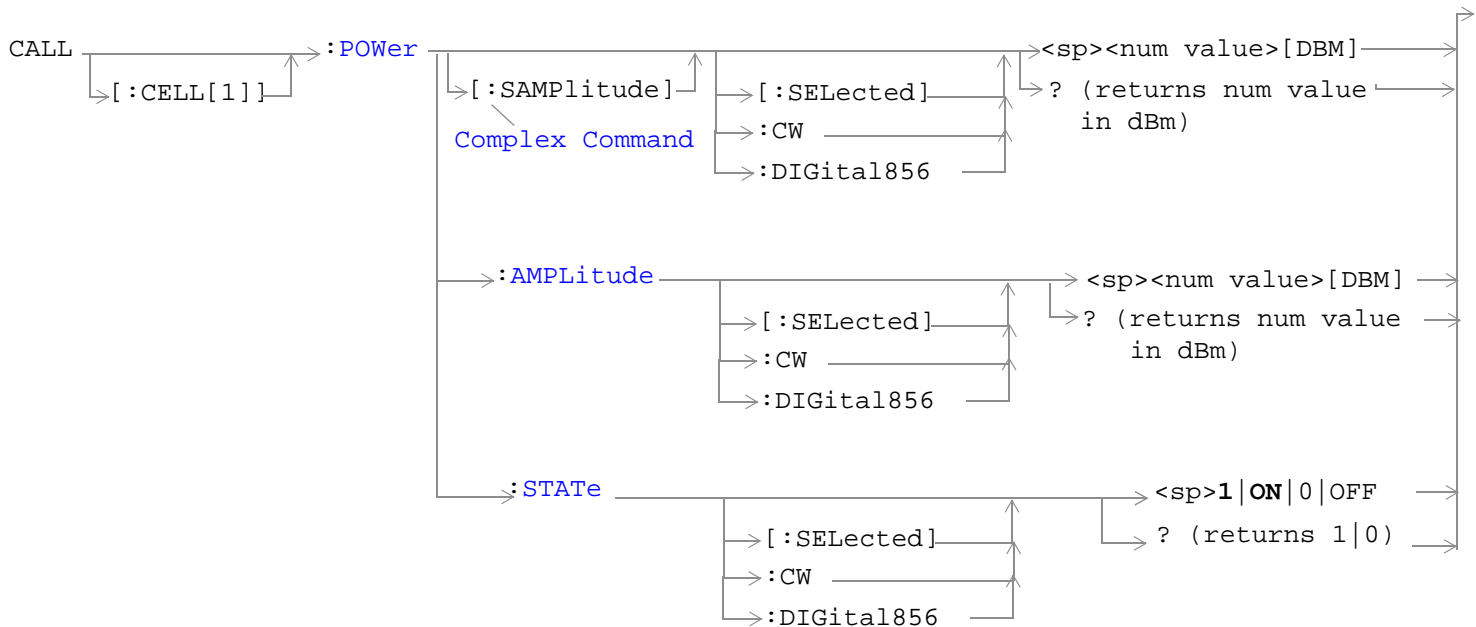


“Diagram Conventions” on page 326

## CALL[:CELL[1]]:PNOffset

Function	Sets/queries the cell’s pseudonoise (PN) offset. See “PN Offset” on page 153. This command may take up to 2 seconds to complete.
Requirements	Test Application Revision: A.01.20
Setting	Range: 0 to 511 Resolution: integer
Query	Same as setting
*RST Setting	12
<b>Programming Example</b> OUTPUT 714;"CALL:PNOffset 333" ! Sets the PN offset to 333.	

## CALL:POWer



“Diagram Conventions” on page 326

### CALL[:CELL]:POWer[:SAMPLitude]<[:SElected]][:CW]:DIGital856>

Function	The setting form of this command performs two functions: (1) sets the desired cell power level and (2) turns the cell power on/off state to on. The query form returns the desired cell power level. (See “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for more information about desired versus current power levels).  The optional [:SElected] keyword in this command specifies that the cell power level being set or queried applies to the current system type (see “System Type” on page 167).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: see “CALL[:CELL]:POWer:AMPLitude<[:SElected]][:CW]:DIGital856>”
Query	Range/Resolution: see “CALL[:CELL]:POWer:AMPLitude<[:SElected]][:CW]:DIGital856>”
*RST Setting	ON, and see “CALL[:CELL]:POWer:AMPLitude<[:SElected]][:CW]:DIGital856>”
<b>Programming Example</b>  OUTPUT 714;"CALL:POWer -30" ! Sets cell power state to ON and ! sets desired cell power level to -30 dBm for the current system type. OUTPUT 714;"CALL:POWer:DIGital856 -56" ! Sets cell power state to ON and ! sets desired cell power level to -56 dBm/1.23 MHz for the DIGital856 system type.	



**CALL[:CELL]:POWer:AMPLitude<[:SElected]][:CW|:DIGital856]>**

Function	Sets/queries the desired cell power level. (See “ <a href="#">Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power</a> ” on page 149 for more information about desired versus current power levels).  The optional [:SElected] keyword in this command specifies that the cell power level being set or queried applies to the current system type (see “ <a href="#">System Type</a> ” on page 167).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: (This is the range of settings accepted, see “ <a href="#">Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power</a> ” on page 149 for the actual hardware range of the source)  <ul style="list-style-type: none"> <li>• CW: -177 dBm to +40 dBm</li> <li>• DIGital856: -170 dBm/1.23 MHz to +37 dBm/1.23 MHz</li> </ul> Resolution: 0.01 dB
Query	Same as setting
*RST Setting	<ul style="list-style-type: none"> <li>• CW: -50 dBm</li> <li>• DIGital856: -55 dBm/1.23 MHz</li> </ul>
<b>Programming Example</b>  <pre>OUTPUT 714;"CALL:POWer:AMPLitude -30" !Sets desired cell power level to -30 dBm for the current system type. OUTPUT 714;"CALL:POWer:AMPLitude:DIGital856 -56" ! Sets desired cell power level to -56 dBm/1.23 MHz for the DIGital 856 system type.</pre>	

**CALL[:CELL]:POWer:STATe<[:SElected]][:CW|:DIGital856]>**

Function	Sets/queries the cell power state.  The optional [:SElected] keyword in this command specifies that the cell power level being set or queried applies to the current system type (see “ <a href="#">System Type</a> ” on page 167).
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	ON
<b>Programming Example</b>  <pre>OUTPUT 714;"CALL:POWer:STATe OFF" !Turns off cell power for the current system type.</pre>	

## CALL:RFGenerator

CALL 
  
 CALL 
  
 >:RFGenerator:FREQUENCY 
  
 <sp><num value>[HZ|KHZ|MHZ|GHZ]
   
 ? (returns num value in Hz)

[“Diagram Conventions” on page 326](#)

### CALL[:CELL]:RFGenerator:FREQUENCY

Function	While in CW operating mode (see <a href="#">“CW Operating Mode” on page 181</a> ), this command sets/queries the frequency that the test set's RF generator shall be set to. If no units are specified the setting defaults to Hz.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
Query	Same as setting
*RST Setting	851000000 Hz
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:RFGenerator:FREQUENCY 450 MHZ"</pre> ! Sets the RF generator frequency to 450 MHz.	

## CALL:SClose

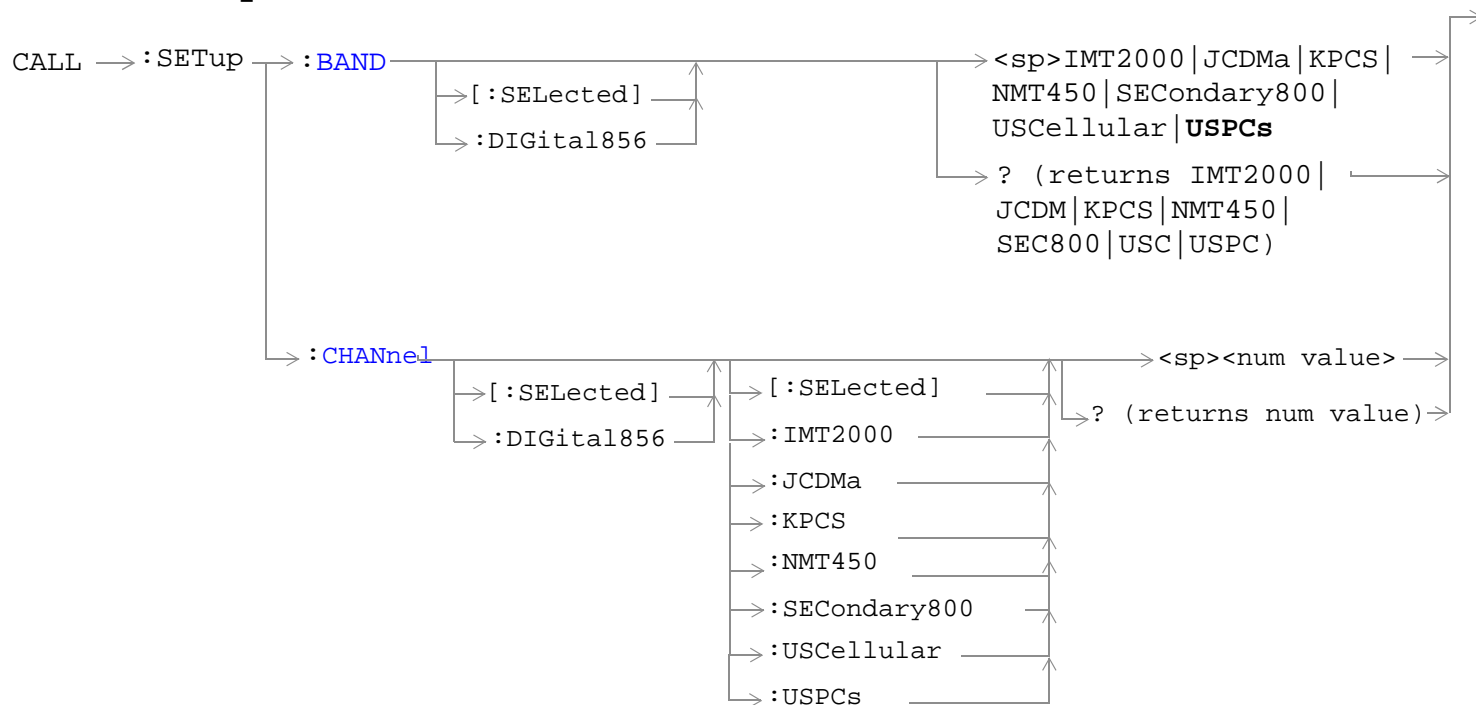


[“Diagram Conventions” on page 326](#)

### CALL:SClose

Function	Close Session causes the AN to close the currently active session. See <a href="#">“Session Closing State” on page 124</a> .
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:SClose" ! Causes the AN to close the currently active session </pre>	

## CALL:SETup



[“Diagram Conventions” on page 326](#)

**CALL:SETup:BAND<[:SElected]:DIGital856>**

Function	<p>Sets/queries the handoff cell band. This is the “Cell Band” that will be handed off to when the “CALL:HANDoff” command is sent. The handoff cell band is associated with a handoff system type (see “System Type” on page 167). You can set one handoff cell band for each handoff system type.</p> <p>The optional [:SElected] keyword in this command specifies that the handoff cell band being set/queried applies to the current handoff system type (see “System Type” on page 167).</p> <p>For more information about handoffs, see “Handoff” on page 121.</p> <p>To set or query the current cell band, rather than the handoff cell band, use the “CALL:BAND” command.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: IMT2000   JCDMa   KPCS   NMT450   SECondary800   USCellular   <b>USPCs</b>
Query	Range: IMT2000   JCDM   KPCS   NMT450   SEC800   USC   USPC
*RST Setting	USPC
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"CALL:SETup:BAND KPCS" ! Sets the handoff cell band to Korean PCS. This is the cell band ! that the test set will move to when the CALL:HANDoff command is sent </pre>	

## CALL:SETup

CALL:SETup:CHANnel<[:SElected]:DIGital856>

<[:SElected]:IMT2000[:JCDMa]:KPCS[:NMT450]:SECondary800[:USCellular]:USPCs>

Function	<p>Sets/queries the handoff channel. This is the “Channel” that will be handed off to when the “CALL:HANDoff” command is sent. The handoff channel is associated with a handoff system type (see “System Type” on page 167) and handoff cell band (see “Cell Band” on page 159). You can set one handoff channel for each handoff cell band.</p> <p>The first optional [:SElected] keyword in this command specifies that the handoff channel being set/queried applies to the current handoff system type (see “System Type” on page 167).</p> <p>The second optional [:SElected] keyword in this command specifies that the handoff channel being set/queried applies to the current handoff cell band (see “Cell Band” on page 159). To set or query the current handoff cell band, use the CALL:SETup:BAND command (see “CALL:SETup:BAND&lt;[:SElected]:DIGital856&gt;”).</p> <p>For more information about handoffs, see “Handoff” on page 121.</p> <p>To set or query the current channel, rather than the handoff channel, use the “CALL:CHANnel” command.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	<p>Range:</p> <ul style="list-style-type: none"><li>• IMT2000: 0 to 1199</li><li>• JCDMa: 1 to 799, 801 to 1039, 1041 to 1199, 1201 to 1600</li><li>• KPCS: 0 to 599</li><li>• NMT450: 1 to 300, 539 to 871, 1039 to 1473, 1792 to 2016</li><li>• SECondary800: 0 to 919</li><li>• USCellular: 1 to 799, 991 to 1023</li><li>• USPCs: 0 to 1199</li></ul> <p>Resolution: integer</p>
Query	Same as setting
*RST Setting	<ul style="list-style-type: none"><li>• [:SElected]: 525 (because *RST causes the band to be set to US PCS)</li><li>• IMT2000: 525</li><li>• JCDMa: 76</li><li>• KPCS: 325</li><li>• NMT450: 210</li><li>• SECondary800: 820</li><li>• USCellular: 384</li><li>• USPCs: 525</li></ul>

**Programming Example**

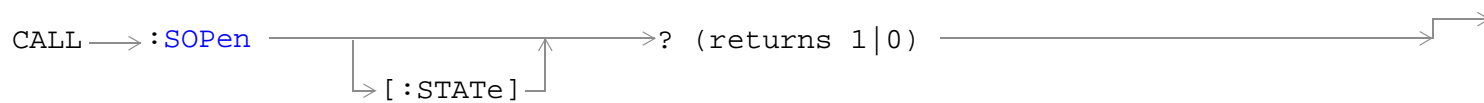
```
OUTPUT 714;"CALL:SETUP:CHANNEL?"
! Queries the channel number of the current handoff system type and handoff cell band.

OUTPUT 714;"CALL:SETUP:CHANNEL 384"
! Sets the channel number of the current handoff system type and handoff cell band.

OUTPUT 714;"CALL:SETUP:CHANNEL:DIGital856:KPCS 384"
! Sets the handoff channel number for the DIGital856 handoff system type and
! Korean PCS handoff cell band to 384. If this system type and cell band are not
! being handed off to (are not the current handoff system type and handoff cell band),
! the value 384 is stored.
```

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## CALL:SOPen?



[“Diagram Conventions” on page 326](#)



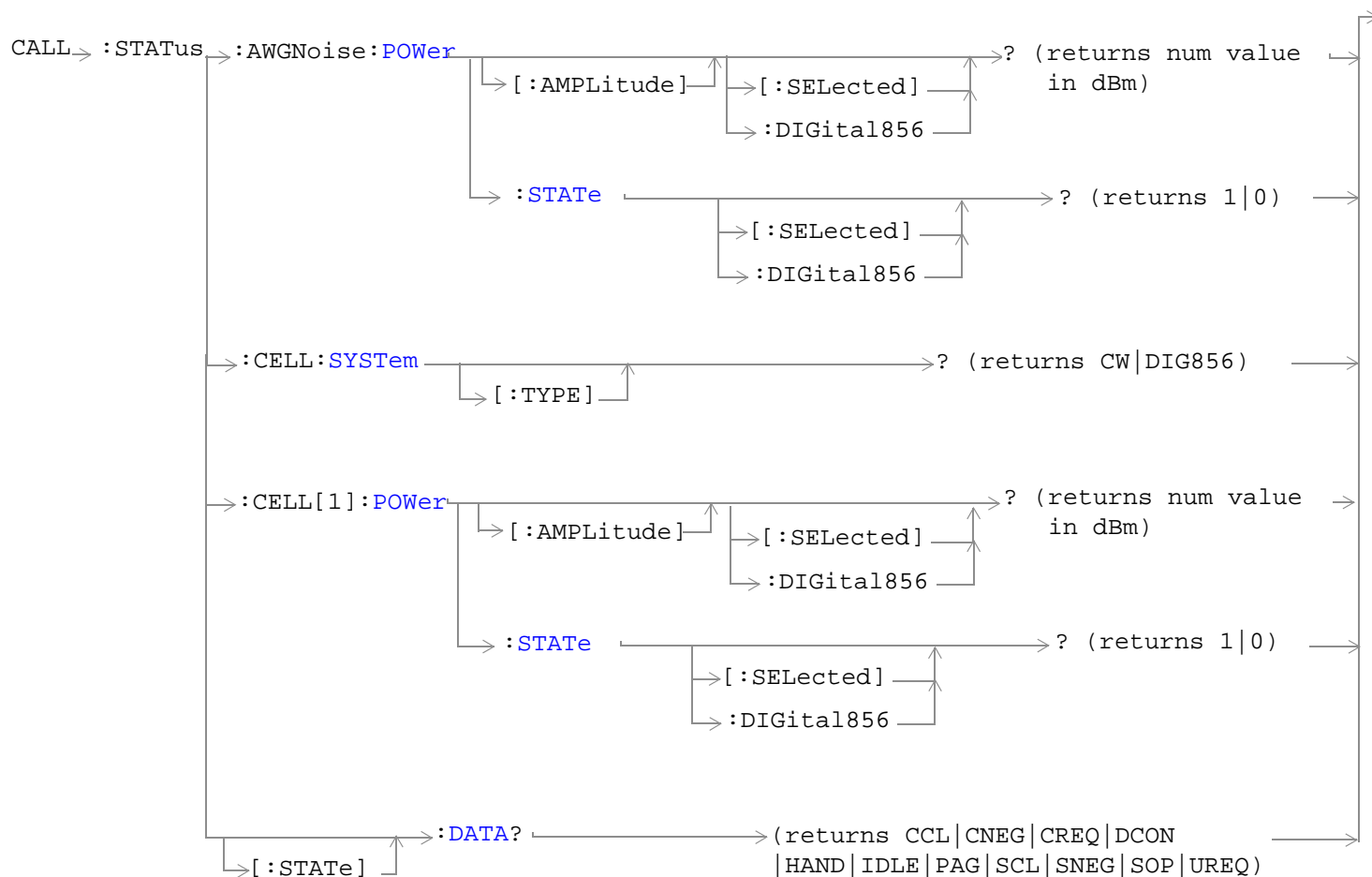
## CALL:SOPen[:STATE]?

Function	<p>This command queries whether or not the data connection is in the session open state (see “<a href="#">Session Open State</a>” on page 115 for a description of this data connection state).</p> <p>When the query is sent:</p> <ul style="list-style-type: none"> <li>• If the data connection is in the session open state, the query immediately returns a 1.</li> <li>• If the data connection is in any other non-transitory state, the query immediately returns a 0 (see “<a href="#">Data Connection Processing Lifecycle</a>” on page 109 for information about which states are non-transitory).</li> <li>• If the data connection is in a transitory state, the query waits until the data connection reaches a non-transitory state, and then returns a 1 if the state is session open or a 0 if the state is any other non-transitory state.</li> </ul> <div style="text-align: center;"> <pre> graph TD     CSOPen[CALL:SOPen?] --&gt; DCState[data connection state]     DCState -- "(idle or connected)" --&gt; Q0[query returns 0]     DCState -- "(session open)" --&gt; Q1[query returns 1]     Transitory["(UATI request, session negotiate, session closing, paging, connection request, connection negotiate, connection closing or handoff)"] --&gt; DCState   </pre> </div> <hr/> <p><b>NOTE</b> The query will hang as long as the data connection is in a transitory state. However, the AT includes protocol timers which limit the time it may stay in a transitory state. So, the AT should force the connection to return to a non-transitory state after its protocol timers expire, and so the query will not hang forever.</p>
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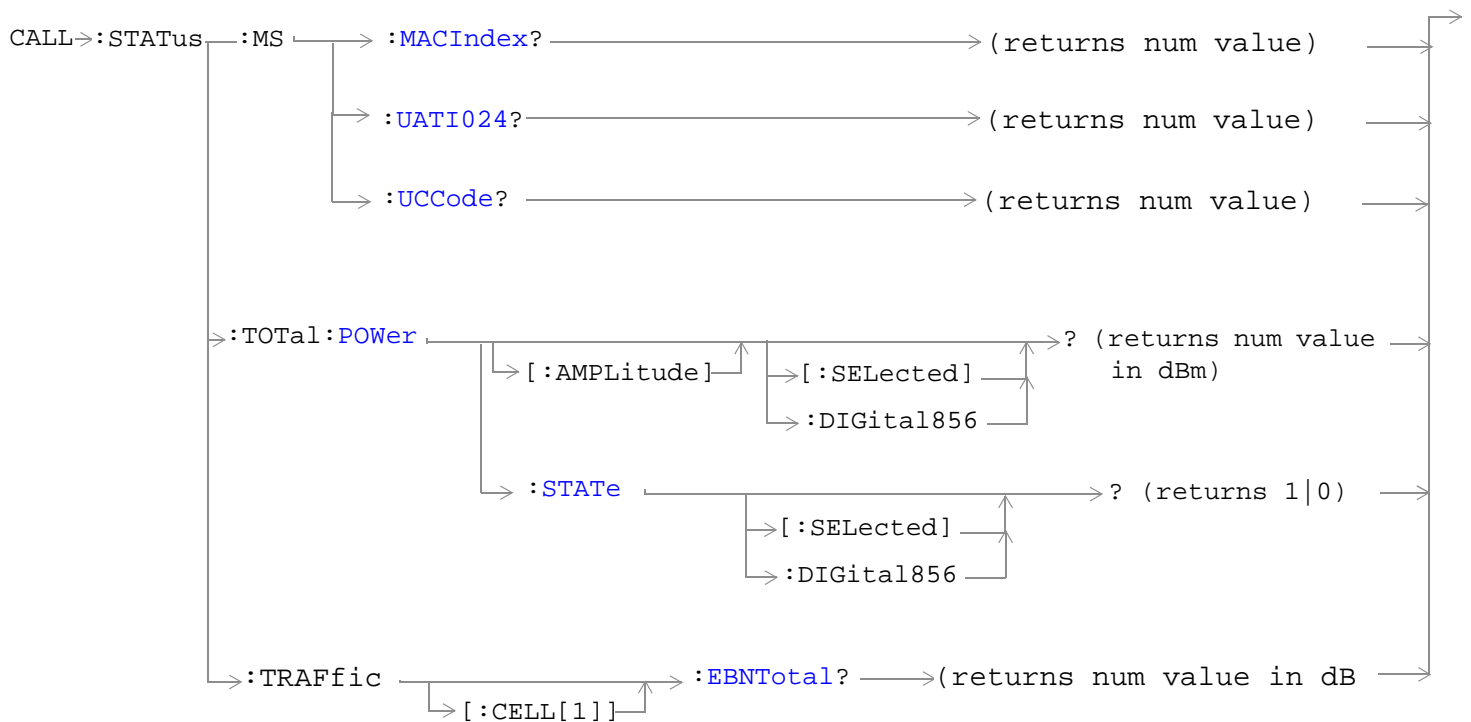
## CALL:SOPen?

	<p>The query behaves differently if the data connection state change detector (see <a href="#">“Data Connection State Change Detector” on page 241</a>) is armed when the query is sent:</p> <ul style="list-style-type: none"><li>• If the data connection is in a non-transitory state, the query hangs until the data connection state reaches a different non-transitory state, then returns a 1 if the state is session open or a 0 if the state is any other non-transitory state. For example, if the data connection is in the session open state when the query is sent, the query hangs until the data connection leaves the session open state, reaches another non-transitory state such as idle or connected, and then returns a 0.</li><li>• If the data connection is in a transitory state, the query hangs until the data connection reaches a non-transitory state, and then returns a 1 if the state is session open or a 0 if the state is any other non-transitory state.</li></ul> <hr/> <p><b>NOTE</b> If the data connection state change detector timeout (see <a href="#">“Data Connection State Change Detector” on page 241</a>) expires before the data connection moves to a different non-transitory state, then the change detector is disarmed, which releases the query. The query will then immediately return a 1 for session open, 0 for idle or connected, or hang until any non-transitory state is reached or the AT protocol timers expire.</p> <hr/> <p>Using the CALL:SOPen? query in conjunction with the data connection state change detector is useful in determining whether an attempt to open a session has been successful (see <a href="#">“Establish a Session from the Access Terminal” on page 196</a>) or to confirm that an attempt to close a connection (but preserve the session) has been successful (see <a href="#">“Close the Connection” on page 204</a>). See <a href="#">“Data Connection State Synchronization” on page 240</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1 0
*RST Setting	0
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:SOPen?" ! Queries whether the Data Connection state is session open.</pre>	

## CALL:STATUS



## CALL:STATus



[“Diagram Conventions” on page 326](#)

**CALL:STATus:AWGNoise:POWer[:AMPLitude]<[:SElected]:DIGital856>?**

Function	<p>Queries the current power level of the additive white Gaussian noise (AWGN) source for the specified system type.</p> <p>The optional [:SElected] keyword in this command specifies that the AWGN power level being set or queried applies to the current system type (see “System Type” on page 167).</p> <p>See “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for more information about desired versus current power levels.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>-170 dBm/1.23 MHz to +35 dBm/1.23 MHz (This is the range of possible query returns, see “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for the actual hardware range of the source)</li> <li>NAN (Returned if “CALL:STATus:AWGNoise:POWer:STATe&lt;[:SElected]:DIGital856&gt;?” is OFF)</li> </ul> <p>Resolution: 0.01 dB</p>
*RST Setting	NAN
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:STATus:AWGN:POWer:AMPLitude?" ! Queries the current AWGN power</pre>	

**CALL:STATus:AWGNoise:POWer:STATe<[:SElected]:DIGital856>?**

Function	<p>Queries the current on/off state of the additive white Gaussian noise (AWGN) source for the specified system type.</p> <p>The optional [:SElected] keyword in this command specifies that the AWGN power level being set or queried applies to the current system type (see “System Type” on page 167).</p> <p>See “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149 for more information about desired versus current power levels.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1   0
*RST Setting	0 (Off)
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:STATus:AWGNoise:POWer:STATe?" ! Queries the current on/off state of the AWGN source</pre>	

## CALL:STATus

### CALL:STATus:CELL:SYSTEM[:TYPE]?

Function	Queries which system type the test set is currently emulating (see <a href="#">“System Type” on page 167</a> ).
Requirements	Test Application Revision: A.01.20 and above
Query	Range: CW   DIG856
*RST Setting	DIG856
<b>Programming Example</b>  OUTPUT 714; "CALL:STATus:CELL:SYSTEM?" ! Queries the current system type.	

### CALL:STATus:CELL[1]:POWER:[AMPLitude]<[:SElected]||:DIGital856>?

Function	Queries the current cell (1) power level for the specified system type.  The optional [:SElected] keyword in this command specifies that the cell power level being set or queried applies to the current system type (see <a href="#">“System Type” on page 167</a> ).  See <a href="#">“Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149</a> for more information about desired versus current power levels.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• -170 dBm/1.23 MHz to +37 dBm/1.23 MHz (This is the range of possible query returns, see <a href="#">“Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149</a> for the actual hardware range of the source)</li><li>• NAN (Returned if <a href="#">“CALL:STATus:CELL[1]:POWER:STATE&lt;[:SElected]  :DIGital856&gt;?”</a> is OFF)</li></ul> Resolution: 0.01 dB
*RST Setting	-55 dBm
<b>Programming Example</b>  OUTPUT 714; "CALL:STATus:CELL:POWER?" ! Queries the current cell power level	

## CALL:STATus:CELL[1]:POWER:STATE&lt;[:SELEcted]&gt;:DIGital856&gt;?

Function	Queries the current on/off state of cell (1) power for the specified system type. The optional [:SELEcted] keyword in this command specifies that the cell power level being set or queried applies to the current system type (see “ <a href="#">System Type</a> ” on page 167). See “ <a href="#">Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power</a> ” on page 149 for more information about desired versus current power levels.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1   0
*RST Setting	1 (on)
<b>Programming Example</b> <pre>OUTPUT 714; "CALL:STATus:CELL:POWER:STATE?" ! Queries the current on/off state of cell power</pre>	

## CALL:STATus[:STATE]:DATA?

Function	Queries the status of the data connection. See “ <a href="#">Data Connection Processing States</a> ” on page 108 and “ <a href="#">Instrument Status Area</a> ” on page 707. Use the CALL:STATus:DATA? query after a handoff to verify the data connection state is still connected. See “ <a href="#">Handoff</a> ” on page 121 and “ <a href="#">Data Connection State Synchronization</a> ” on page 240.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: CCL (“ <a href="#">Connection Closing State</a> ” on page 123) CNEG (“ <a href="#">Connection Negotiate State</a> ” on page 118) CREQ (“ <a href="#">Connection Request State</a> ” on page 117) DCON (“ <a href="#">Connected State</a> ” on page 120) HAND (“ <a href="#">Handoff</a> ” on page 121) IDLE (“ <a href="#">Idle State</a> ” on page 111) PAG (“ <a href="#">Paging State</a> ” on page 116) SCL (“ <a href="#">Session Closing State</a> ” on page 124) SNEG (“ <a href="#">Session Negotiate State</a> ” on page 113) SOP (“ <a href="#">Session Open State</a> ” on page 115) UREQ (“ <a href="#">UATI Request State</a> ” on page 112)
*RST Setting	IDLE
<b>Programming Example</b> <pre>OUTPUT 714; "CALL:STATus:DATA?" ! Queries the status of the data connection.</pre>	

## CALL:STATus

### CALL:STATus:MS:MACIndex?

Function	Queries the MAC Index assigned to the AT under test by the test set. See <a href="#">“MAC Index” on page 175.</a>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 5 to 63, NAN Resolution: integer
*RST Setting	NAN
<b>Programming Example</b> OUTPUT 714; "CALL:STATus:MS:MACIndex?" ! Queries the MAC Index	

### CALL:STATus:MS:UATI024?

Function	Queries the UATI 024. See <a href="#">“UATI 024” on page 177.</a>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 16777215, NAN Resolution: integer
*RST Setting	NAN
<b>Programming Example</b> OUTPUT 714; "CALL:STATus:MS:UATI024?" ! Queries the UATI 024.	

### CALL:STATus:MS:UCCode?

Function	Queries the UATI Color Code. See <a href="#">“UATI Color Code” on page 178.</a>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 255, NAN Resolution: integer
*RST Setting	NAN
<b>Programming Example</b> OUTPUT 714; "CALL:STATus:MS:UCCode?" ! Queries the UATI Color Code.	



**CALL:STATus:TOTal:POWer[:AMPLitude]<[:SELEcted]][:DIGital856]>?**

Function	<p>Queries the current total RF power for the specified system type.</p> <p>The total RF power is equal to the sum of the cell power and AWGN power.</p> <p>The optional [:SELEcted] keyword in this command specifies that the total RF power level being set or queried applies to the current system type (see “<a href="#">System Type</a>” on page 167).</p> <p>See “<a href="#">Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power</a>” on page 149 for more information about desired versus current power levels.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>-170 dBm/1.23 MHz to +42 dBm/1.23 MHz (This is the range of possible query returns, see “<a href="#">Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power</a>” on page 149 for the actual hardware range of the source)</li> <li>NAN (Returned if “<a href="#">CALL:STATus:TOTal:POWer:STATe&lt;[:SELEcted]][:DIGital856]&gt;?</a>” is OFF)</li> </ul> <p>Resolution: 0.01 dB</p>
*RST Setting	-55 dBm
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:STATus:TOTal:POWer?" ! Queries the current total RF power</pre>	

**CALL:STATus:TOTal:POWer:STATe<[:SELEcted]][:DIGital856]>?**

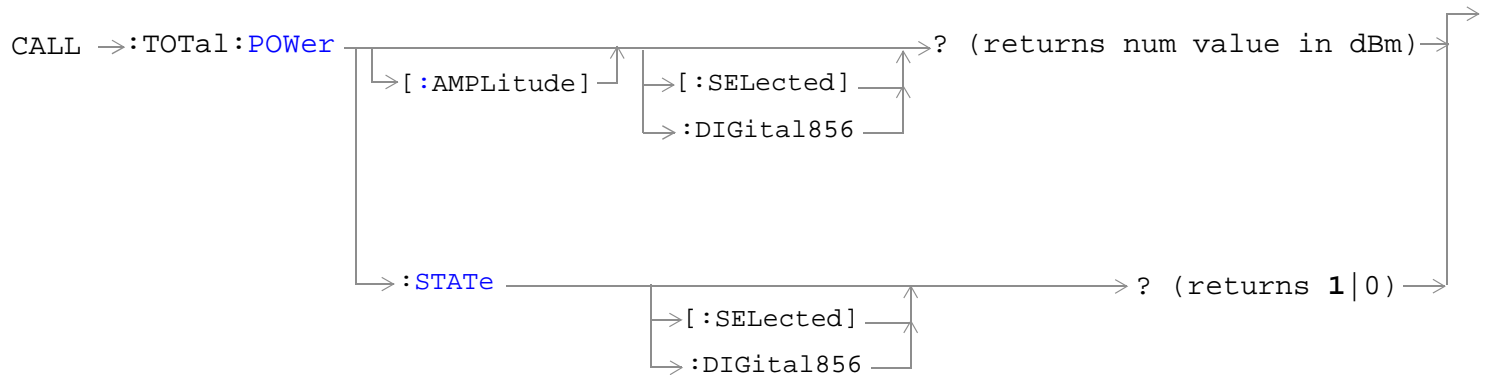
Function	<p>Queries the current on/off state of total RF power for the specified system type.</p> <p>This query will return a 1 (on) if either current cell power or current AWGN power power states are on.</p> <p>The optional [:SELEcted] keyword in this command specifies that the total RF power level being set or queried applies to the current system type (see “<a href="#">System Type</a>” on page 167).</p> <p>See “<a href="#">Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power</a>” on page 149 for more information about desired versus current power levels.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1   0
*RST Setting	1 (on)
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:STATus:TOTal:POWer:STATe?" ! Queries the current on/off state of the total RF power</pre>	

## CALL:STATus

### CALL:STATus:TRAFfic[:CELL[1]]:EBNTotal?

Function	Queries the cell energy per bit divided by noise, total ( $E_b/N_t$ ). See “Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• -24.26 to +33.80 dB</li><li>• NAN (Returned if the data connection state is not “Connected State” )</li></ul> Resolution: 0.01 dB
*RST Setting	NAN
<b>Programming Example</b> OUTPUT 714;"CALL:STATus:TRAFfic:EBNTotal?" ! Queries the current Eb/Nt	

## CALL:TOTal:POWer



[“Diagram Conventions” on page 326](#)

### CALL:TOTal:POWer[:AMPLitude]<[:SElected]][:DIGital856]>?

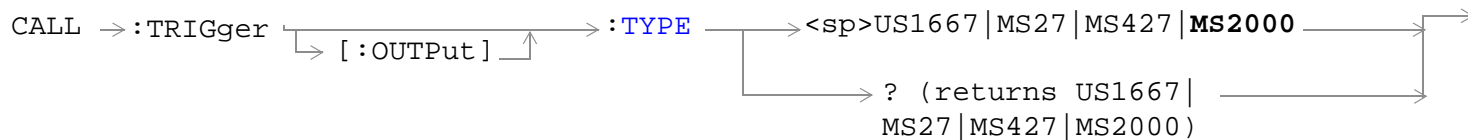
Function	<p>Queries the desired total RF power. This is not a settable parameter; it is calculated from the settings for cell power and AWGN power. (See <a href="#">“Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149</a> for more information about desired versus current power levels).</p> <p>The optional [:SElected] keyword in this command specifies that this query applies to the current system type (see <a href="#">“System Type” on page 167</a>).</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>-170 dBm/1.23 MHz to +42 dBm/1.23 MHz</li> <li>9.91 E+37 (NAN) is returned if both cell power and AWGN power are set to OFF</li> </ul> <p>Resolution: 0.01 dB</p>
*RST Setting	-55 dBm/1.23 MHz
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"CALL:TOTal:POWer?" ! Queries the current setting for desired total RF power ! (based on the settings for desired cell power and AWGN power)           </pre>	

## CALL:TOTal:POWer

### CALL:TOTal:POWer:STATe<[:SElected]][:DIGital856]>?

Function	Queries the total RF power state. The total RF power state is 1 (on) if either cell power or AWGN power is on. The optional [:SElected] keyword in this command specifies that this query applies to the current system type (see <a href="#">"System Type" on page 167</a> ).
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1   0
*RST Setting	1 (on)
<b>Programming Example</b>  OUTPUT 714;"CALL:TOTal:POWer:STATe?" ! Queries the total RF power state	

## CALL:TRIGger



[“Diagram Conventions” on page 326](#)

### CALL:TRIGger[:OUTPut]:TYPE

Function	Sets/queries the trigger that is routed to the rear panel. See <a href="#">“External Trigger Type” on page 152</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <ul style="list-style-type: none"> <li>• US1667 (1.67 ms)</li> <li>• MS27 (26.67 ms)</li> <li>• MS427 (426.67 ms)</li> <li>• MS2000 (2 s)</li> </ul>
Query	Same as setting
*RST Setting	MS2000
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:TRIGger:TYPE MS427" ! Sets the external trigger type to 426.67 ms.</pre>	

---

## DISPlay Subsystem

### Description

The DISPlay subsystem is used to configure the test set's display mode or display brightness . Use of the DISPlay subsystem is not required to set or query any data or results.

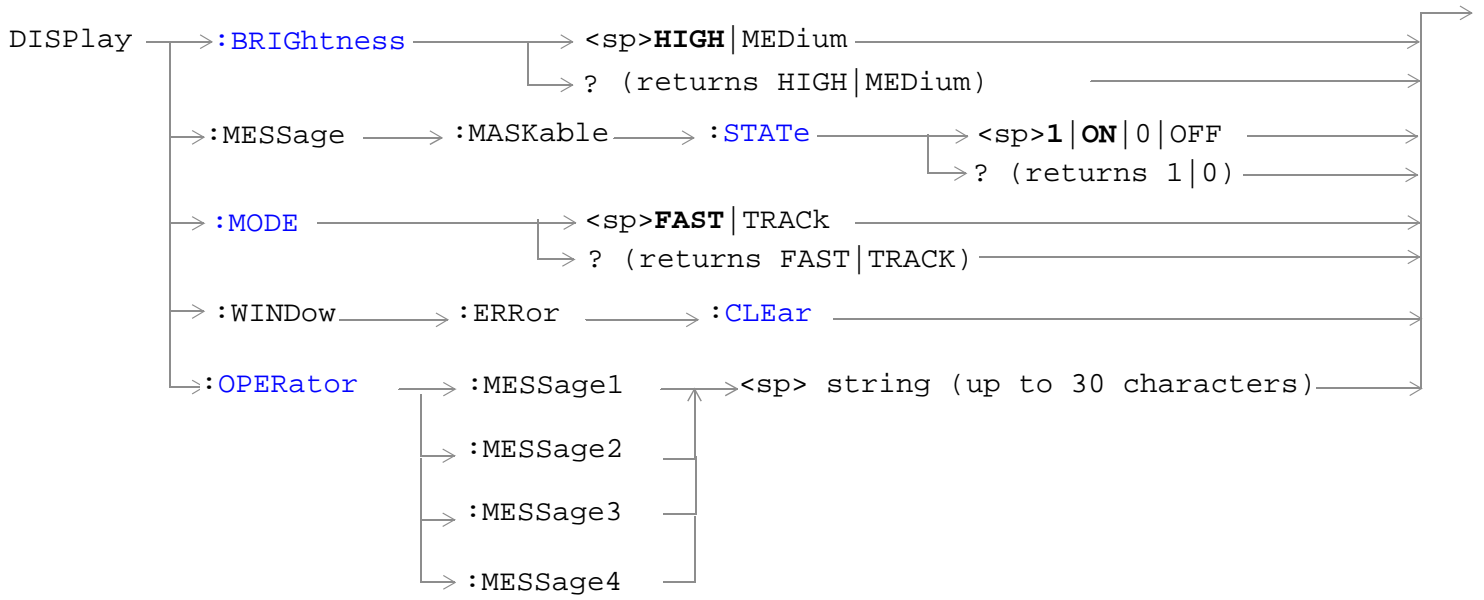
### Display Backlight Dimming

The test set's display brightness parameter has two settings at this time, high and medium. The life of the display's backlight will be maximized when brightness is set to medium. The test set has an auto dimming feature that will lower the display brightness automatically if approximately 10 minutes pass without a key being pressed on the test set's front panel. The display will return to the brightness level shown in the Display Brightness field when the test set is set to local and any front panel key is pressed. There is no other user control for this feature.

### Syntax Diagram and Command Descriptions

["DISPlay" on page 411](#)

# DISPlay



“Diagram Conventions” on page 326

## DISPlay

### DISPlay:BRIGhtness

Function	Sets/queries the test set's display brightness. A display backlight dimming feature lowers the display brightness after approximately 10 minutes without any manual user interaction with the test set. See <a href="#">"Display Backlight Dimming" on page 410.</a>
Setting	Range: MEDium   HIGH
Query	Range: MED   HIGH
Factory setting	HIGH (this parameter is not affected by any reset operation and can only be changed by direct user access)
<b>Programming Example</b> OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" !Sets display brightness to medium.	

### DISPlay:MESSAge:MASKable:STATe

Function	Blocks maskable messages from appearing on the test set display display screen but not from the Message Log. Maskable messages are reported to the Message Log in either state. See <a href="#">"Error Messages" on page 728.</a>
Setting	Range: On   Off
Query	Range: On   Off
Factory setting	On
<b>Programming Example</b> OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.	

### DISPlay:MODE

Function	Sets/queries the test set's display mode. See <a href="#">"Display Mode (Track/Fast)" on page 778</a> for a description of fast and track display modes.
Setting	Range: FAST   TRACK
Query	Range: FAST   TRAC
*RST setting	TRACK
<b>Programming Example</b> OUTPUT 714;"DISPLAY:MODE FAST" !Sets display mode to fast.	



**DISPlay:WINDow:ERRor:CLEAr**

Function	Clears the error message from the display screen but not from the Message Log.
Programming Example	
OUTPUT 714;"DISPLAY:WINDOW:ERROR:CLEAR" !Clears an error message from the display.	

**DISPlay:OPERator:MESSage**

Function	Allows the operator to enter up to four messages, each up to 30 characters in length. These messages will be printed to the display when the command is sent and "DISPlay:MODE" is set to FAST.
Setting	1   2   3   4 1=uppermost field, 4=lowermost field
Factory setting	Each message is initialized to a null string. Nothing will be displayed until one or more of the four GPIB messages is sent to the test set.
Programming Example	
OUTPUT 714;"DISP:OPER:MESS1'Press F6 to stop test'" !Writes the message "Press F6 to stop test" to the uppermost display field.	

---

## FETCh? Subsystem

### Description

The FETCh? query is a function that allows users to query results from a measurement that was previously INITiated or READ. It does NOT begin a measurement. If no measurement is in progress it will return the integrity and measurement values from the last measurement made, or return an integrity of No Result Available and results of NAN. If a measurement is in process, the query will hang until the results are available, or the measurement fails or times out. The exact results returned with a FETCh? will depend on the specific measurement. A measurement may have a number of different results or combination of results for a FETCh?. The FETCh? queries are intended to be used to provide overlapped operation access to measurement results from the test set. When used along with SETup and INITiate commands , FETCh? is the primary way for the user to retrieve measurement results. In order to use the test set's concurrent test capabilities the overlapped commands of INITiate and FETCh? must be used. Overlapped commands allow the user to send commands and not wait for completion.

### Syntax Diagrams and Command Descriptions

“FETCh:AFANalyzer” on page 415 (Audio Analyzer)

“FETCh:CAPPower” on page 424 (Access Probe Power)

“FETCh:CPError” on page 425 (Packet Error Rate)

“FETCh:CPOWer” on page 427 (Channel Power)

“FETCh:CTXSpurious” on page 429 (Tx Spurious Emissions)

“FETCh:DAPower” on page 432 (Digital Average Power)

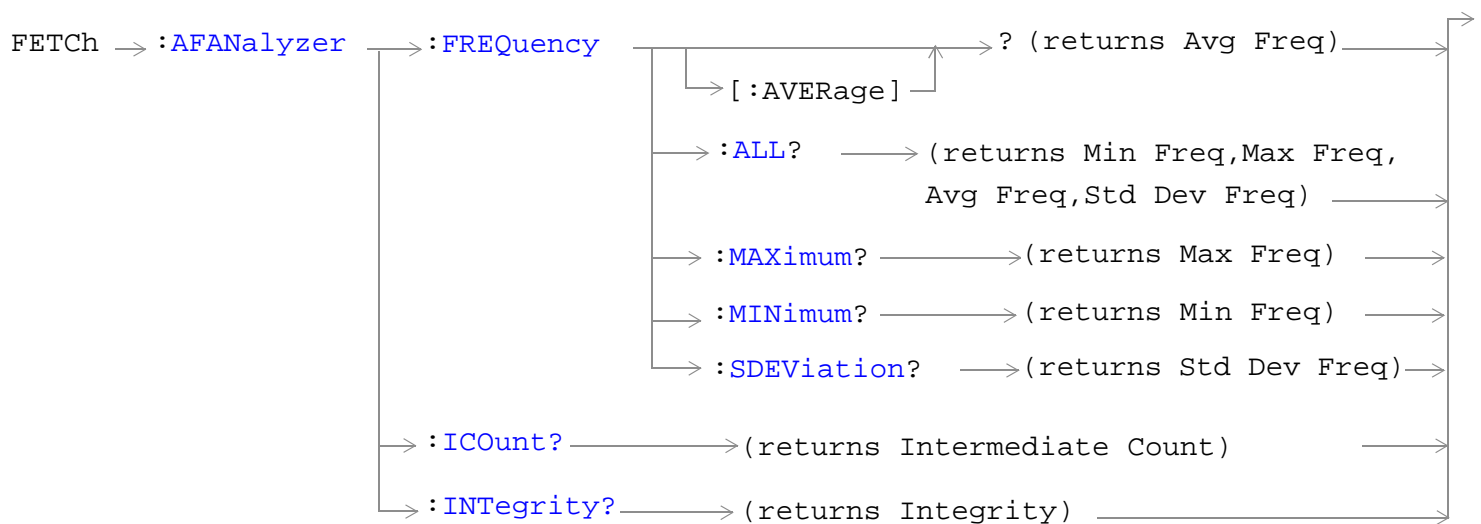
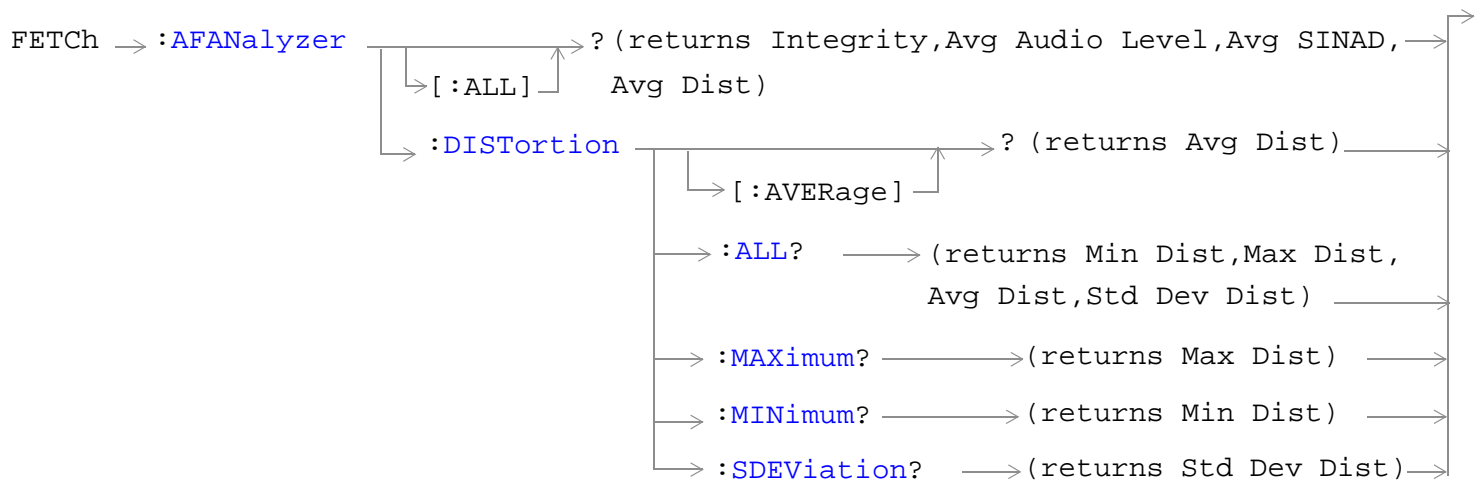
“FETCh:DOWQuality” on page 434 (Waveform Quality + Code Domain Power)

“FETCh:SAUDio” on page 448 (Swept Audio)

“FETCh:SMONitor” on page 453 (Spectrum Monitor)

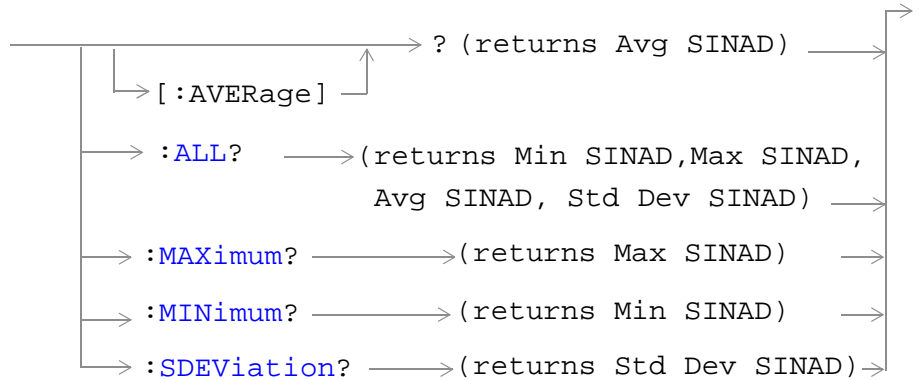
“FETCh:TROPower” on page 454 (Time Response of Open Loop Power Control)

## FETCh:AFANalyzer

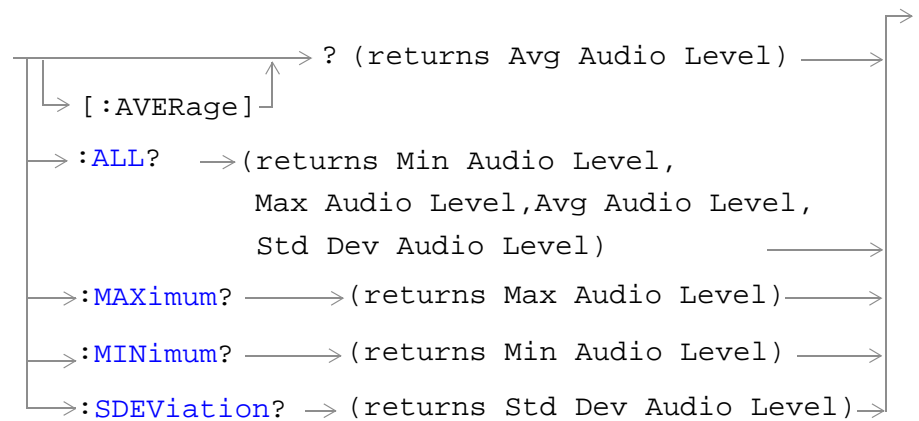


## FETCh:AFANalyzer

FETCh → :AFANalyzer → :SINAD



FETCh → :AFANalyzer → :VOLTage



[“Diagram Conventions” on page 326](#)

**FETCh:AFANalyzer[:ALL]?**

Function	<p>Queries the AF analyzer measurements.</p> <p>Measurement results are returned in the following order: integrity, average audio level, average SINAD, average distortion.</p>
Query	<p>Average analog audio level</p> <ul style="list-style-type: none"> <li>• Range: 0 to 20 volts, 9.91 E+37</li> <li>• Resolution: The lesser of 4 significant digits or 10 uV</li> </ul> <p>Average SINAD</p> <ul style="list-style-type: none"> <li>• Range:-99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Average audio distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

**Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:ALL?"
!Returns integrity, average audio level, average SINAD,and average audio distortion.
```

**FETCh:AFANalyzer:DISToRtion[:AVERAge]?**

Function	<p>Queries the average audio distortion measurement.</p>
Query	<p>Average audio distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

**Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:DISToRtion:AVERAge?"
```

## **FETCh:AFANalyzer**

### **FETCh:AFANalyzer:DISTortion:ALL?**

Function	Queries the audio distortion measurements. The measurement results are returned in the following order: minimum distortion, maximum distortion, average distortion, standard deviation distortion.
Query	Minimum, maximum, and average audio distortion: <ul style="list-style-type: none"><li>• Range: 0 to 99%, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> Standard deviation audio distortion: <ul style="list-style-type: none"><li>• Range: 0 to 99%, 9.91 E+37</li><li>• Resolution: 0.001%</li></ul>

#### **Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:DISORTION:ALL?"  
!Returns minimum, maximum, average, and standard deviation audio distortion.
```

### **FETCh:AFANalyzer:DISTortion:MAXimum?**

Function	Queries the maximum audio distortion.
Query	Range: 0 to 99%, 9.91 E+37 Resolution: 0.01%

#### **Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:DISORTION:MAXIMUM?"
```

### **FETCh:AFANalyzer:DISTortion:MINimum?**

Function	Queries the minimum audio distortion.
Query	Range: 0 to 99%, 9.91 E+37 Resolution: 0.01%

#### **Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:DISORTION:MINIMUM?"
```

### **FETCh:AFANalyzer:DISTortion:SDEVIation?**

Function	Queries the standard deviation audio distortion.
Query	Range: 0 to 99%, 9.91 E+37 Resolution: 0.001%

#### **Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:DISORTION:SDEVIATION?"
```

**FETCh:AFANalyzer:FREQuency[:AVERAge]?**

Function	Queries the average audio frequency measurement.
Query	Average audio frequency <ul style="list-style-type: none"> <li>• Range: 0 to 99999 Hz, 9.91 E+37</li> <li>• Resolution: 0.1 Hz</li> </ul>

**Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:FREQUENCy:AVERAGE?"
```

**FETCh:AFANalyzer:FREQuency:ALL?**

Function	Queries the audio frequency measurements. The measurement results are returned in the following order: minimum frequency, maximum frequency, average frequency, standard deviation frequency.
Query	Minimum, maximum, and average audio frequency: <ul style="list-style-type: none"> <li>• Range: 0 to 99999 Hz, 9.91 E+37</li> <li>• Resolution: 0.1 Hz</li> </ul> Standard deviation audio frequency: <ul style="list-style-type: none"> <li>• Range: 0 to 99999 Hz, 9.91 E+37</li> <li>• Resolution: 0.01 Hz</li> </ul>

**Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:FREQUENCy:ALL?"
!Returns minimum, maximum, average, and standard deviation audio frequency.
```

**FETCh:AFANalyzer:FREQuency:MAXimum?**

Function	Queries the maximum audio frequency.
Query	Range: 0 to 99999 Hz, 9.91 E+37 Resolution: 0.1 Hz

**Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:FREQUENCy:MAXIMUM?"
```

**FETCh:AFANalyzer:FREQuency:MINimum?**

Function	Queries the minimum audio frequency.
Query	Range: 0 to 99999 Hz, 9.91 E+37 Resolution: 0.1 Hz

**Programming Example**

```
OUTPUT 714;"FETCh:AFANALYZER:FREQUENCy:MINIMUM?"
```

## FETCh:AFANalyzer

### FETCh:AFANalyzer:FREQuency:SDEVIation?

Function	Queries the standard deviation audio frequency.
Query	Range: 0 to 99999 Hz, 9.91 E+37 Resolution: 0.01 Hz

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:FREQUENCY:SDEVIATION?"
```

### FETCh:AFANalyzer:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:ICOUNT?"
```

### FETCh:AFANalyzer:INTegrity?

Function	Queries the measurement integrity indicator for the last AF analyzer measurement completed. Zero indicates a normal measurement. See <a href="#">"Integrity Indicator" on page 255</a> for information about non-zero integrity results.
Query	Range: 1 through 16

#### Programming Example

```
OUTPUT 714;"FETCh:AFANalyzer:INTegrity?"  
!Query the integrity indicator for the AF analyzer results.
```

### FETCh:AFANalyzer:SINAD[:AVERage]?

Function	Queries the average SINAD measurement.
Query	Average SINAD <ul style="list-style-type: none"><li>• Range:-99 to 99 dB, 9.91 E+37</li><li>• Resolution: 0.01 dB</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:SINAD:AVERAGE"
```



### FETCh:AFANalyzer:SINAD:ALL?

Function	Queries the SINAD measurements. Measurement results are returned in the following order: minimim SINAD, maximum SINAD, average SINAD, and standard deviation SINAD.
Query	Minimum, maximum, average SINAD: <ul style="list-style-type: none"> <li>• Range: -99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> Standard deviation SINAD <ul style="list-style-type: none"> <li>• Range: -99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.001 dB</li> </ul>

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:SINAD:ALL?"
!Returns minimum, maximum, average, and standard deviation SINAD.
```

### FETCh:AFANalyzer:SINAD:MAXimum?

Function	Queries the maximum SINAD measurements.
Query	Range: -99 to 99 dB, 9.91 E+37 Resolution: 0.01 dB

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:SINAD:MAXIMUM?"
```

### FETCh:AFANalyzer:SINAD:MINimum?

Function	Queries the minimum SINAD measurements.
Query	Range: -99 to 99 dB, 9.91 E+37 Resolution: 0.01 dB

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:SINAD:MINIMUM?"
```

### FETCh:AFANalyzer:SINAD:SDEVIation?

Function	Queries the standard deviation SINAD measurements.
Query	Range: 0 to 99 dB, 9.91 E+37 Resolution: 0.001 dB

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:SINAD:SDEVIATION?"
```

## FETCh:AFANalyzer

### FETCh:AFANalyzer:VOLTage[:AVERage]?

Function	Queries the average audio level measurement.
Query	Range: 0 to 20 volts, 9.91 E+37 Resolution: the lesser of 4 significant digits or 10 uV

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:VOLTAGE:AVERAGE"
```

### FETCh:AFANalyzer:VOLTage:ALL?

Function	Queries the audio level measurements. Measurement results are returned in the following order: minimum audio level, maximum audio level, average audio level, standard deviation audio level.
Query	Range: 0 to 20 V, 9.91 E+37 Resolution: 4 significant digits

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:VOLTAGE:ALL?"  
!Returns minimum, maximum, average, and standard deviation audio level.
```

### FETCh:AFANalyzer:VOLTage:MAXimum?

Function	Queries the maximum audio level measurement.
Query	Range: 0 to 20 V, 9.91 E+37 Resolution: 4 significant digits

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:VOLTAGE:MAXIMUM?"
```

### FETCh:AFANalyzer:VOLTage:MINimum?

Function	Queries the minimum audio level measurement.
Query	Range: 0 to 20 V, 9.91 E+37 Resolution: 4 significant digits

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:VOLTAGE:MAXIMUM?"
```

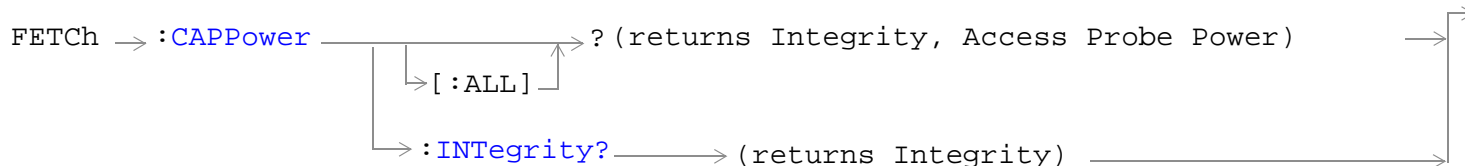
**FETCh:AFANalyzer:VOLTage:SDEVIation?**

Function	Queries the standard deviation audio level measurement.
Query	Range: 0 to 20 V, 9.91 E+37 Resolution: 4 significant digits

**Programming Example**

```
OUTPUT 714; "FETCh:AFANALYZER:VOLTAGE:SDEVIATION?"
```

## FETCh:CAPPower



[“Diagram Conventions” on page 326](#)

### FETCh:CAPPower[:ALL]?

Function	Queries the access probe power measurement results. This query returns an integrity indicator followed by the most recent access probe power measurement result (if results are available). See <a href="#">“Access Probe Power Measurement Results” on page 39</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	<ul style="list-style-type: none"> <li>Range: -100 to 100 dBm, 9.91 E+37</li> <li>Resolution: 0.01 dBm</li> </ul>

#### Programming Example

```
OUTPUT 714;"FETCh:CAPPower?" !Returns integrity, access probe power measurement.
```

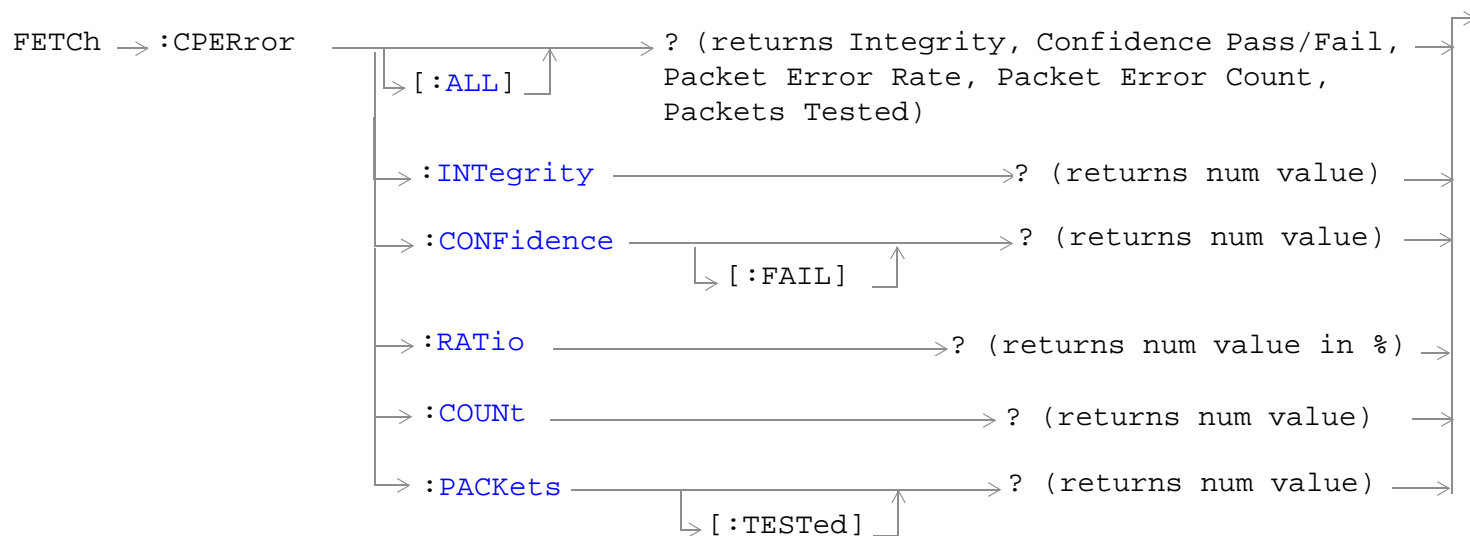
### FETCh:CAPPower:INTegrity?

Function	Queries the measurement integrity indicator for the last access probe power measurement completed. Zero indicates a normal measurement. See <a href="#">“Access Probe Power Measurement Results” on page 39</a> , “Integrity Indicator,” for information about non-zero integrity results.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 through 23

#### Programming Example

```
OUTPUT 714;"FETCh:CAPPower:INTegrity?"
!Queries the integrity indicator for the most recent access probe power result.
```

## FETCh:CPErRor



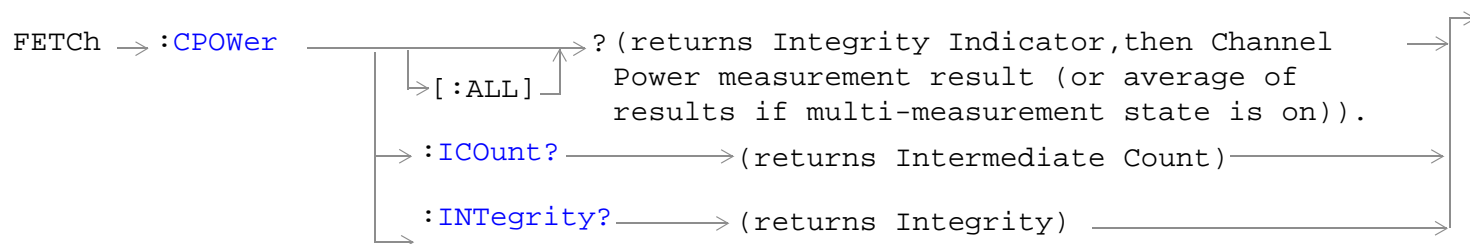
[“Diagram Conventions” on page 326](#)

## FEtCh:CPERror

### FEtCh:CPERror[:ALL]?

Function	Queries the packet error rate (PER) measurement results. This measurement returns up to 5 results in the following order: integrity, confidence pass/fail, packet error rate, packet error count, packets tested. See <a href="#">“PER Measurement Results” on page 57</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Integrity</p> <ul style="list-style-type: none"><li>• Range: 0 to 23 see <a href="#">“Integrity Indicator”</a></li><li>• Resolution: 1</li></ul> <p>Confidence Pass/Fail</p> <ul style="list-style-type: none"><li>• Range: 0 to 2 (0 = passed, 1 = failed, 2 = max packets), 9.91 E+37 indicates undefined</li></ul> <p>Packet Error Rate</p> <ul style="list-style-type: none"><li>• Range: 0.00 to 100.00, 9.91 E+37</li><li>• Resolution: 0.01 %</li></ul> <p>Packet Error Count</p> <ul style="list-style-type: none"><li>• Range: 0 to 10,000,000, 9.91 E+37</li><li>• Resolution: 1 packet</li></ul> <p>Packets Tested</p> <ul style="list-style-type: none"><li>• Range: 0 to 10,000,000, 9.91 E+37</li><li>• Resolution: 1 packet</li></ul>
<b>Programming Example</b> <pre>OUTPUT 714;"FEtCh:CPERror?" ! Returns integrity, confidence pass/fail, packet error rate, ! packet error count, packets tested.</pre>	

## FETCh:CPOWer



[“Diagram Conventions” on page 326](#)

## FETCH:CPOWer

### FETCH:CPOWer[:ALL]?

Function	Queries a channel power measurement result.  This query returns an integrity indicator followed by a channel power measurement result (if results are available). See <a href="#">“Channel Power Measurement Results” on page 50</a> .  If the multi-measurement state is on, the result represents the <i>average</i> of a number of channel power measurements. Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:CPOWer:COUNT[:SNUMBER]” on page 501</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	<ul style="list-style-type: none"><li>• Range: -100 to 100 dBm, 9.91 E+37</li><li>• Resolution: 0.01 dBm</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:CPOWer?"  
! Returns integrity, channel power measurement.
```

### FETCH:CPOWer:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement.  To set up multi-measurements, see <a href="#">“SETup:CPOWer:COUNT[:SNUMBER]” on page 501</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714;"FETCH:CPOWer:ICount?"  
! Returns the intermediate count of channel power multi-measurements.
```

### FETCH:CPOWer:INTEgrity?

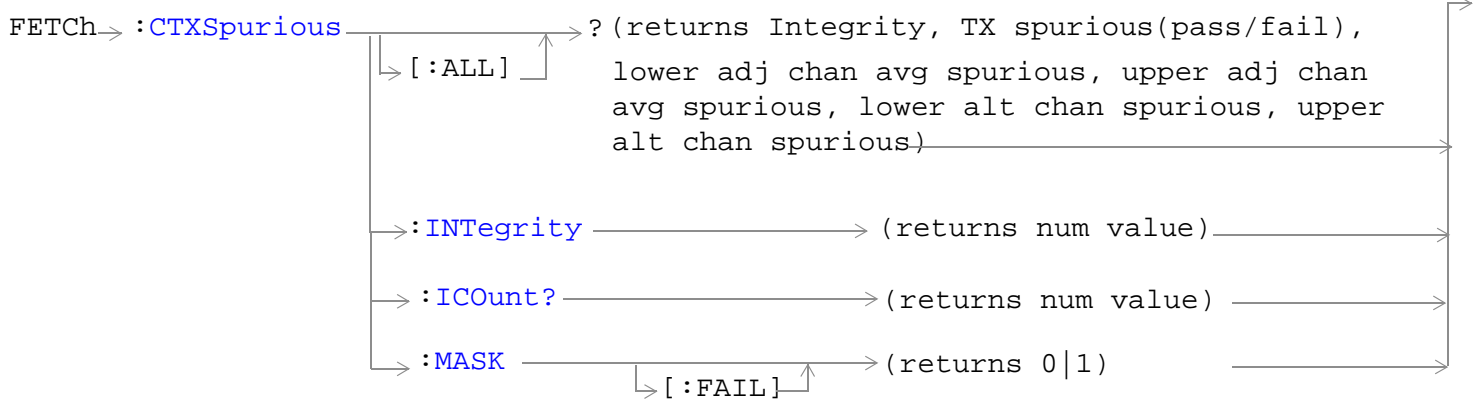
Function	Queries the measurement integrity indicator for the last channel power measurement completed.  Zero indicates a normal measurement. See <a href="#">“Integrity Indicator” on page 255</a> for information about non-zero integrity results.  See <a href="#">“Channel Power Measurement Results” on page 50</a>
Query	Range: 0 through 23

#### Programming Example

```
OUTPUT 714;"FETCH:CPOWer:INTEgrity?"  
!Queries the integrity indicator for the channel power results.
```



## FETCh:CTXSpurious



“Diagram Conventions” on page 326

### FETCh:CTXSpurious<[:ALL]:INTegrity>?

<p><b>Function</b></p>	<p>Queries the TX spurious emissions measurement results.</p> <p>This measurement returns results in the following order: integrity, TX spurious emissions pass/fail result, lower adjacent channel (-0.885 or -1.25 MHz) average TX spurious emissions, upper adjacent channel (+0.885 or +1.25 MHz) average TX spurious emissions, lower alternate channel (-1.98 MHz) average TX spurious emissions, upper alternate channel (+1.98 MHz) average TX spurious emissions.</p> <p>See “TX Spurious Emissions Measurement Results” on page 75.</p>
<p><b>Requirements</b></p>	<p>Test Application Revision: A.01.20 and above</p>

## FETCh:CTXSpurious

Query	<p>Integrity</p> <ul style="list-style-type: none"><li>• Range: 0 to 23 see <a href="#">“Integrity Indicator” on page 255</a></li><li>• Resolution: 1</li></ul> <p>TX spurious emissions pass/fail result</p> <ul style="list-style-type: none"><li>• Range: 0 to 1 (0 = passed, 1 = failed), 9.91 E+37</li></ul> <p>Lower adjacent channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul> <p>Upper adjacent channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul> <p>Lower alternate channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul> <p>Upper alternate channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul>
-------	---

### Programming Example

```
OUTPUT 714;"FETCh:CTXSpurious?"
```

**FETCh:CTXSpurious:ICount?**

Function	Queries the intermediate count of measurements completed in a multi-measurement. The multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:CTXSpurious:COUNT[:SNUMber]”</a> on page 506.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 999

**Programming Example**

OUTPUT 714; "FETCh:CTXSpurious:ICount?"

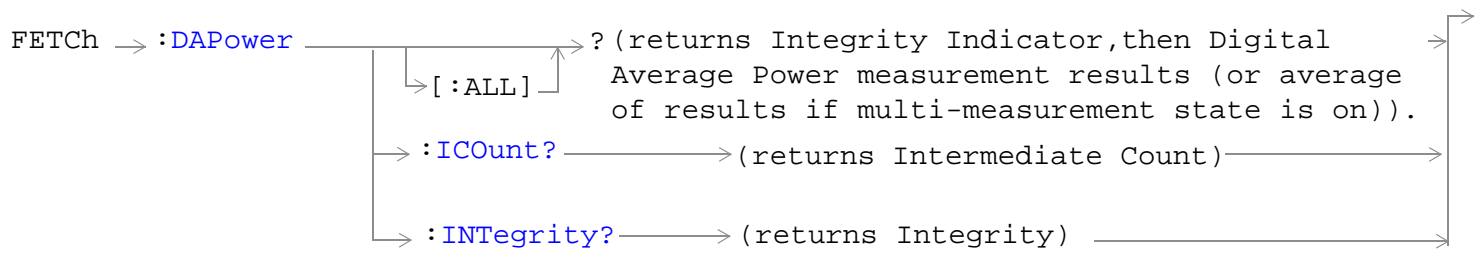
**FETCh:CTXSpurious:MASK[:FAIL]?**

Function	Queries the pass/fail results. Pass/fail results are based on fixed limit lines on display. See <a href="#">“TX Spurious Emissions Measurement Results”</a> on page 75.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 (Pass)   1(Fail), 9.91 E+37

**Programming Example**

OUTPUT 714; "FETCh:CTXSpurious:MASK?"

## FETCh:DAPower



“Diagram Conventions” on page 326

## FETCh:DAPower[:ALL]?

Function	<p>Queries a digital average power measurement result.</p> <p>This query returns an integrity indicator followed by a digital average power measurement result (if results are available).</p> <p>If the multi-measurement state is on, the result represents the <i>average</i> of a number of digital average power measurements. Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DAPower:COUNt[:SNUMber]” on page 512</a>.</p> <p>See <a href="#">“Digital Average Power Measurement Results” on page 53</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<ul style="list-style-type: none"> <li>• Range: -100 to 100 dBm, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

## Programming Example

```
OUTPUT 714;"FETCh:DAPower?"
! Returns integrity, average transmit power.
```

## FETCh:DAPower:ICount?

Function	<p>Queries the intermediate count of measurements completed in a multi-measurement.</p> <p>The multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DAPower:COUNt[:SNUMber]” on page 512</a></p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 999

## Programming Example

```
OUTPUT 714;"FETCh:DAPower:ICount?"
```

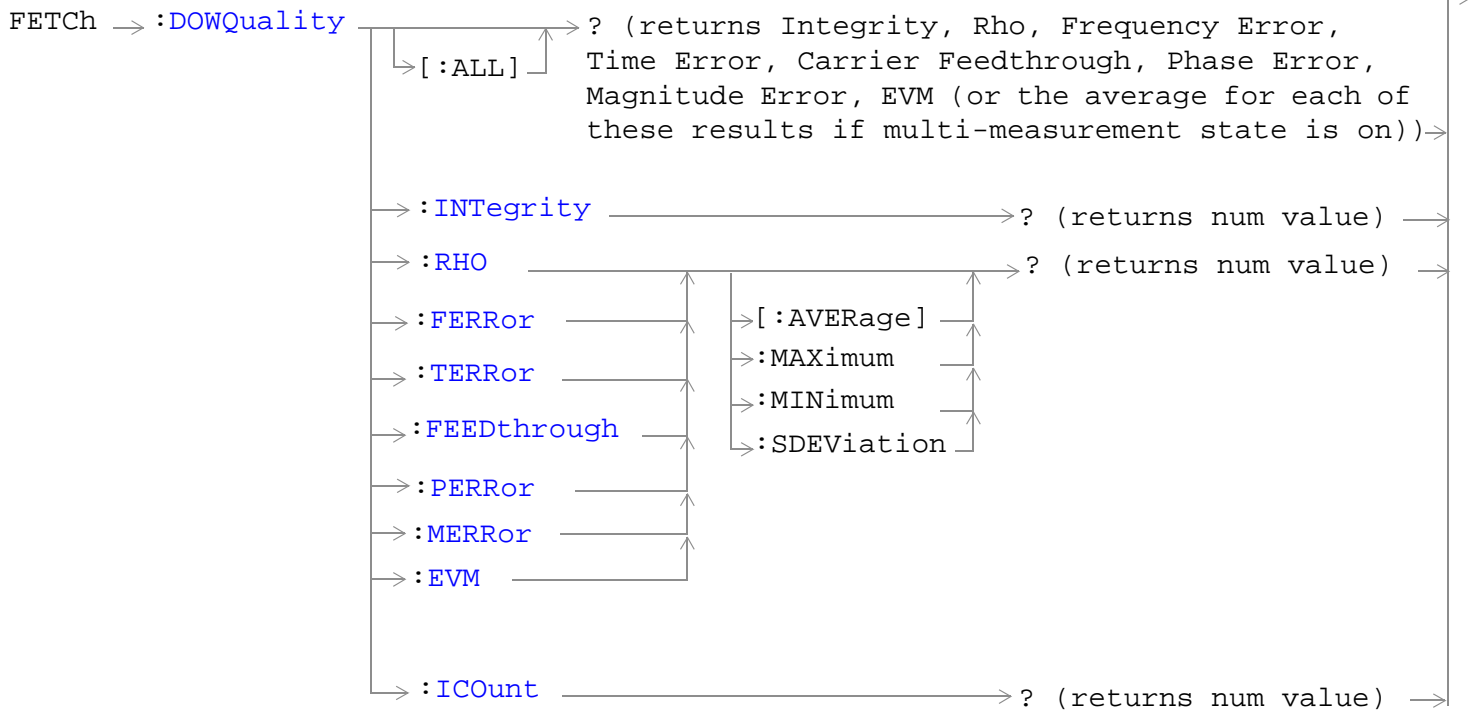
## FETCh:DAPower:INTegrity?

Function	<p>Queries the measurement integrity indicator for the last digital average power measurement completed.</p> <p>Zero indicates a normal measurement. See <a href="#">“Integrity Indicator” on page 255</a> for information about non-zero integrity results.</p> <p>See <a href="#">“Digital Average Power Measurement Results” on page 53</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 1 through 16

## Programming Example

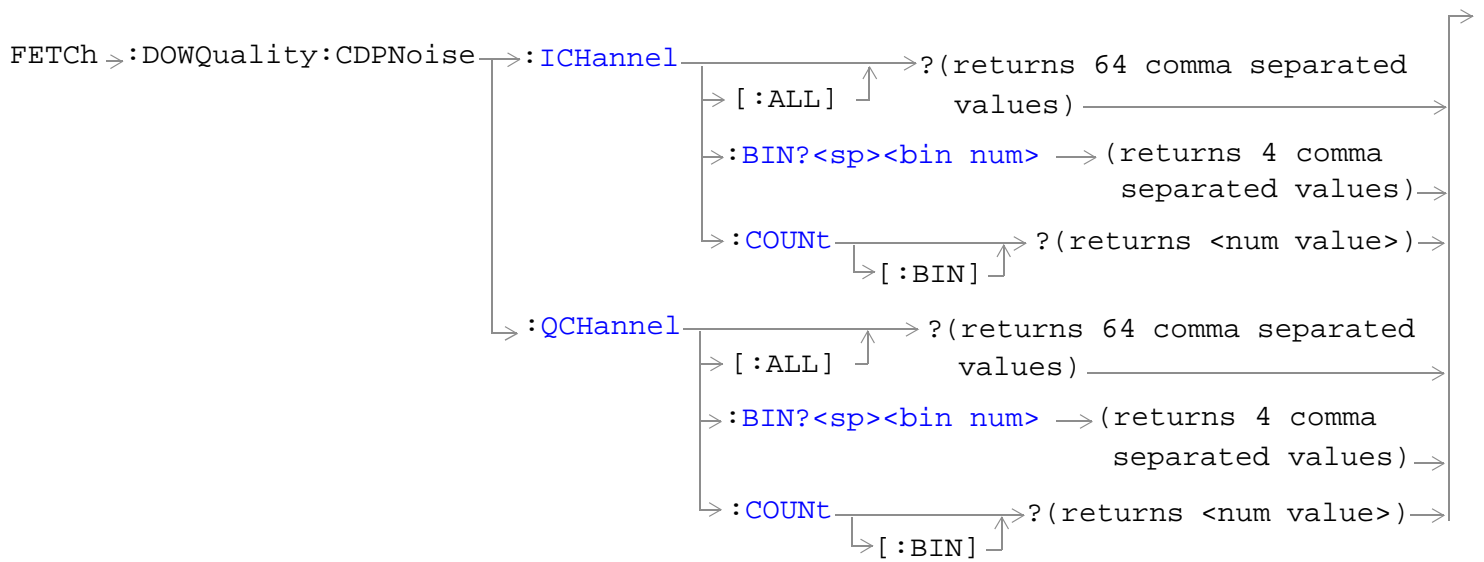
```
OUTPUT 714;"FETCh:DAPower:INTegrity?"
!Queries the integrity indicator for the average digital transmit power results.
```

## FETCh:DOWQuality





## FETCh:DOWQuality



[“Diagram Conventions” on page 326](#)



FETCh:DOWQuality<[:ALL]:INTEgrity|:RHO|:FERRor|:TERRor|:FEEDthrough|:PERRor|:MERRor|:EVM>?

<p>Function</p>	<p>Queries the waveform quality (numeric rho) measurement results. See <a href="#">“Waveform Quality Measurement Results” on page 82.</a></p> <p>[:ALL] returns measurement results in the following order: integrity, rho, frequency error, time error (in seconds), carrier feedthrough, phase error (in degrees), magnitude error, EVM.</p> <p>If the multi-measurement state is on, each result represents the average of a number of waveform quality measurements. (See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a>, “Multi-Measurement Count.”) Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNT[:SNUMBER]” on page 517.</a></p> <p>Instead of returning [:ALL] results, you may query the result for any particular measurement individually using the associated keyword, such as :RHO. If multi-measurement state is on, you may query the average, maximum, minimum or standard deviation for any particular measurement result individually by adding the :MAXimum, :MINimum or :SDEVIation keyword.</p>
<p>Requirements</p>	<p>Test Application Revision: A.01.20 and above</p>
<p>Query</p>	<p>Integrity</p> <ul style="list-style-type: none"> <li>• Range: 0 to 23</li> <li>• Resolution: 1</li> </ul> <p>Rho</p> <ul style="list-style-type: none"> <li>• Range: 0.0000 to 1.0000, 9.91 E+37</li> <li>• Resolution: 0.0001</li> </ul> <p>Frequency Error (in Hz)</p> <ul style="list-style-type: none"> <li>• Range: -9999.0 to 9999.0 Hz, 9.91 E+37</li> <li>• Resolution: 0.1 Hz</li> </ul> <p>Time Error (in s)</p> <ul style="list-style-type: none"> <li>• Range: -99.99 E-6 to 99.99 E-6 s, 9.91 E+37</li> <li>• Resolution: 0.01 E-6 s</li> </ul> <p>Carrier Feedthrough</p> <ul style="list-style-type: none"> <li>• Range: -100.00 to 0.00 dBc, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0.00 to 359.99 degrees, 9.91 E+37</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Magnitude Error</p> <ul style="list-style-type: none"> <li>• Range: 0.00 to 100.00%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul> <p>Error Vector Magnitude (EVM)</p> <ul style="list-style-type: none"> <li>• Range: 0.00 to 100.00%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

## **FEtCh:DOWQuality**

---

### **Programming Example**

```
OUTPUT 714;"FEtCh:DOWQuality?"
! Returns integrity, rho, frequency error, time error, carrier feedthrough, phase error,
! magnitude error, EVM (or average for each if multi-meas is on).

OUTPUT 714;"FEtCh:DOWQuality:RHO?"
! Returns the rho result
! (or average rho result if multi-measurement state is on).

OUTPUT 714;"FEtCh:DOWQuality:TERRor:MAXimum?"
! Returns the maximum time error measurement result
! (useful only if multi-measurement state is on).
```

### FETCh:DOWQuality:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement. See <a href="#">“Measurement Progress Report” on page 259</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714;"FETCh:DOWQuality:ICOUNT?"
```

### FETCh:DOWQuality:CDPower<:PILot[:RRIChannel]:DRCChannel]:ACKChannel]:DATA>[:REVerse]?

Function	<p>These commands return code domain power results for each of the reverse channels.</p> <p>The commands return 7 comma separated values, in the following order: modulation channel, Walsh code, spread factor, code domain power (dB), total code domain power (dB), normalized total code domain power (dB), and normalized total code domain power relative to R-Pilot (dB). See <a href="#">“Code Domain Power Measurement Results Available for Each Reverse Channel” on page 89</a> for more information about these measurement results.</p> <p>If the multi-measurement state is on, the results are the <i>average</i> of a number of code domain power measurements. (See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a>, “Multi-Measurement Count.”) Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNt[:SNUMber]” on page 517</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>• Modulation Channel: 0=I, 1=Q; 9.91 E+37 (undefined)</li> <li>• Walsh code: 0 to 15; 9.91 E+37</li> <li>• Spread Factor: 4, 8, 16; 9.91 E+37</li> <li>• Code Domain Power: -100.0 to 0.0 dB; 9.91 E+37</li> <li>• Total Code Domain Power: -100.0 to 0.0 dB; 9.91 E+37</li> <li>• Normalized Total Code Domain Power: -100.0 to 0.0 dB; 9.91 E+37</li> <li>• Normalized Total Code Domain Power Relative to R-Pilot: -100.0 to +100.0 dB; 9.91 E+37</li> </ul>

#### Programming Example

```
OUTPUT 714;"FETCh:DOWQuality:CDPower:PILot?"
! Queries the R-Pilot code domain power results.

OUTPUT 714;"FETCh:DOWQuality:CDPower:ACKChannel?"
! Queries the R-ACK Channel code domain power results.
```

## FETCh:DOWQuality

### FETCh:DOWQuality:CDPower:ICHannel[:ALL]?

Function	<p>Queries the I channel code domain power measurement results for all 16 bins. See <a href="#">“Code Domain Power Measurement Results Available by Numbered Bins” on page 87</a> for more information about numbered bins.</p> <p>This query returns 64 comma separated values. These represent 4 values for each of 16 bins. There are frequently fewer than 16 bins with measurement data. For any unassigned bins (bins that don't contain measurement results), four 9.91 E+37 results are returned instead of data. This allows the query to always return 64 results regardless of how many bins contain measurement data.</p> <p>The <a href="#">“FETCh:DOWQuality:CDPower:ICHannel:COUNT[:BIN]?”</a> command allows you to determine the total number of assigned bins (bins containing measurement results).</p> <p>The 4 values returned for each bin are: active/inactive, Walsh code, spread factor, and power (dB). See <a href="#">“Code Domain Power Measurement Results Available by Numbered Bins” on page 87</a> for more information about these measurement results.</p> <p>If the multi-measurement state is on, the results are the <i>average</i> of a number of code domain power measurements. (See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a>, “Multi-Measurement Count.”) Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNT[:SNUMBER]” on page 517</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"><li>• Active/Inactive: 0 = inactive, 1 = active; 9.91 E+37 (undefined)</li><li>• Walsh code: 0 to 15; 9.91 E+37</li><li>• Spread Factor: 4, 8, 16; 9.91 E+37</li><li>• Power: -100.0 to 0.0 dB; 9.91 E+37</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCh:DOWQuality:CDPower:ICHannel?"
! Returns 1 or 0, Walsh code, spread factor, and power for bin 0.
! Then returns the same for bin 1, and repeats until the values for the last bin
! (bin 15) have been returned
! (for a total of 64 comma separated values)
```

### FETCh:DOWQuality:CDPower:ICHannel:BIN? <bin num>

Function	<p>Queries the I channel code domain power results for a specific bin. The results returned are the same as those returned for every bin using the <a href="#">“FETCh:DOWQuality:CDPower:ICHannel[:ALL]?”</a> query: active/inactive, Walsh code, spread factor, power (dB).</p> <p>The range of &lt;bin num&gt; is 0 to 15.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: See <a href="#">“FETCh:DOWQuality:CDPower:ICHannel[:ALL]?” on page 440</a> .

---

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPower:ICHannel:BIN? 13"
```

```
! Queries the I channel code domain power results for bin 13.
```

## FETCh:DOWQuality

### FETCh:DOWQuality:CDPower:ICHannel:COUNT[:BIN]?

Function	This query indicates how many I channel bins contain measurement data. For example, if 13 is returned, I channel bins 0 through 12 contain measurement data and bins 13 through 15 contain 9.91 E+37 results.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 16

#### Programming Example

```
OUTPUT 714; "FETCh:DOWQuality:CDPower:ICHannel:COUNT?"  
! Returns the number of assigned bins (containing measurement results)
```

### FETCh:DOWQuality:CDPower:QChannel[:ALL]?

Function	<p>Queries the Q channel code domain power measurement results for all 16 bins. See <a href="#">“Code Domain Power Measurement Results Available by Numbered Bins” on page 87</a> for more information about numbered bins.</p> <p>This query returns 64 comma separated values. These represent 4 values for each of 16 bins. There are frequently fewer than 16 bins with measurement data. For any unassigned bins (bins that don't contain measurement results), four 9.91 E+37 results are returned instead of data. This allows the query to always return 64 results regardless of how many bins contain measurement data.</p> <p>The <a href="#">“FETCh:DOWQuality:CDPower:QChannel:COUNT[:BIN]?”</a> command allows you to determine the total number of assigned bins (bins containing measurement results).</p> <p>The 4 values returned for each bin are: active/inactive, Walsh code, spread factor, and power (dB). See <a href="#">“Code Domain Power Measurement Results Available by Numbered Bins” on page 87</a> for more information about these measurement results.</p> <p>If the multi-measurement state is on, the results are the <i>average</i> of a number of code domain power measurements. (See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a>, “Multi-Measurement Count.”) Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNT[:SNUMBER]” on page 517</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• Active/Inactive: 0 = inactive, 1 = active; 9.91 E+37 (undefined)</li><li>• Walsh code: 0 to 15; 9.91 E+37</li><li>• Spread Factor: 4, 8, 16; 9.91 E+37</li><li>• Power: -100.0 to 0.0 dB; 9.91 E+37</li></ul>

#### Programming Example

```
OUTPUT 714; "FETCh:DOWQuality:CDPower:QChannel?"  
! Returns 1 or 0, Walsh code, spread factor, and power for bin 0.  
! Then returns the same for bin 1, and repeats until the values for the last bin  
! (bin 15) have been returned  
! (for a total of 64 comma separated values)
```

**FETCh:DOWQuality:CDPower:QCHannel:BIN? <bin num>**

Function	Queries the Q channel code domain power results for a specific bin. The results returned are the same as those returned for every bin using the <a href="#">“FETCh:DOWQuality:CDPower:QCHannel[:ALL]?”</a> on page 442 query: active/inactive, Walsh code, spread factor, power (dB). The range of <bin num> is 0 to 15.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: See <a href="#">“FETCh:DOWQuality:CDPower:QCHannel[:ALL]?”</a> on page 442.

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPower:QCHannel:BIN? 13"
! Queries the Q channel code domain power results for bin 13.
```

**FETCh:DOWQuality:CDPower:QCHannel:COUNT[:BIN]?**

Function	This query indicates how many Q channel bins contain measurement data. For example, if 13 is returned, Q channel bins 0 through 12 contain measurement data and bins 13 through 15 contain 9.91 E+37 results.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 16

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPower:QCHannel:COUNT?"
! Returns the number of assigned bins (containing measurement results)
```

## FETCh:DOWQuality

### FETCh:DOWQuality:CDPNoise:ICHannel[:ALL]?

Function	<p>Queries the I channel code domain power + noise measurement results for all 16 bins. See <a href="#">“Code Domain Power Measurement Results Available by Numbered Bins” on page 87</a> for more information about numbered bins.</p> <p>This query returns 64 comma separated values. These represent 4 values for each of 16 bins. There are frequently fewer than 16 bins with measurement data. For any unassigned bins (bins that don't contain measurement results), four 9.91 E+37 results are returned instead of data. This allows the query to always return 64 results regardless of how many bins contain measurement data.</p> <p>The <a href="#">“FETCh:DOWQuality:CDPNoise:ICHannel:COUNt[:BIN]?”</a> command allows you to determine the total number of assigned bins (bins containing measurement results).</p> <p>The 4 values returned for each bin are: Walsh code, spread factor, noise power (dB) and power (dB). See <a href="#">“Code Domain Power + Noise Measurement Results Available Programmatically” on page 91</a> for more information about these measurement results.</p> <p>If the multi-measurement state is on, the results are the <i>average</i> of a number of code domain power measurements. (See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a>, “Multi-Measurement Count.”) Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNt[:SNUMBER]” on page 517</a>.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"><li>• Walsh code: 0 to 15; 9.91 E+37</li><li>• Spread Factor: 4, 8, 16; 9.91 E+37</li><li>• Noise Power: -100.0 to 0.0 dB; 9.91 E+37</li><li>• Power: -100.0 to 0.0 dB; 9.91 E+37</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCh:DOWQuality:CDPNoise:ICHannel?"  
! Returns Walsh code, spread factor, noise power and power for bin 0.  
! Then returns the same for bin 1, and repeats until the values for the last bin  
! (bin 15) have been returned  
! (for a total of 64 comma separated values)
```



**FETCh:DOWQuality:CDPNoise:ICHannel:BIN? <bin num>**

Function	Queries the I channel code domain power + noise results for a specific bin. The results returned are the same as those returned for every bin using the <a href="#">“FETCh:DOWQuality:CDPNoise:ICHannel[:ALL]?”</a> on page 444 query: Walsh code, spread factor, noise power (dB) and power (dB). The range of <bin num> is 0 to 15.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: See <a href="#">“FETCh:DOWQuality:CDPNoise:ICHannel[:ALL]?”</a> on page 444.

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPNoise:ICHannel:BIN? 13"
```

```
! Queries the I channel code domain power + noise results for bin 13.
```

**FETCh:DOWQuality:CDPNoise:ICHannel:COUNT[:BIN]?**

Function	This query indicates how many I channel bins contain measurement data. For example, if 13 is returned, I channel bins 0 through 12 contain measurement data and bins 13 through 15 contain 9.91 E+37 results.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 16

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPNoise:ICHannel:COUNT?"
```

```
! Returns the number of assigned bins (containing measurement results)
```

## FETCh:DOWQuality

### FETCh:DOWQuality:CDPNoise:QCHannel[:ALL]?

Function	<p>Queries the Q channel code domain power + noise measurement results for all 16 bins. See <a href="#">“Code Domain Power Measurement Results Available by Numbered Bins”</a> on page 87 for more information about numbered bins.</p> <p>This query returns 64 comma separated values. These represent 4 values for each of 16 bins. There are frequently fewer than 16 bins with measurement data. For any unassigned bins (bins that don't contain measurement results), four 9.91 E+37 results are returned instead of data. This allows the query to always return 64 results regardless of how many bins contain measurement data.</p> <p>The <a href="#">“FETCh:DOWQuality:CDPNoise:QCHannel:COUNT[:BIN]?”</a> command allows you to determine the total number of assigned bins (bins containing measurement results).</p> <p>The 4 values returned for each bin are: Walsh code, spread factor, noise power (dB) and power (dB). See <a href="#">“Code Domain Power + Noise Measurement Results Available Programmatically”</a> on page 91 for more information about these measurement results.</p> <p>If the multi-measurement state is on, the results are the <i>average</i> of a number of code domain power measurements. (See <a href="#">“Waveform Quality + Code Domain Measurement Parameters”</a> on page 81, “Multi-Measurement Count.”) Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNT[:SNUMBER]”</a> on page 517.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"><li>• Walsh code: 0 to 15; 9.91 E+37</li><li>• Spread Factor: 4, 8, 16; 9.91 E+37</li><li>• Noise Power: -100.0 to 0.0 dB; 9.91 E+37</li><li>• Power: -100.0 to 0.0 dB; 9.91 E+37</li></ul>

### Programming Example

```
OUTPUT 714;"FETCh:DOWQuality:CDPNoise:QCHannel?"
! Returns Walsh code, spread factor, noise power and power for bin 0.
! Then returns the same for bin 1, and repeats until the values for the last bin
! (bin 15) have been returned
! (for a total of 64 comma separated values)
```

**FETCh:DOWQuality:CDPNoise:QChannel:BIN? <bin num>**

Function	Queries the Q channel code domain power + noise results for a specific bin. The results returned are the same as those returned for every bin using the <a href="#">“FETCh:DOWQuality:CDPNoise:QChannel[:ALL]?”</a> on page 446 query: Walsh code, spread factor, noise power (dB) and power (dB). The range of <bin num> is 0 to 15.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: See <a href="#">“FETCh:DOWQuality:CDPNoise:QChannel[:ALL]?”</a> on page 446.

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPNoise:QChannel:BIN? 13"
```

```
! Queries the Q channel code domain power + noise results for bin 13.
```

**FETCh:DOWQuality:CDPNoise:QChannel:COUNT[:BIN]?**

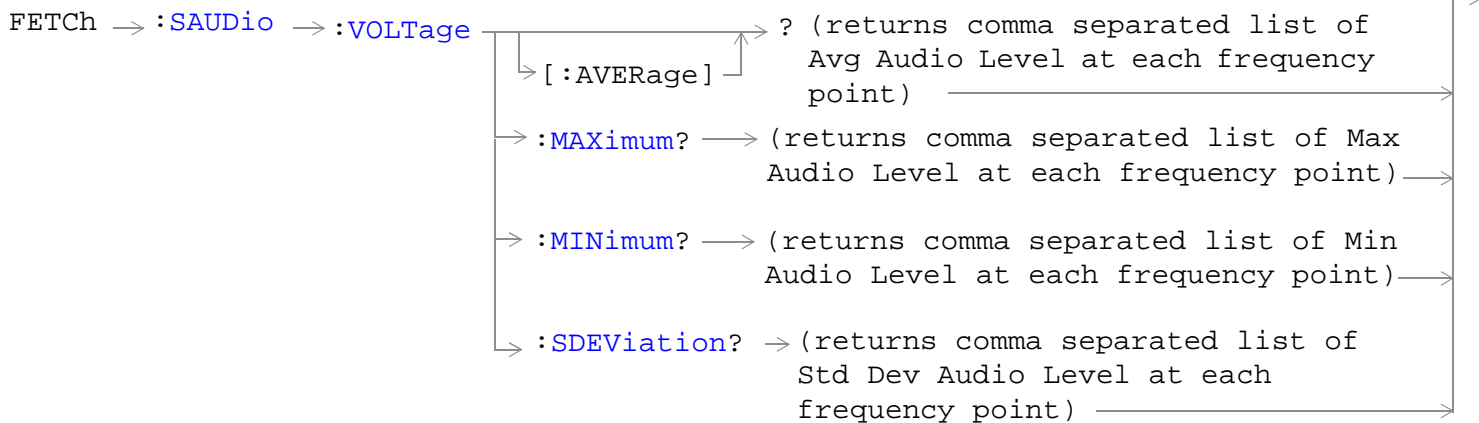
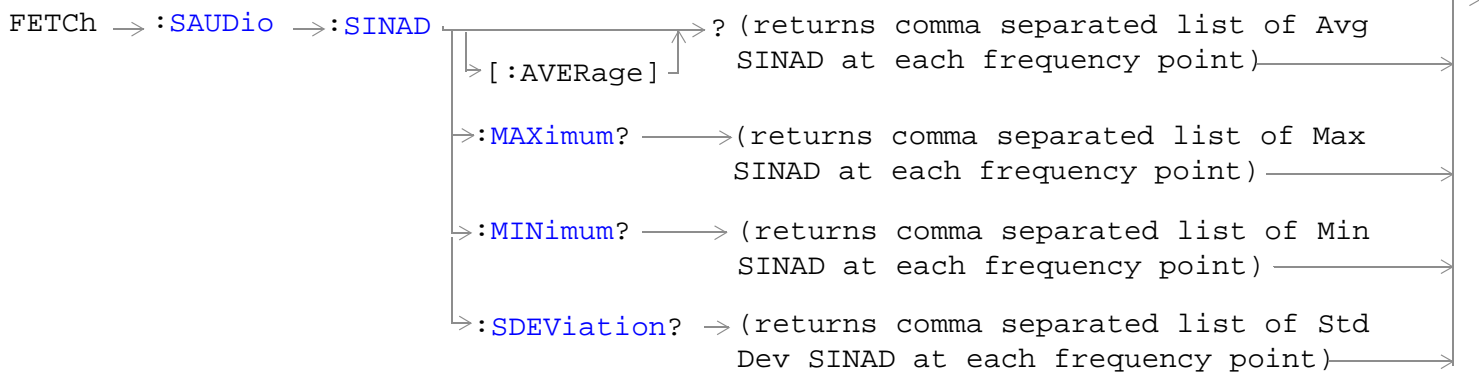
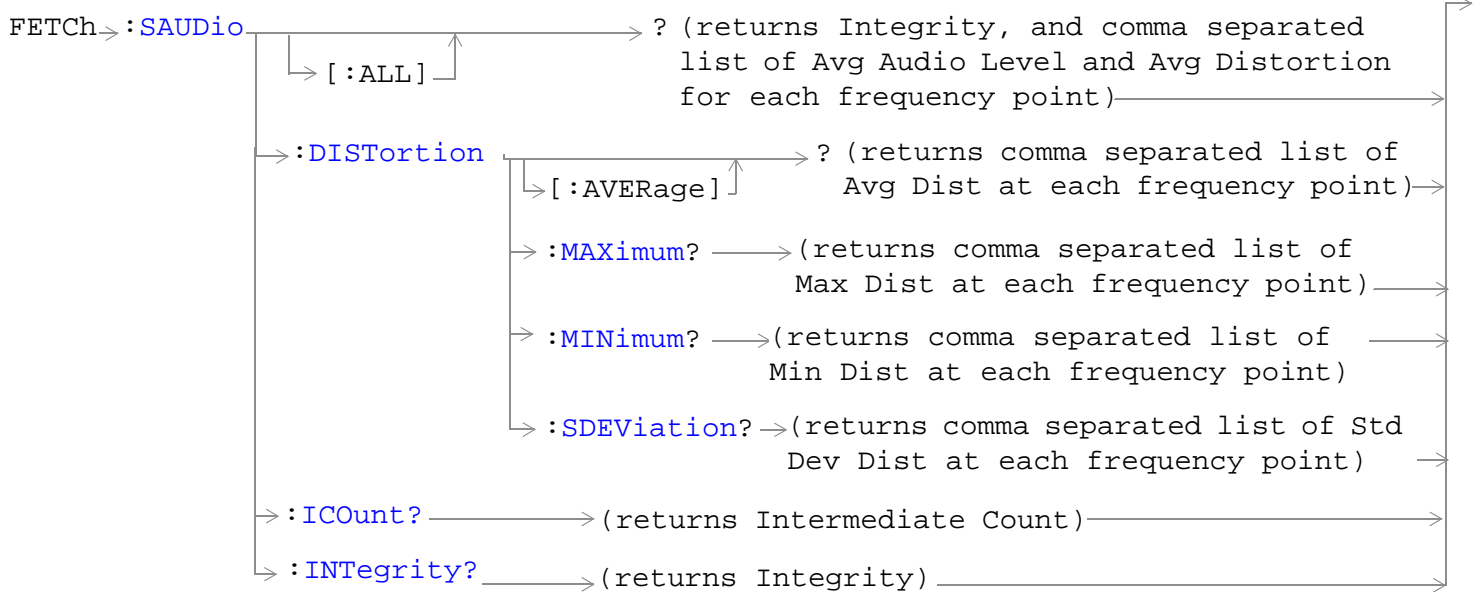
Function	This query indicates how many Q channel bins contain measurement data. For example, if 13 is returned, I channel bins 0 through 12 contain measurement data and bins 13 through 15 contain 9.91 E+37 results.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 16

**Programming Example**

```
OUTPUT 714;"FETCh:DOWQuality:CDPNoise:QChannel:COUNT?"
```

```
! Returns the number of assigned bins (containing measurement results)
```

## FETCh:SAUDio



[“Diagram Conventions” on page 326](#)

**FETCh:SAUDio[:ALL]?**

Function	<p>This query returns the swept audio measurement results. This query returns results in the following order: integrity indicator, average swept audio level and average distortion for the first frequency point, average swept audio level and average distortion for the second frequency point, and so on. The number of frequency points is determined with the <a href="#">“SETup:SAUDio:FREQuency:POINts”</a> command.</p> <p>For frequencies above 10 kHz, this measurement returns 9.91 E+37.</p>
Query	<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 255</a>.</li> <li>• Resolution: 1</li> </ul> <p>Average audio level</p> <ul style="list-style-type: none"> <li>• Range: 1 mV to 20 V, 9.91 E+37</li> <li>• Resolution: the lesser of 4 significant digits or 10 uV</li> </ul> <p>Average distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99.9%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

**FETCh:SAUDio:DISToRtion[:AVERAge]?**

Function	<p>This query returns a comma separated list of the audio distortion measured at each frequency point in the sweep. The number of frequency points is determined with the <a href="#">“SETup:SAUDio:FREQuency:POINts”</a> command.</p> <p>For frequencies above 10 kHz, this measurement returns 9.91 E+37.</p>
Query	<p>Average audio distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99.9%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

**FETCh:SAUDio:DISToRtion:MAXimum?**

Function	<p>This query returns a comma separated list of the maximum audio distortion measured at each frequency point in the sweep. The number of frequency points is determined with the <a href="#">“SETup:SAUDio:FREQuency:POINts”</a> command.</p> <p>For frequencies above 10 kHz, this measurement returns 9.91 E+37.</p>
Query	<p>Range: 0 to 99.9%, 9.91 E+37 Resolution: 0.01%</p>

## FETCh:SAUDio

### FETCh:SAUDio:DISTortion:MINimum?

Function	This query returns a comma separated list of the minimum audio distortion measured at each frequency point in the sweep. For frequencies above 10 kHz, this measurement returns 9.91 E+37.
Query	Range: 0 to 99.9%, 9.91 E+37 Resolution: 0.01%

### FETCh:SAUDio:DISTortion:SDEVIation?

Function	This query returns a comma separated list of the standard deviation audio distortion measured at each frequency point in the sweep. The number of frequency points is determined with the <a href="#">“SETup:SAUDio:FREQuency:POINts”</a> command. For frequencies above 10 kHz, this measurement returns 9.91 E+37.
Query	Range: 0 to 99.9%, 9.91 E+37 Resolution: 0.001%

### FETCh:SAUDio:ICOunt?

Function	This query returns the intermediate count of swept audio multi-measurements completed. The total measurement count is the number of measurements specified in with the multi-measurement count command, <a href="#">“SETup:SAUDio:COUnT[:SNUMber]”</a> , times the number of frequency points specified with the <a href="#">“SETup:SAUDio:FREQuency:POINts”</a> . Therefore, when completing a 5 point sweep with multi-measurements turned off, the measurement will return 5 not 1. See also <a href="#">“SETup:SAUDio:ICOunt:MAXimum?”</a> on page 526.
Query	Range: 1 to 999 x 60 Resolution: 1

### FETCh:SAUDio:INTegrity?

Function	This query returns the integrity indicator for the last swept audio measurement completed. Zero indicates a normal measurement. See <a href="#">“Integrity Indicator”</a> on page 255 for descriptions of non-zero integrity indicators.
Query	Range: See <a href="#">“Integrity Indicator”</a> on page 255. Resolution: 1

### FETCh:SAUDio:SINAD[:AVERAge]?

Function	This query returns a comma separated list of the average SINAD measured at each frequency point in the sweep. The number of frequency points is determined with the <a href="#">“SETup:SAUDio:FREQuency:POINts”</a> command.
Query	Average SINAD <ul style="list-style-type: none"><li>• Range: -99.99 to 99.99 dB, 9.91 E+37</li><li>• Resolution: 0.01 dB</li></ul>

**FETCh:SAUDio:SINAD:MAXimum?**

Function	This query returns a comma separated list of the maximum SINAD measured at each frequency point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command.
Query	Range: -99.99 to 99.99 dB, 9.91 E+37 Resolution: 0.01 dB

**FETCh:SAUDio:SINAD:MINimum?**

Function	This query returns a comma separated list of the minimum SINAD measured at each frequency point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command.
Query	Range: -99.99 to 99.99 dB, 9.91 E+37 Resolution: 0.01 dB

**FETCh:SAUDio:SINAD:SDEVIation?**

Function	This query returns a comma separated list of the standard deviation of SINAD measured at each frequency point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command.
Query	Range: 0 to 99.99 dB, 9.91 E+37 Resolution: 0.001 dB

**FETCh:SAUDio:VOLTage[:AVERage]?**

Function	This query returns a comma separated list of the average swept audio level measured at each frequency point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command. Value is returned in units of V.
Query	Range: 1 mV to 20, 9.91 E+37 Resolution: 4 significant digits

**FETCh:SAUDio:VOLTage:MAXimum?**

Function	This query returns a comma separated list of the maximum audio voltage measured at each frequency point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command.
Query	Range: 1 mV to 20 V, 9.91 E+37 Resolution: 4 significant digits

## **FETCh:SAUDio**

### **FETCh:SAUDio:VOLTage:MINimum?**

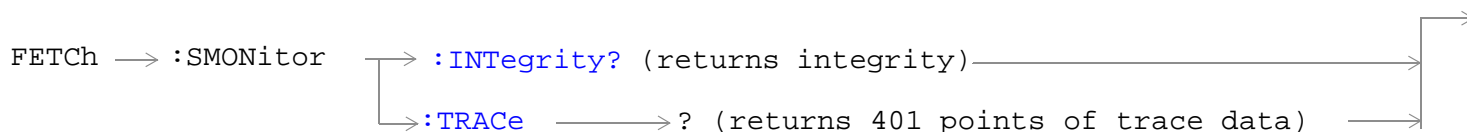
Function	This query returns a comma separated list of minimum audio voltage measured at each frequency point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command.
Query	Range: 1 mV to 20 V, 9.91 E+37 Resolution: 4 significant digits

### **FETCh:SAUDio:VOLTage:SDEVIation?**

Function	This query returns a comma separated list of the standard deviation of audio voltage measured at each point in the sweep. The number of frequency points is determined with the "SETup:SAUDio:FREQuency:POINts" command.
Query	Range: 1 mV to 20 V, 9.91 E+37 Resolution: 4 significant digits



## FETCh:SMONitor



“Diagram Conventions” on page 326

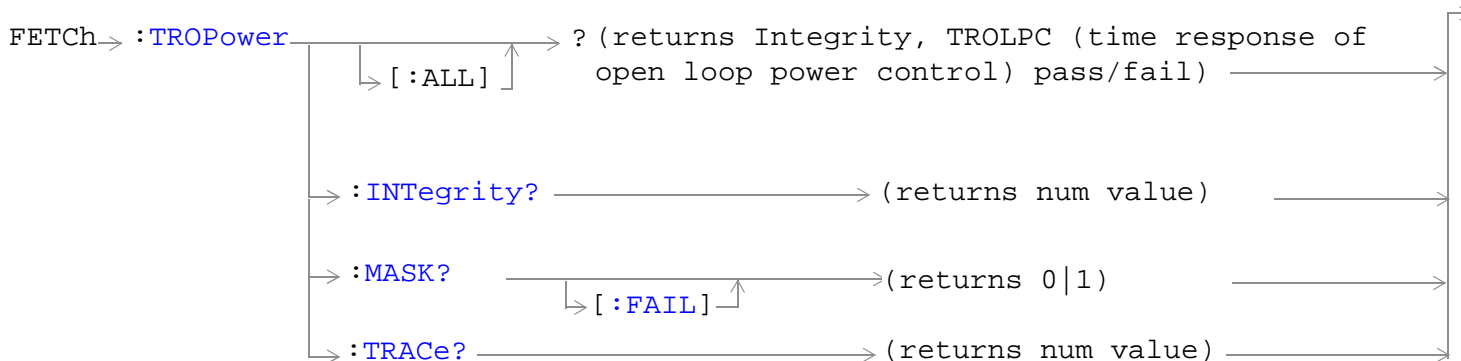
### FETCh:SMONitor:INTEgrity?

Function	Returns the integrity indicator value for the last spectrum monitor measurement performed. Zero indicates a normal result. See “Integrity Indicator” on page 255 for descriptions of non-zero integrity indicators.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: See “Integrity Indicator” on page 255. Resolution: 1

### FETCh:SMONitor:TRACe?

Function	Queries the spectrum monitor and returns 401 points representing the amplitude results (in dBm) of the trace data.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"> <li>• For spans of 125 kHz and 500 kHz           <ul style="list-style-type: none"> <li>— frequency of point: within the current span (relative to the center frequency)</li> <li>— amplitude of point: -50 to +55 dB</li> </ul> </li> <li>• For all other spans           <ul style="list-style-type: none"> <li>— frequency of point: within the current span (relative to the center frequency)</li> <li>— amplitude of point: (reference level - 60 dB) to +55 dB</li> </ul> </li> </ul>

## FETCh:TROPower



“Diagram Conventions” on page 326

### FETCh:TROPower[:ALL]?

Function	Queries the time response of open loop power control measurement results. This measurement returns results in the following order: integrity, time response of open loop power pass/fail result. See “TROLPC Measurement Results” on page 67.
Requirements	Test Application Revision: A.01.20 and above
Query	Integrity <ul style="list-style-type: none"> <li>• Range: 0 to 23 see “Integrity Indicator” on page 255</li> <li>• Resolution: 1</li> </ul> Tme response of open loop power pass/fail result <ul style="list-style-type: none"> <li>• Range: 0 to 1 (0 = passed, 1 = failed), 9.91 E+37 (undefined)</li> <li>• Resolution: 1</li> </ul>

#### Programming Example

OUTPUT 714; "FETCh:TROPower?"

### FETCh:TROPower:MASK[:FAIL]?

Function	Queries the pass/fail results of the time response of open loop power control measurement. If any measurement data points fail to meet the requirements of the mask shown on the test set’s display, the measurement will fail. See “TROLPC Measurement Results” on page 67.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 1 (0 = passed, 1 = failed), 9.91 E+37 (undefined)

#### Programming Example

OUTPUT 714; "FETCh:TROPower:MASK?"

**FEtCh:TROPower:TRACe?**

<p><b>Function</b></p>	<p>Queries the time response of open loop power control trace.</p> <p>A total of 371 comma-separated values are returned. If valid measurement results are available, each comma-separated measurement value will be 16 characters in length and represent the change (delta) of power level in units of dB. If no trace is present, each comma-separated value is 7 characters in length (9.91E37).</p> <p>The first value corresponds to t = 0 ms. The last value corresponds to t = 100 ms. This implies that the time between values is 100 ms ÷ 370 (approximately 270.270 µs).</p> <p>Returned values are in dB.</p> <p>See <a href="#">“TROLPC Measurement Results” on page 67</a>, “Power Versus Time Data Points.”</p>
<p><b>Requirements</b></p>	<p>Test Application Revision: A.01.20 and above</p>
<p><b>Query</b></p>	<p>Range: 2967 to 6306 characters, representing 371 values.</p>

**Programming Example**

OUTPUT 714; "FEtCh:TROPower:TRACe?"

---

# INITiate Subsystem

## Syntax Diagrams and Command Descriptions

[“INITiate” on page 458](#)

### Description

#### INITiate Command Functions

The INITiate subsystem is used to:

- Start (activate) individual or multiple (concurrent) measurements.
- Turn individual measurements off.
- Determine the number of measurements currently active (INIT:COUNT?).
- Determine the names of the measurements currently active (INIT:ON?).
- Determine which measurements are finished (INIT:DONE?).

#### What Happens When a Measurement is INITiated?

When a measurement is started using INITiate commands, a new measurement cycle is started. If the selected measurement is currently in a measurement cycle, it is aborted. If a timeout is specified, the timeout period begins when a measurement is initiated.

---

**NOTE** The INITiate subsystem is derived from SCPI, but has some modifications to make it more compatible with the manual operation of the test set. Most notably, the choice of single or continuous measurement triggering is made using the SETup subsystem.

---

#### INITiate Programming Examples (how INIT commands are used)

The INITiate command is used to start measurements.

INITiate commands allow multiple measurements to be started without waiting for other measurement processes to complete. For example, the following program example starts the Digital Average Power and Waveform Quality measurements, and then uses the INITiate:DONE? command in a loop to query the completion status of these measurements. See [“Measurement Event Synchronization” on page 244](#).

As each measurement is completed, the FETCh command can be used to acquire the results, and the results entered into variables in the controlling application.

This program ends when the INITiate:DONE? command returns the string 'NONE' indicating that all initiated measurements have gone through the measuring state see ["Measurement States" on page 252](#).

---

**NOTE** The INIT:DONE? command is only useful when performing concurrent testing. When initiating only one measurement at a time, simply send the INITiate command immediately followed by the FETCh command to retrieve the results.

---



---

**NOTE** Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. The best practice (during remote operation) is to use single measurement mode. This simplifies the tasks of starting concurrent measurements, then using the INIT subsystem commands to determine which measurements are ready to be FETChed.

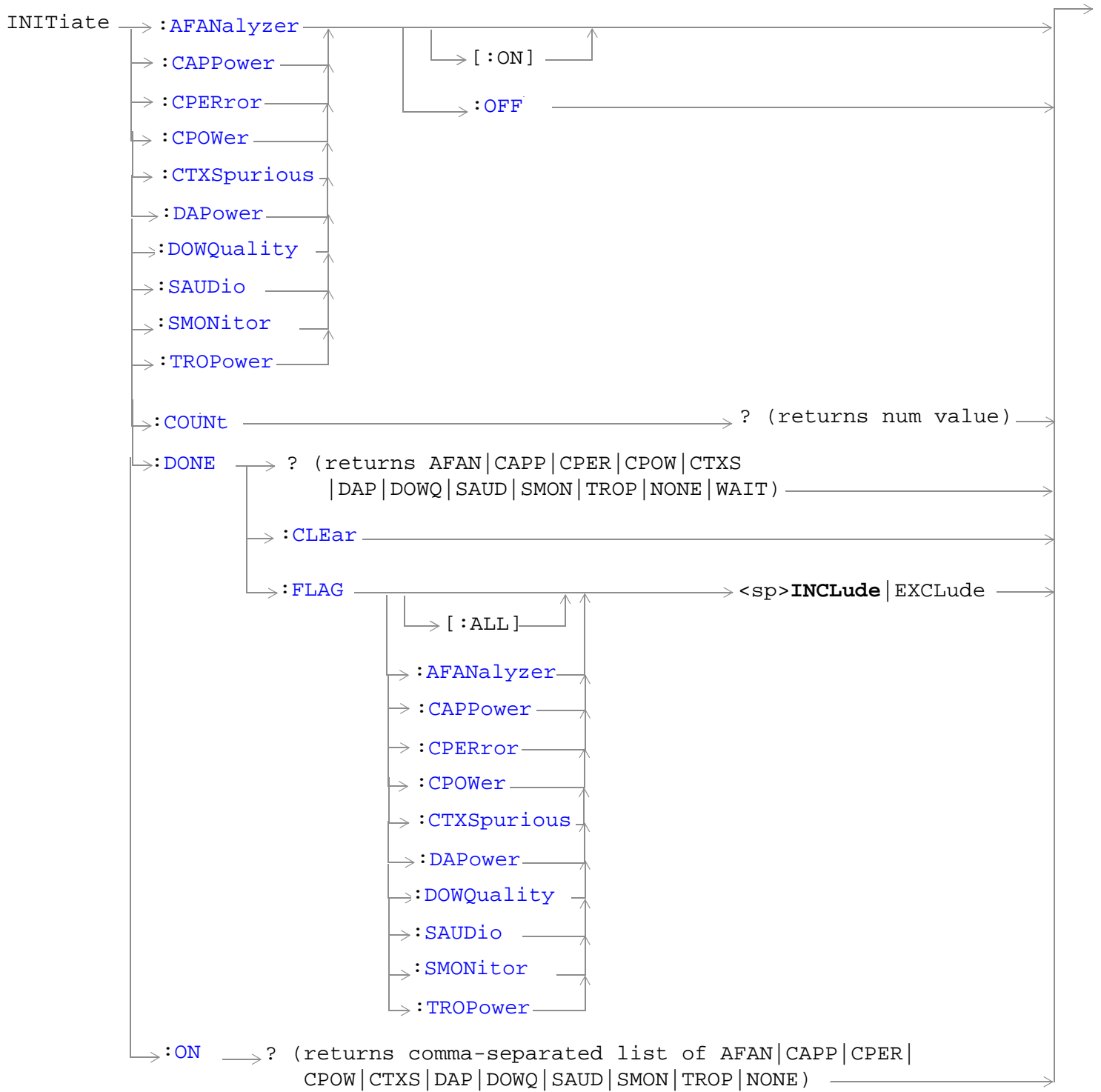
---

```

10  OUTPUT 714;"SETup:ALL:CONTinuous:OFF"
20  ! select single trigger mode for all measurements.
30  OUTPUT 714;"INITiate:DAPower;DOWQuality"
40  ! start digital average power and waveform quality measurements.
50  LOOP
60  OUTPUT 714;"INITiate:DONE?"
70  ! query to find out if any measurements are done.
80  ENTER 714;Meas_complete$
90  SELECT Meas_complete$
100 CASE "DAP"
110 ! test for the string "DAP" indicating
120 ! digital average power measurement is done.
130 OUTPUT 714;"FETCh:DAPower?"
140 ! query digital average power measurement.
150 ENTER 714;Dap_int;Dapower
160 CASE "DOWQ"
170 ! test for the string "DOWQ" indicating
180 ! that the waveform quality measurement is done.
190 OUTPUT 714;"FETCh:DOWQ:RHO?"
200 ! query rho.
210 ENTER 714;Rho
220 END SELECT
230 EXIT IF Meas_complete$="NONE"
240 END LOOP
250 PRINT Dapower
260 PRINT Rho
270 END

```

# INITiate



“Diagram Conventions” on page 326

**INITiate:<measurement mnemonic>[:ON]**

Function	<p>This command initiates (starts) the specified measurements:</p> <ul style="list-style-type: none"> <li>• AFANalyzer - Audio Frequency Analyzer measurement</li> <li>• CAPPower - Access Probe Power measurement</li> <li>• CPERror - Packet Error Rate measurement</li> <li>• CPOWer - Channel Power measurement</li> <li>• CTXSpurious - TX Spurious Emissions measurement</li> <li>• DAPower - Digital Average Power measurement</li> <li>• DOWQuality - Waveform Quality measurement</li> <li>• SAUDio - Swept Audio measurement</li> <li>• SMONitor - Spectrum Monitor</li> <li>• TROPower - Time Response of Open Loop Power Control measurement</li> </ul> <p>The INITiate command is associated with the SETup “SETup Subsystem” on page 482 and the “FETCh? Subsystem” on page 414.</p> <p>One or more measurements can be initiated with the same program line (see “Concurrent Measurements” on page 246 and the Programming Example below).</p> <p>See “INITiate Programming Examples (how INIT commands are used)” on page 456.</p>
Requirements	Test Application Revision: A.01.20 and above
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"INITiate:CPOWer;DOWQuality" ! Initiates a channel power and a waveform quality measurement.</pre>	

**INITiate:<measurement mnemonic>:OFF**

Function	<p>Deactivates the selected measurement. See “Measurement States” on page 252.</p> <p>Only one measurement can be deactivated at a time. To stop one or more measurements and leave them in the active state, use “ABORT” on page 329.</p>
Requirements	Test Application Revision: A.01.20 and above
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"INITiate:CPOWer:OFF" ! Deactivates the channel power measurement.</pre>	

## INITiate

### INITiate:COUNt?

Function	Queries the number of measurements that have been initiated (are active). See <a href="#">“Measurement States” on page 252</a> .
Requirements	Test Application Revision: A.01.20 and above
Query	Range: 0 to 10
<b>Programming Example</b> OUTPUT 714;"INITiate:COUNt?" ! Queries the number of currently active measurements	

### INITiate:DONE?

Function	Queries (one at a time) which measurements, if any, are finished or have timed-out. See <a href="#">“INITiate Programming Examples (how INIT commands are used)” on page 456</a> and <a href="#">“Measurement Event Synchronization” on page 244</a> for how to use this command. See <a href="#">“Measurement States” on page 252</a> to understand the test set’s measurement states. See <a href="#">“INITiate:DONE:FLAG:&lt;measurement mnemonic&gt;” on page 462</a> for include or exclude commands.
Requirements	Test Application Revision: A.01.20 and above
Query	Range: <ul style="list-style-type: none"><li>• AFAN - Audio Frequency Analyzer measurement</li><li>• CAPP - Access Probe Power measurement</li><li>• CPER - Packet Error Rate measurement</li><li>• CPOW - Channel Power measurement</li><li>• CTXS - TX Spurious Emissions measurement</li><li>• DAP - Digital Average Power measurement</li><li>• DOWQ - Waveform Quality measurement</li><li>• SAUD - Swept Audio measurement</li><li>• SMON - Spectrum Monitor</li><li>• TROP - Time Response of Open Loop Power Control measurement</li><li>• NONE - there are no measurements in the measuring state.</li><li>• WAIT - there are one or more measurements in the measuring state, and none are ready to be fetched.</li></ul>
<b>Programming Example</b> OUTPUT 714;"INITiate:DONE?" ! Queries which measurements are finished	



**INITiate:DONE:CLEar**

Function	Clears the done flag from all measurements. See “INITiate:DONE?” on page 460 and “INITiate:DONE:FLAG[:ALL]” on page 461.
Requirements	Test Application Revision: A.01.20 and above
<b>Programming Example</b> <pre>OUTPUT 714;"INITiate:DONE:CLEar" ! Clears the done flag from all measurements</pre>	

**INITiate:DONE:FLAG[:ALL]**

Function	<p>Specifies that all measurements are either included or excluded when the INITiate:DONE? query is sent.</p> <p>If a measurement trigger arm is left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT. The INITiate:DONE? query will probably not be able to catch the measurement at the instant it is done; therefore, the measurement will never appear to be done. If a measurement's triggering must be continuously armed, you should exclude the measurement using “INITiate:DONE:FLAG:&lt;measurement mnemonic&gt;” .</p> <p>Use INITiate:DONE:FLAG:ALL EXCLude to exclude all measurements.</p> <p>Once INITiate:DONE:FLAG has been set to EXCLude for a measurement, the user must send the INCLude command for that measurement in order to query that measurement with the INITiate:DONE? query. The test set will not reset any excluded measurement with any type of preset.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <b>INCLude</b>   EXCLude
*RST Setting	INCLude
<b>Programming Example</b> <pre>OUTPUT 714;"INITiate:DONE:FLAG INCLude" ! Includes all measurements in the INITiate:DONE? query.</pre>	

## INITiate

### INITiate:DONE:FLAG:<measurement mnemonic>

Function	<p>Specifies if a measurement done flag is considered (using the INCLude or EXCLude settings) when the INITiate:DONE? query is sent.</p> <p>If more than one measurement is active, and one or more measurement trigger arm states is continuous, the INITiate:DONE? query may not be effective. The best solution is to change the arm state of all measurements to single using the “SETup:CONTinuous” command. However, if a measurement must be continuously triggered, you should exclude the measurement using the EXCLude setting provided by this command if you want to use INITiate:DONE? to query measurement done status.</p> <p>The test set will not reset any excluded measurement to included with any type of preset.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <b>INCLude</b>   EXCLude
*RST Setting	INCLude
<b>Programming Example</b> <pre>OUTPUT 714;"INITiate:DONE:FLAG:DAPower EXCLude"</pre> <p>! Excludes the digital average power measurement from responding to the INITiate:DONE? query.</p>	

### INITiate:ON?

Function	<p>Queries the measurements that are on. See “<a href="#">Measurement States</a>” on page 252.</p> <p>Returns a comma separated list of measurement mnemonics.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range:</p> <ul style="list-style-type: none"><li>• AFAN - Audio Frequency Analyzer measurement</li><li>• CAPP - Access Probe Power measurement</li><li>• CPER - Packet Error Rate measurement</li><li>• CPOW - Channel Power measurement</li><li>• CTXS - TX Spurious Emissions measurement</li><li>• DAP - Digital Average Power measurement</li><li>• DOWQ - Waveform Quality measurement</li><li>• SAUD - Swept Audio measurement</li><li>• SMON - Spectrum Monitor</li><li>• TROP - Time Response of Open Loop Power Control measurement</li><li>• NONE - no measurements are on</li></ul>
<b>Programming Example</b> <pre>OUTPUT 714;"INITiate:ON?"</pre> <p>! Queries which measurements are on.</p>	

---

## READ? Subsystem

### Syntax Diagram and Command Descriptions

[“READ” on page 465](#)

### Description

The READ? command provides a sequential method to make measurements and retrieve the results. READ? will hang the GPIB bus until the measurement is completed, or until the timeout value has been exceeded. Associated SETUp commands (for each measurement) are used with the READ? command to retrieve desired measurement results in a sequential manner.

Sending a READ? command is equivalent to an INITiate/FETCh cycle for a measurement. A READ? command executes an abort action on that measurement followed by an INITiate and a FETCh?.

READ? commands can be mixed with FETCh? queries in order to make combinations of sequential and overlapped operations. One measurement can be issued a READ? command (sequential), and the next measurement can be issued INITiate/FETCh? commands (overlapped), if necessary.

The advantage of using the READ? commands to obtain measurement results, as opposed to the INITiate/FETCh method is:

- It is simpler. Fewer commands are required to obtain measurement results.

Some disadvantages of using READ? over INITiate and FETCh are:

- The test set does not process any additional GPIB commands until the requested measurement results are available.
- The sequential nature of the READ? command does not allow the user to make concurrent measurements. Concurrent measurements require the overlapped commands INITiate, DONE? and FETCh? .
- The READ? command does not provide measurement results such as statistics that are available using the INITiate/FETCh method.
- The READ? commands have pre-defined measurement results. If additional results are needed from a measurement they may be obtained with a FETCh? query.

---

**NOTE** Trigger arming for each measurement is controlled in the SETUp subsystem. Best practice during remote operation is to set trigger arm to single (Continuous Off).

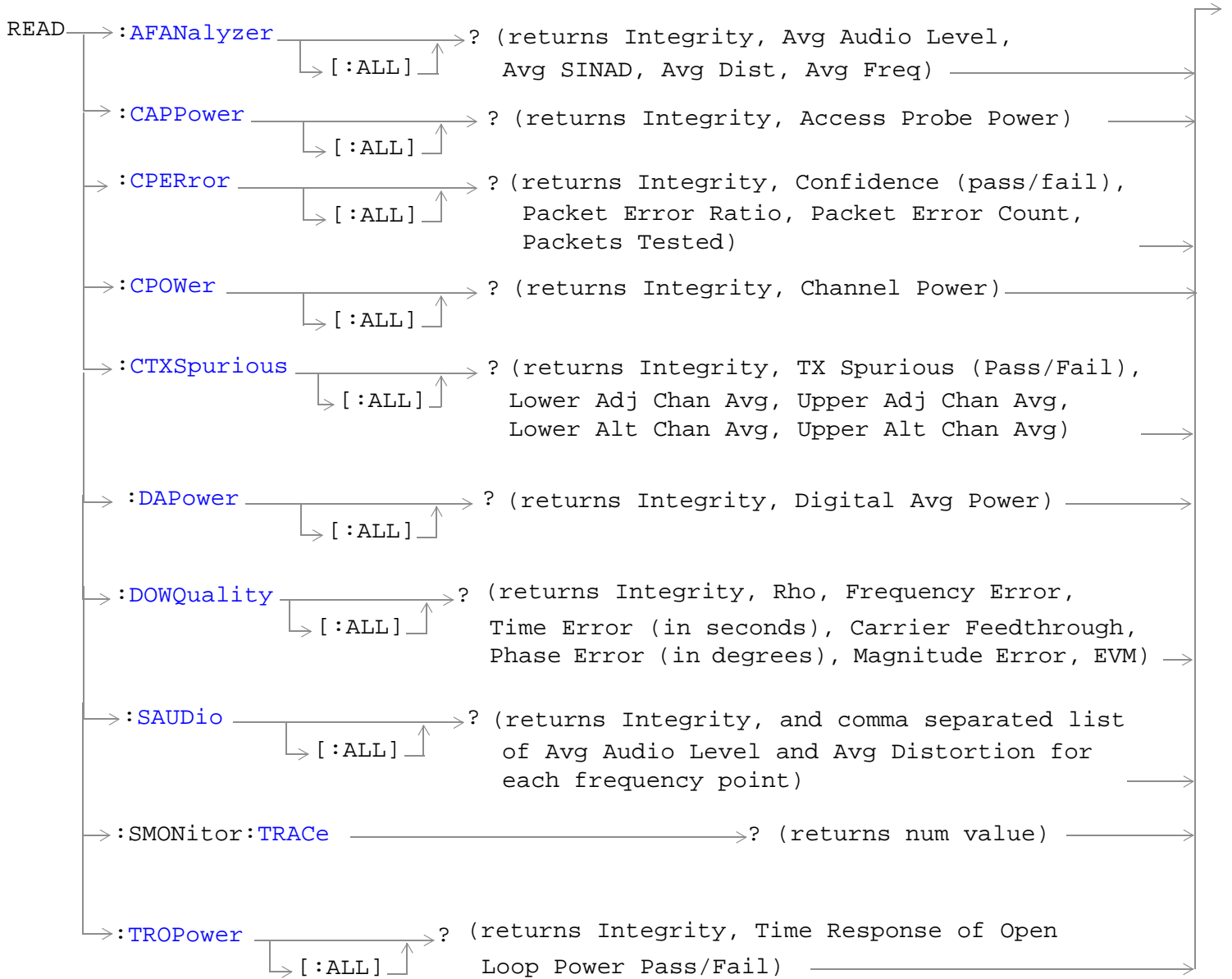
---

## **READ? Subsystem**

### **Program Example - READ:DAPower?**

```
OUTPUT 714;"READ:DAPower?" ! Starts digital average power measurement. As soon as the
                        ! measurement cycle has completed, the test set
                        ! provides the digital average power measurement results to the
                        ! controlling application.
ENTER 714;Integrity, Dapower ! Enters the integrity indicator and
                        ! digital average power measurement values into
                        ! controlling application.
```

# READ



“Diagram Conventions” on page 326

## READ

### READ:AFANalyzer[:ALL]?

Function	Initiates and fetches an audio frequency analyzer measurement as a sequential operation. Measurement results are returned in the following order: integrity, average audio level, average SINAD, average audio distortion.
Query	Integrity <ul style="list-style-type: none"><li>• Range: 0 to 23 see “Integrity Indicator”</li><li>• Resolution: 1</li></ul> Average audio level <ul style="list-style-type: none"><li>• Range: 0 to 20 volts, 9.91 E+37</li><li>• Resolution: the lesser of 4 significant digits or 10 uV.</li></ul> Average SINAD <ul style="list-style-type: none"><li>• Range: -99.00 to 99.00 dB, 9.91 E+37</li><li>• Resolution: 0.01 dB</li></ul> Average audio distortion <ul style="list-style-type: none"><li>• Range: 0.00 to 99.00%, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul>

### READ:CAPPower[:ALL]?

Function	Initiates and fetches an access probe power measurement as a sequential operation. Measurement results are returned in the following order: integrity, access probe power.
Query	Integrity <ul style="list-style-type: none"><li>• Range: 0 to 23 see “Integrity Indicator”</li><li>• Resolution: 1</li></ul> Access probe power <ul style="list-style-type: none"><li>• Range: -100.00 to 100.00 dBm, 9.91 E+37</li><li>• Resolution: 0.01 dB</li></ul>

**READ:CPerError[:ALL]?**

Function	<p>Initiates and fetches the PER (packet error rate) measurement as a sequential operation. This measurement returns up to 5 results in the following order: integrity, confidence pass/fail, packet error rate, packet error count, packets tested. See <a href="#">“Packet Error Rate (PER) Measurement Description”</a> on page 56).</p>
Query	<p>Integrity</p> <ul style="list-style-type: none"> <li>• Range: 0 to 23 see <a href="#">“Integrity Indicator”</a></li> <li>• Resolution: 1</li> </ul> <p>Confidence Pass/Fail</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2 (0 = passed, 1 = failed, 2 = max packets), 9.91 E+37 indicates undefined</li> </ul> <p>Packet Error Rate</p> <ul style="list-style-type: none"> <li>• Range: 0.00 to 100.00, 9.91 E+37</li> <li>• Resolution: 0.01 %</li> </ul> <p>Packet Error Count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 10,000,000, 9.91 E+37</li> <li>• Resolution: 1 packet</li> </ul> <p>Packets Tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 10,000,000, 9.91 E+37</li> <li>• Resolution: 1 packet</li> </ul>

**READ:CPOWer[:ALL]?**

Function	<p>Initiates and fetches a channel power measurement as a sequential operation. Measurement results are returned in the following order: integrity, average channel power. If the multi-measurement state is on, the result represents the average of a number of channel power measurements. Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:CPOWer:COUNT[:SNUMBER]”</a> on page 501.</p>
Query	<p>Integrity</p> <ul style="list-style-type: none"> <li>• Range: 0 to 23 see <a href="#">“Integrity Indicator”</a></li> <li>• Resolution: 1</li> </ul> <p>Channel power</p> <ul style="list-style-type: none"> <li>• Range: -100.00 to 100.00 dBm, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

## READ

### READ:CTXSpurious[:ALL]?

Function	<p>Initiates and fetches the TX spurious emission measurement as a sequential operation.</p> <p>FER measurement results are returned in the following order: integrity, TX spurious emission pass/fail result, lower adjacent channel (-0.885 or -1.25 MHz) average spurious emissions, upper adjacent channel (+0.885 or +1.25 MHz) average spurious emissions, lower alternate channel (-1.98 MHz) average spurious emissions, upper alternate channel (+1.98 MHz) average spurious emissions.</p>
Query	<p>Integrity</p> <ul style="list-style-type: none"><li>• Range: 0 to 23 see “<a href="#">Integrity Indicator</a>”</li><li>• Resolution: 1</li></ul> <p>TX spurious emissions pass/fail result</p> <ul style="list-style-type: none"><li>• Range: 0 to 1 (0 = passed, 1 = failed), 9.91 E+37</li></ul> <p>Lower adjacent channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul> <p>Upper adjacent channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul> <p>Lower alternate channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul> <p>Upper alternate channel spurious emissions</p> <ul style="list-style-type: none"><li>• Range: 0.00 to -80.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dBc</li></ul>



## READ:DAPower[:ALL]?

Function	<p>Initiates and fetches a digital average power measurement as a sequential operation.</p> <p>Measurement results are returned in the following order: integrity, digital average transmit power.</p> <p>If the multi-measurement state is on, the result represents the <i>average</i> of a number of digital average power measurements. Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DAPower:COUNt[:SNUMber]”</a> on page 512.</p>
Query	<p>Integrity</p> <ul style="list-style-type: none"> <li>• Range: 0 to 23 see <a href="#">“Integrity Indicator”</a></li> <li>• Resolution: 1</li> </ul> <p>Digital average power:</p> <ul style="list-style-type: none"> <li>• Range: -100.00 to 100.00 dBm, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

## READ

### READ:DOWQuality[:ALL]?

Function	<p>Initiates and fetches the waveform quality measurements as a sequential operation.</p> <p>Measurement results are returned in the following order: integrity, rho, frequency error, time error (in seconds), carrier feedthrough, phase error (in degrees), magnitude error, EVM.</p> <p>If the multi-measurement state is on, each result represents the <i>average</i> of a number of waveform quality measurements. Multi-measurement state, by default, is off. To set up multi-measurements, see <a href="#">“SETup:DOWQuality:COUNT[:SNUMber]” on page 517.</a></p> <p>See <a href="#">“Waveform Quality + Code Domain Measurement Description” on page 80.</a></p>
Query	<p>Integrity</p> <ul style="list-style-type: none"><li>• Range: 0 to 23 see <a href="#">“Integrity Indicator”</a></li><li>• Resolution: 1</li></ul> <p>Rho</p> <ul style="list-style-type: none"><li>• Range: 0.0000 to 1.0000, 9.91 E+37</li><li>• Resolution: 0.0001</li></ul> <p>Frequency Error</p> <ul style="list-style-type: none"><li>• Range: -9999.0 to 9999.0 Hz, 9.91 E+37</li><li>• Resolution: 0.1 Hz</li></ul> <p>Time Error</p> <ul style="list-style-type: none"><li>• Range: -99.99 E-6 to 99.99 E-6 s, 9.91 E+37</li><li>• Resolution: 0.01 E-6 s</li></ul> <p>Carrier Feedthrough</p> <ul style="list-style-type: none"><li>• Range: -100.00 to 0.00 dBc, 9.91 E+37</li><li>• Resolution: 0.01 dB</li></ul> <p>Phase Error</p> <ul style="list-style-type: none"><li>• Range: 0.00 to 359.99 degrees, 9.91 E+37</li><li>• Resolution: 0.01 degrees</li></ul> <p>Magnitude Error</p> <ul style="list-style-type: none"><li>• Range: 0.00 to 100.00%, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> <p>Error Vector Magnitude (EVM)</p> <ul style="list-style-type: none"><li>• Range: 0.00 to 100.00%, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul>

**READ:SAUDio[:ALL]?**

Function	<p>Initiates and fetches a swept audio measurement as a sequential operation.</p> <p>Measurement results are returned in the following order: integrity, and a comma separated list of average audio level and average audio distortion for each frequency point in the sweep.</p> <p>For frequencies about 10 kHz, the measurement will return 9.91 E+37.</p>
Query	<p>Integrity</p> <ul style="list-style-type: none"> <li>• Range: 0 to 23 see “Integrity Indicator”</li> <li>• Resolution: 1</li> </ul> <p>Average Audio Level</p> <ul style="list-style-type: none"> <li>• Range: 1 mV to 20 V, 9.91 E+37</li> <li>• Resolution: the lesser of 4 significant digits or 10 uV</li> </ul> <p>Average Audio Distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99.9%, 9.91E+37</li> <li>• Resolution: 0.1</li> </ul>

**READ:SMONitor:TRACe?**

Function	<p>Initiates and fetches a spectrum monitor measurement as a sequential operation.</p> <p>Returns a comma separated list of 401 points representing the amplitude results of the trace data.</p>
Query	<p>Range</p> <ul style="list-style-type: none"> <li>• For spans of 125 kHz and 500 kHz             <ul style="list-style-type: none"> <li>— frequency of point: within the current span (relative to the center frequency)</li> <li>— amplitude of point: -50 to +55 dB</li> </ul> </li> <li>• For all other spans             <ul style="list-style-type: none"> <li>— frequency of point: within the current span (relative to the center frequency)</li> <li>— amplitude of point: (reference level - 60 dB) to +55 dB</li> </ul> </li> </ul>

## READ

### READ:TROPower[:ALL]?

Function	Initiates and fetches a time response of open loop power control measurement as a sequential operation. Measurement results are returned in the following order: integrity, time response of open loop power control pass/fail result. For the pass/fail result, 0 = pass, 1 = fail, 9.91 E+37 = undefined.
Query	Integrity <ul style="list-style-type: none"><li>• Range: 0 to 23 see <a href="#">“Integrity Indicator”</a></li><li>• Resolution: 1</li></ul> Time Response of Open Loop Power Control <ul style="list-style-type: none"><li>• Range: 0, 1, 9.91 E+37</li></ul>

---

## RFANalyzer Subsystem

### Description

The RFANalyzer command subsystem performs “lower-level” functions that control the test set's measuring receiver. The measuring receiver includes three separate signal paths:

- Power detector
- Demodulation
- Measurement

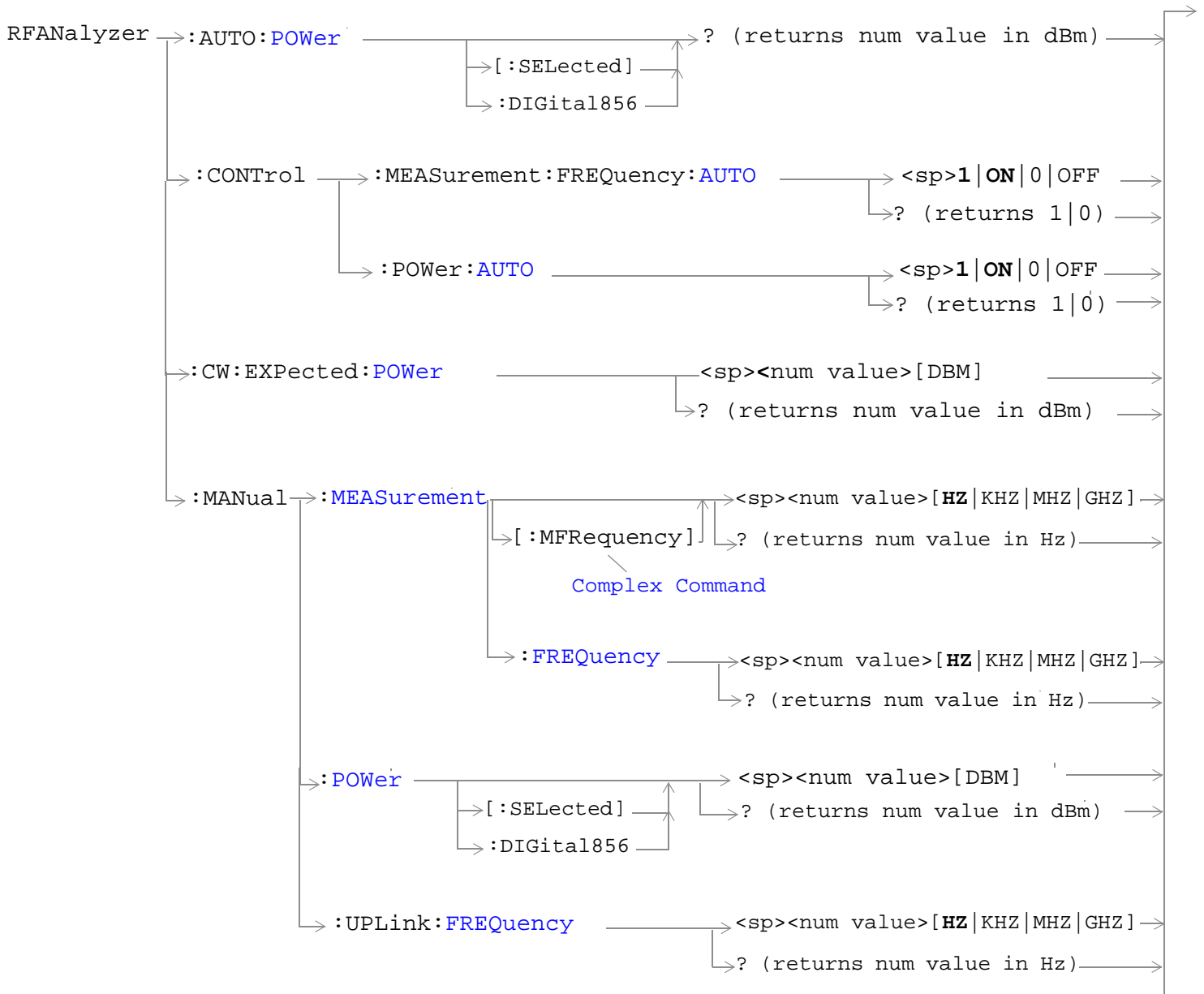
Refer to the [“Block Diagram” on page 765](#) for a description of the signal paths.

The RFANalyzer commands allow manual settings to the tune frequency or expected power level to each of these paths if it is necessary to override automatic settings.

### Syntax Diagrams and Command Descriptions

[“RFANalyzer” on page 474](#)

# RFAnalyzer



“Diagram Conventions” on page 326

## RFANalyzer:AUTO:POWer&lt;[:SElected]][:DIGital856]&gt;?

Function	<p>Queries the expected input power when receiver power control mode is set to automatic using the “RFANalyzer:CONTROL:POWer:AUTO” command. See “Expected Power” on page 185 for information on how the expected input power level is determined by the test set in automatic mode.</p> <p>The optional [:SElected] keyword in this command specifies that the expected input power being queried applies to the current system type (see “System Type” on page 167).</p> <p>This command only applies to “Active Cell Operating Mode” . To set/query the expected input power while in “CW Operating Mode” see “RFANalyzer:CW:EXpected:POWer” on page 477.</p> <p>See “Receiver Control” on page 182 for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Query	<p>Range: -69 dBm to +30 dBm</p> <p>Resolution: 0.01 dBm</p>
*RST setting	<p>-20.72 dBm</p> <p>Expected power due to the following *RST settings:</p> <ul style="list-style-type: none"> <li>• Cell Power: -55 dBm/1.23 MHz</li> <li>• Open Loop Adjust: 81 dB</li> <li>• Probe Initial Adjust: 0 dB</li> <li>• Data Offset Nom: 0 dB</li> <li>• Data Offset 9k6: 0 dB</li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"RFANalyzer:AUTO:POWer:SElected?"</pre> <p>! Queries the expected input power when receiver power control mode ! is set to automatic.</p>	

## RFANalyzer

### RFANalyzer:CONTROL:MEASUREMENT:FREQUENCY:AUTO

Function	<p>Sets/queries the receiver measurement frequency control mode.</p> <p>ON = automatic receiver measurement frequency control</p> <p>OFF = manual receiver measurement frequency control</p> <p>This command only applies to “Active Cell Operating Mode” . Receiver measurement frequency control is always manual in “CW Operating Mode” .</p> <p>Set the receiver measurement frequency manually using the “RFANalyzer:MANual:MEASurement:FREQuency” command.</p> <p>See “Receiver Control” on page 182 for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	1 (automatic)
<b>Programming Example</b>	
<pre>OUTPUT 714;"RFANalyzer:CONTROL:MEASUREMENT:FREQUENCY:AUTO OFF" ! Enables manual control of the receiver measurement frequency.</pre>	

### RFANalyzer:CONTROL:POWER:AUTO

Function	<p>Sets/queries the receiver power control mode.</p> <p>ON = automatic receiver power control</p> <p>OFF = manual receiver power control</p> <p>This command only applies to “Active Cell Operating Mode” . Receiver power control is always manual in “CW Operating Mode” .</p> <p>Set the receiver expected input power manually using the “RFANalyzer:MANual:POWER&lt;[:SElected]   :DIGital856&gt;” command.</p> <p>See “Receiver Control” on page 182 for more information about manual versus automatic receiver control..</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	1 (automatic)
<b>Programming Example</b>	
<pre>OUTPUT 714;"RFANalyzer:CONTROL:POWER:AUTO OFF" ! Enables manual control of the expected input power level.</pre>	



**RFAnalyzer:CW:EXpected:POWer**

Function	<p>Sets/queries the expected CW input power.</p> <p>This command only applies to “<a href="#">CW Operating Mode</a>” . To set/query the expected input power while in “<a href="#">Active Cell Operating Mode</a>” see “<a href="#">RFAnalyzer:AUTO:POWer&lt;[:SElected] :DIGital856&gt;?</a>” on page 475 and “<a href="#">RFAnalyzer:MANual:POWer&lt;[:SElected] :DIGital856&gt;</a>” .</p> <p>See “<a href="#">Receiver Control</a>” on page 182 for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	<p>Range: -80 dBm to +93 dBm (This is the range of settings accepted, see “<a href="#">Expected Power</a>” on page 185 for the actual hardware range of the detector)</p> <p>Resolution: 0.01 dBm</p>
Query	Same as setting
*RST setting	+13 dBm
<b>Programming Example</b> <pre>OUTPUT 714;"RFAnalyzer:CW:EXpected:POWer -20" ! Sets the expected CW input power level to -20 dBm</pre>	

**RFAnalyzer:MANual:MEASurement[:MFRequency]**

Function	<p>The setting form of this command performs two functions: (1) sets the receiver measurement frequency, and (2) sets the receiver measurement frequency mode to manual (auto off).</p> <p>The query form of this command returns the receiver measurement frequency.</p> <p>The receiver measurement frequency mode can be returned to auto using the “<a href="#">RFAnalyzer:CONTRol:MEASurement:FREQuency:AUTO</a>” command.</p> <p>This command applies to both “<a href="#">Active Cell Operating Mode</a>” and “<a href="#">CW Operating Mode</a>” . However, receiver measurement frequency mode is always manual for CW operating mode so this command performs the same function as “<a href="#">RFAnalyzer:MANual:MEASurement:FREQuency</a>” when in CW operating mode.</p> <p>If no units are specified the setting defaults to Hz.</p> <p>See “<a href="#">Receiver Control</a>” on page 182 for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: See “ <a href="#">RFAnalyzer:MANual:MEASurement:FREQuency</a> ”
Query	Range/Resolution: See “ <a href="#">RFAnalyzer:MANual:MEASurement:FREQuency</a> ”
*RST setting	896000000 Hz (but *RST returns receiver measurement frequency mode to automatic)
<b>Programming Example</b> <pre>OUTPUT 714;"RFAnalyzer:MANual:MEASurement 942.6 MHZ" ! Enables manual control of the receiver measurement frequency and ! sets the tune frequency to 942.6 MHz.</pre>	

## RFANalyzer

### RFANalyzer:MANual:MEASurement:FREQuency

Function	<p>Sets/queries the receiver measurement frequency. See <a href="#">“Receiver Control” on page 182</a>.</p> <p>For <a href="#">“Active Cell Operating Mode”</a>, the receiver measurement frequency control must first be set to manual using the <a href="#">“RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO”</a> command. For <a href="#">“CW Operating Mode”</a>, measurement frequency control is always set to manual.</p> <p>If no units are specified the setting defaults to Hz.</p> <p>See <a href="#">“Receiver Control” on page 182</a> for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 292.5 MHz to 2700 MHz Resolution: 0.1 Hz
Query	Same as setting
*RST setting	896000000 Hz
<b>Programming Example</b>  OUTPUT 714;"RFANalyzer:MANual:MEASurement:FREQuency 942.6 MHz" ! Sets the receiver measurement frequency to 942.6 MHz when manual control mode is used.	

### RFANalyzer:MANual:POWEr<[:SELEcted]][:DIGital856>

Function	<p>Sets/queries the expected input power when the receiver power control mode is set to manual using the <a href="#">“RFANalyzer:CONTRol:POWEr:AUTO”</a> command.</p> <p>The optional [:SELEcted] keyword in this command specifies that the expected input power setting applies to the current system type (see <a href="#">“System Type” on page 167</a>).</p> <p>This command only applies to <a href="#">“Active Cell Operating Mode”</a>. To set/query the expected input power while in <a href="#">“CW Operating Mode”</a> see <a href="#">“RFANalyzer:CW:EXPEcted:POWEr” on page 477</a>.</p> <p>See <a href="#">“Receiver Control” on page 182</a> for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: -129 dBm to +80 dBm (This is the range of settings accepted, see <a href="#">“Expected Power” on page 185</a> for the actual hardware range of the detector) Resolution: 0.01 dBm
Query	Same as setting
*RST setting	0 dBm
<b>Programming Example</b>  OUTPUT 714;"RFANalyzer:MANual:POWEr 24" ! Sets the receiver expected input power level ! for the currently selected system type to 24 dBm.	

## RFAnalyzer:MANual:UPLink:FREQuency

Function	<p>Sets/queries the receiver demodulation frequency. See <a href="#">“Receiver Control” on page 182</a>.</p> <p>This command only applies to <a href="#">“CW Operating Mode”</a> . There is no manual control of the receiver demodulation frequency available in <a href="#">“Active Cell Operating Mode”</a> .</p> <p>If no units are specified the setting defaults to Hz.</p> <p>See <a href="#">“Receiver Control” on page 182</a> for more information about manual versus automatic receiver control.</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	<p>Range: 292.5 MHz to 2700 MHz</p> <p>Resolution: 0.1 Hz</p>
Query	Same as setting
*RST setting	896000000 Hz
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"RFAnalyzer:MANual:UPLink:FREQuency 942.6 MHZ" !Sets the receiver demodulation frequency to 942.6 MHz.</pre>	

## RFGenerator Subsystem

### Description

The RFGenerator subsystem selects the RF generator output port on test sets equipped with both the RF IN/OUT port and the RF OUT ONLY port. If the test set does not have the RF OUT ONLY port, an error message is generated when attempting to switch output ports.

The RF OUT ONLY port may not be used with some test applications or lab applications. In that case, a message is displayed that tells you that the port could not be switched.

### Syntax Diagrams and Command Descriptions

[“RFGenerator:OUTPut” on page 481](#)

## RFGenerator:OUTPut

RFGenerator → :OUTPut → [:DESTination] → <sp>[ IO | OUT] → ? (returns IO | OUT)

[“Diagram Conventions” on page 326](#)

### RFGenerator:OUTPut[:DESTination]

Function	Sets/queries the RF output port destination: RF IN/OUT (IO) or RF OUT ONLY (OUT). If the correct hardware is not installed when trying to change to the RF OUT ONLY port, the test set displays the following error: Hardware error; RFIO version does not support RF out only selection. The query form will always return a value, regardless of the hardware version.
Requirements	Test Application Revision: A.01.20 and above Hardware: RF Input/Output module with second RF output connector, modified front panel.
Setting	Range: IO   OUT
Query	Range: IO   OUT
*RST Setting	IO
<b>Programming Example</b> <pre>OUTPUT 714;"RFGenerator:OUTPut OUT" !Sets the RF generator's output destination to the RF Out Only port.</pre>	

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## SETup Subsystem

### Description

The SETup subsystem is used to configure the test set for each measurement. Typical settings include:

- Multi-Measurement Count, how many measurements will be made each time a measurement is initiated.
- Trigger Arm, determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).
- Trigger Source, how a measurement is triggered.
- Trigger Delay, controls the delay time between the trigger and the start of sampling.
- Measurement Timeout, length of time before a measurement times out.

---

**NOTE** Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. In most cases, it is a best practice (during remote operation) to use “single” measurement mode. This simplifies the tasks of starting concurrent measurements, using the INIT subsystem commands to determine which measurements are ready to be fetched, then using the FETCh subsystem to obtain results. The command “SETup:CONTInuous:OFF sets all measurements to “single” trigger mode.

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### Syntax Diagrams and Command Descriptions

[“SETup:CONTInuous” on page 483](#)

[“SETup:AFANalyzer” on page 484](#) (Audio Analyzer)

[“SETup:CAPPower” on page 491](#) (Access Probe Power)

[“SETup:CPERror” on page 494](#) (Packet Error Rate)

[“SETup:CPOWer” on page 500](#) (Channel Power)

[“SETup:CTXSpurious” on page 505](#) (TX Spurious Emissions)

[“SETup:DAPower” on page 511](#) (Digital Average Power)

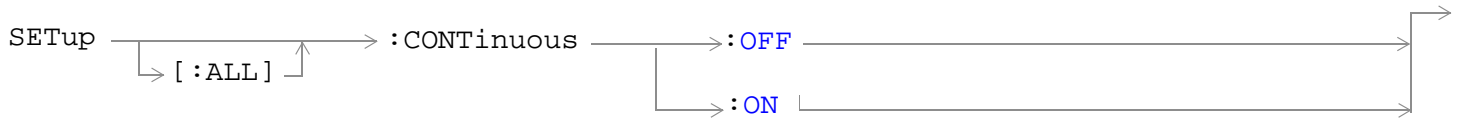
[“SETup:DOWQuality” on page 516](#) (Waveform Quality + Code Domain)

[“SETup:SAUDio” on page 521](#) (Swept Audio)

[“SETup:SMONitor” on page 530](#) (Spectrum Monitor)

[“SETup:TROPower” on page 539](#) (Time Response of Open Loop Power Control)

## SETup:CONTInuous

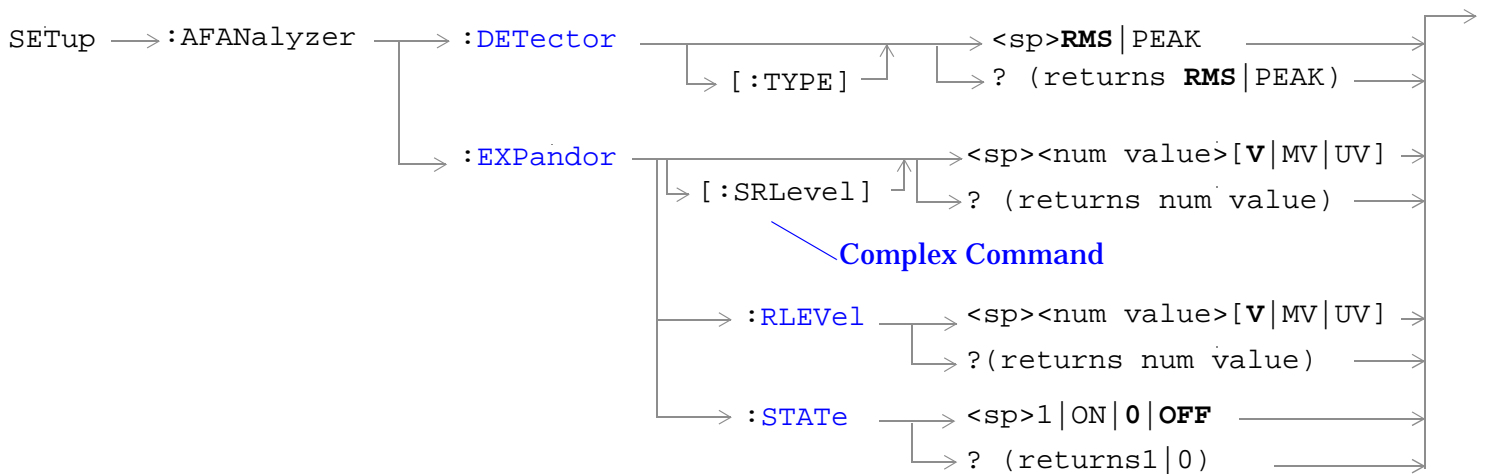
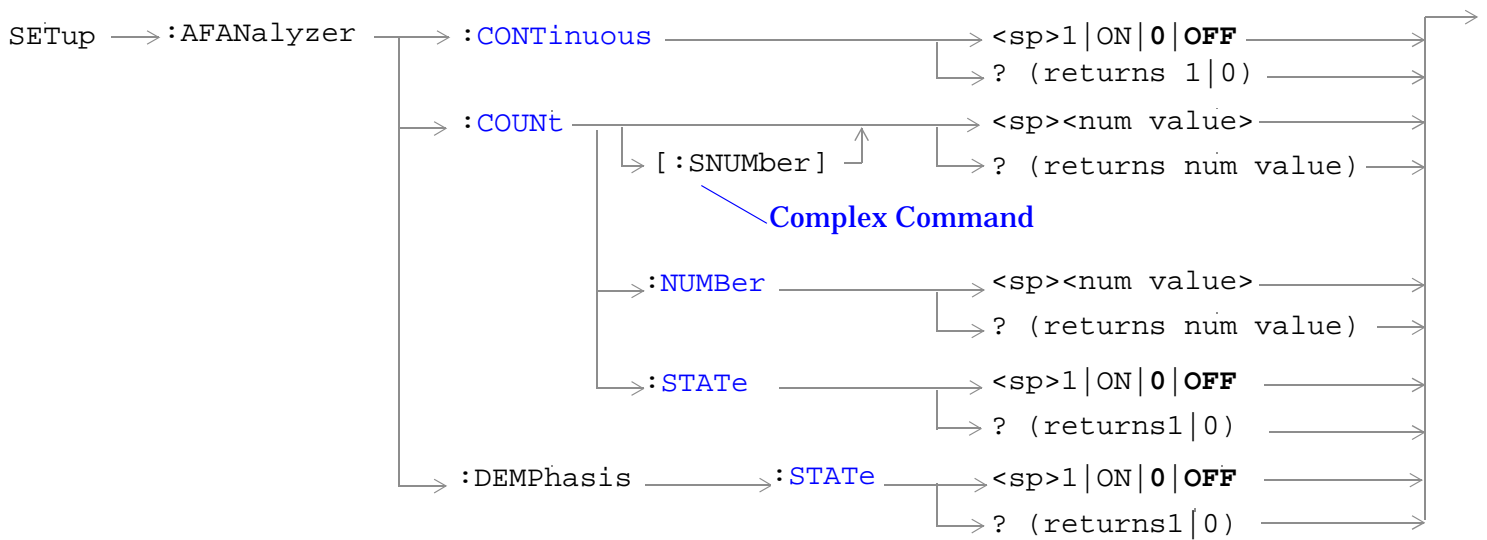


[“Diagram Conventions” on page 326](#)

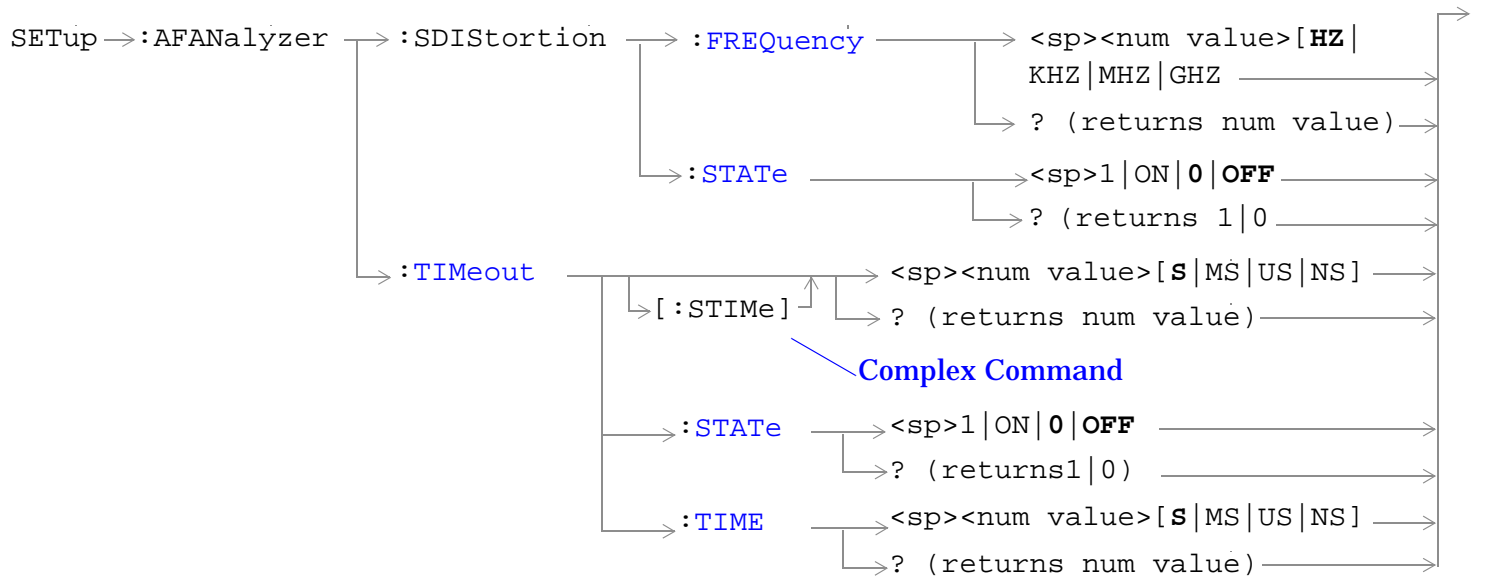
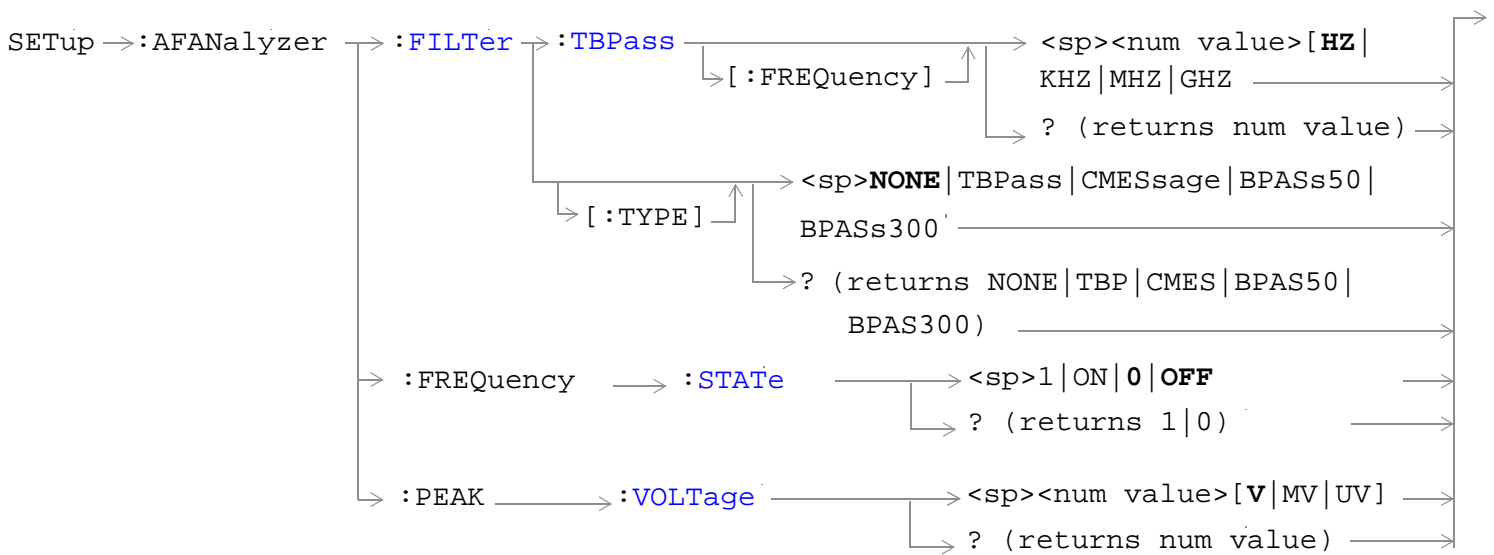
### SETup[:ALL]:CONTInuous:OFF[:ON]

Function	<p>These commands set the trigger arm state for all measurements. Determines whether all measurements will make one measurement then stop (:OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (:ON (continuous)). See <a href="#">“Trigger Arm (Single or Continuous) Description” on page 253</a>.</p> <p>This setting overrides previously set trigger arm settings for individual measurements (see <a href="#">“SETup Subsystem” on page 482</a>).</p>
Requirements	Test Application Revision: A.01.20 and above
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SETup:CONTInuous:OFF" ! Sets all measurements to single trigger mode. </pre>	

## SETup:AFANalyzer







“Diagram Conventions” on page 326

## SETup:AFANalyzer

### SETup:AFANalyzer:CONTInuous

Function	Sets/queries the trigger arm state for the AF analyzer measurement. Determines whether measurement will make one measurement then stop (0   OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1   ON (continuous)).
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETUP:AFANALYZER:CONTINUOUS OFF" !Sets measurement to single trigger mode.	

### SETup:AFANalyzer:COUNT[:SNUMBER]

Function	Sets/queries the number of AF analyzer measurements to be made in a multi-measurement setup. This command sets the count, and automatically sets the multi-measurement STATE command to 1 (on).
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	Off (10 when STATE = On)
<b>Programming Example</b>  OUTPUT 714;"SETUP:AFANALYZER:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.	

### SETup:AFANalyzer:COUNT:NUMBER

Function	Sets/queries the number of AF analyzer measurements to be made when multi-measurement state is ON.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b>  OUTPUT 714;"SETUP:AFANALYZER:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

**SETup:AFANalyzer:COUNT:STATE**

Function	Sets/queries the multi-measurement state of the AF analyzer measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:COUNT:STATE ON" !Turns on multi-measurements.	

**SETup:AFANalyzer:DEMPHasis:STATE**

Function	Sets/queries whether 750 us de-emphasis is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:DEMPHESIS:STATE ON"	

**SETup:AFANalyzer:DETECTOR[:TYPE]**

Function	Sets/queries the detector type for audio level measurements.
Setting	Range: RMS   PEAK
Query	Range: RMS   PEAK
*RST setting	RMS
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:DETECTOR:TYPE PEAK"	

**SETup:AFANalyzer:EXPANDOR[:SRLevel]**

Function	Sets/queries the expander's reference level and automatically sets the expander's state to ON.
Setting	Range: 10 mV to 10 V Resolution: 1 mV
Query	Range: 10 mV to 10 V
*RST setting	1 V
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:EXPANDOR:SRLEVEL 5V" !Sets expander state to on and level to 5 V.	

## SETup:AFANalyzer

### SETup:AFANalyzer:EXPandor:RLEVel

Function	Sets/queries the expander's reference level to be used when the expander's state is set to ON.
Setting	Range: 10 mV to 10 V Resolution: 1 mV
Query	Range: 10 mV to 10 V
*RST setting	1 V
<b>Programming Example</b> OUTPUT 714;"SETUP:AFANALYZER:EXPANDOR:RLEVEL 5V" !Sets expander reference level to 5 V.	

### SETup:AFANalyzer:EXPandor:STATE

Function	Sets/queries whether the expander is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETUP:AFANALYZER:EXPANDOR:STATE ON"	

### SETup:AFANalyzer:FILTer[:TYPE]

Function	Sets/queries the filter type for audio measurements.
Setting	Range: NONE   TBPAss   CMESsage   BPASs50   BPASs300
Query	Range: NONE   TBP   CMES   BPAS50   BPAS300
*RST setting	NONE
<b>Programming Example</b> OUTPUT 714;"SETUP:AFANALYZER:FILTER:TYPE BPASS50" !Selects the 50 Hz to 15 kHz bandpassfilter.	

### SETup:AFANalyzer:FILTer:TBPAss[:FREQuency]

Function	Sets/queries the center frequency for the 100 Hz tunable bandpass filter (TBPAss).
Setting	Range: 300.0 to 20000 Hz Resolution: 0.1
Query	Range: 300.0 to 20000 Hz
*RST setting	1000
<b>Programming Example</b> 10 OUTPUT 714;"SETUP:AFANALYZER:FILTER:TBPASS:FREQUENCY 300HZ"	

**SETup:AFANalyzer:FREQUENCY:STATE**

Function	Sets/queries whether the audio frequency measurement is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:FREQUENCY:STATE ON"	

**SETup:AFANalyzer:PEAK:VOLTage**

Function	Sets/queries the expected peak voltage for audio measurements.
Setting	Range: 0.001 to 20 Vpk Resolution: 0.001
Query	Range: 0.001 to 20 Vpk
*RST setting	20
Programming Example	
10 OUTPUT 714;SETUP:AFANALYZER:PEAK:VOLTAGE 10V"	

**SETup:AFANalyzer:SDISTORTION:FREQUENCY**

Function	Sets/queries the fundamental frequency setting for the SINAD/distortion measurement.
Setting	Range: 100.0 to 10000 Hz Resolution: 0.1
Query	Range: 100.0 to 10000 Hz
*RST setting	1000
Programming Example	
10 OUTPUT 714;SETUP:AFANALYZER:SDISTORTION:FREQUENCY 300HZ"	

**SETup:AFANalyzer:SDISTORTION:STATE**

Function	Sets/queris whether the SINAD/distortion measurement is enabled.
Setting	Range: 1   0N   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
Programming Example	
10 OUTPUT 714;SETUP:AFANALYZER:SDISTORTION:STATE ON"	

## SETup:AFANalyzer

### SETup:AFANalyzer:TIMEout[:STIME]

Function	Sets/queries the AF analyzer measurement's timeout setting and automatically sets the timeout state to ON.
Setting	Range: 1 to 999 seconds Resolution: 1 second
Query	Range: 1 to 999
*RST Setting	10 seconds, on
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

### SETup:AFANalyzer:TIMEout:STATE

Function	Sets/queries the AF analyzer measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:TIMEOUT:STATE ON"	

### SETup:AFANalyzer:TIMEout:TIME

Function	Sets/queries the AF analyzer measurement's timeout setting to be used when the timeout state is set to ON.
Setting	Range: 1 to 999 seconds Resolution: 1 second
Query	Range: 1 to 999
*RST Setting	10 seconds
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:TIMEOUT:TIME 5S"	

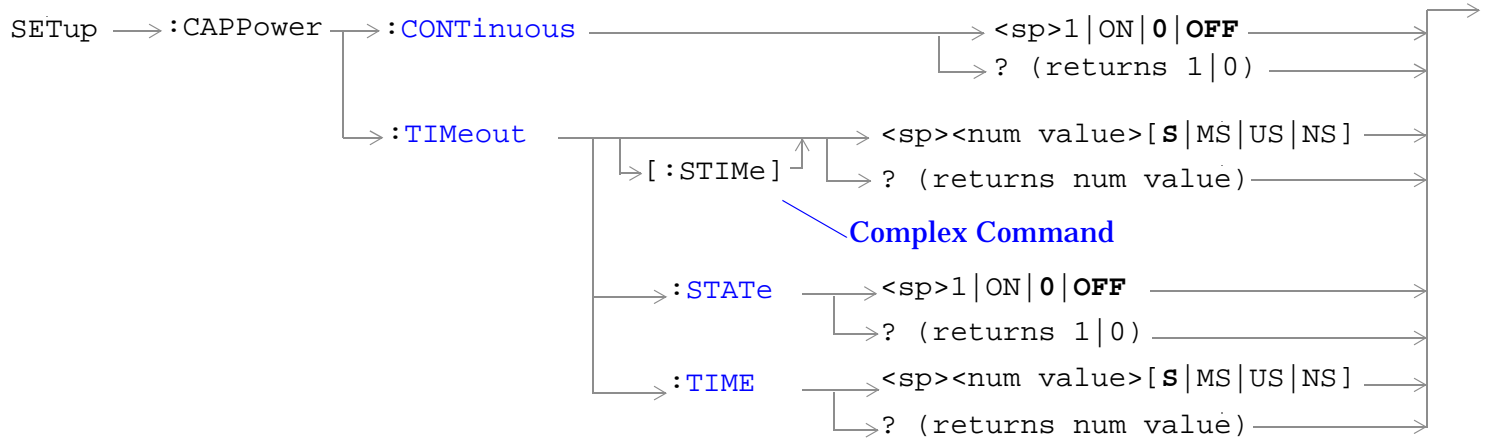
## SETup:CAPPower

**NOTE** The following four parameters directly affect access probe power measurements:

- Power Step
- Initial Adjust
- Sequence Maximum
- Num Step

GPIB commands for these three parameters can be found in the [“CALL:APARAmeter”](#) syntax diagrams.

To limit a call attempt to the access attempt state, see [“CALL:CONNected:LIMit\[:STATe\]<\[:SElected\] | :TA856>”](#) on page 367



[“Diagram Conventions”](#) on page 326

## SETup:CAPPower

### SETup:CAPPower:CONTInuous

Function	<p>Sets/queries the trigger arm state for the access probe power measurement. The trigger arm state determines whether the access probe power measurement will be made on the first access probe in an access probe sequence then stop (0   OFF (single)), or automatically re-arm and make measurements on each of the following access probes (1   ON (continuous)).</p> <p>Continuous trigger arming can be used to measure access probe power sequences, however single triggering allows program counters to synchronize with mobile station transmitted power steps. This is important if you want measurement triggering to stop when an access probe sequence has completed.</p> <p>See <a href="#">“Access Probe Power Measurement Parameters” on page 39</a>, “Trigger Arm.”</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETup:CAPPower:CONTInuous OFF" !Sets measurement to single trigger mode.	

### SETup:CAPPower:TIMEout[:STIME]

Function	<p>The setting form of this command performs two functions: (1) sets the access probe power measurement's timeout (see <a href="#">“Timeouts” on page 250</a>) value, and (2) sets the access probe power measurement's timeout STATE to 1 (on).</p> <p>The query form returns the access probe power measurement's timeout value.</p> <p>If the timeout timer is not turned on, and an access probe is not received, the access probe power measurement will hang on the FETCh? command indefinitely.</p> <p>See <a href="#">“Access Probe Power Measurement Parameters” on page 39</a>, “Timeout Time/State.”</p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds, on
<b>Programming Example</b>  OUTPUT 714;"SETup:CAPPower:TIMEout 5" !Sets timeout state to ON and sets the timeout time to 5 seconds.	



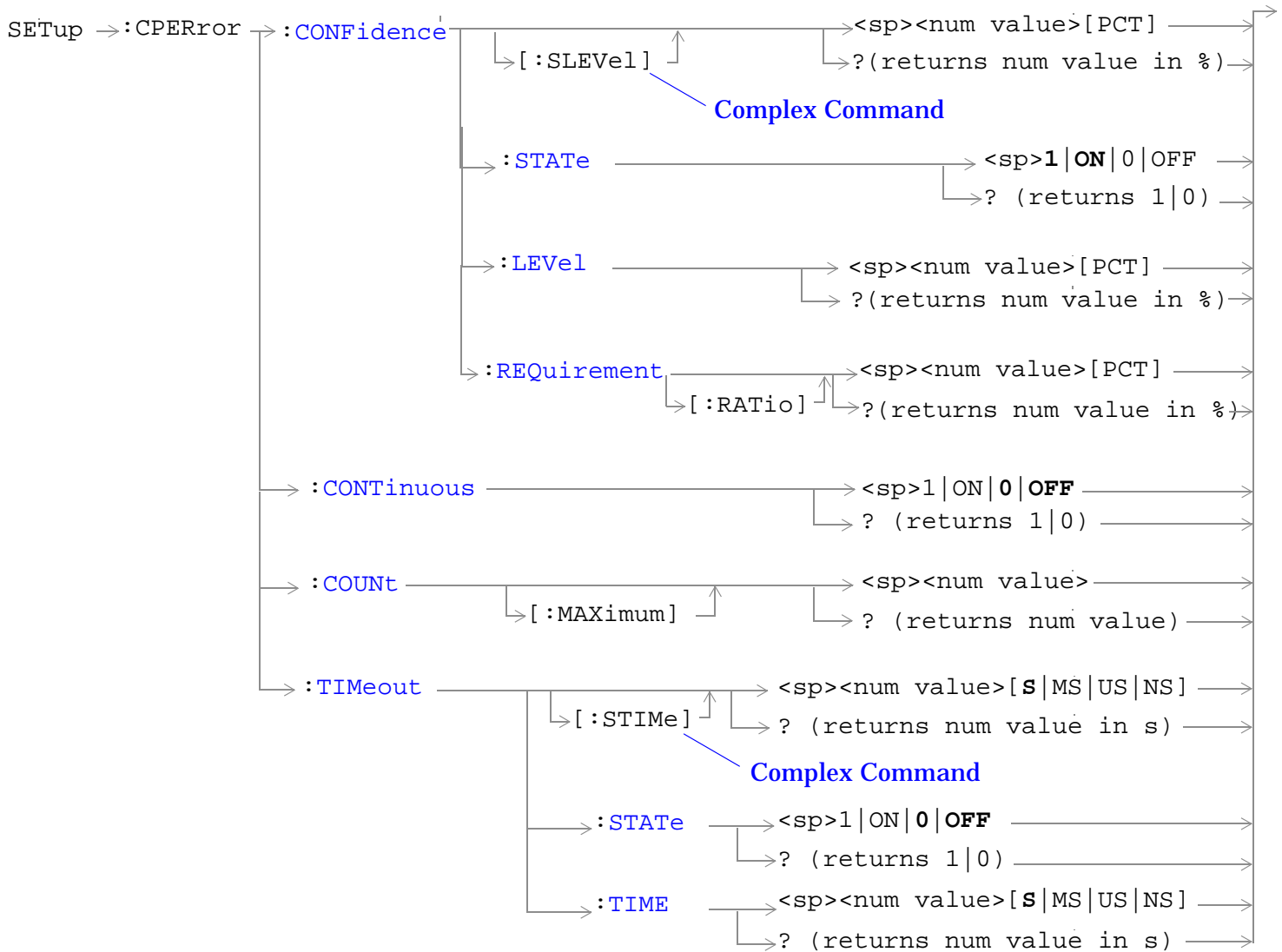
**SETup:CAPPower:TIMEout:STATE**

Function	Sets/queries the access probe power measurement's timeout state. See <a href="#">“Access Probe Power Measurement Parameters” on page 39</a> , “Timeout Time/State.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>	
OUTPUT 714; "SETup:CAPPower:TIMEout:STATE ON"	

**SETup:CAPPower:TIMEout:TIME**

Function	Sets/queries the access probe power measurement's timeout setting to be used when the timeout state is set to ON. See <a href="#">“Access Probe Power Measurement Parameters” on page 39</a> , “Timeout Time/State.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds
<b>Programming Example</b>	
OUTPUT 714; "SETup:CAPPower:TIMEout:TIME 5"	

## SETup:CPErRor



"Diagram Conventions" on page 326

**SETup:CPERror:CONFidence[:SLEVel]**

Function	The setting form of this command performs two functions: (1) sets the PER (packet error rate) measurement's confidence level, and (2) sets the PER measurement's confidence level STATE to 1 (on).  The query form of this command returns the PER measurement's confidence level setting.  See <a href="#">"PER Measurement Parameters" on page 57.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: see <a href="#">"SETup:CPERror:CONFidence:LEVel" on page 496.</a>
Query	Range/Resolution: see <a href="#">"SETup:CPERror:CONFidence:LEVel" on page 496.</a>
*RST Setting	95%, on
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:CPERror:CONFidence 90"</pre> <p>! Turns confidence level testing on ! and sets the PER confidence level to 90%</p>	

**SETup:CPERror:CONFidence:STATE**

Function	Sets/queries whether the confidence level will be used during PER testing.  See <a href="#">"PER Measurement Parameters" on page 57.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: <b>1   ON   0   OFF</b>
Query	1   0
*RST Setting	1 (on)
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:CPERror:CONFidence:STATE OFF"</pre> <p>! Turns confidence level testing off.</p>	

## SETup:CPERror

### SETup:CPERror:CONFidence:LEVel

Function	Sets/queries the PER (packet error rate) measurement's confidence level to be used when the confidence level state is set to on using the "SETup:CPERror:TIMEout:STATE" command. See "PER Measurement Parameters" on page 57.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 80 to 99.99% Resolution: 0.01%
Query	Same as setting
*RST Setting	95%
<b>Programming Example</b> OUTPUT 714;"SETup:CPERror:CONFidence:LEVel 90" ! Sets the confidence level to 90%.	

### SETup:CPERror:CONFidence:REQUIREment[:RATio]

Function	Sets/queries the PER (packet error rate) measurement's PER requirement. See "PER Measurement Parameters" on page 57.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.10 to 15.0% Resolution: 0.01%
Query	Same as setting
*RST Setting	1.00%
<b>Programming Example</b> OUTPUT 714;"SETup:CPERror:CONFidence:REQUIREment 2" ! Sets the confidence level requirement to 2%.	

## SETup:CPERror:CONTInuous

Function	Sets/queries the trigger arm state for the PER (packet error rate) measurement. The trigger arm state determines whether the waveform quality measurement will be made once then stop (0   OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1   ON (continuous)). See <a href="#">"PER Measurement Parameters" on page 57.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   <b>0   OFF</b>
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPERror:CONTInuous OFF" ! Sets the PER measurement to single trigger mode.</pre>	

## SETup:CPERror:COUNT[:MAXimum]

Function	Sets/queries the maximum number of packets to be counted during a PER measurement. See <a href="#">"PER Measurement Parameters" on page 57.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 25 to 10,000,000 packets Resolution: 1 packet
Query	Same as setting
*RST Setting	10,000 packets
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPERror:COUNT 20000" ! Sets the maximum packet count value to 20,000 packets.</pre>	

## SETup:CPERror

### SETup:CPERror:TIMEout[:STIME]

Function	The setting form of this command performs two functions: (1) sets the PER (packet error rate) measurement's timeout value, and (2) sets the PER measurement's timeout STATE to 1 (on). The query form returns the PER measurement's timeout value. See <a href="#">"PER Measurement Parameters" on page 57</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: <a href="#">"SETup:CPERror:TIMEout:TIME" on page 499</a> .
Query	Range/Resolution: <a href="#">"SETup:CPERror:TIMEout:TIME" on page 499</a> .
*RST Setting	267.0 seconds, off
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPERror:TIMEout 300" ! Sets timeout state to ON and sets the timeout time to 300 seconds.</pre>	

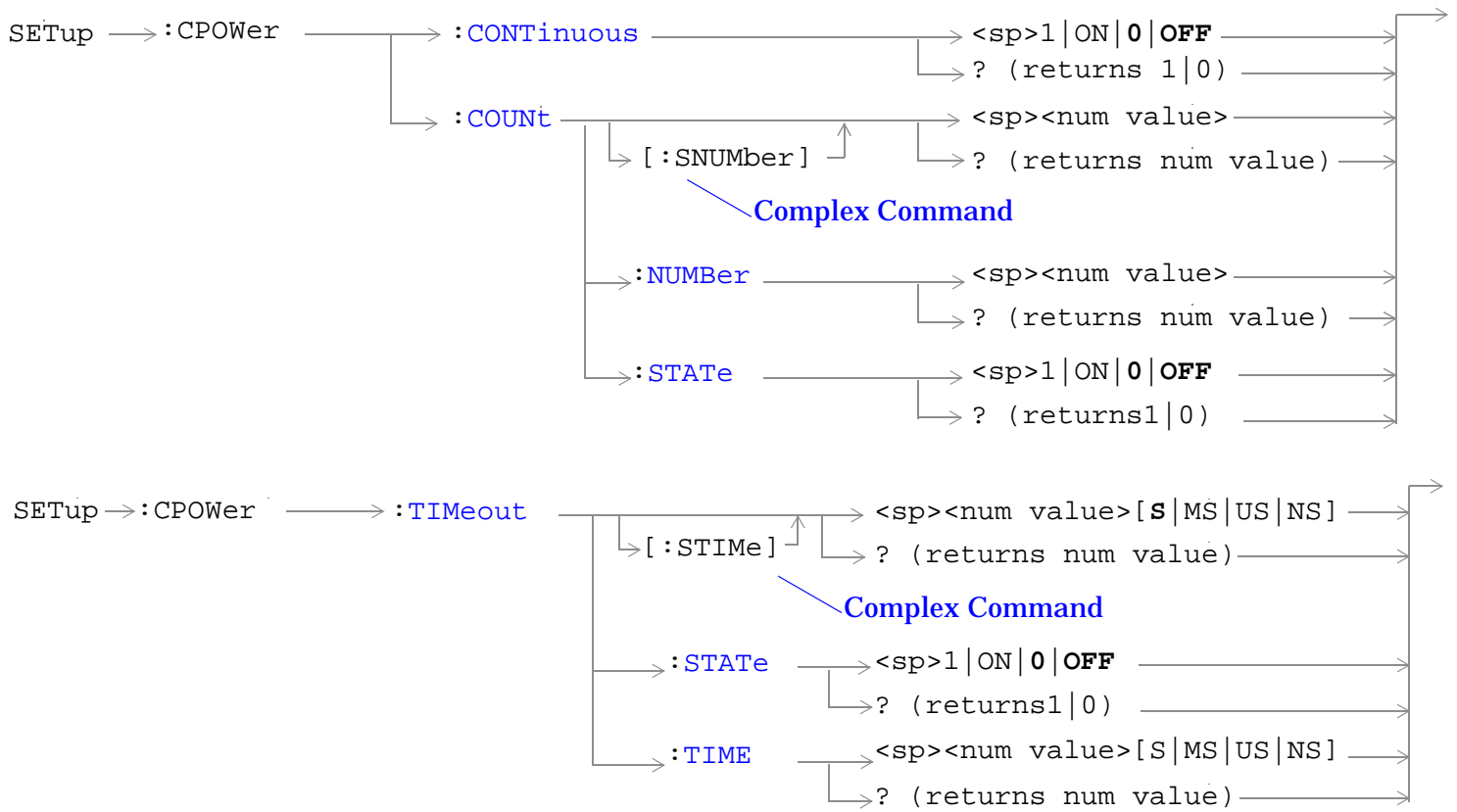
### SETup:CPERror:TIMEout:STATE

Function	Sets/queries the PER (packet error rate) measurement's timeout state. See <a href="#">"PER Measurement Parameters" on page 57</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   <b>0</b>   <b>OFF</b>
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPERror:TIMEout:STATE ON" ! Sets the timeout state to ON.</pre>	

## SETup:CPERror:TIMEout:TIME

Function	Sets/queries the PER (packet error rate) measurement's timeout setting to be used when the timeout state is set to ON using the "SETup:CPERror:TIMEout:STATE" command. See "PER Measurement Parameters" on page 57.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 266,667.0 seconds Resolution: 0.1 seconds
Query	Same as setting
*RST Setting	267.0 seconds (allows time for the default of 10,000 max packets to be tested)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPERror:TIMEout:TIME 300" ! Sets the timeout time to 300 seconds.</pre>	

## SETup:CPOWer



[“Diagram Conventions” on page 326](#)



## SETup:CPOWer:CONTInuous

Function	Sets/queries the trigger arm state for the channel power measurement. The trigger arm state determines whether the channel power measurement will be made once then stop (0   OFF (single)), or automatically re-arm upon completion of one measurement and repeat the process (1   ON (continuous)). See <a href="#">“Channel Power Measurement Parameters” on page 50.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPOWer:CONTInuous OFF" !Sets measurement to single trigger mode.</pre>	

## SETup:CPOWer:COUNT[:SNUMber]

Function	<p>The setting form of this command performs two functions: (1) sets the number of channel power measurements to be made in a multi-measurement, and (2) sets the multi-measurement STATE command to 1 (on).</p> <p>The query form returns the number of channel power multi-measurements to be made when mult-measurement state is ON.</p> <p>See <a href="#">“Channel Power Measurement Parameters” on page 50.</a></p>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	Off (10 when STATE = On)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CPOWer:COUNT 5" !Turns on multi-measurements and sets the number of measurements to 5.</pre>	

## SETup:CPOWer

### SETup:CPOWer:COUNT:NUMBER

Function	Sets/queries the number of channel power measurements to be made when the multi-measurement state is ON. See <a href="#">“Channel Power Measurement Parameters” on page 50.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> OUTPUT 714;"SETup:CPOWer:COUNT:NUMBER 5" !Sets the number of channel power multi-measurements to 5.	

### SETup:CPOWer:COUNT:STATE

Function	Sets/queries the channel power multi-measurement state. See <a href="#">“Channel Power Measurement Parameters” on page 50.</a>
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETup:CPOWer:COUNT:STATE ON" !Turns on channel power multi-measurements.	

## SETup:CPOWer:TIMEout[:STIME]

Function	The setting form of this command performs two functions: (1) sets the channel power measurement's timeout (see <a href="#">"Timeouts" on page 250</a> ) value, and (2) sets the channel power measurement's timeout STATE to 1 (on).  The query form returns the channel power measurement's timeout value.  See <a href="#">"Channel Power Measurement Parameters" on page 50</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds, on
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:CPOWer:TIMEout 5" !Sets timeout state to ON and sets the timeout time to 5 seconds.</pre>	

## SETup:CPOWer:TIMEout:STATE

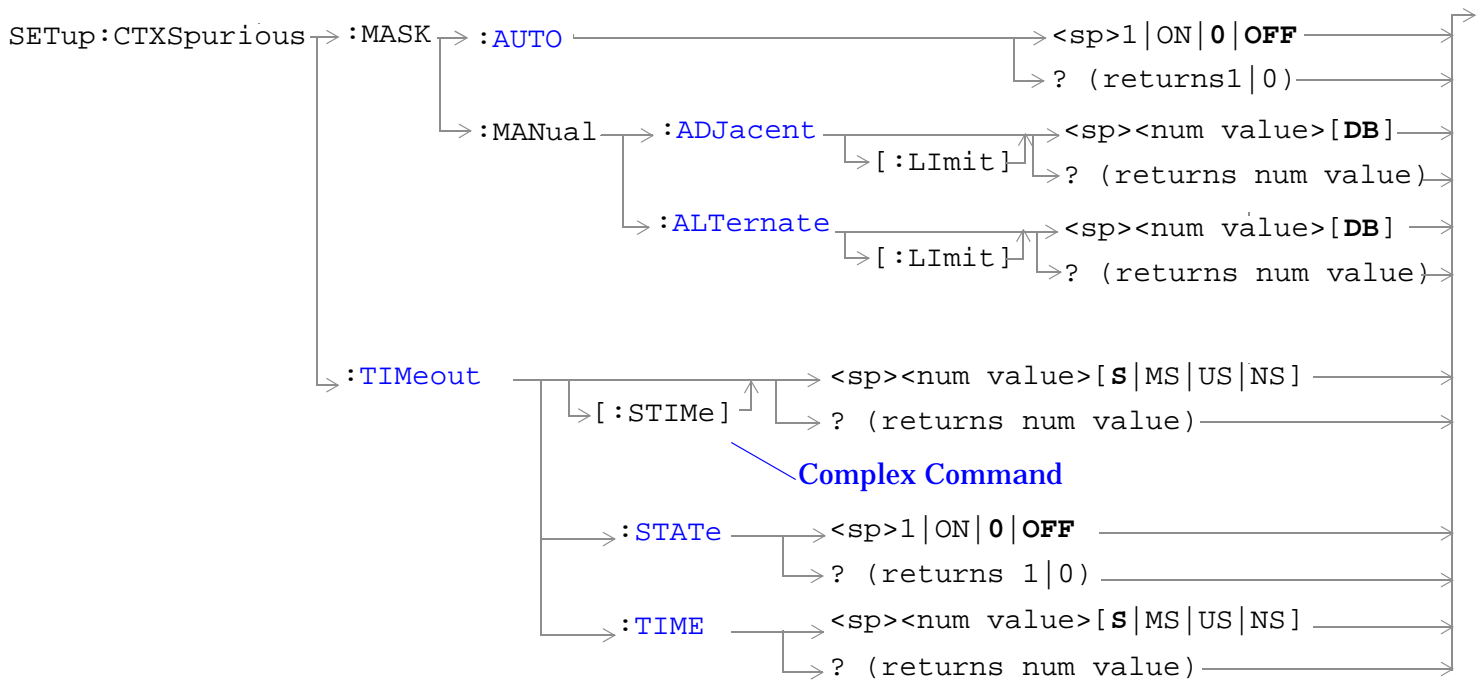
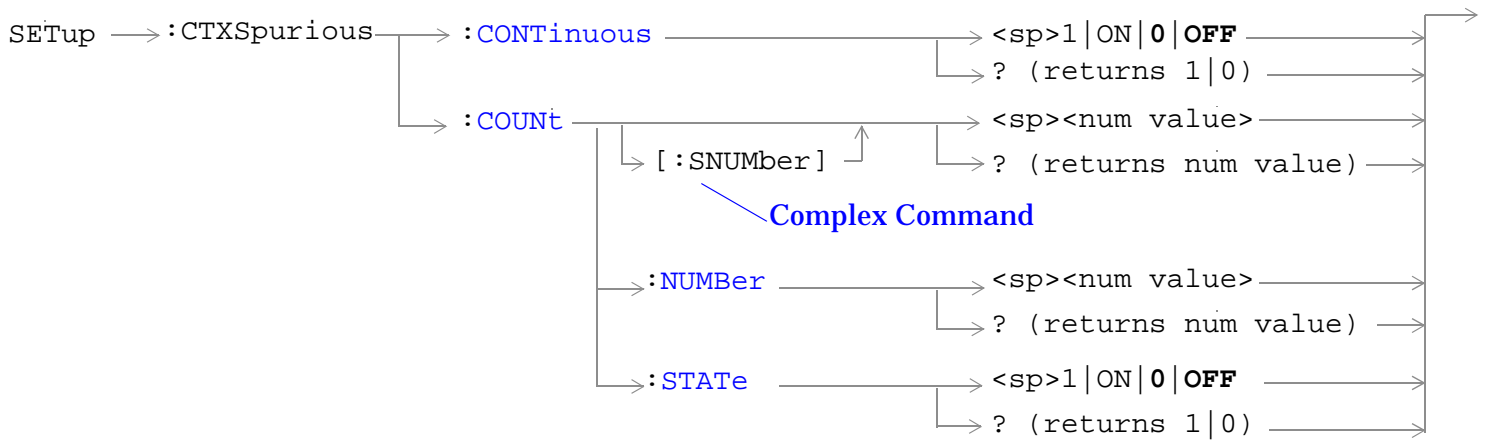
Function	Sets/queries the channel power measurement's timeout (see <a href="#">"Timeouts" on page 250</a> ) state. See <a href="#">"Channel Power Measurement Parameters" on page 50</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:CPOWer:TIMEout:STATE ON"</pre>	

## SETup:CPOWer

### SETup:CPOWer:TIMEout:TIME

Function	Sets/queries the channel power measurement's timeout (see "Timeouts" on page 250) setting to be used when the timeout state is set to ON. See "Channel Power Measurement Parameters" on page 50.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds
<b>Programming Example</b> OUTPUT 714;"SETup:CPOWer:TIMEout:TIME 5"	

## SETup:CTXSpurious



“Diagram Conventions” on page 326

## SETup:CTXSpurious

### SETup:CTXSpurious:CONTInuous

Function	Sets/queries the trigger arm state for the tx spurious emissions measurement. The trigger arm state determines whether the tx spurious emissions measurement will be made once then stop (0   OFF (single)), or automatically re-arm upon completion of one measurement and repeat the process (1   ON (continuous)).  See <a href="#">“TX Spurious Emissions Measurement Parameters” on page 74</a> , “Trigger Arm.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETup:CTXSpurious:CONTInuous OFF" !Sets measurement to single trigger mode.	

### SETup:CTXSpurious:COUNt[:SNUMBER]

Function	The setting form of this command performs two functions: (1) sets the number of tx spurious emissions measurements to be made in a multi-measurement, and (2) sets the multi-measurement STATE command to 1 (on).  The query form returns the number of tx spurious emissions multi-measurements to be made when mulit-measurement state is ON.  See <a href="#">“TX Spurious Emissions Measurement Parameters” on page 74</a> , “Multi-Measurement Count.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	Off (10 when STATE = On)
<b>Programming Example</b>  OUTPUT 714;"SETup:CTXSpurious:COUNt 5" !Turns on multi-measurements and sets the number of measurements to 5.	

**SETup:CTXSpurious:COUNT:NUMBER**

Function	Sets/queries the number of tx spurious emissions measurements to be made when the multi-measurement state is ON.  See <a href="#">“TX Spurious Emissions Measurement Parameters” on page 74</a> , “Multi-Measurement Count.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CTXSpurious:COUNT:NUMBER 5" !Sets the number of tx spurious emissions multi-measurements to 5.</pre>	

**SETup:CTXSpurious:COUNT:STATE**

Function	Sets/queries the tx spurious emissions multi-measurement state.  See <a href="#">“TX Spurious Emissions Measurement Parameters” on page 74</a> , “Multi-Measurement Count.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:CTXSpurious:COUNT:STATE ON" ! Turns on tx spurious emissions multi-measurements.</pre>	

**SETup:CTXSpurious:MASK:AUTO**

Function	Sets/queries the mask control.  ON (1) sets the mask limits to the values specified in C.S0033. OFF (0) allows you to set arbitrary limits (see <a href="#">“SETup:CTXSpurious:MASK:MANual:ADJacent[:LIMit]”</a> and <a href="#">“SETup:CTXSpurious:MASK:MANual:ALternate[:LIMit]”</a> ).  See <a href="#">“TX Spurious Emissions Measurement Parameters” on page 74</a> , “Mask Control.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	1 (ON)

## SETup:CTXSpurious

### Programming Example

```
OUTPUT 714;"SETup:CTXSpurious:MASK:AUTO ON"
```

## SETup:CTXSpurious:MASK:MANual:ADJacent[:LIMit]

Function	Sets/queries the tx spurious emissions manually set measurement limit mask. This limit is activated when "SETup:CTXSpurious:MASK:AUTO" is set to OFF (0). See "TX Spurious Emissions Measurement Parameters" on page 74, "Adjacent Limit."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: -10.00 to -65.00 dBc Resolution: 0.01 dB
Query	Range/Resolution: Same as setting.
*RST Setting	-42 dBc
<b>Programming Example</b>	
OUTPUT 714;"SETup:CTXSpurious:MASK:MANual:ADJacent -45"	

## SETup:CTXSpurious:MASK:MANual:ALternate[:LIMit]

Function	Sets/queries the tx spurious emissions manually set measurement limit mask. This limit is activated when "SETup:CTXSpurious:MASK:AUTO" is set to OFF (0). See "TX Spurious Emissions Measurement Parameters" on page 74, "Alternate Limit."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: -10.00 to -65.00 dBc Resolution: 0.01 dB
Query	Range/Resolution: Same as setting.
*RST Setting	-50 dBc
<b>Programming Example</b>	
OUTPUT 714;"SETup:CTXSpurious:MASK:MANual:ALternate -55".	



## SETup:CTXSpurious:TIMEout[:STIME]

Function	The setting form of this command performs two functions: (1) sets the tx spurious emissions measurement's timeout (see <a href="#">"Timeouts" on page 250</a> ) value, and (2) sets the tx spurious emissions measurement's timeout STATE to 1 (on).  The query form returns the tx spurious emissions measurement's timeout value.  See <a href="#">"TX Spurious Emissions Measurement Parameters" on page 74</a> , "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds  Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds, on
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:CTXSpurious:TIMEout 5" !Sets timeout state to ON and sets the timeout time to 5 seconds.</pre>	

## SETup:CTXSpurious:TIMEout:STATE

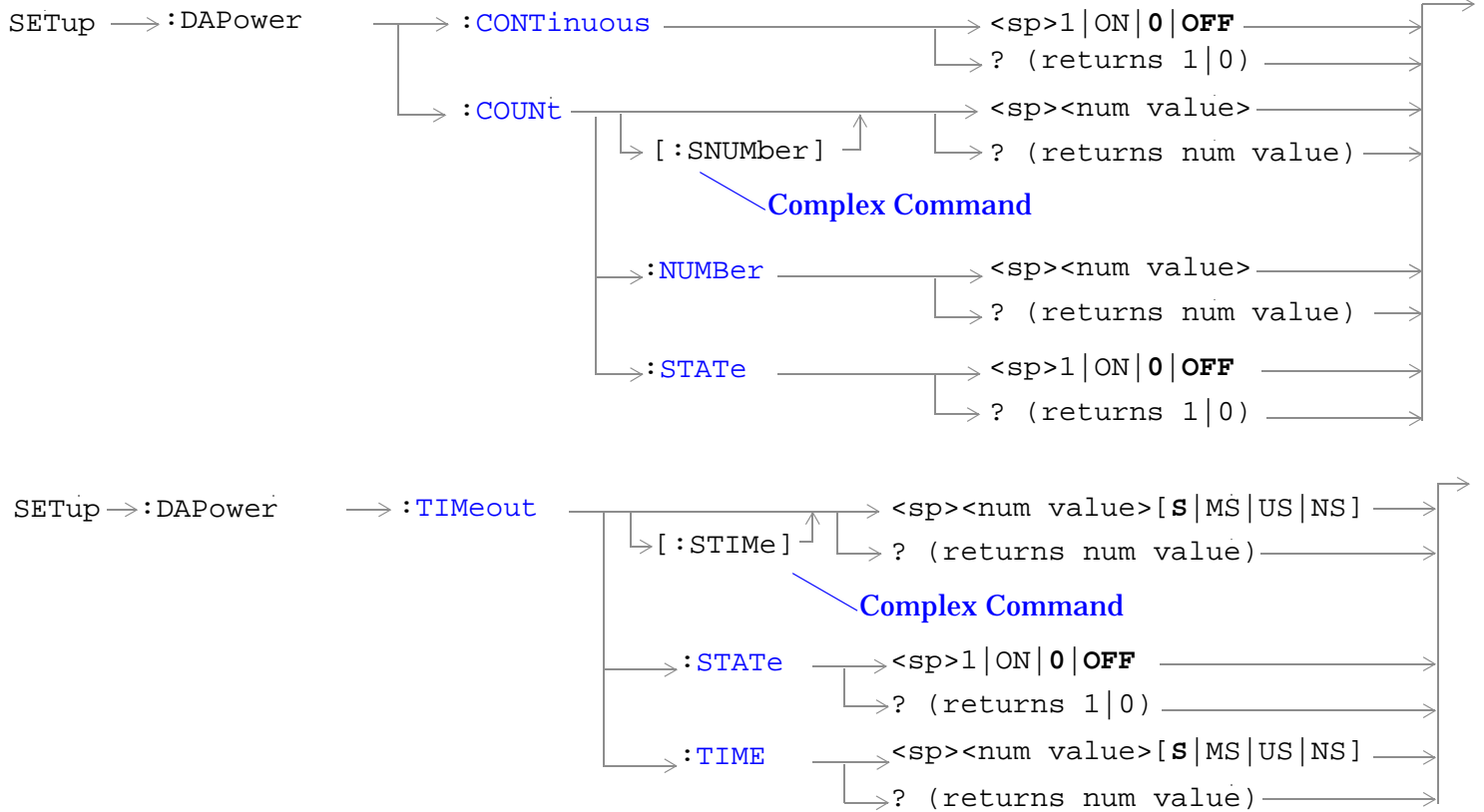
Function	Sets/queries the tx spurious emissions measurement's timeout (see <a href="#">"Timeouts" on page 250</a> ) state.  See <a href="#">"TX Spurious Emissions Measurement Parameters" on page 74</a> , "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:CTXSpurious:TIMEout:STATE ON"</pre>	

## SETup:CTXSpurious

### SETup:CTXSpurious:TIMEout:TIME

Function	Sets/queries the tx spurious emissions measurement's timeout (see <a href="#">"Timeouts" on page 250</a> ) setting to be used when the timeout state is set to ON. See <a href="#">"TX Spurious Emissions Measurement Parameters" on page 74</a> , "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds
<b>Programming Example</b> OUTPUT 714;"SETup:CTXSpurious:TIMEout:TIME 5"	

## SETup:DAPower



“Diagram Conventions” on page 326

## SETup:DAPower

### SETup:DAPower:CONTInuous

Function	Sets/queries the trigger arm state for the digital average power measurement. The trigger arm state determines whether the digital average measurement will be made once then stop (0   OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1   ON (continuous)).  See <a href="#">"Digital Average Power Measurement Parameters" on page 53</a> , "Trigger Arm."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETup:DAPower:CONTInuous ON" !Sets measurement to single trigger mode.	

### SETup:DAPower:COUNT[:SNUMBER]

Function	The setting form of this command performs two functions: (1) sets the number of digital average power measurements to be made in a multi-measurement, and (2) sets the multi-measurement STATE command to 1 (on).  The query form returns the number of digital average power multi-measurements to be made when multi-measurement state is ON.  See <a href="#">"Digital Average Power Measurement Parameters" on page 53</a> , "Multi-Measurement Count."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	Off (10 when STATE = On)
<b>Programming Example</b>  OUTPUT 714;"SETup:DAPower:COUNT 5" !Turns on multi-measurements and sets the number of measurements to 5.	

## SETup:DAPower:COUNT:NUMBER

Function	Sets/queries the number of digital average power measurements to be made when the multi-measurement state is ON. See <a href="#">“Digital Average Power Measurement Parameters” on page 53</a> , “Multi-Measurement Count.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:DAPower:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.</pre>	

## SETup:DAPower:COUNT:STATE

Function	Sets/queries the multi-measurement state of the digital average power measurement. See <a href="#">“Digital Average Power Measurement Parameters” on page 53</a> , “Multi-Measurement Count.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:DAPower:COUNT:STATE ON" ! Turns on multi-measurements.</pre>	

## SETup:DAPower

### SETup:DAPower:TIMEout[:STIME]

Function	The setting form of this command performs two functions: (1) sets the digital average power measurement's timeout value, and (2) sets the digital average power measurement's timeout STATE to 1 (on).  The query form returns the channel power measurement's timeout value.  See <a href="#">"Digital Average Power Measurement Parameters" on page 53</a> , "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999 seconds  Resolution: 1 second
Query	Range: 1 to 999
*RST Setting	10 seconds, on
<b>Programming Example</b>  OUTPUT 714;"SETup:DAPower:TIMEout 5" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

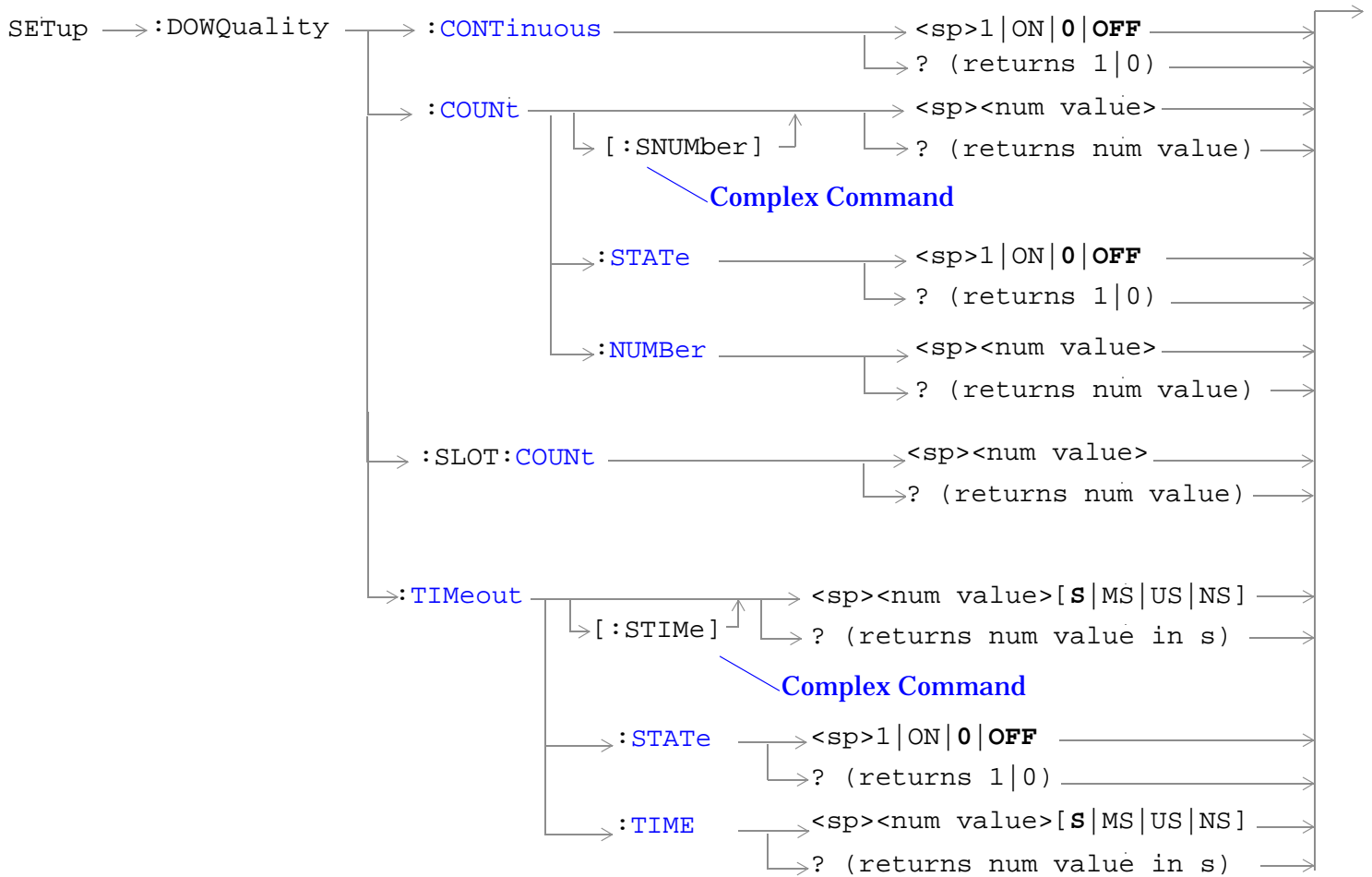
### SETup:DAPower:TIMEout:STATE

Function	Sets/queries the digital average power measurement's timeout state.  See <a href="#">"Digital Average Power Measurement Parameters" on page 53</a> , "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETup:DAPower:TIMEout:STATE ON"	

## SETup:DAPower:TIMEout:TIME

Function	Sets/queries the digital average power measurement's timeout setting to be used when the timeout state is set to ON. See " <a href="#">Digital Average Power Measurement Parameters</a> " on page 53, "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999 seconds Resolution: 1 second
Query	Range: 1 to 999
*RST Setting	10 seconds
<b>Programming Example</b> OUTPUT 714; "SETup:DAPower:TIMEout:TIME 5"	

## SETup:DOWQuality



[“Diagram Conventions” on page 326](#)



## SETup:DOWQuality:CONTInuous

Function	Sets/queries the trigger arm state for the waveform quality measurement. The trigger arm state determines whether the waveform quality measurement will be made once then stop (0   OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1   ON (continuous)).  See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a> , “Trigger Arm.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:DOWQuality:CONTInuous OFF" ! Sets measurement to single trigger mode.</pre>	

## SETup:DOWQuality:COUNT[:SNUMBER]

Function	The setting form of this command performs two functions: (1) sets the number of waveform quality measurements to be made in a multi-measurement, and (2) sets the multi-measurement STATE command to 1 (on).  The query form returns the number of waveform quality multi-measurements to be made when multi-measurement state is ON.  See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a> , “Multi-Measurement Count.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: See <a href="#">“SETup:DOWQuality:COUNT:NUMBER” on page 518</a>
Query	Range: See <a href="#">“SETup:DOWQuality:COUNT:NUMBER” on page 518</a>
*RST Setting	10, off
<b>Programming Example</b>  <pre>OUTPUT 714;"SETup:DOWQuality:COUNT 5" ! Turns on multi-measurements and sets the number of measurements to 5.</pre>	

## SETup:DOWQuality

### SETup:DOWQuality:COUNT:STATE

Function	Sets/queries the multi-measurement state of the waveform quality measurement. Set the number of measurements to be made using the "SETup:DOWQuality:COUNT:NUMBER" command. See "Waveform Quality + Code Domain Measurement Parameters" on page 81, "Multi-Measurement Count."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETup:DOWQuality:COUNT:STATE ON" ! Turns on multi-measurements.	

### SETup:DOWQuality:COUNT:NUMBER

Function	Sets/queries the number of waveform quality measurements to be made when the multi-measurement state is set to ON using the "SETup:DOWQuality:COUNT:STATE" command. See "Waveform Quality + Code Domain Measurement Parameters" on page 81, "Multi-Measurement Count."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999 Resolution: 1
Query	Same as setting
*RST Setting	10
<b>Programming Example</b>  OUTPUT 714;"SETup:DOWQuality:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

**SETup:DOWQuality:SLOT:COUNT**

Function	Sets/queries the number of slots to measure when the measurement is performed. See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a> , “Slots to Measure.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 8 Resolution: 1
Query	Same as setting
*RST Setting	1
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:DOWQuality:SLOT:COUNT 8" !Sets the number of slots to measure to 8</pre>	

**SETup:DOWQuality:TIMEout[:STIME]**

Function	The setting form of this command performs two functions: (1) sets the waveform quality measurement's timeout value, and (2) sets the waveform quality measurement's timeout STATE to 1 (on). The query form returns the waveform quality measurement's timeout value. See <a href="#">“Waveform Quality + Code Domain Measurement Parameters” on page 81</a> , “Timeout Time/State.”
Requirements	Test Application Revision: A.01.20 and above
Setting	Range/Resolution: See <a href="#">“SETup:DOWQuality:TIMEout:TIME” on page 520</a>
Query	Range/Resolution: See <a href="#">“SETup:DOWQuality:TIMEout:TIME” on page 520</a>
*RST Setting	10 s, off
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:DOWQuality:TIMEout 5" !Sets timeout state to ON and sets the timeout time to 5 s.</pre>	

## SETup:DOWQuality

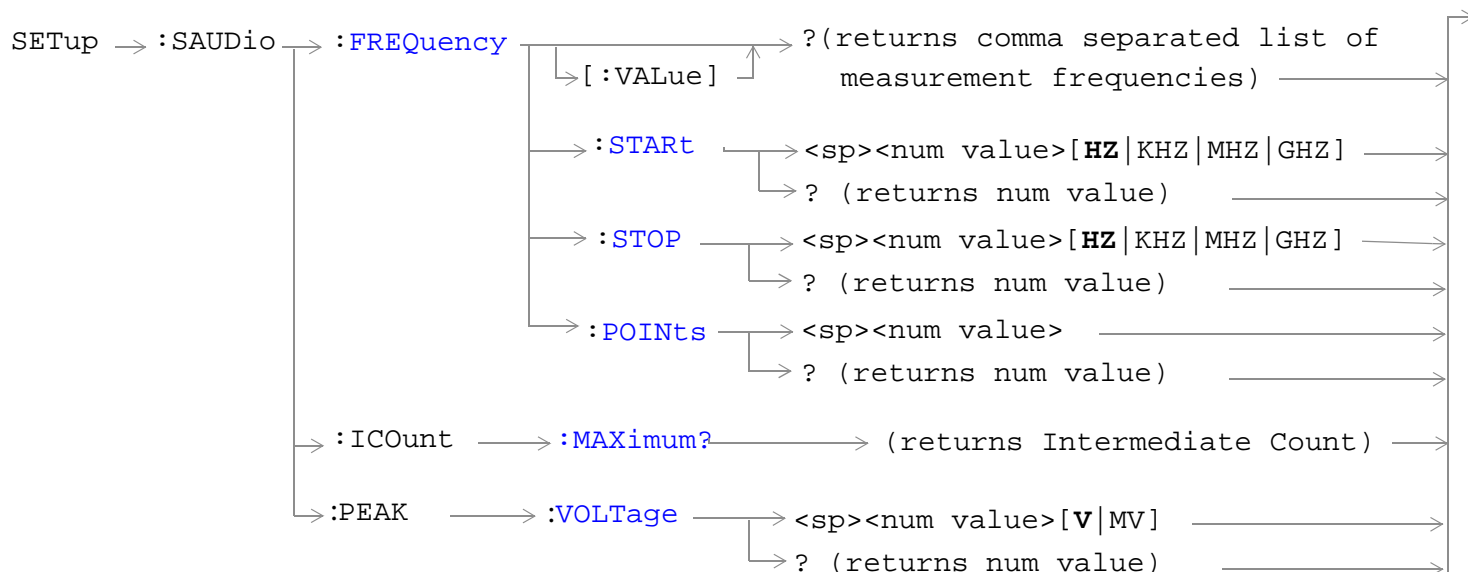
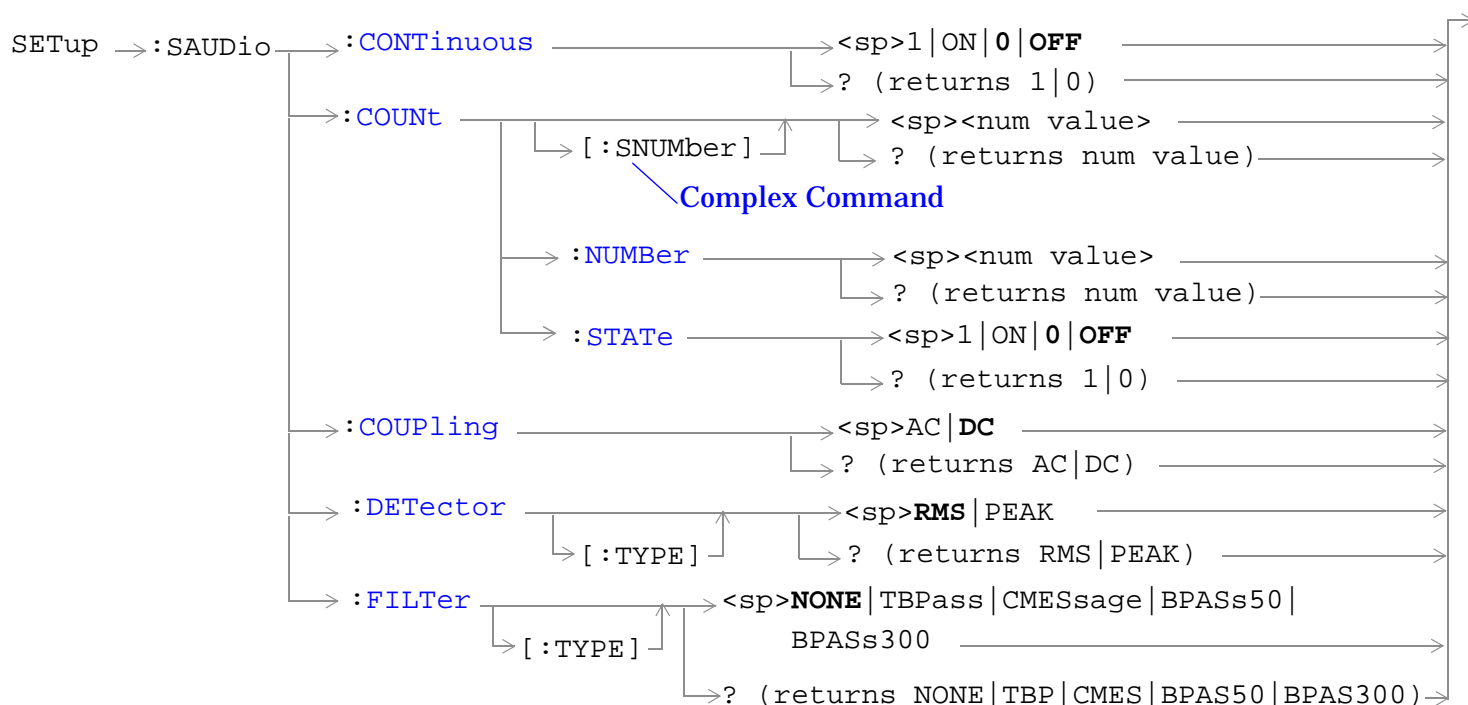
### SETup:DOWQuality:TIMEout:STATE

Function	Sets/queries the waveform quality measurement's timeout state. Set the timeout time using the "SETup:DOWQuality:TIMEout:TIME" command. See "Waveform Quality + Code Domain Measurement Parameters" on page 81, "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETup:DOWQuality:TIMEout:STATE ON" ! Sets the measurement timeout time to 5 s.	

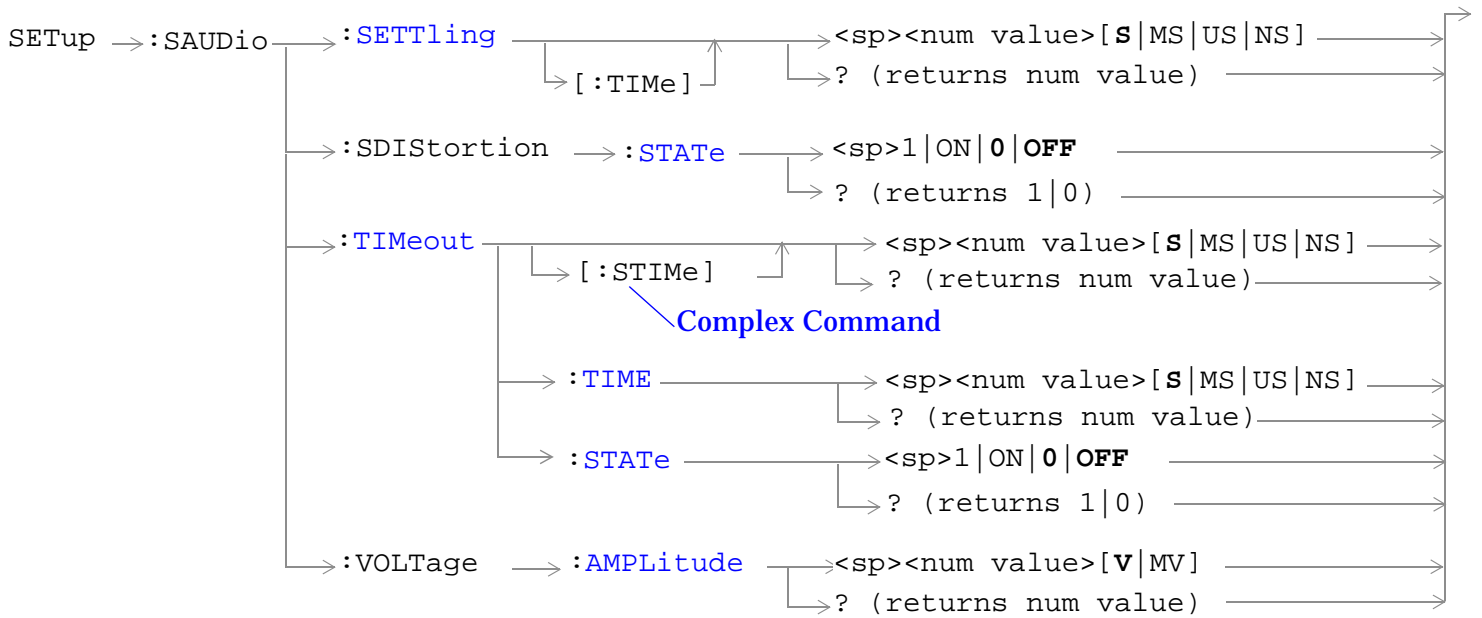
### SETup:DOWQuality:TIMEout:TIME

Function	Sets/queries the waveform quality measurement's timeout setting to be used when the timeout state is set to ON using the "SETup:DOWQuality:TIMEout:STATE" command. See "Waveform Quality + Code Domain Measurement Parameters" on page 81, "Timeout Time/State."
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1 to 999 seconds Resolution: 0.1 second
Query	Same as setting
*RST Setting	10 s
<b>Programming Example</b>  OUTPUT 714;"SETup:DOWQuality:TIMEout:TIME 5" ! Sets the waveform quality timeout time to 5 seconds.	

## SETup:SAUDio



## SETup:SAUDio



[“Diagram Conventions” on page 326](#)

**SETup:SAUDio:CONTInuous**

Function	Sets/queries the trigger arm state for the swept audio measurement. Determines whether measurement will make one measurement then stop (0   OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1   ON (continuous)).
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:SAUDIO:CONTINUOUS ON" !Turns on continuous triggering.</pre>	

**SETup:SAUDio:COUNT[:SNUMBER]**

Function	Sets/queries the number of audio measurements to perform at each measurement point in a single multi-measurement sweep. This command sets the count, and automatically sets the multi-measurement STATE command to 1 (on).
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:SAUDIO:COUNT:SNUMBER 5" !Turns on multi-measurements and makes 5 measurements at each frequency point in the sweep.</pre>	

**SETup:SAUDio:COUNT:NUMBER**

Function	Sets/queries the number of audio measurements to perform at each measurement point in a single multi-measurement sweep when the "SETup:SAUDio:COUNT:STATE" is set to 1 (on).
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:SAUDIO:COUNT:NUMBER 5" !Makes 5 measurements at each frequency point in the sweep.</pre>	

## SETup:SAUDio

### SETup:SAUDio:COUNT:STATE

Function	Selects/queries the swept audio measurement's multi-measurement count state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETUP:SAUDIO:COUNT:STATE ON" !Turns on multi-measurement for the swept audio measurement.	

### SETup:SAUDio:COUPLing

Function	Sets/queries the audio generator's coupling to the AUDIO OUT port.
Setting	Range: AC   DC
Query	Range: AC   DC
*RST Setting	DC
<b>Programming Example</b>  OUTPUT 714;"SETUP:SAUDIO:COUPLING AC" !Select AC coupling to the AUDIO OUT port.	

### SETup:SAUDio:DETEctor[:TYPE]

Function	Sets/queries the type of level detector used in swept audio measurements.
Setting	Range: RMS   PEAK
Query	Range: RMS   PEAK
*RST Setting	RMS
<b>Programming Example</b>  OUTPUT 714;"SETUP:SAUDIO:DETECTOR:TYPE PEAK" !Select the peak detector for the AF analyzer.	



**SETup:SAUDio:FILTer[:TYPE]**

Function	Sets/queries the type of filter on the sampled data, before any measurements are performed. The filter choices are: none, TBPass (100 Hz bandwidth bandpass), CMESsage (C-Message), BPASs50 (50 Hz to 15 kHz bandpass), BPASs300 (300 Hz to 15 kHz bandpass)
Setting	Range: NONE   TBPass   CMESsage   BPASs50   BPASs300
Query	Range: NONE   TBP   CMES   BPAS50   BPAS300
*RST Setting	None
<b>Programming Example</b> OUTPUT 714;"SETUP:SAUDIO:FILTER:TYPE TBPASS" !Selects the 100 Hz bandpass filter.	

**SETup:SAUDio:FREQuency[:VALue]?**

Function	Returns a comma-separated list of the generated frequency for each frequency point (see <a href="#">"SETup:SAUDio:FREQuency:POINts"</a> ). When you specify the start frequency, stop frequency, and the number of measurement points, the test set calculates the intermediate frequencies that are generated. You cannot directly set the intermediate frequencies using this command, you can only query them.
Query	Range: up to 60 comma separated values
<b>Programming Example</b> OUTPUT 714;"SETUP:SAUDIO:FREQUENCY:VALUE?" !Queries the list of generated frequencies.	

**SETup:SAUDio:FREQuency:POINts**

Function	Sets/queries the number of evenly-spaced frequency points in the sweep. If this value is set to 1, only the start frequency is used in the sweep.
Setting	Range: 1 to 60
Query	Range: 1 to 60
*RST Setting	5
<b>Programming Example</b> OUTPUT 714;"SETUP:SAUDIO:FREQUENCY:POINTS 20" !Make audio measurements at 20 frequency points in the sweep.	

## SETup:SAUDio

### SETup:SAUDio:FREQUENCY:START

Function	Sets/queries the frequency at which to begin the sweep. The default units are Hz. It is possible to set the start frequency higher than the stop frequency. If this is done, the sweep starts at the higher frequency and stops at the lower frequency.
Setting	Range: 300.0 to 15000.0 Hz
Query	Range: 300.0 to 15000.0 Hz
*RST Setting	300 Hz
Programming Example OUTPUT 714;"SETUP:SAUDIO:FREQUENCY:START 450HZ" !Start the frequency sweep at 450 Hz.	

### SETup:SAUDio:FREQUENCY:STOP

Function	Sets/queries the frequency at which to end the sweep. The default units are Hz. It is possible to set the stop frequency lower than the start frequency. If this is done, the sweep starts at the higher frequency and stops at the lower frequency.
Setting	Range: 300.0 to 15000.0 Hz
Query	Range: 300.0 to 15000.0 Hz
*RST Setting	3000 Hz
Programming Example OUTPUT 714;"SETUP:SAUDIO:FREQUENCY:STOP 1500HZ" !Stop the frequency sweep at 1500 Hz.	

### SETup:SAUDio:ICount:MAXimum?

Function	Queries the total multi-measurement count. This is equal to the number of frequency points in the sweep multiplied by the multi-measurement count set for the swept audio measurement.
Query	Range: 1 to 59940 (60 measurement points multiplied by 999 multi-measurements)
*RST Setting	5
Programming Example OUTPUT 714;"SETUP:SAUDIO:ICOUNT:MAXIMUM?" !Queries the total number of measurements made.	

**SETup:SAUDio:PEAK:VOLTage**

Function	Sets/queries the expected peak voltage of the swept audio measurement. This determines the range and resolution of the sampled voltage values.
Setting	Range: 1 mV to 20 V Resolution: 1 mV
Query	Range: 1 mV to 20 V
*RST Setting	20 V peak
Programming Example	
OUTPUT 714;"SETUP:SAUDIO:PEAK:VOLTAGE 5V"	

**SETup:SAUDio:SETTLing[:TIME]**

Function	Sets/queries how long swept audio measurements wait to start an audio measurement after setting the audio source's frequency. A setting of 0.0 seconds let's swept audio measurements run at maximum speed.  Settling time may be needed when testing a device that has a time delay through the audio path. Path delays can cause the audio generator's signal to change frequencies before the output signal can be analyzed at that frequency. Specifying a settling time ensures that the audio generator stays at each frequency point long enough for the audio analyzer to correctly measure the device's audio output.
Setting	Range: 0.0 to 999 ms Resolution: 1 ms
Query	Range: 0.0 to 999 ms
*RST Setting	0 ms
Programming Example	
OUTPUT 714;"SETUP:SAUDIO:SETTLING:TIME 20MS"	

**SETup:SAUDio:SDISTortion:STATE**

Function	Sets/queries whether SINAD and distortion measurements are enabled. Turning on SINAD/Distortion measurements will cause the swept audio measurement to run significantly slower because of added sampling and calculation times.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:SAUDIO:SDISTORTION:STATE ON"	

## SETup:SAUDio

### SETup:SAUDio:TIMEout[:STIME]

Function	Selects/queries the timeout value in seconds that is used for swept audio measurements and sets the timeout state to ON. Units (S   MS) are optional, if no units are specified then units default to S (seconds).
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query	Range: 0.1 to 999 seconds
*RST Setting	10 seconds
<b>Programming Example</b>  OUTPUT 714;"SETUP:SAUDIO:TIMEOUT:STIME 10" !Enables timeouts and sets the value to 10 seconds.	

### SETup:SAUDio:TIMEout:TIME

Function	Selects/queries the timeout value in seconds that is used for swept audio measurements when the timeout state is set to ON. Units (S   MS) are optional, if no units are specified then units default to S (seconds).
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query	Range: 0.1 to 999 seconds
*RST Setting	10 seconds
<b>Programming Example</b>  OUTPUT 714;"SETUP:SAUDIO:TIMEout:TIME 10" !Sets the timeout value to 10 seconds.	

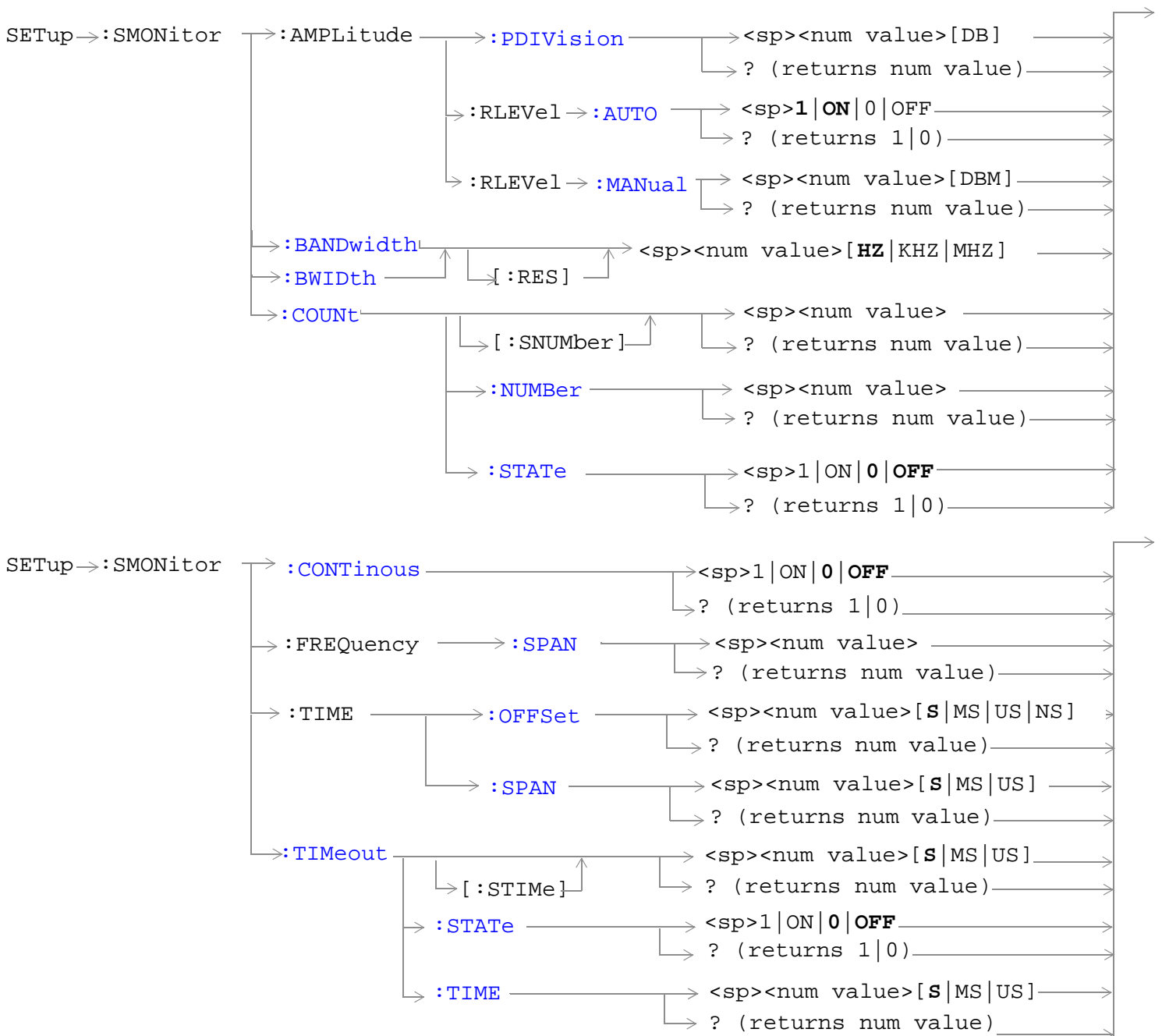
### SETup:SAUDio:TIMEout:STATE

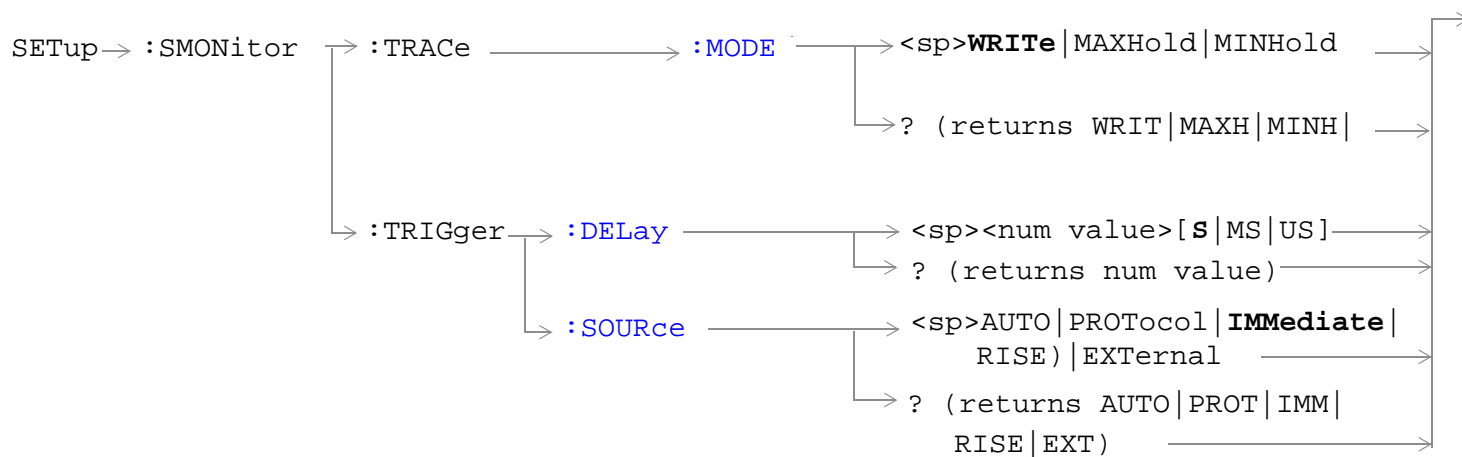
Function	Selects/queries the swept audio measurement timeout state. Timeout is set using the <a href="#">"SETup:SAUDio:TIMEout:TIME"</a> command.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"SETUP:SAUDIO:TIMEOUT:STATE ON" !Enables timeouts for swept audio measurements.	

## SETup:SAUDio:VOLTAge:AMPLitude

Function	Sets/queries the output level (peak voltage) of the audio generator when it is turned on. This command does not turn on the audio generator.
Setting	Range: 0.0 to 9.0 V peak ( $R_L > 600$ ohms) Resolution: <ul style="list-style-type: none"> <li>• &lt; 0.5 mV peak (less than or equal to 1 V peak output)</li> <li>• &lt; 5 mV peak (greater than 1 V peak output)</li> </ul>
Query	Range: 0.0 to 9.0 V peak ( $R_L > 600$ ohms)
*RST Setting	0.0 V peak
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:SAUDIO:VOLTAGE:AMPLITUDE 1V" !Set the audio generator's output to 1Vpeak.</pre>	

## SETup:SMONitor





[“Diagram Conventions” on page 326](#)

## SETup:SMONitor

### SETup:SMONitor:AMPLitude:PDIVision

Function	This command sets the scale of the spectrum monitor's display in dB per division (dB/div).
Setting	Range: 0.1 to 20 dB Resolution: 0.1
Query	Range: 0.1 to 20 dB Resolution: 0.1
*RST Setting	10 dB
<b>Programming Example</b> OUTPUT 714;"SETup:SMONitor:AMPLitude:PDIVision 1DB" !Sets scale of the spectrum monitor's display to 1 dB per division.	

### SETup:SMONitor:AMPLitude:RLEVel:AUTO

Function	This command allows you to set whether or not the spectrum monitor's reference level is selected automatically by the test set.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	OFF
<b>Programming Example</b> OUTPUT 714;"SETup:SMONitor:AMPLitude:RLEVel:AUTO ON" !Sets spectrum monitor's reference level to set automatically.	

### SETup:SMONitor:AMPLitude:RLEVel:MANual

Function	This command allows you to set the spectrum monitors actual reference level in dBm. The range settings are coupled to the amplitude offset value for the current value of the expected frequency (set using " <a href="#">SYSTEM:CORRection[:SGAin]</a> " on page 611). Changing the amplitude offset value does not change the reference value, unless the new value for the amplitude offset forces the current value of the reference level to exceed the range limits. If this happens the reference level is set to its limit.
Setting	Range: (-50 dBm + Amplitude Offset) to +37 dBm Resolution: 0.1 dB
Query	Range: (-50 dBm + Amplitude Offset) to +37 dBm Resolution: 0.1 dB
*RST Setting	+37 dB + Amplitude Offset
<b>Programming Example</b> OUTPUT 714;"SETup:SMONitor:AMPLitude:RLEVel:MANual -20DBM" !Sets spectrum monitor's reference level to -20 dBm.	



**SETup:SMONitor:BWIDth[:RES]**

Function	This command sets/queries the resolution bandwidth. To measure the total power of a signal you must select a resolution bandwidth greater than or equal to the signal bandwidth. To resolve two spectral components the resolution bandwidth must be less than the difference between them. The units (HZ   KHZ   MHZ) are optional, if no units are specified then the default is HZ. To set a resolution bandwidth the command "SETup:SMONitor:FREQuency:SPAN" on page 534, must be set to 0 Hz.  Any setting you enter is rounded to the nearest of the three settings.
Setting	Range: 100 kHz   300 kHz   1 MHz
Query	Range: 100 kHz   300 kHz   1 MHz
*RST Setting	300 kHz
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:BAND 100 KHZ" !Sets spectrum monitor's resolution bandwidth to 100 kHz.</pre>	

**SETup:SMONitor:COUNT[:SNUMBER]**

Function	This command sets/queries the averaging count and turns on averaging.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	100
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:COUNT 200" !Sets the averaging count to 200 and sets the averaging the state to on.</pre>	

**SETup:SMONitor:COUNT:NUMBER**

Function	This command sets/queries the averaging count used when the averaging is turned on.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	100
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:COUNT:NUMBER 200" !Sets the averaging count to 200.</pre>	

## SETup:SMONitor

### SETup:SMONitor:COUNt:STATe

Function	This command sets/queries the averaging state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	OFF
Programming Example	
OUTPUT 714;"SETup:SMONitor:COUNt:STATe 1" !Turns on averaging.	

### SETup:SMONitor:CONTInous

Function	This command arms triggering for a measurement sweep. Trigger arming can be single (OFF) or continuous (ON). With single triggering, the measurement sweep starts when an INITiate or READ command is received. With continuous triggering, measurement sweeps initiate immediately and continuously.  The *RST (remote full preset) default setting is single triggering. At power-on or after a front-panel preset, the default setting is continuous triggering.
Setting	Range: ON   1   OFF   0
Query	Range: 1   0
*RST Setting	OFF
Programming Example	
OUTPUT 714;"SETup:SMONitor:CONTInous ON" ! Sets the trigger mode to continuous.	

### SETup:SMONitor:FREQuency:SPAN

Function	This command sets/queries the spectrum monitor's frequency span.
Setting	Range: A value in the range 125 kHz to 100 MHz can be entered, however the value is rounded to the nearest of: <ul style="list-style-type: none"><li>• 125 kHz, 500 kHz, 1.25 MHz, 2.5 MHz, 4 MHz, 5 MHz, 10 MHz, 12 MHz, 20 MHz, 40 MHz, 80 MHz, 100 MHz</li></ul>
Query	Range: Same as setting range.
*RST Setting	5 MHz
Programming Example	
OUTPUT 714;"SETup:SMONitor:FREQuency:SPAN 10MHZ" ! Sets the frequency span to 10 MHz.	

## SETup:SMONitor:TIME:OFFSet

Function	This command sets/queries the time offset. You can specify the time window for viewing the signal using this command and the "SETup:SMONitor:TIME:SPAN" on page 535. The measurement is made for the duration of the time span, beginning at the time defined by the trigger event plus the trigger delay plus the time offset. The units (S MS US NS) are optional, if no units are specified then the default is S.
Setting	Range: 0 us to 10 s Resolution: 0.1 us
Query	Range: 0 us to 10 s Resolution: 0.1 us
*RST Setting	0 us
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:TIME:OFFSet 25 MS" ! Sets the spectrum monitor's time offset to 25 millisecond.</pre>	

## SETup:SMONitor:TIME:SPAN

Function	This command sets/queries the span of the time display. The units (S MS US) are optional, if no units are specified then the default is S.
Setting	Range: 50 us to 70 ms Resolution: 0.250 us
Query	Range: 50 us to 70 ms Resolution: 0.250 us
*RST Setting	10 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:TIME:SPAN 30MS" ! Sets the spectrum monitor's time span to 30 millisecond.</pre>	

## SETup:SMONitor

### SETup:SMONitor:TIMEout[:STIME]

Function	This command sets/queries the spectrum monitor's timeout interval and turns on the timeout state. The units (S MS US) are optional, if no units are specified then the default is S.
Setting	Range: 1 to 999 seconds Resolution: 0.1 second
Query	Range: 1 to 999 seconds Resolution: 0.1 second
*RST Setting	10 s
<b>Programming Example</b>  OUTPUT 714;"SETup:SMONitor:TIMEout:STIME 12S" ! Turns on the timeout timer and sets the timer to expire in 12 seconds.	

### SETup:SMONitor:TIMEout:STATE

Function	This command sets/queries the state of the spectrum monitor's timeout timer.
Setting	Range: 1 ON 0 OFF
Query	Range: 1 0
*RST Setting	OFF
<b>Programming Example</b>  OUTPUT 714;"SETup:SMONitor:TIMEout:STATE 1" ! Turns on the timeout timer.	

### SETup:SMONitor:TIMEout:TIME

Function	This command sets/queries the spectrum monitor's timeout interval. The units (S MS US) are optional, if no units are specified then the default is S.
Setting	Range: 1 to 999 seconds Resolution: 0.1 seconds
Query	Range: 1 to 999 seconds Resolution: 0.1 seconds
*RST Setting	10 seconds
<b>Programming Example</b>  OUTPUT 714;"SETup:SMONitor:TIMEout:TIME 20S" ! Generates a timeout error if no results are reported within 20 seconds.	

## SETup:SMONitor:TRACe:MODE

Function	<p>This command sets/queries the trace update parameter.</p> <ul style="list-style-type: none"> <li>• WRITe (Clear-write) erases any data previously stored in the selected trace.</li> <li>• MAXHold (maximum hold) maintains the maximum level for each trace point of the selected trace and updates each trace point if a new maximum level is detected in successive sweeps.</li> <li>• MINHold (minimum hold) maintains the minimum level for each trace point of the selected trace and updates each trace point if a new minimum level is detected in successive sweeps.</li> </ul> <p>If you change the center, start, or the frequency span, or the resolution bandwidth, the MAXHold and MINHold traces are restarted. These traces are not restarted if you change only the reference level or the scale.</p>
Setting	Range: WRITe   MAXHold   MINHold
Query	Range: WRIT   MAXH   MINH
*RST Setting	WRITe
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:TRACe:MODE MAXH" ! Sets the update method to maximim hold.</pre>	

## SETup:SMONitor:TRIGger:DELay

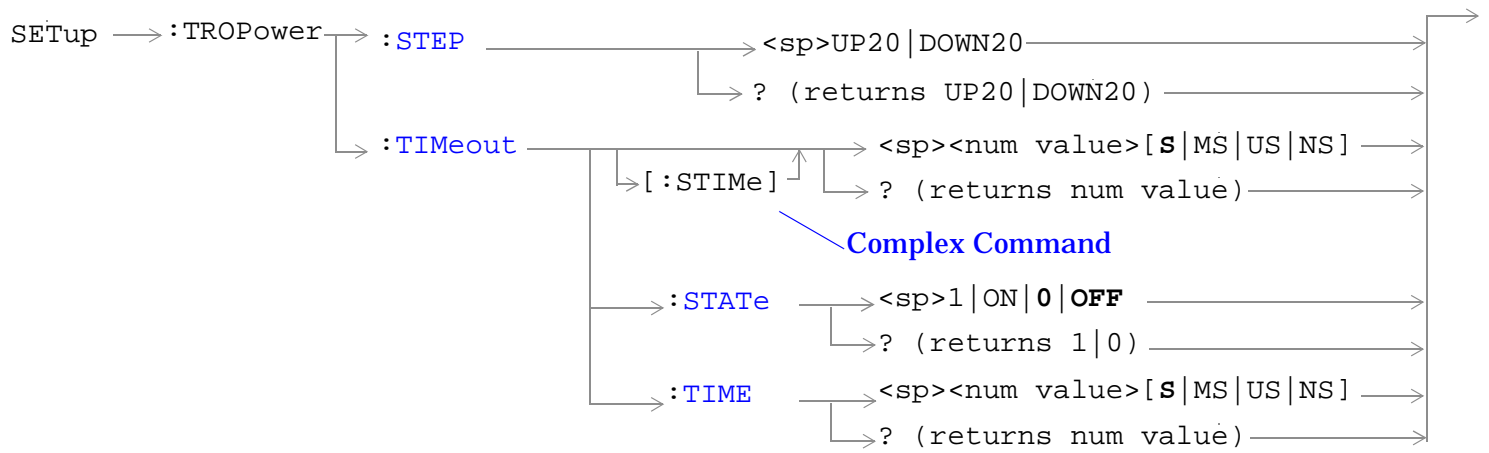
Function	<p>This command sets/queries the trigger delay. This command allows you to add a time delay following the trigger event before samples are taken. The delay can be positive or negative. The units (S MS US) are optional, if no units are specified then the default is S.</p>
Setting	<p>Range: -50 ms to +50 ms</p> <p>Resolution: 5 significant digits or 100 ns, whichever is greater</p>
Query	<p>Range: -50 ms to +50 ms</p> <p>Resolution: 5 significant digits or 100 ns, whichever is greater</p>
*RST Setting	350 us
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:SMONitor:TRIGger:DELay 1MS" ! Sets the trigger delay to 1 millisecond.</pre>	

## SETup:SMONitor

### SETup:SMONitor:TRIGger:SOURce

Function	This command sets the trigger source. Immediate triggering happens as soon as the measurement is armed. RF rise triggering is initiated by the rising edge of an RF burst. With protocol triggering, sampling is initiated by a signaling event such as the start of a burst. An external trigger is used when set to external. Auto triggering will select protocol if a protocol trigger is available, otherwise it will select RF rise triggering.
Setting	Range: AUTO   IMMEDIATE   PROTOCOL   RISE   EXTERNAL
Query	Range: AUTO   IMM   PROT   RISE   EXT
*RST Setting	IMMEDIATE
<b>Programming Example</b>  OUTPUT 714;"SETup:SMONitor:TRIGger:SOURce RISE" ! Sets the measurement to trigger on the rising edge of an RF burst.	

## SETup:TROPower



[“Diagram Conventions” on page 326](#)

## SETup:TROPower

### SETup:TROPower:STEP

Function	Sets the direction of the test set's cell power change. The mobile's output power is expected to change in the opposite direction as the 20 dB test set cell power change. See <a href="#">"Time Response of Open Loop Power Control (TROLPC) Measurement Description"</a> on page 66.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: UP20   DOWN20
*RST Setting	UP20
<b>Programming Example</b> OUTPUT 714;"SETup:TROPower:STEP UP20"	

### SETup:TROPower:TIMEout[:STIME]

Function	Sets the time response of open loop power control measurement's timeout value, and sets the measurement's timeout STATE to 1 (on). See <a href="#">"TROLPC Measurement Parameters"</a> on page 67.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9 seconds
*RST Setting	10 seconds, off
<b>Programming Example</b> OUTPUT 714;"SETup:TROPower:TIMEout 20" !Sets timeout state to ON and sets the timeout time to 20 seconds.	

### SETup:TROPower:TIMEout:STATE

Function	Sets/queries the time response of open loop power control measurement's timeout state. See <a href="#">"TROLPC Measurement Parameters"</a> on page 67.
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETup:TROPower:TIMEout:STATE ON" ! sets the timeout state to on.	



## SETup:TROPower:TIMEout:TIME

Function	Sets/queries the time response of open loop power control measurement's timeout setting to be used when the timeout state is set to ON. See <a href="#">"TROLPC Measurement Parameters" on page 67</a> .
Requirements	Test Application Revision: A.01.20 and above
Setting	Range: 0.1 to 999.9 seconds Resolution: 1 second
Query	Range: 0.1 to 999.9 seconds
*RST Setting	10 seconds
<b>Programming Example</b> <pre>OUTPUT 714;"SETup:TROPower:TIMEout:TIME 20" ! sets the timeout time to 20 seconds.</pre>	

---

## STATus Subsystem

### Description

The STATus subsystem is used to communicate current test set status information to the controlling application program.

### Syntax Diagrams and Command Descriptions

[“STATus:OPERation” on page 543](#)

[“STATus:PRESet” on page 568](#)

[“STATus:QUEStionable” on page 569](#)

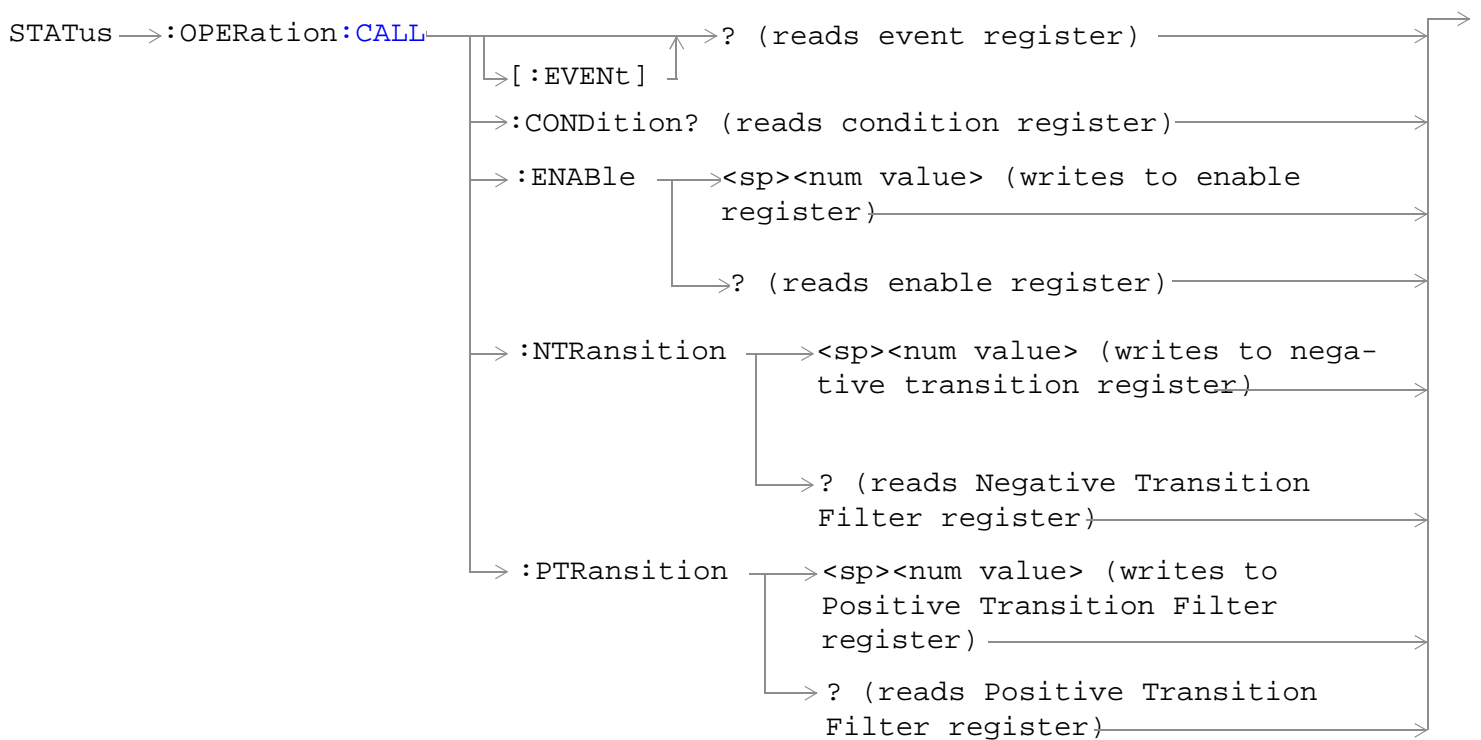
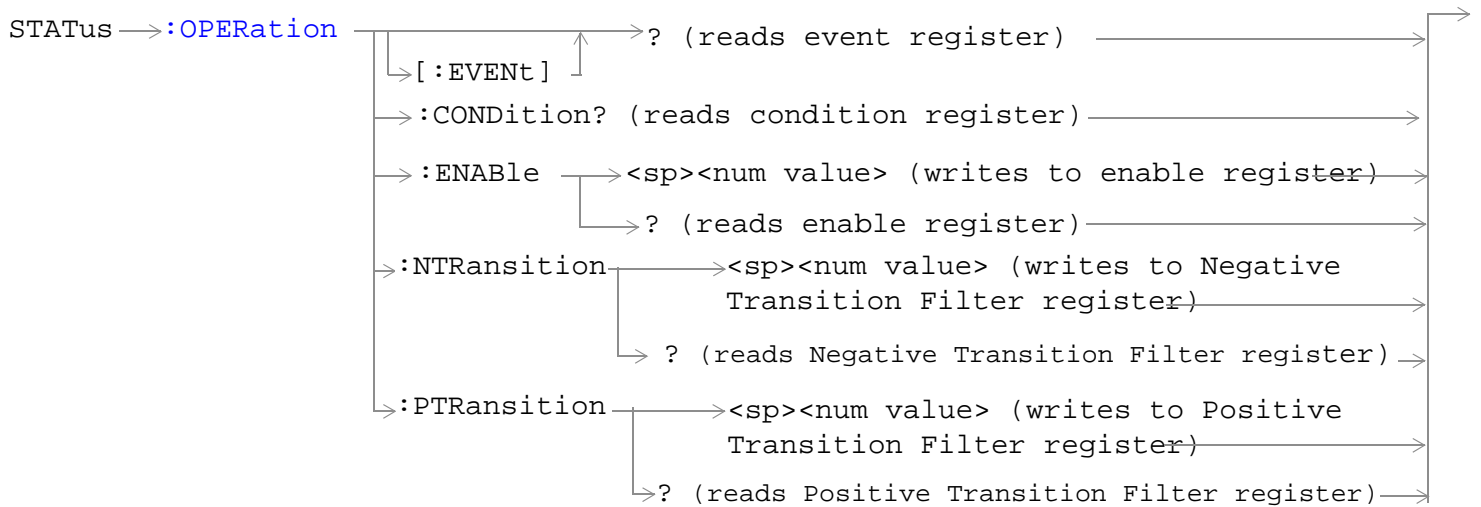
[“Status Byte Register” on page 592](#)

[“Standard Event Status Register” on page 593](#)

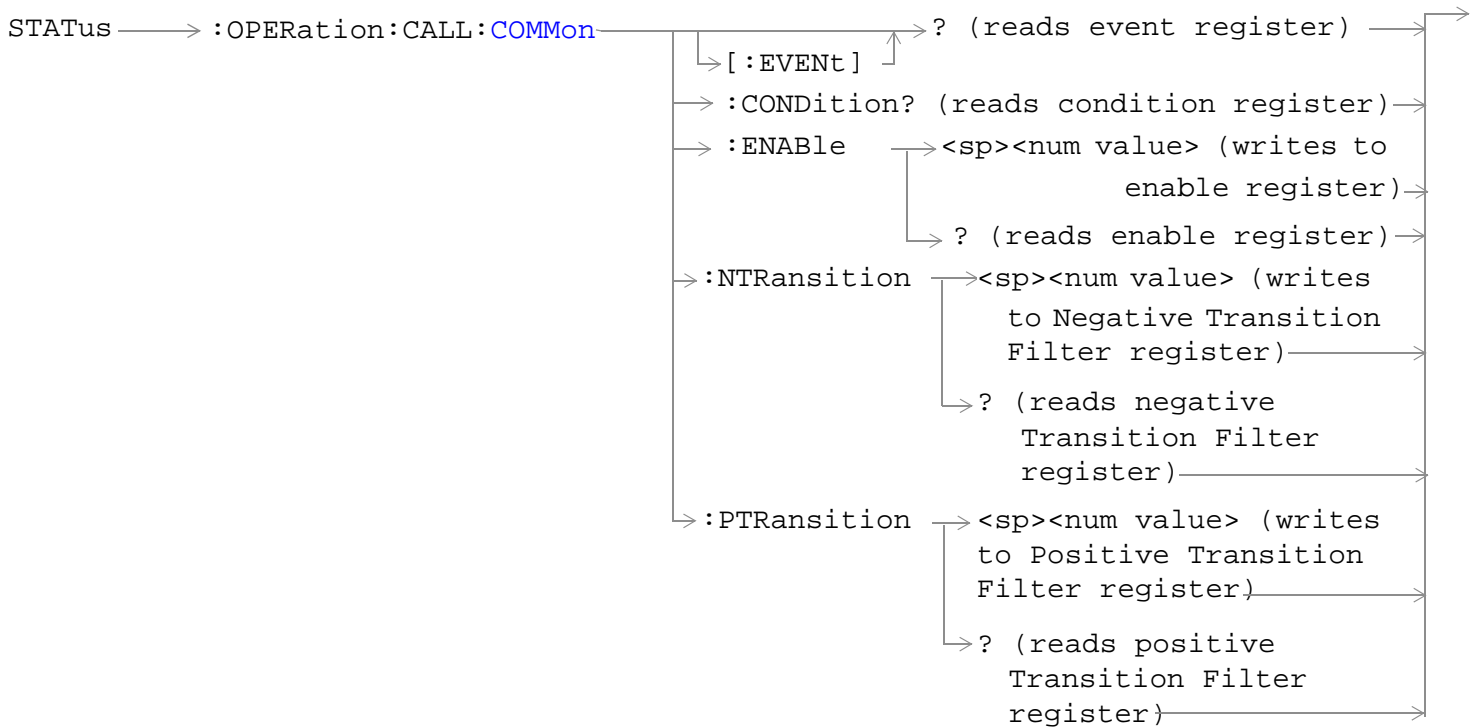
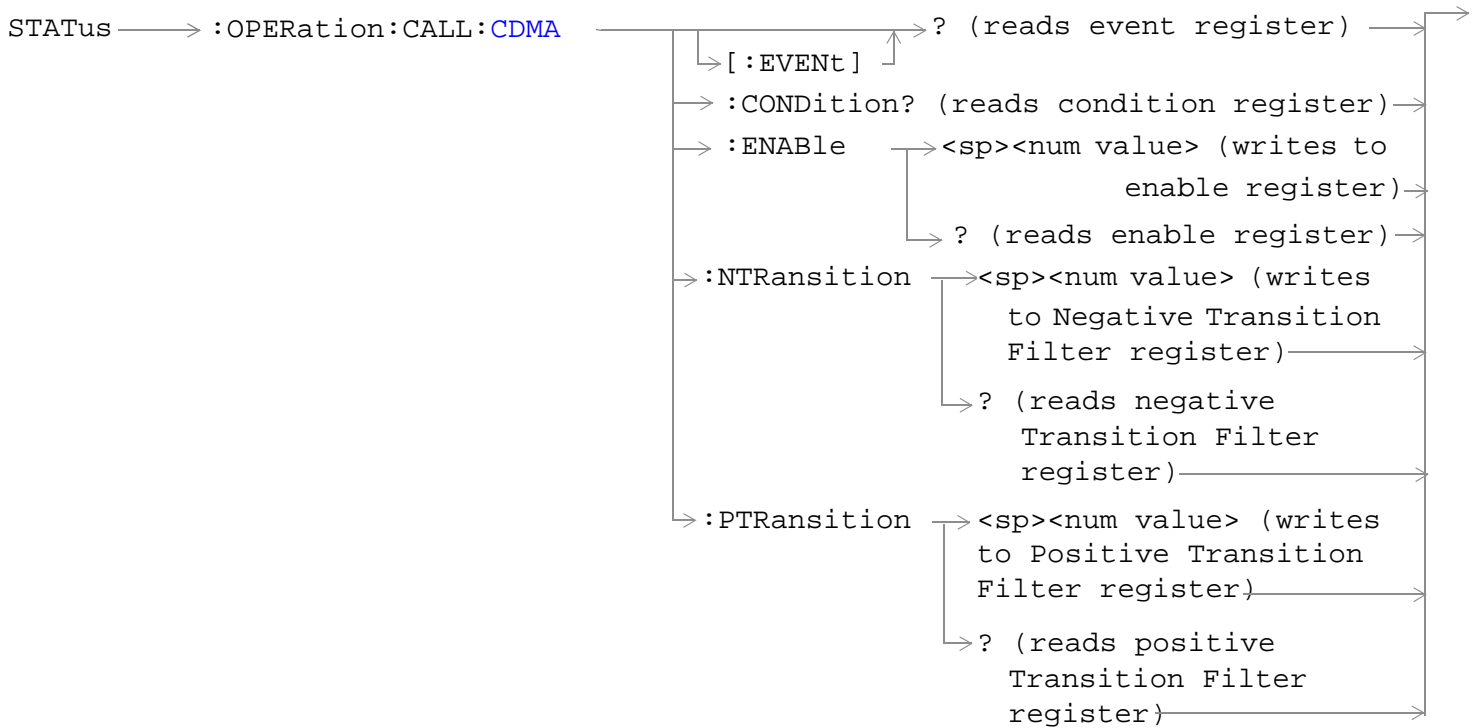
### Related Topics

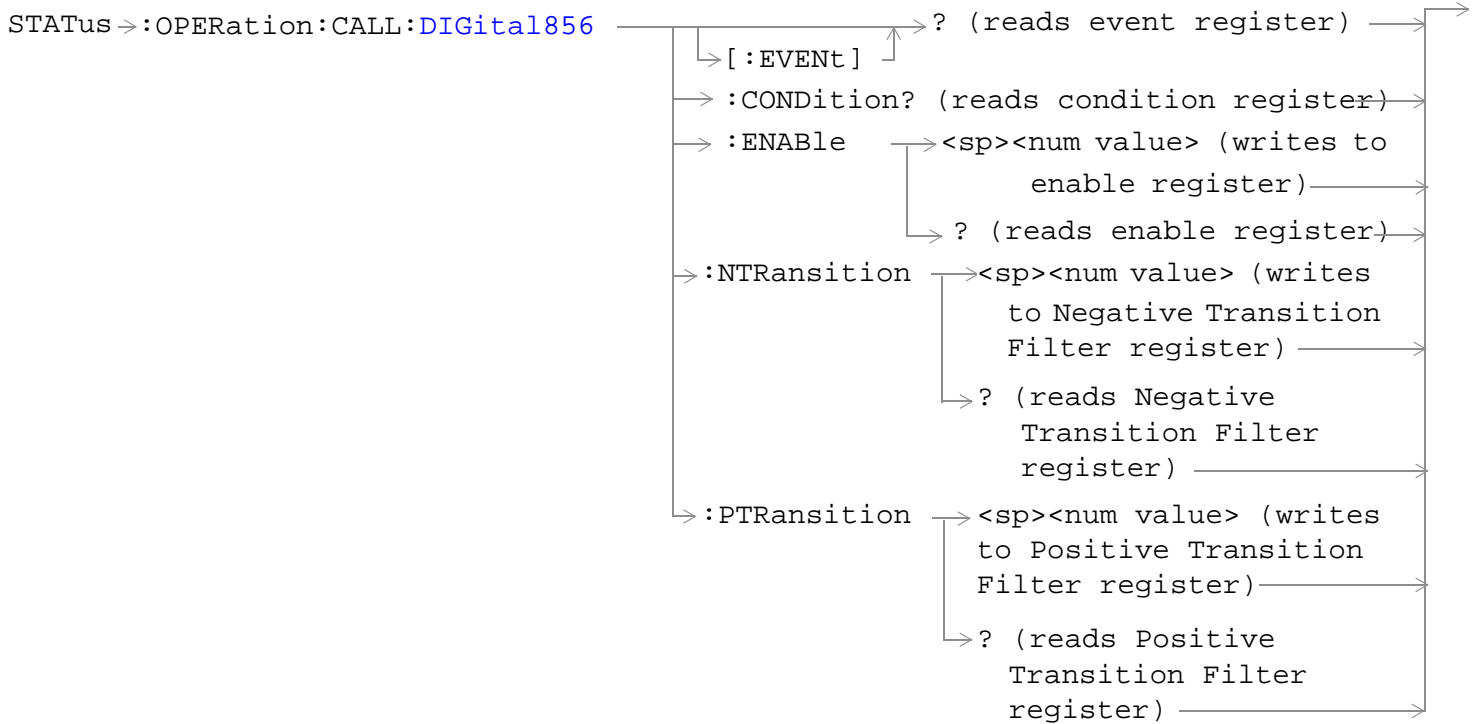
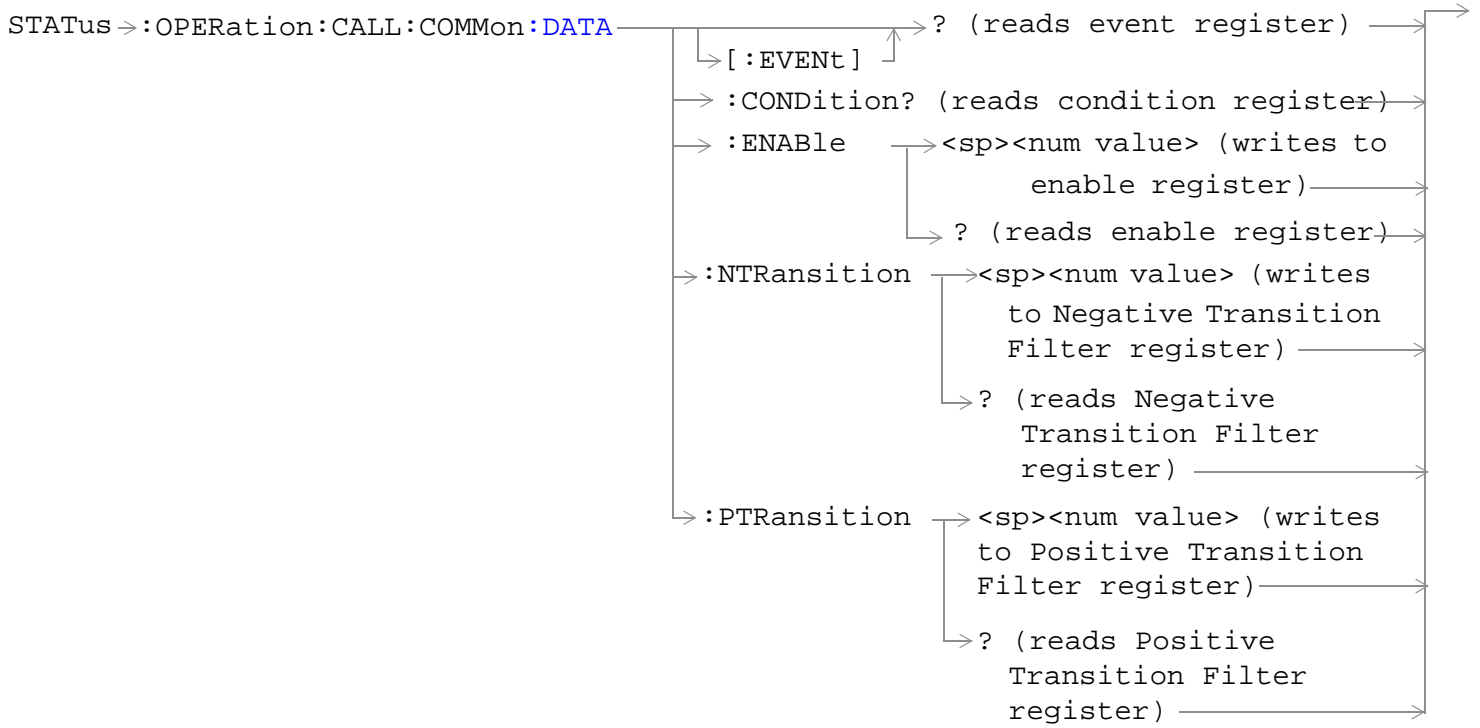
[“Status Subsystem Overview” on page 300](#)

## STATUS:OPERation

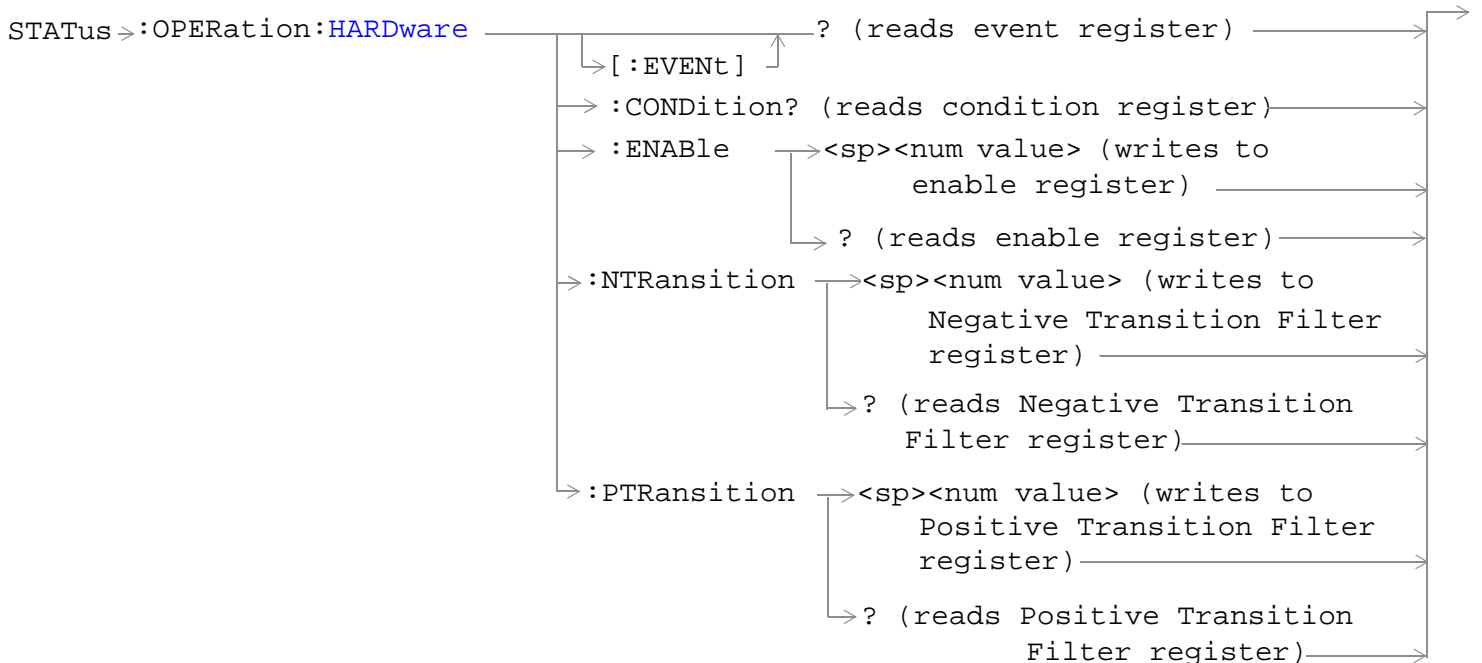
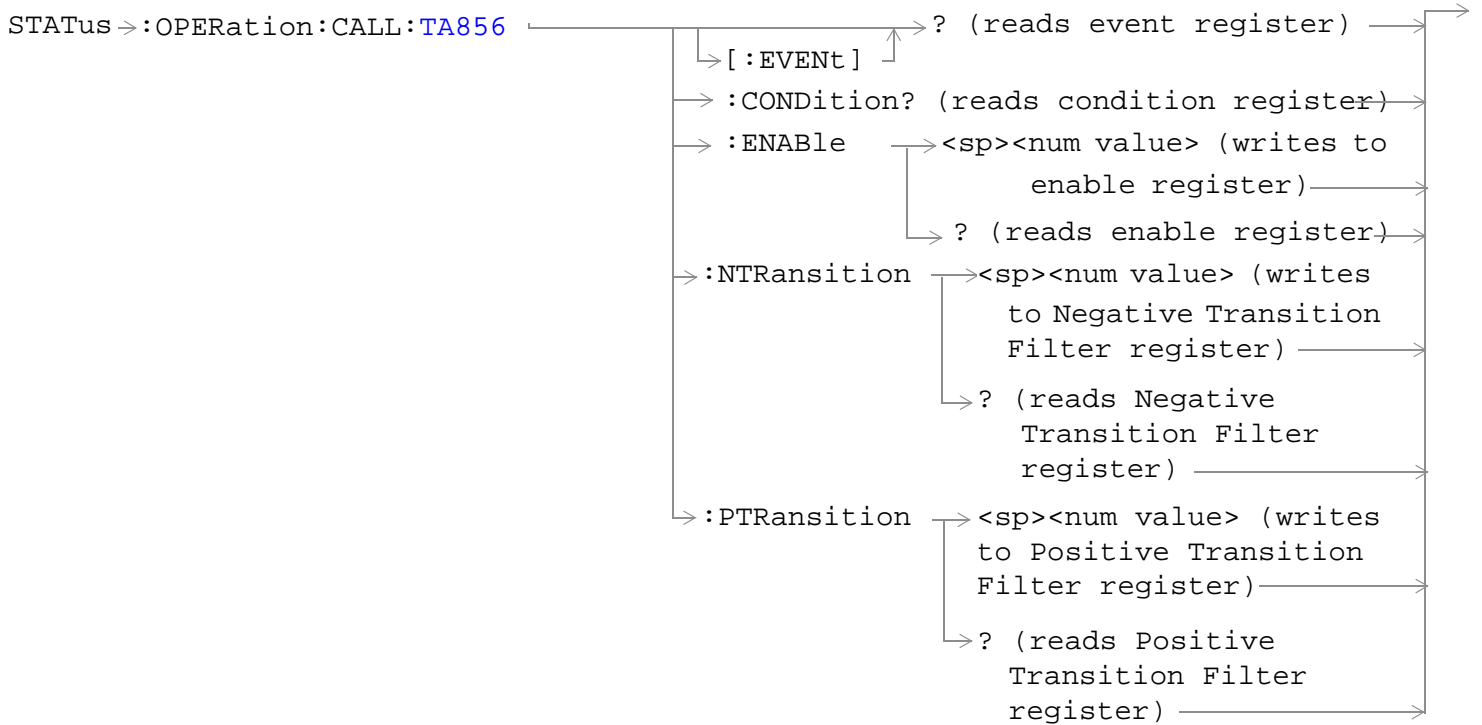


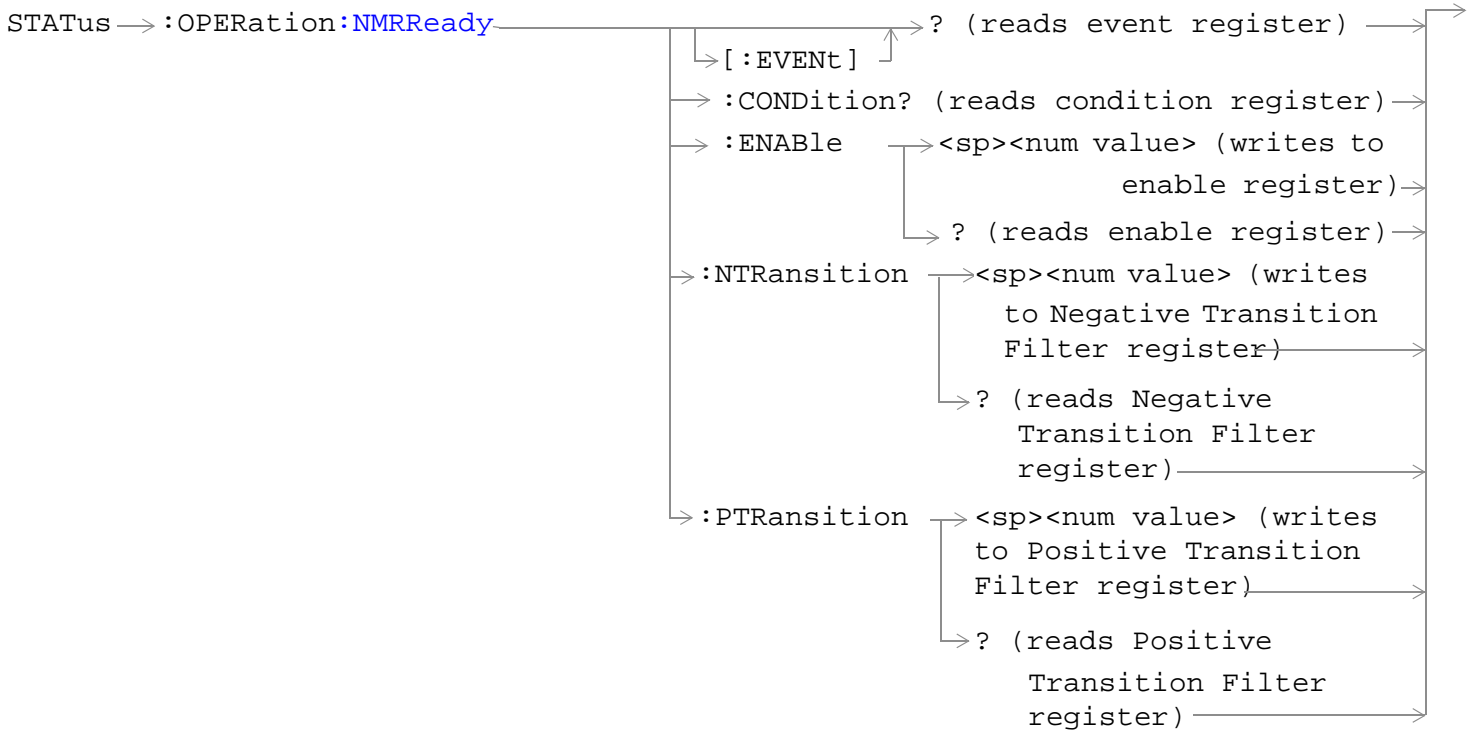
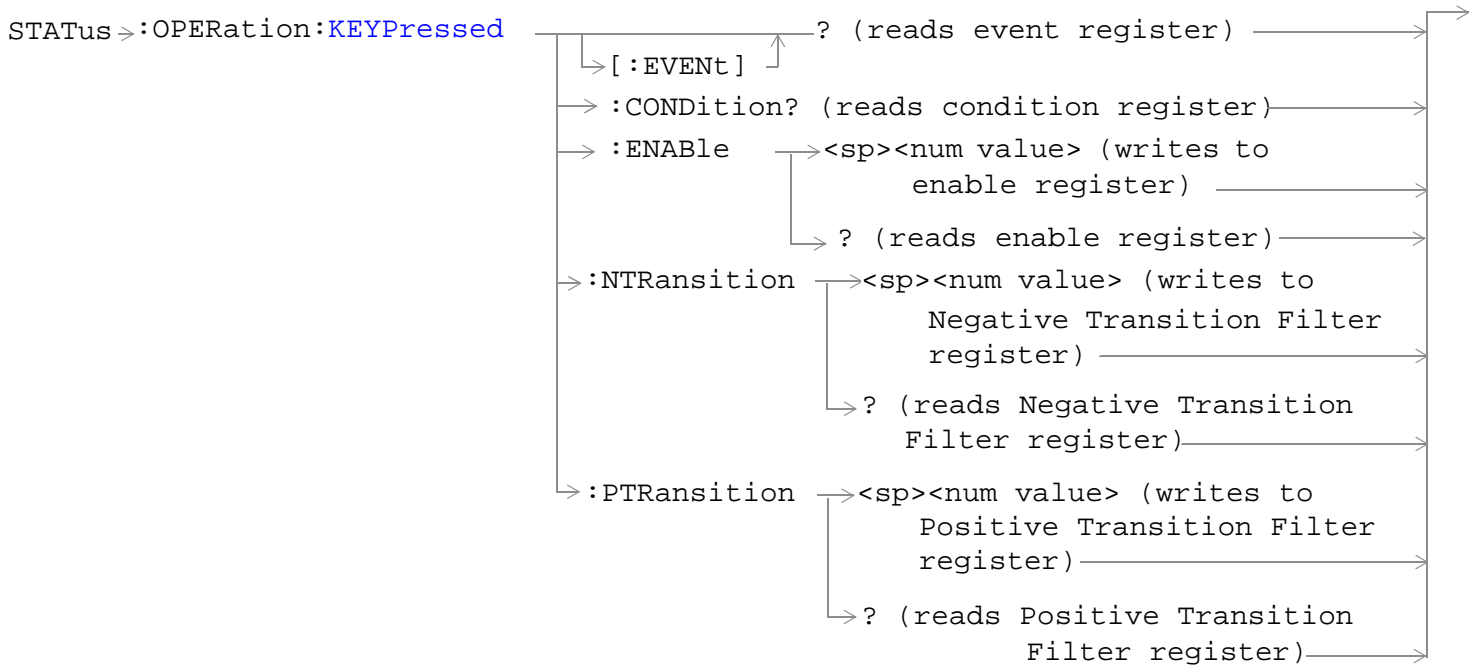
## STATUS:OPERation





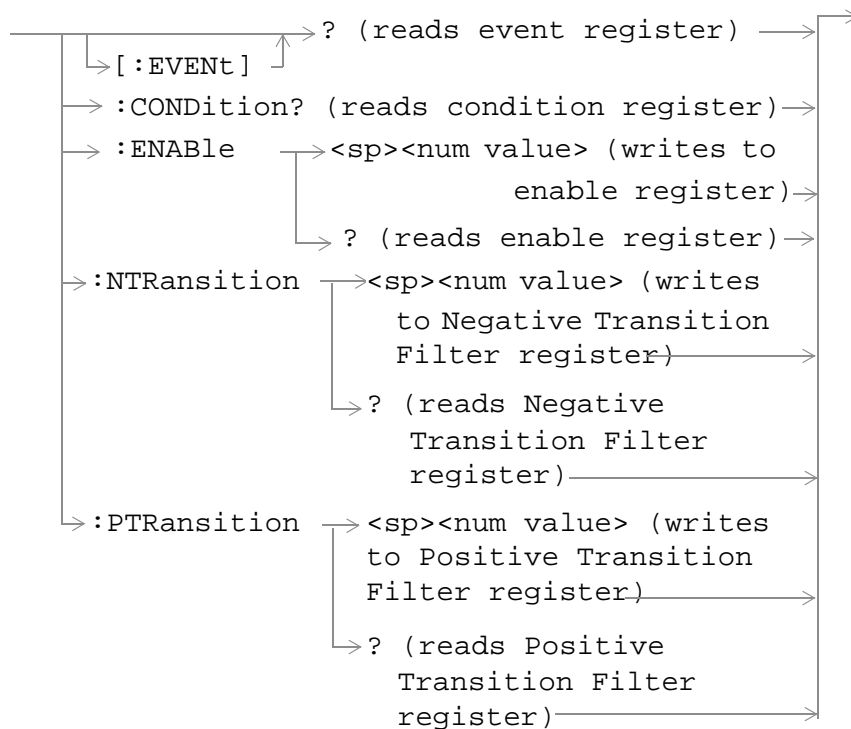
## STATUS:OPERation



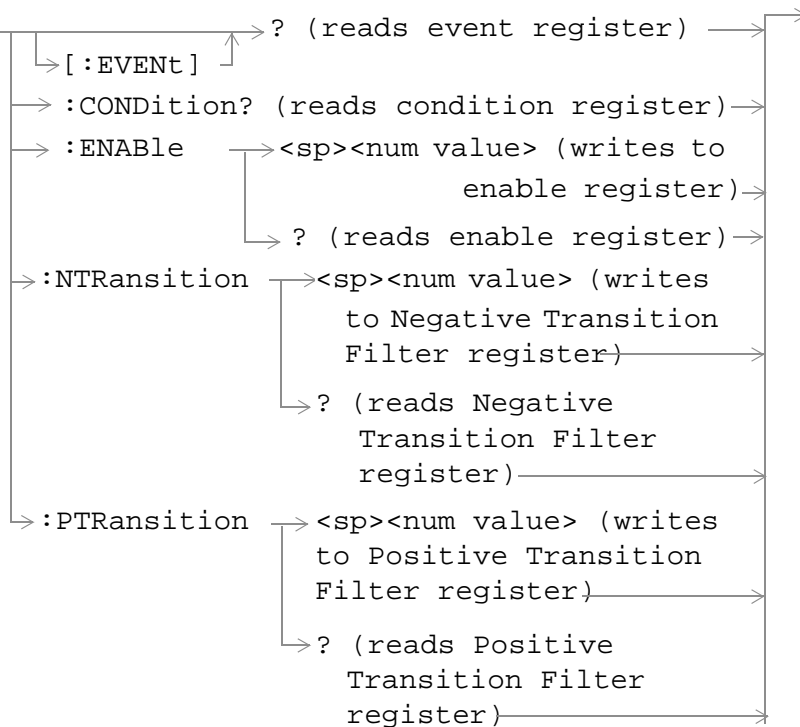


## STATUS:OPERation

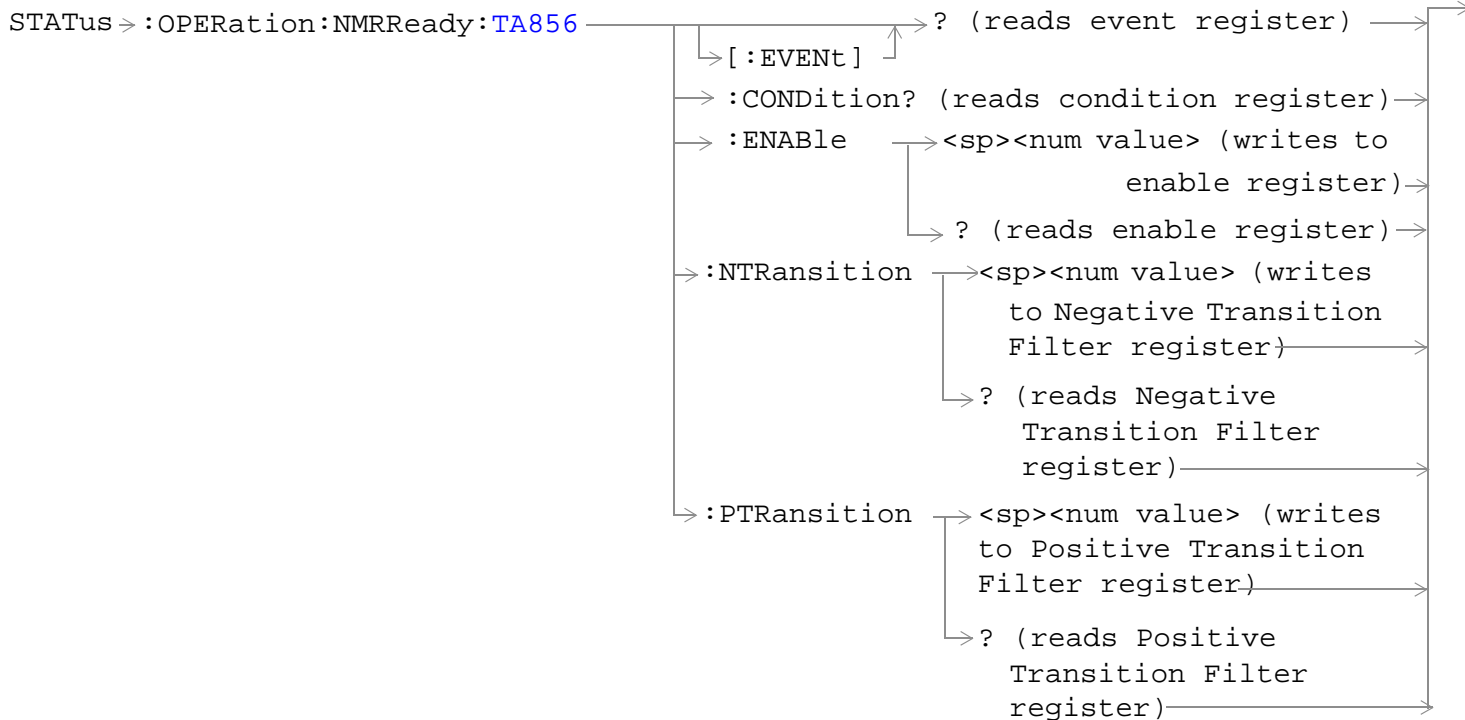
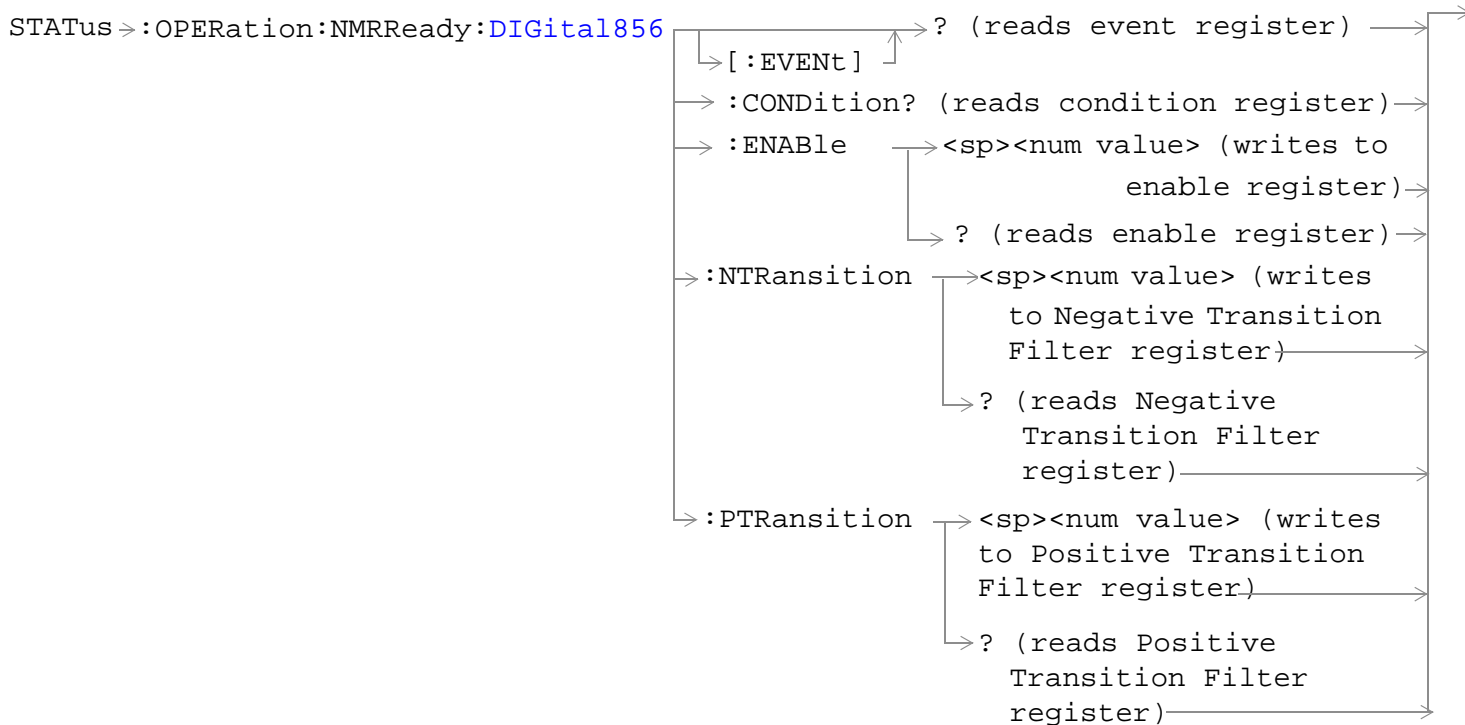
STATUS → :OPERation:NMRReady:CDMA



STATUS → :OPERation:NMRReady:COMMon







“Diagram Conventions” on page 326

## STATUS:OPERation

### STATUS:OPERation Condition Register Bit Assignments

The OPERation status register set contains bits which give an indication of conditions that are part of the test set's normal operation.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	KEYPressed Summary	This bit is the summary bit for the STATUS:OPERation:KEYPressed register.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	SYSTEM:SYNChronized	This condition bit is "pulsed" by the SYSTEM:SYNChronized command. This will allow the status system to indicate that the input buffer is synchronized to the point where this command is parsed and that all prior sequential commands are completed and all prior overlapped commands have started.
11	2048	HARDware Summary	This bit is the summary bit for the STATUS:OPERation:HARDware register.
10	1024	CALL Summary	This bit is the summary bit for the STATUS:OPERation:CALL register.
9	512	NMRReady (New Measurement Result Ready) Summary	This bit is the summary bit for the STATUS:OPERation:NMRReady register.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.
1	2	Reserved for future use.	This bit is always 0.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation**

```
OUTPUT 714;"STATUS:OPERATION:EVENT?" !Queries the Operation Event Register.
OUTPUT 714;"STATUS:OPERATION:CONDITION?" !Queries the Operation Condition Register.
OUTPUT 714;"STATUS:OPERATION:ENABLE 1024" !Sets the Operation Enable Register for bit 10.
OUTPUT 714;"STATUS:OPERATION:NTR 1024" !Sets the Operation Negative Transition
      !Register for bit 10.
OUTPUT 714;"STATUS:OPERATION:PTR 512" !Sets the Operation Event Positive Transition
      !Register for bit 9.
```

## STATUS:OPERation

### STATUS:OPERation:CALL Condition Register Bit Assignment

The STATUS:OPERation:CALL register bits will be used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	DIGital856 Summary bit.	This bit is the summary bit for the STATUS:OPERation:CALL:DIGital856 register.
13	8192	TA856 Summary bit.	This bit is the summary bit for the STATUS:OPERation:CALL:TA856 register.
12	4096	GPRS Summary bit.	This bit is the summary bit for the STATUS:OPERation:CALL:GPRS register.
11	2048	WCDMa Summary bit.	This bit is the summary bit for the STATUS:OPERation:CALL:WCDMa register.
10	1024	FDD Summary bit.	This bit is the summary bit for the STATUS:OPERation:CALL:FDD register.
9	512	TA2000 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:TA2000 register.
8	256	CDMA Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:CDMA register.
7	128	DIGital2000 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:DIGital2000 register.
6	64	DIGital95 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:DIGital95 register.
5	32	TA136 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:DIGITAL136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:GSM register.
1	2	COMMon Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:COMMon register.
0	1	Extension Bit	This bit is always 0.

### Program Examples - STATUS:OPERation:CALL

```
OUTPUT 714;"STATUS:OPERATION:CALL:EVENT?" !Queries the Operation Call Event !Register.  
OUTPUT 714;"STATUS:OPERATION:CALL:CONDITION?" !Queries the Operation Call Condition Register.
```

OUTPUT 714;"STATUS:OPERATION:CALL:ENABLE 4"

!Sets the Operation Call Enable Register for bit 2.

OUTPUT 714;"STATUS:OPERATION:CALL:NTR 4" !Sets the Negative Transition Register for bit 2.

OUTPUT 714;"STATUS:OPERATION:CALL:PTR 256" !Sets the Positive Transition Register for bit 8.

**STATUS:OPERation:CALL:CDMA Condition Register Bit Assignment**

The STATUS:OPERation:CALL:CDMA register bits will be used to indicate status of processes that occur during CDMA call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.
1	2	Reserved for future use.	This bit is always 0.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:CALL:CDMA**

OUTPUT 714;"STATUS:OPERATION:CALL:CDMA:EVENT?"

!Queries the Operation Call CDMA Event Register.

OUTPUT 714;"STATUS:OPERATION:CALL:CDMA:CONDITION?"

!Queries the Operation Call CDMA Condition Register.

OUTPUT 714;"STATUS:OPERATION:CALL:CDMA:ENABLE 2"

!Sets the Operation Call CDMA Enable Register for bit 1.

OUTPUT 714;"STATUS:OPERATION:CALL:CDMA:NTR 4"

!Sets the CDMA Negative Transition Register for bit 2.

OUTPUT 714;"STATUS:OPERATION:CALL:CDMA:PTR 256"

!Sets the CDMA Positive Transition Register for bit 8.

## STATUS:OPERation

### STATUS:OPERation:CALL:COMMON Condition Register Bit Assignment

The STATUS:OPERation:CALL:COMMON register bits will be used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Data Summary	This bit is the summary bit for the STATUS:OPERation:CALL:COMMON:DATA register.
13	8192	Call Control Status Access Probe	This bit is a 1 when the test set is in the call control status access probe state.
12	4096	Call Control Status Set Up Request	This bit is a 1 when the test set is in the call control status set up request state.
11	2048	Call Control Status Releasing	This bit is a 1 when the test set is in the call control status releasing state.
10	1024	Call Control Status Paging	This bit is a 1 when the test set is in the call control status paging state.
9	512	Registering (BS initiated)	This bit is set to a 1 when the Base Station initiates registration.
8	256	Reserved for future use.	This bit is always 0.
7	128	BS Originating	This bit is a 1 when: <ul style="list-style-type: none"><li>• Active Cell mode - the call processing state leaves the idle state</li><li>• Test mode - the test set has noted a base station origination.</li></ul>
6	64	Call Control Status Changing	This bit is a 1 when the test set is in the call control status changing state.
5	32	Call Control Status Handover/Handoff	This bit is a 1 when the test set is in the call control handover or handoff state.
4	16	Call Control Status Registering	This bit will be a 1 when the test set is in the call control status registering state.
3	8	Call Control Status Alerting	This bit is a 1 when the test set is in the call alerting state (ringing).
2	4	Call Control Status is Connected	This bit is a 1 when the test set is in the call connected state.
1	2	Call Control Status is Idle	This bit is a 1 when the test set is in the call idle state.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:CALL:COMMON**

```

OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:EVENT?" !Queries the Operation Call Common Event
!Register.
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:CONDITION?" !Queries the Operation Call Common
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:ENABLE 8" !Sets the Operation Call Common Enable
!Register for bit 3.
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:NTR 8" !Sets the Negative Transition
!Register for bit 3.
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:PTR 256" !Sets the Positive Transition
!Register for bit 8.
    
```

**STATUS:OPERation:CALL:COMMON:DATA Condition Register Bit Assignment**

The STATUS:OPERation:CALL:COMMON:DATA register bits are used to indicate status of processes that occur during normal data connection processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	PDP Active State	This bit is a 1 when the PDP is active, zero when inactive.
7	128	Starting Data Connection	This bit is a 1 when: <ul style="list-style-type: none"> <li>Active Cell mode - the data connection status leaves the idle state</li> <li>Test mode - the test set has noted a base station origination.</li> </ul>
6	64	Data Connection Status Changing	This bit is set to a 1 when the data connection status change detector has been armed.
5	32	Data Connection Status Off	This bit is set to 1 when the test set is in the call control status handover/handoff state.
4	16	Data Connection Status Data Connected	This bit is set to 1 when data connection status data is in the connected state.
3	8	Data Connection Status Transferring	This bit is set to 1 when the data connection status is Transferring.
2	4	Data Connection Status Attached	This bit is set to 1 when the data connection status is Attached.

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
1	2	Data Connection Status Idle	This bit is set to 1 when the data connection status is Idle.
0	1	Extension Bit	This bit will always be 0.

## Program Examples STATUS:OPERation:CALL:COMMON:DATA

```
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:EVENT?" !Queries and clears the Operation
!Call Common Data Event Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:CONDITION?" !Queries and clears the Operation
!Call Common Data Condition
!Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:ENABLE 128" !Sets the Operation Call Common
!Data Enable Register for bit 7
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:NTRANSITION 2" !Sets the Operation Call Common
!Data Negative Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:PTRANSITION 2" !Sets the Operation Call Common
!Data Positive Transition Filter
!Register for bit 1
```

## STATUS:OPERation:CALL:DIGital856 Condition Register Bit Assignment

The STATUS:OPERation:CALL:DIGital856 register bits will be used to indicate status of processes that occur during DIGital856 call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.



Bit Number	Binary Weighting	Condition	Description
2	4	Reserved for future use.	This bit is always 0.
1	2	Reserved for future use.	This bit is always 0.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:CALL:DIGital856**

```

OUTPUT 714;"STATUS:OPERATION:CALL:DIGITAL856:EVENT?"
!Queries the Operation Call DIGital856 Event Register.
OUTPUT 714;"STATUS:OPERATION:CALL:DIGITAL856:CONDITION?"
!Queries the Operation Call DIGital856Condition Register.
OUTPUT 714;"STATUS:OPERATION:CALL:DIGITAL856:ENABLE 2"
!Sets the Operation Call DIGital856Enable Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:CALL:DIGITAL856:NTR 4"
!Sets the DIGital856 Negative Transition Register for bit 2.
OUTPUT 714;"STATUS:OPERATION:CALL:DIGITAL856:PTR 256"
!Sets the DIGital856 Positive Transition Register for bit 8.
    
```

**STATUS:OPERation:CALL:TA856 Condition Register Bit Assignment**

The STATUS:OPERation:CALL:TA856 register bits will be used to indicate status of processes that occur during TA856 call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
1	2	Reserved for future use.	This bit is always 0.
0	1	Extension Bit	This bit is always 0.

### Program Examples - STATUS:OPERation:CALL:TA856

```
OUTPUT 714;"STATUS:OPERATION:CALL:TA856:EVENT?"  
!Queries the Operation Call TA856 Event Register.  
OUTPUT 714;"STATUS:OPERATION:CALL:TA856:CONDITION?"  
!Queries the Operation Call TA856Condition Register.  
OUTPUT 714;"STATUS:OPERATION:CALL:TA856:ENABLE 2"  
!Sets the Operation Call TA856Enable Register for bit 1.  
OUTPUT 714;"STATUS:OPERATION:CALL:TA856:NTR 4"  
!Sets the TA856 Negative Transition Register for bit 2.  
OUTPUT 714;"STATUS:OPERATION:CALL:TA856:PTR 256"  
!Sets the TA856 Positive Transition Register for bit 8.
```

### STATUS:OPERation:HARDware Condition Register Bit Assignments

The STATUS:OPERation:HARDware register bits indicate when a softkey on the test set's front panel has been pressed while the test set is in remote operating mode.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.

Bit Number	Binary Weighting	Condition	Description
1	2	External Timebase in use	This bit is a 1 if a suitable external timebase is connected to the test set's 10 MHz REF IN connector on the rear panel of the test set.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:HARDware**

```

OUTPUT 714;"STATUS:OPERATION:HARDware:EVENT?"
    !Queries the HARDware Event Register.
OUTPUT 714;"STATUS:OPERATION:HARDware:CONDITION?"
    !Queries the HARDware Condition Register.
OUTPUT 714;"STATUS:OPERATION:HARDware:ENABLE 16"
    !Sets HARDware Enable register for bit 4.
OUTPUT 714;"STATUS:OPERATION:HARDware:NTR 2"
    !Sets the HARDware Negative Transition Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:HARDware:PTR 4"
    !Sets the HARDware Positive Transition Register for bit 2
    
```

**STATUS:OPERation:KEYPressed Condition Register Bit Assignments**

The STATUS:OPERation:KEYPressed register bits indicate when a softkey on the test set's front panel has been pressed while the test set is in remote operating mode.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	F12 softkey	This bit is a 1 when the test set's F12 softkey has been pressed.
10	1024	F11 softkey	This bit is a 1 when the test set's F11 softkey has been pressed.
9	512	F10 softkey	This bit is a 1 when the test set's F10 softkey has been pressed.
8	256	F9 softkey	This bit is a 1 when the test set's F9 softkey has been pressed.
7	128	F8 softkey	This bit is a 1 when the test set's F8 softkey has been pressed.
6	64	F7 softkey	This bit is a 1 when the test set's F7 softkey has been pressed.

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
5	32	F6 softkey	This bit is a 1 when the test set's F6 softkey has been pressed.
4	16	F5 softkey	This bit is a 1 when the test set's F5 softkey has been pressed.
3	8	F4 softkey	This bit is a 1 when the test set's F4 softkey has been pressed.
2	4	F3 softkey	This bit is a 1 when the test set's F3 softkey has been pressed.
1	2	F2 softkey	This bit is a 1 when the test set's F2 softkey has been pressed.
0	1	F1 softkey	This bit is a 1 when the test set's F1 softkey has been pressed.

### Program Examples - STATUS:OPERation:KEYPressed

```
OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:EVENT?"
!Queries the Keypressed Event Register.
OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:CONDITION?"
!Queries the Keypressed Condition Register.
OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:ENABLE 16"
!Sets Keypressed Enable register for bit 4.
OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:NTR 2"
!Sets the Keypressed Negative Transition Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:PTR 4"
!Sets the Keypressed Positive Transition Register for bit 2
```

### STATUS:OPERation:NMRReady Condition Register Bit Assignments

The STATUS:OPERation:NMRReady register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	DIGital856	This bit is the summary bit for the STATUS:OPERation:NMRReady:DIGital856 register.
13	8192	TA856	This bit is the summary bit for the STATUS:OPERation:NMRReady:TA856 register.
12	4096	GPRS	This bit is the summary bit for the STATUS:OPERation:NMRReady:GPRS register.
11	2048	WCDMa	This bit is the summary bit for the STATUS:OPERation:NMRReady:WCDMa register.

Bit Number	Binary Weighting	Condition	Description
10	1024	FDD	This bit is the summary bit for the STATUS:OPERation:NMRReady:FDD register.
9	512	TA2000 Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:TA2000 register.
8	256	CDMA Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:CDMA register.
7	128	DIGital2000 Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:DIGital2000 register.
6	64	DIGital95 Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:DIGital95 register.
5	32	TA136 Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:TA136 register.
4	16	DIGITAL136 Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:DIGITAL136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:AMPS register.
2	4	GSM Summary bit	STATUS:This bit is the summary bit for the OPERATION:NMRReady:GSM register.
1	2	COMMON Summary bit	This bit is the summary bit for the STATUS:OPERation:NMRReady:COMMON register.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:NMRReady**

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:EVENT?" !Queries the New Measurement
!Results Ready Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CONDITION?" !Queries the New Measurement
!Results Ready
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:ENABLE 16" !Sets New Measurement Results
!Ready Enable Register
!for bit 4.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:NTR 2" !Sets the New Measurement Results
!Ready Negative Transition
!Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:PTR 4" !Sets the New Measurement
!Results Ready Positive
!Transition Register
!for bit 2

```

## STATUS:OPERation

### STATUS:OPERation:NMRReady:CDMA Condition Register Bit Assignments

The STATUS:OPERation:NMRReady:CDMA register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	GAPPower New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
8	256	CTXSpurious New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
7	128	GPOWER New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
6	64	TROPower New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
5	32	CAPPower New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>

Bit Number	Binary Weighting	Condition	Description
4	16	CFERror New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
3	8	CPOWer New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
2	4	WQQuality New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
1	2	DAPower New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 251.</a>
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:NMRReady:CDMA**

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:CDMA:EVENT?" !Queries the New Measurement
                !Results Ready CDMA Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CDMA:CONDITION?" !Queries the New Measurement
                !Results Ready CDMA
                !Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CDMA:ENABLE 8" !Sets New Measurement Results
                !Ready CDMA Enable Register
                !for bit 3.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CDMA:NTR 2" !Sets the New Measurement Results
                !Ready CDMA Negative Transition
                !Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CDMA:PTR 4" !Sets the New Measurement
                !Results Ready CDMA Positive
                !Transition Register
                !for bit 2
    
```

## STATUS:OPERation

### STATUS:OPERation:NMRReady:COMMON Condition Register Bit Assignments

The STATUS:OPERation:NMRReady:COMMON register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Spectrum Monitor New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Triggering of Measurements" on page 251.</a>
2	4	Reserved for future use.	This bit is always 0.
1	2	Audio Analyzer New Measurement Result Ready	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Triggering of Measurements" on page 251.</a>
0	1	Extension Bit	This bit is always 0.

### Program Examples - STATUS:OPERation:NMRReady:COMMON

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:EVENT?" !Queries the New Measurement
!Results Ready Common Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:CONDITION?" !Queries the New Measurement
!Results Ready Common
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:ENABLE 2" !Sets New Measurement Results
!Ready Common Enable Register
```



!for bit 1.

OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:NTR 2" !Sets the New Measurement Results  
!Ready Common Negative Transition  
!Register for bit 1.

OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:PTR 2" !Sets the New Measurement  
!Results Ready Common Positive  
!Transition Register  
!for bit 1

**STATUS:OPERation:NMRReady:DIGital856 Condition Register Bit Assignments**

The STATUS:OPERation:NMRReady:DIGital856 register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	DOWQuality New Measurement Result Ready.	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Triggering of Measurements" on page 251.</a>
1	2	CPERror New Measurement Result Ready.	This bit is a 1 if the measurement has been completed and has produced new results.  This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Triggering of Measurements" on page 251.</a>

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
0	1	Extension Bit	This bit is always 0.

### Program Examples - STATUS:OPERation:NMRReady:DIGital856

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL856:EVENT?" !Queries the New Measurement  
!Results Ready DIG856 Event Register.
```

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL856:CONDITION?" !Queries the New  
!Measurement Results Ready DIG856  
!Condition Register.
```

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL856:ENABLE 8" !Sets New Measurement Results  
!Ready DIG856 Enable Register  
!for bit 3.
```

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL856:NTR 2" !Sets the New Measurement Results  
!Ready DIG856 Negative Transition  
!Register for bit 1.
```

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL856:PTR 4" !Sets the New Measurement  
!Results Ready DIG856 Positive  
!Transition Register  
!for bit 2
```

### STATUS:OPERation:NMRReady:TA856 Condition Register Bit Assignments

The STATUS:OPERation:NMRReady:TA856 register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.

Bit Number	Binary Weighting	Condition	Description
2	4	Reserved for future use.	This bit is always 0.
1	2	Reserved for future use.	This bit is always 0.
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:NMRReady:TA856**

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:TA856:EVENT?" !Queries the New Measurement
!Results Ready DIG2000 Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:TA856:CONDITION?" !Queries the New
!Measurement Results Ready DIG2000
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:TA856:ENABLE 8" !Sets New Measurement Results
!Ready DIG2000 Enable Register
!for bit 3.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:TA856:NTR 2" !Sets the New Measurement Results
!Ready DIG2000 Negative Transition
!Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:TA856:PTR 4" !Sets the New Measurement
!Results Ready DIG2000 Positive
!Transition Register
!for bit 2
    
```

## STATus:PRESet

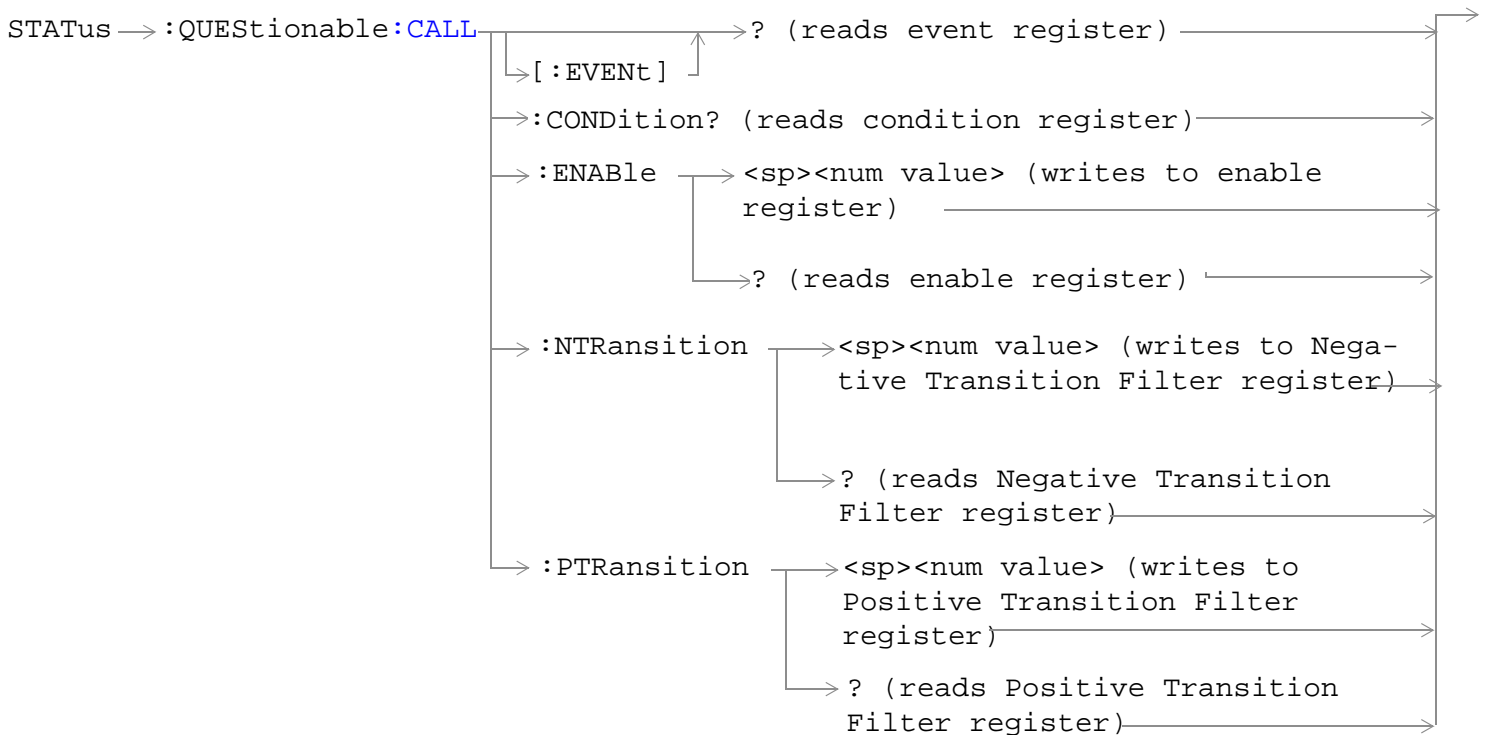
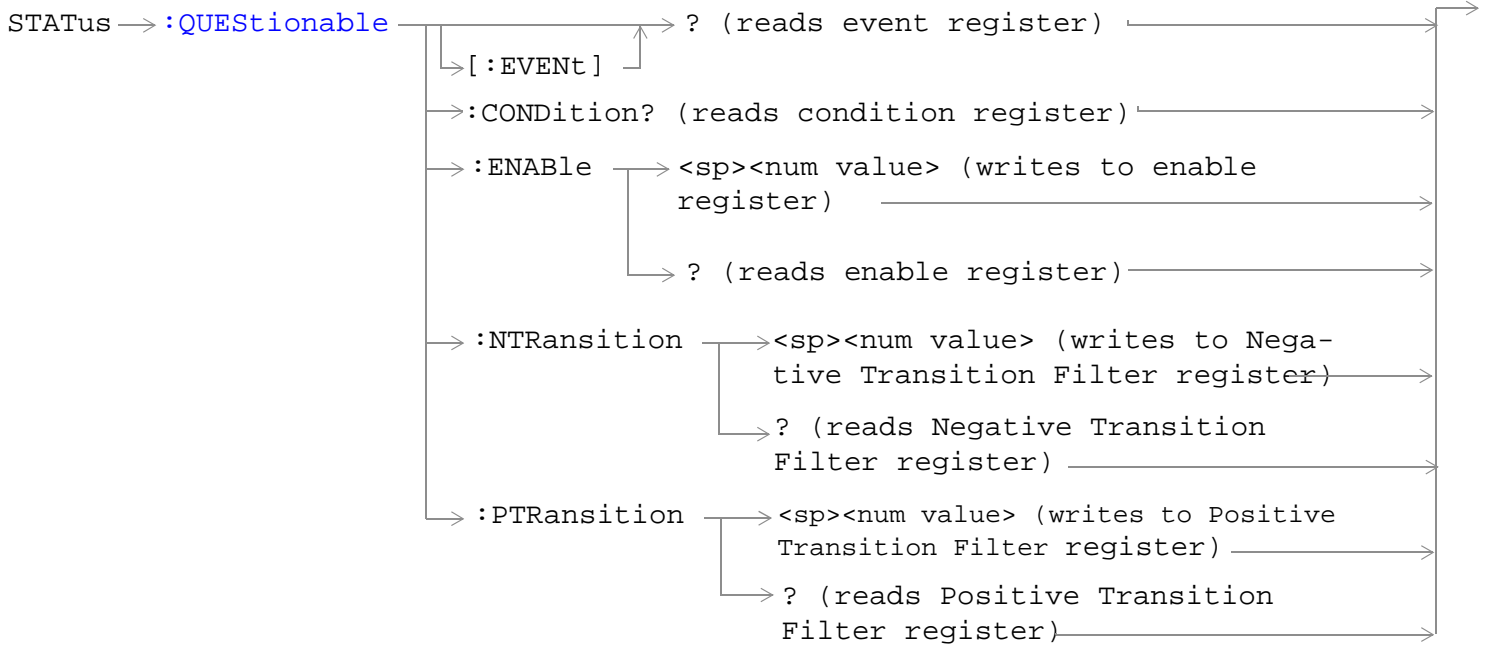
STATus → :PRESet →

[“Diagram Conventions” on page 326](#)

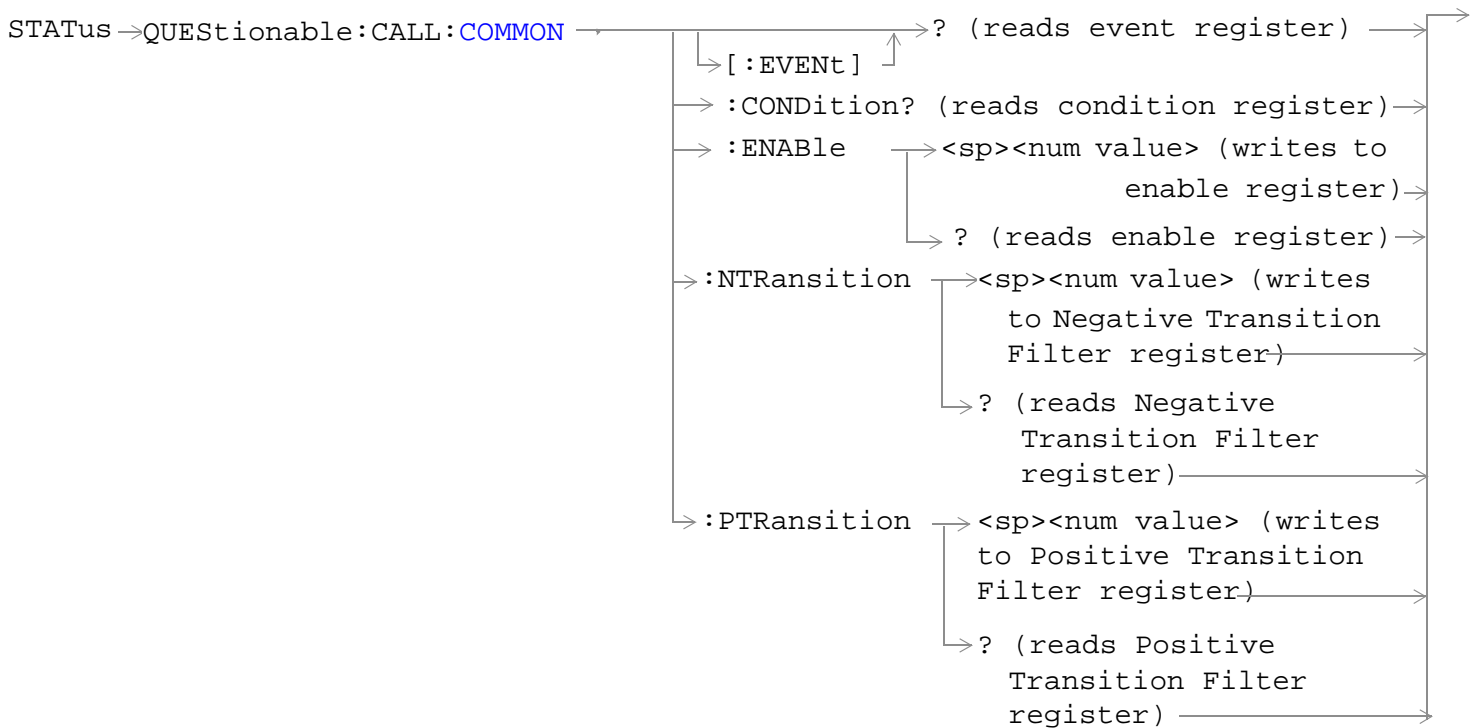
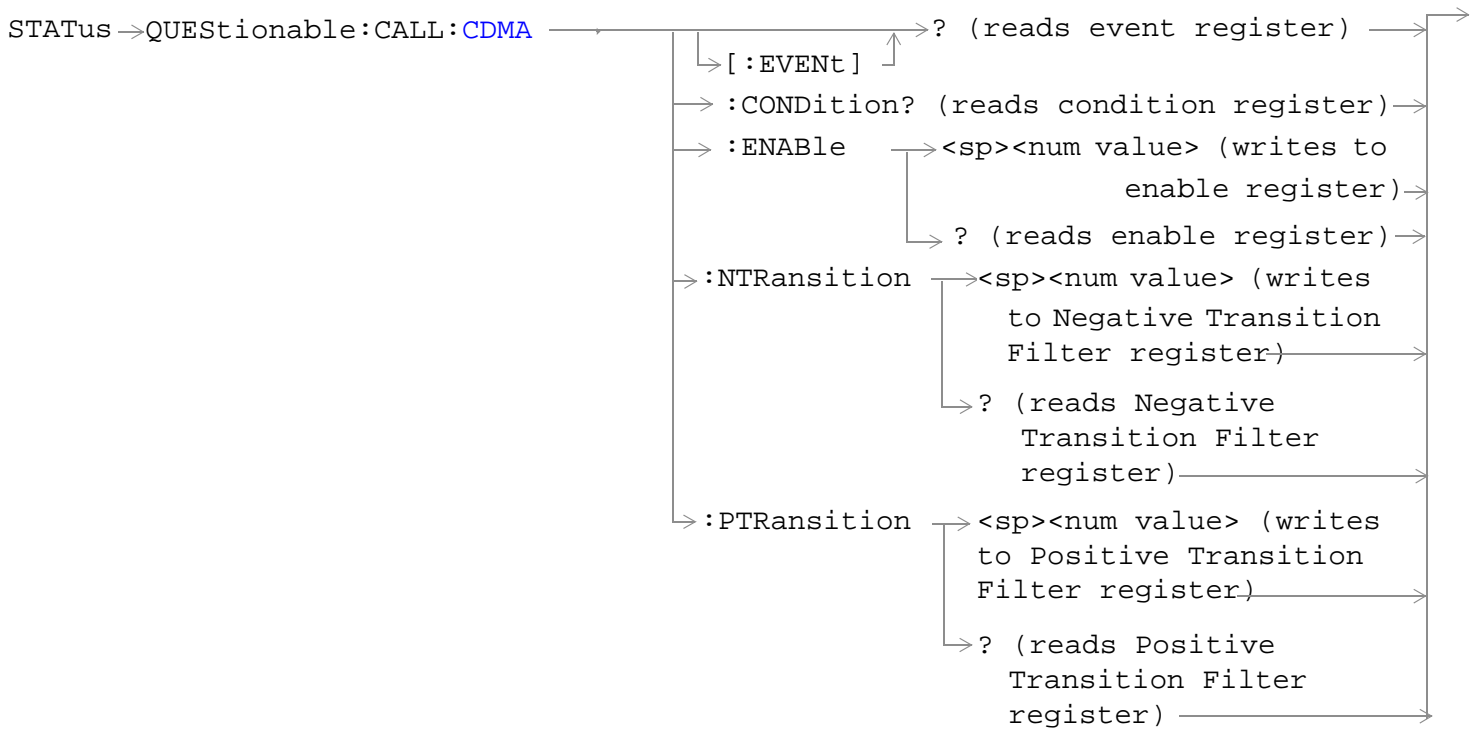
### STATus:PRESet

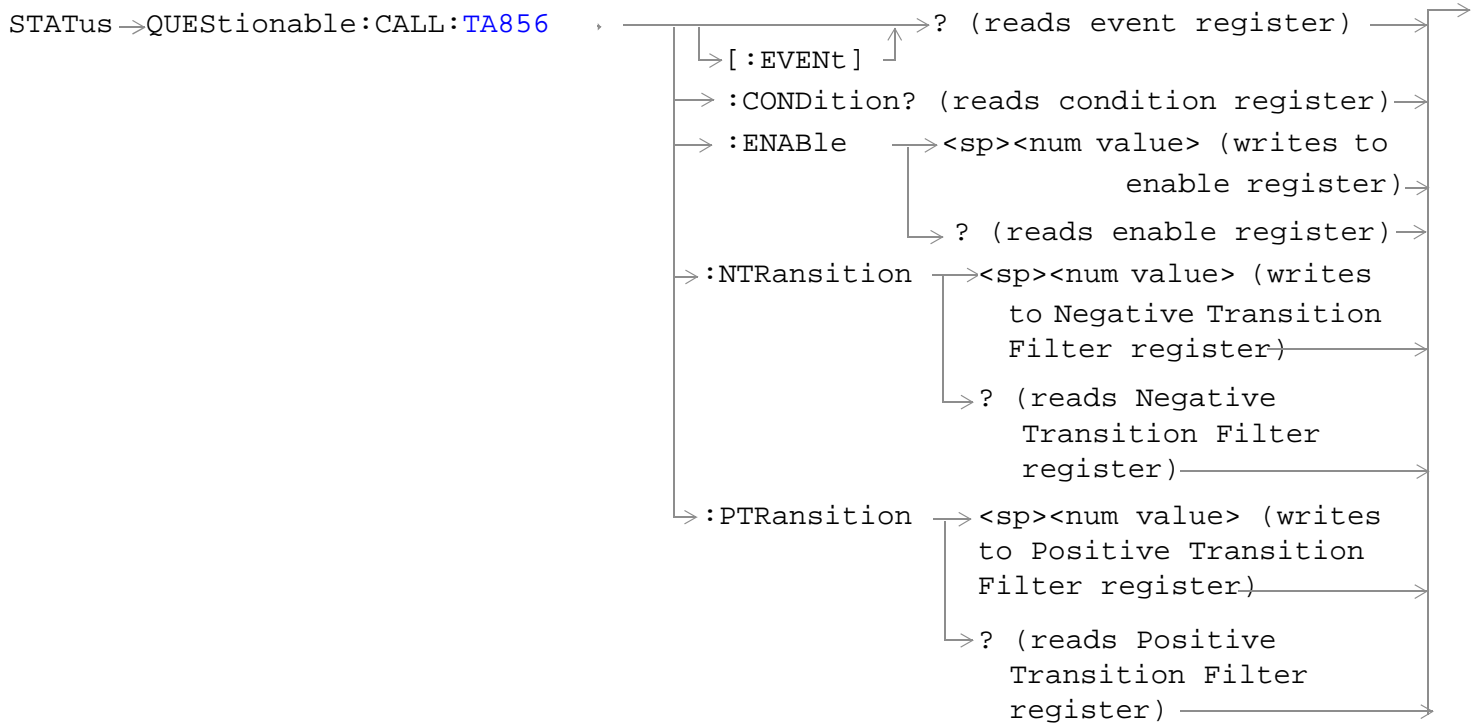
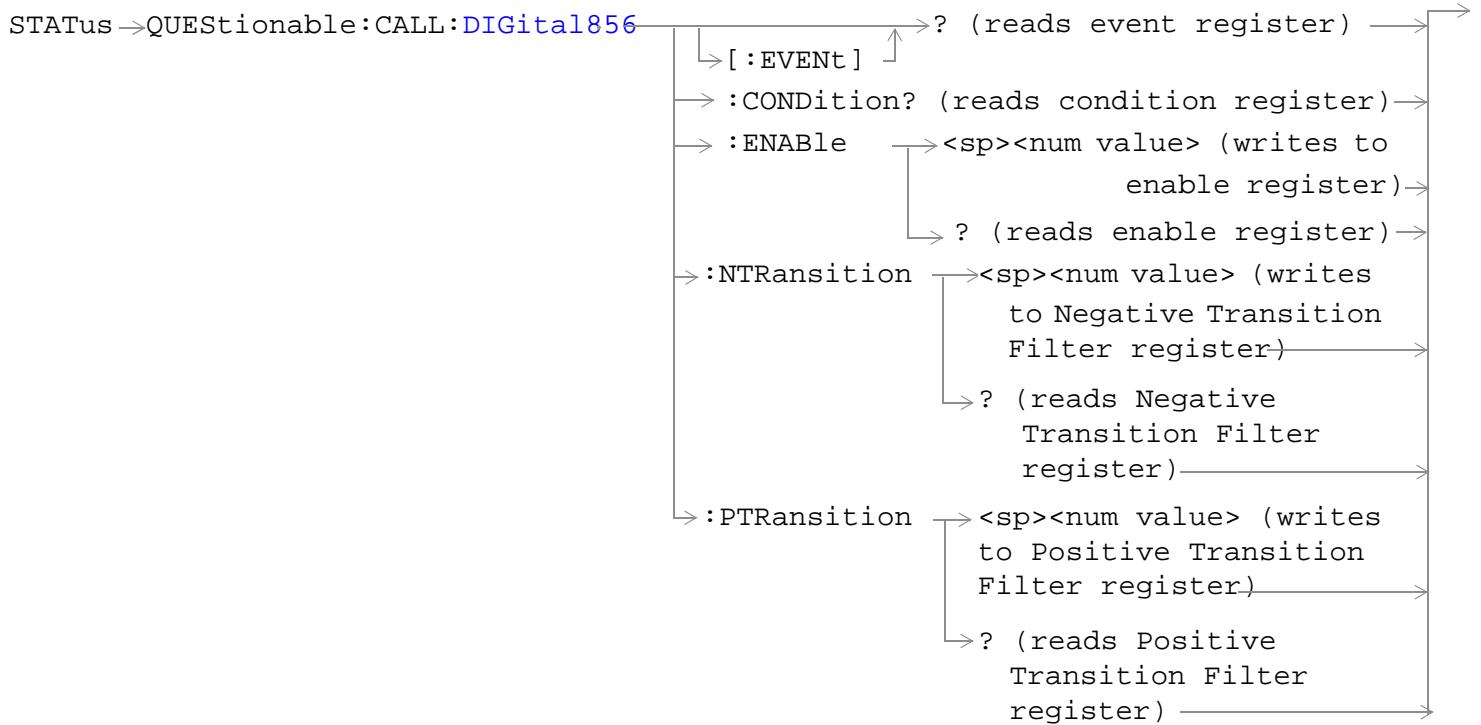
<p>Function</p>	<p>Presets the status subsystem.</p> <p>Presetting the status subsystem performs the following functions:</p> <ul style="list-style-type: none"> <li>• All enable registers are set to 0 (not enabled)</li> <li>• All Positive Transition Registers (PTR's) are set to 1 (positive transitions enabled).</li> <li>• All Negative Transition Registers (NTR's) are set to 0 (negative transitions disabled).</li> </ul>
-----------------	--

## STATUS:QUESTIONABLE

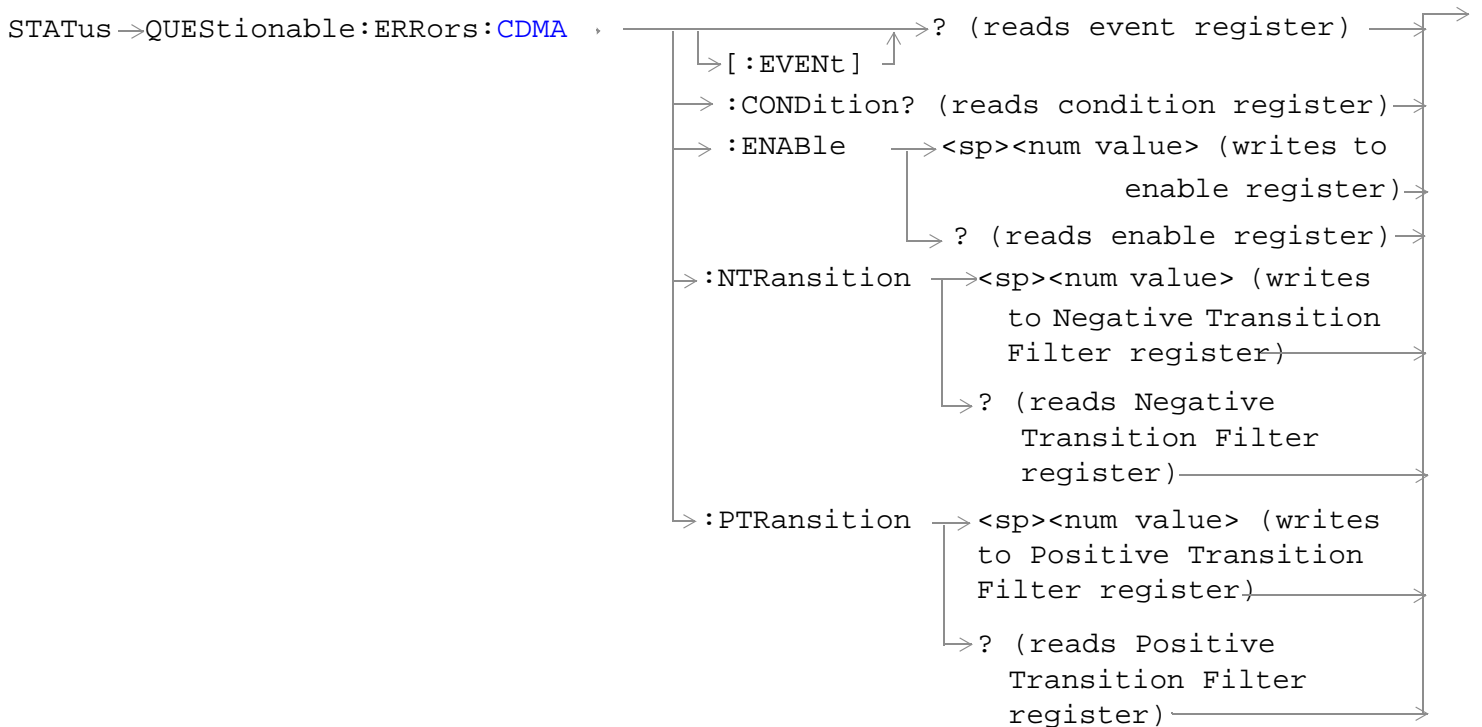
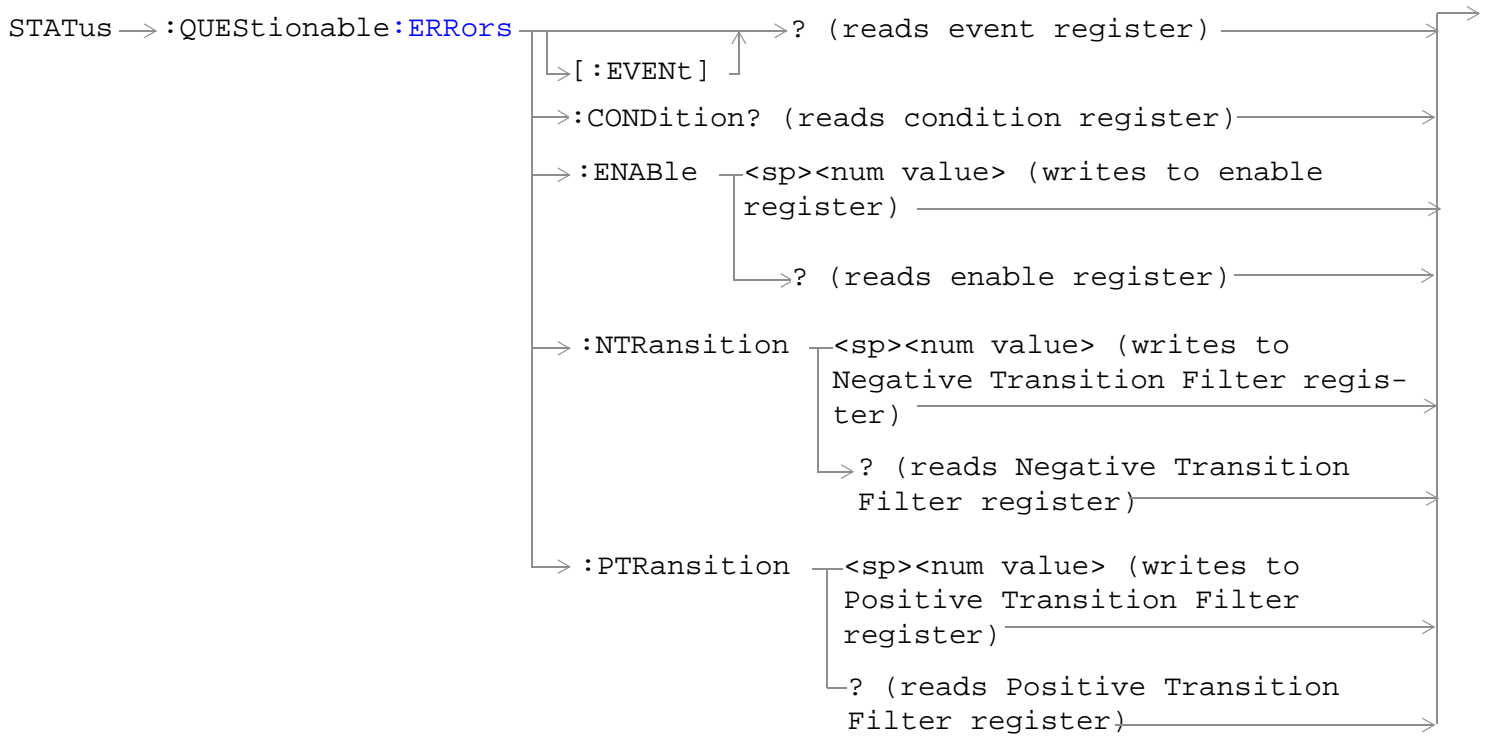


## STATUS:QUESTIONABLE



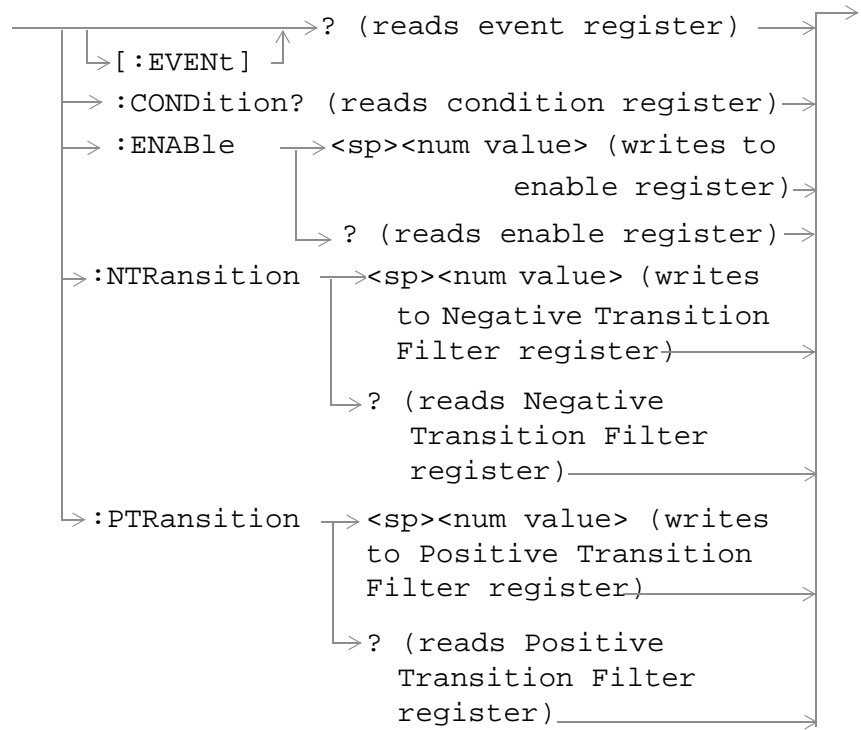


## STATUS:QUESTIONABLE

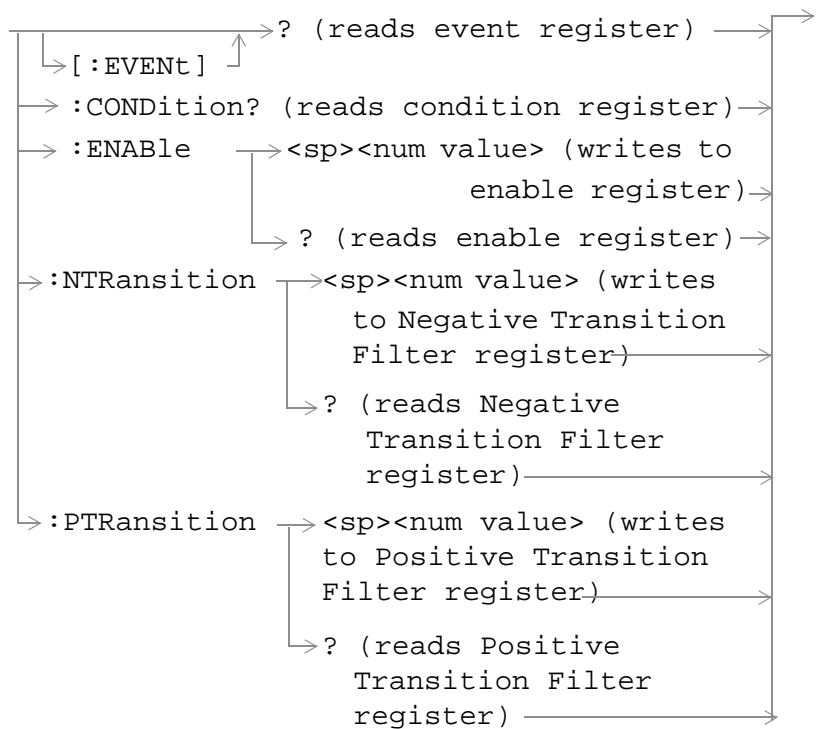




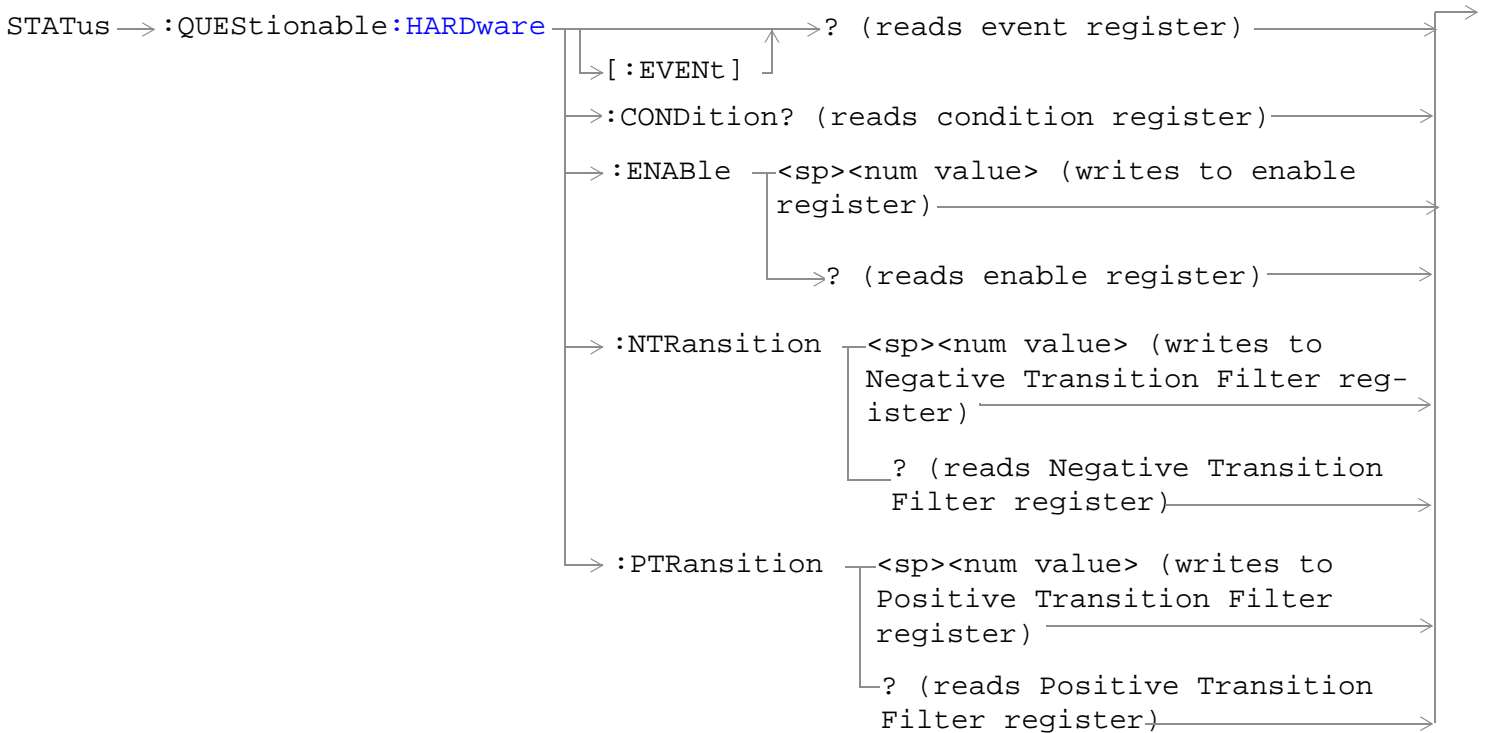
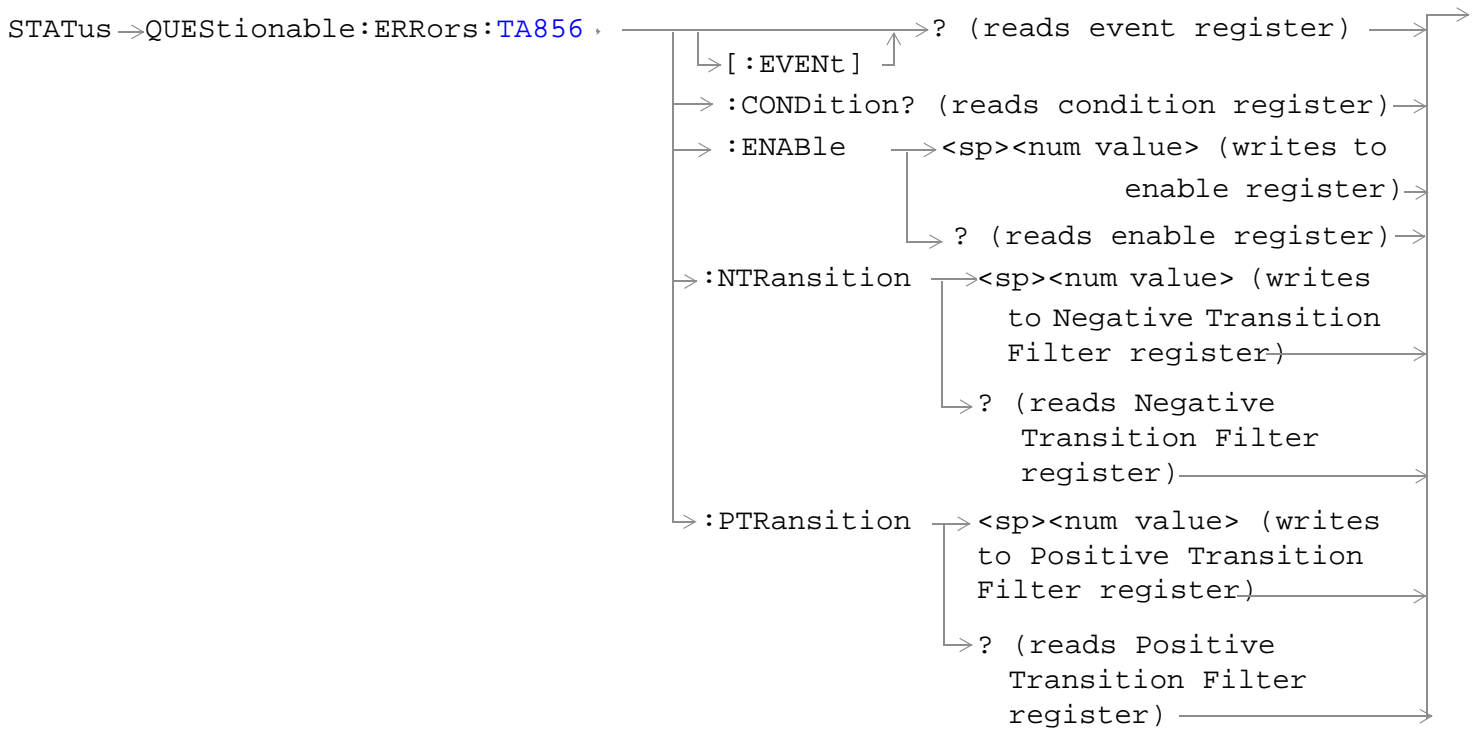
STATUS →QUESTIONABLE:ERRORS:COMMON



STATUS →QUESTIONABLE:ERRORS:DIGital856



## STATUS:QUESTIONABLE



“Diagram Conventions” on page 326

### STATUS:QUESTIONABLE Condition Register Bit Assignment

The STATUS:QUESTIONABLE register contains bits which give an indication that the data currently being acquired or generated is of questionable quality due to some condition affecting the functionality associated with that bit.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	QUESTIONABLE:HARDware summary	This bit is the summary bit for the STATUS:QUESTIONABLE:HARDware register.
10	1024	QUESTIONABLE:CALL summary	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL register.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.
1	2	QUESTIONABLE:ERRors summary	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRors register.
0	1	Reserved for future use.	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE Register Bit Assignments

```

OUTPUT 714;"STATUS:QUESTIONABLE:EVENT?" !Queries and clears the Questionable Event
                                           !Register
OUTPUT 714;"STATUS:QUESTIONABLE:CONDITION?" !Queries and clears the Questionable Condition
                                           !Register
OUTPUT 714;"STATUS:QUESTIONABLE:ENABLE 1024" !Sets the Questionable Enable Register
                                           !for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:NTRANSITION 2" !Sets the Questionable Negative
                                           !Transition Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:PTRANSITION 2" !Sets the Questionable Positive
                                           !Transition Filter Register for bit 1
    
```

## STATUS:QUESTIONABLE

### STATUS:QUESTIONABLE:CALL Condition Register Bit Assignment

The STATUS:QUESTIONABLE:CALL registers will contain information about which event(s) occurred during call processing that indicate what call processing procedure failed

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	DIGital856 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:DIGital856 register.
13	8192	TA856 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:TA856 register.
12	4096	GPRS Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:GPRS register.
11	2048	WCDMa Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:WCDMa register.
10	1024	FDD Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:FDD register.
9	512	TA2000 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:TA2000 register.
8	256	CDMA Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:CDMA register.
7	128	DIGital2000 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:CALL:DIGital2000 register.
6	64	DIGital95 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:CALL:DIGital95 register.
5	32	TA136 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:GSM register.
1	2	COMMon Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:COMMon register.
0	1	Extension Bit	This bit is always 0.

**Program Example - STATUS:QUESTIONABLE:CALL Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:CALL:EVENT?" !Queries and clears the Questionable
!Call Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CONDITION?" !Queries and clears the Questionable
!Call Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:ENABLE 1024" !Sets the Questionable
!Call Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:NTRANSITION 2" !Sets the Questionable Call
!Negative Transition Filter Register
!for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:PTRANSITION 2" !Sets the Questionable Call
!Positive Transition Filter Register
!for bit 1
    
```

**STATUS:QUESTIONABLE:CALL:CDMA Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:CALL:CDMA registers will contain information about which event(s) occurred during call processing that indicate what call processing procedure failed

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	MUI Maskable Message.	This bit is a 1 when a Maskable Message occurs.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Session timer timed out.	This bit is a 1 when (RHRUIPD 10-001734 rev 25).
4	16	Call drop timer timed out.	This bit is a 1 after 250 consecutive bad frames are counted indicating that the reverse link is lost
3	8	Service connect completion not received.	This bit is a 1 when the test set has not received a message from the MS that it has completed the change to a new Service Option or Radio Configuration.
2	4	Service Option or Radio Configuration rejected by MS.	This bit is a 1 when the MS receives a Service Option or a Radio Configuration that it does not support.

## STATUS:QUESTIONABLE

Bit Number	Binary Weighting	Condition	Description
1	2	Traffic channel preamble not received.	This bit is a 1 if no preamble was received from the MS.
0	1	Extension Bit.	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE:CALL:CDMA Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CDMA:EVENT?"
!Queries and clears the Questionable Call CDMA Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CDMA:CONDITION?"
!Queries and clears the Questionable Call CDMA Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CDMA:ENABLE 1024"
!Sets the Questionable Call CDMA Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CDMA:NTRANSITION 2"
!Sets the Questionable Call CDMA Negative Transition Filter Register !for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CDMA:PTRANSITION 2"
!Sets the Questionable Call CDMA Positive Transition Filter Registerfor bit 1
```

### STATUS:QUESTIONABLE:CALL:COMMON Condition Register Bit Assignment

The STATUS:QUESTIONABLE:CALL:COMMON registers contain information about which event(s) occurred during normal call processing that indicate why the call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.
1	2	Reserved for future use.	This bit is always 0.

Bit Number	Binary Weighting	Condition	Description
0	1	Extension Bit	This bit is always 0.

**Program Example - STATUS:QUESTIONABLE:CALL:COMMON Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:EVENT?" !Queries and clears the Questionable
!Call Common Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:CONDITION?" !Queries and clears the Questionable
!Call Common Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:ENABLE 1024" !Sets the Questionable Call Common
!Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:NTRANSITION 2" !Sets the Questionable Call
!Common Negative Transition
!Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:PTRANSITION 2" !Sets the Questionable Call
!Common Positive Transition
!Filter Register for bit 1
    
```

**STATUS:QUESTIONABLE:CALL:DIGITAL856 Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:CALL:DIGITAL856 registers will contain information about which event(s) occurred during call processing that indicate what call processing procedure failed

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Reserved for future use.	This bit is always 0.
3	8	Reserved for future use.	This bit is always 0.
2	4	Reserved for future use.	This bit is always 0.
1	2	Reserved for future use.	This bit is always 0.

## STATUS:QUESTIONABLE

Bit Number	Binary Weighting	Condition	Description
0	1	Extension Bit	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE:CALL:TA2000 Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:DIGITAL856:EVENT?"
!Queries and clears the Questionable Call Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:DIGITAL856:CONDITION?"
!Queries and clears the Questionable Call Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:DIGITAL856:ENABLE 1024"
!Sets the Questionable Call Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:DIGITAL856:NTRANSITION 2"
!Sets the Questionable Call Negative Transition Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:DIGITAL856:PTRANSITION 2"
!Sets the Questionable Call Positive Transition Filter Register for bit 1
```

### STATUS:QUESTIONABLE:CALL:TA856 Condition Register Bit Assignment

The STATUS:QUESTIONABLE:CALL:TA856 registers will contain information about which event(s) occurred during call processing that indicate what call processing procedure failed

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	MUI Maskable Message.	This bit is a 1 when a Maskable Message occurs.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	Reserved for future use.	This bit is always 0.
8	256	Reserved for future use.	This bit is always 0.
7	128	Reserved for future use.	This bit is always 0.
6	64	Handoff rejected due to no traffic channel.	This bit is a 1 when
5	32	FTAP Parameter Assignment Complete message not received.	This bit is a 1 when
4	16	RTAP Parameter Assignment Complete message not received.	This bit is a 1 when
3	8	Close Connection message not received.	This bit is a 1 when



Bit Number	Binary Weighting	Condition	Description
2	4	Session Close message not received in response to Session Close message sent..	This bit is a 1 when
1	2	Hardware ID Response message not received.	This bit is a 1 when
0	1	Extension Bit	This bit is always 0.

**Program Example - STATUS:QUESTIONABLE:CALL:TA2000 Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:CALL:TA856:EVENT?"
    !Queries and clears the Questionable Call Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:TA856:CONDITION?"
    !Queries and clears the Questionable Call Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:TA856:ENABLE 1024"
    !Sets the Questionable Call Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:TA856:NTRANSITION 2"
    !Sets the Questionable Call Negative Transition Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:TA856:PTRANSITION 2"
    !Sets the Questionable Call Positive Transition Filter Register for bit 1
    
```

**STATUS:QUESTIONABLE:ERRORS Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:ERRORS register bits will be used to indicate information about test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	DIGital856 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:DIGital856 register.
13	8192	TA856 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:TA856 register.
12	4096	GPRS Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:GPRS register.
11	2048	WCDMA Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:WCDMA register.
10	1024	FDD Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:FDD register.
9	512	TA2000 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:TA2000 register.
8	256	CDMA Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:CDMA register.

## STATUS:QUESTIONABLE

Bit Number	Binary Weighting	Condition	Description
7	128	DIGital2000 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:DIGital2000 register.
6	64	DIGital95 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:DIGital95 register.
5	32	TA136 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:AMPS register.
2	4	GSM Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:ERRORS:GSM register.
1	2	COMMon Summary bit	This bit is the summary bit for the STATUS:QUESTIONABLE:CALL:ERRORS register.
0	1	Extension Bit	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE:ERRORS Register Bit Assignments

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:EVENT?" !Queries and clears the Questionable
!Errors Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CONDITION?" !Queries and clears the Questionable
!Errors Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:ENABLE 1024" !Sets the Questionable
!Errors Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:NTRANSITION 2" !Sets the Questionable Errors
!Negative Transition Filter Register
!for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:PTRANSITION 2" !Sets the Questionable Errors
!Positive Transition Filter Register
!for bit 1
```

### STATUS:QUESTIONABLE:ERRORS:CDMA Condition Register Bit Assignments

The STATUS:QUESTIONABLE:ERRORS:CDMA register bits will be used to indicate information about CDMA related test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	MUI Maskable Message.	This bit is a 1 when a Maskable Message occurs.

Bit Number	Binary Weighting	Condition	Description
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	+900 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
4	16	+400 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.

## STATUS:QUESTIONABLE

Bit Number	Binary Weighting	Condition	Description
3	8	+300 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE:ERRORS:CDMA Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CDMA:EVENT?" !Queries and clears the Questionable
!Errors CDMA Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CDMA:CONDITION?" !Queries and clears the Questionable
!Errors CDMA Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CDMA:ENABLE 1024" !Sets the Questionable
!Errors CDMA Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CDMA:NTRANSITION 2" !Sets the Questionable Errors
!CDMA Negative Transition
!Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CDMA:PTRANSITION 2" !Sets the Questionable Errors
!CDMA Positive Transition
!Filter Register for bit 1
```

### STATUS:QUESTIONABLE:ERRORS:COMMON Condition Register Bit Assignments

The STATUS:QUESTIONABLE:ERRORS:COMMON register bits will be used to indicate information about the COMMON test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	RUI Maskable Messages.	This bit is a 1 when a Maskable Message occurs.
13	8192	Reserved for future use.	This bit is always 0.

Bit Number	Binary Weighting	Condition	Description
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	+900 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
4	16	+400 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.

## STATUS:QUESTIONABLE

Bit Number	Binary Weighting	Condition	Description
3	8	+300 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE:ERRORS:COMMON Register Bit Assignments

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:EVENT?" !Queries and clears the Questionable
!Errors Common Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:CONDITION?" !Queries the and clears the
!Questionable Errors
!Common Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:ENABLE 1024" !Sets the Questionable
!Errors Common Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:NTRANSITION 2" !Sets the Questionable Errors
!Common Negative Transition
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:PTRANSITION 2" !Sets the Questionable Errors
!Common Positive Transition
!Register for bit 1
```

### STATUS:QUESTIONABLE:ERRORS:DIGITAL856 Condition Register Bit Assignment

The STATUS:QUESTIONABLE:ERRORS:DIGITAL856 register bits will be used to indicate information about DIGITAL856 related test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	MUI Maskable Message.	This bit is a 1 when a Maskable Message occurs.???

Bit Number	Binary Weighting	Condition	Description
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	+900 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
4	16	+400 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.

**STATUS:QUESTIONABLE**

Bit Number	Binary Weighting	Condition	Description
3	8	+300 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONABLE:ERRORS:DIGITAL2000 Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL856:EVENT?" !Queries and clears the
!Questionable Errors
!DIGITAL2000 Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL856:CONDITION?" !Queries and clears the
!Questionable Errors
!DIGITAL2000 Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL856:ENABLE 1024" !Sets the Questionable
!Errors DIGITAL2000 Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL856:NTRANSITION 2" !Sets the Questionable
!Errors DIGITAL2000 Negative
!Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL856:PTRANSITION 2" !Sets the Questionable
!Errors DIGITAL2000 Positive
!Transition Filter
!Register for bit 1

```



**STATUS:QUESTIONABLE:ERRORS:TA856 Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:ERRORS:TA856 register bits will be used to indicate information about TA856 related test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	MUI Maskable Message.	This bit is a 1 when a Maskable Message occurs.???
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit is always 0.
11	2048	Reserved for future use.	This bit is always 0.
10	1024	Reserved for future use.	This bit is always 0.
9	512	+900 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.

**STATUS:QUESTIONABLE**

Bit Number	Binary Weighting	Condition	Description
4	16	+400 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
3	8	+300 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONABLE:ERRORS:DIGITAL95 Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA856:EVENT?" !Queries and clears the
!Questionable Errors
!DIGITAL95 Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA856:CONDITION?" !Queries and clears the
!Questionable Errors
!DIGITAL95 Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA856:ENABLE 1024" !Sets the Questionable
!Errors DIGITAL95 Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA856:NTRANSITION 2" !Sets the Questionable
!Errors DIGITAL95 Negative
!Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA856:PTRANSITION 2" !Sets the Questionable
!Errors DIGITAL95 Positive
!Transition Filter
!Register for bit 1

```

**STATUS:QUESTIONABLE:HARDWARE Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:HARDWARE register bits give an indication that the data/signals currently being acquired or generated are of questionable quality.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit is always 0.
14	16384	Reserved for future use.	This bit is always 0.
13	8192	Reserved for future use.	This bit is always 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Power-up Self Test(s) Failed	This bit will be a 1 if the power-up self tests failed.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	Reserved for future use.	This bit will always be 0.
0	1	Extension Bit.	This bit will always be 0.

**Program Example - STATUS:QUESTIONABLE:HARDWARE Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:EVENT?" !Queries and clears the Questionable
!Hardware Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:CONDITION?" !Queries and clears the Questionable
!Hardware Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:ENABLE 1024" !Sets the Questionable
!Hardware Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:NTRANSITION 2" !Sets the Questionable
!Hardware Negative Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:PTRANSITION 2" !Sets the Questionable
!Hardware Positive Transition Filter
!Register for bit 1
    
```

## Status Byte Register

\*STB?

\*STB?

**NOTE** The Status Byte Register can also be read with a serial poll. For example, the command “Status\_byte = SPOLL(714)” would perform a serial poll of the Status Byte Register, returning and releasing RQS (bit 6).

### Status Byte Register Bit Assignments

Bit Number	Binary Weighting	Label	Description
7	128	STATUS: OPERATION	Summarizes the STATUS: OPERATION Status Register, which fans out to the NMRReady and CALL Status Registers.
6	64	RQS (SRQ TRUE?)/Master Summary Status	RQS is read by a serial poll (SPOLL) Master Summary Status is read by a *STB? query - defined by IEEE 488.2
5	32	Standard Event Status Register	Summarizes the Standard Event Status Register
4	16	Message Available	SCPI - Defined
3	8	STATUS: QUESTIONABLE Status Register	Summary Message comes from the STATUS: QUESTIONABLE Status Register, which fans out to the CALL and HARDWARE Status Registers
2	4	Error/ Event Queue	SCPI - Defined
1	2	Reserved	
0	1	Reserved	

### Program Example - Status Byte Register Bit Assignments

```
OUTPUT 714;"*STB?" !Queries the Status Byte.
```

---

## Standard Event Status Register

### \*ESR?

\*ESR? → Reads and clears the Std Event Status Register. →

### \*ESE?

\*ESE? → Reads the Std Event Status Register Enable Register →

### \*ESE

\*ESE → Writes to the Std Event Status Register Enable Register →

[“Diagram Conventions” on page 326](#)

## Standard Event Status Register

### Standard Event Status Register Bit Assignment

Bit Number	Binary Weighting	Condition	Description
15	32768	Reserved by IEEE.	This bit will always be 0.
14	16384	Reserved by IEEE.	This bit will always be 0.
13	8192	Reserved by IEEE.	This bit will always be 0.
12	4096	Reserved by IEEE.	This bit will always be 0.
11	2048	Reserved by IEEE.	This bit will always be 0.
10	1024	Reserved by IEEE.	This bit will always be 0.
9	512	Reserved by IEEE.	This bit will always be 0.
8	256	Reserved by IEEE.	This bit will always be 0.
7	128	Power On	This bit is set to 1 if the power supply has been turned off and on since the last time this register was read or otherwise cleared. Defined in "IEEE Std. 488.2-1992", 11.5.1.1.2
6	64	Reserved for future use.	This bit will always be 0.
5	32	Command Error	This bit is set to 1 if the test set detects an error while trying to process a command. The following events cause a command error: <ul style="list-style-type: none"> <li>• An IEEE 488.2 syntax error. The test set received a message that did not follow the syntax defined by the standard.</li> <li>• A semantic error. For example the test set received an incorrectly spelled command.</li> <li>• The test set received a group execution trigger (GET) inside a program message</li> </ul>
4	16	Execution Error	This bit is set to 1 if the test set detects an error while trying to execute a command. The following events cause a execution error: <ul style="list-style-type: none"> <li>• A &lt;PROGRAM DATA&gt; element received in a command is outside the legal range for the test set, or it is inconsistent with the operation of the test set.</li> <li>• The test set could not execute a valid command due to some test set hardware/firmware condition.</li> </ul>
3	8	Device Dependent Error	This bit is set to 1 if a test set operation does not execute properly due to an internal condition (such as, overrange). This bit indicates that the error was not a command, query, or execution error.

## Standard Event Status Register

Bit Number	Binary Weighting	Condition	Description
2	4	Query Error	This bit is set to 1 if an error has occurred while trying to read the test set's output queue. The following events cause a query error: <ul style="list-style-type: none"><li>• An attempt is made to read data from the output queue when no data is present or is pending.</li><li>• Data in the output queue has been lost. An example of this would be an output queue overflow.</li></ul>
1	2	Reserved for future use.	This bit will always be 0.
0	1	Operation Complete	This bit is set to 1 when the test set has completed all pending operations and is ready to accept new commands. This bit is only generated in response to the *OPC IEEE 488.2 common command.

### Program Example - Standard Event Status Register

OUTPUT 714;"\*ESR?" !Queries (reads) the Standard Event Status Register.

---

## SYSTEM Subsystem

### Description

The SYSTEM subsystem collects the functions that are not related to test set performance. Examples include functions for performing general housekeeping and functions related to setting global configurations, such as TIME or CORRection (amplitude offset).

### Syntax Diagrams and Command Descriptions

[“SYSTEM:APPLication” on page 597](#)

[“SYSTEM:BEEPer” on page 604](#)

[“SYSTEM:COMMunicate” on page 605](#)

[“SYSTEM:CONFigure” on page 609](#)

[“SYSTEM:CORRection” on page 610](#)

[“SYSTEM:CURRent:TA” on page 616](#)

[“SYSTEM:DATE” on page 617](#)

[“SYSTEM:ERRor?” on page 618](#)

[“SYSTEM:MEASurement:RESet” on page 619](#)

[“SYSTEM:PRESet” on page 620](#)

[“SYSTEM:REGister” on page 622](#)

[“SYSTEM:ROSCillator” on page 624](#)

[“SYSTEM:SYNChronized” on page 625](#)

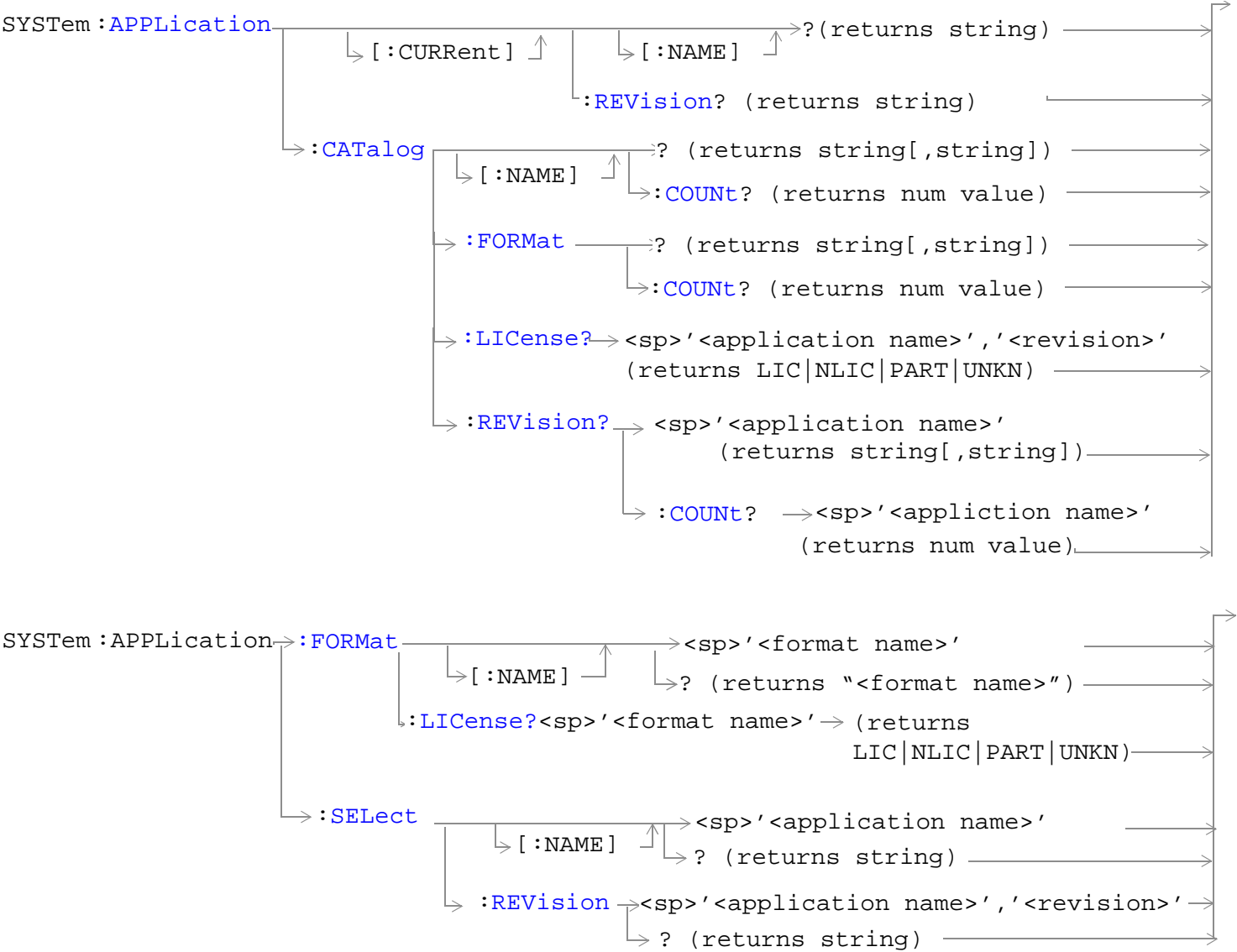
[“SYSTEM:TIME” on page 626](#)

[“SYSTEM:TZONE” on page 627](#)

[“SYSTEM:UTC” on page 628](#)



# SYSTem:APPLication



“Diagram Conventions” on page 326

## SYSTEM:APPLICATION

### SYSTEM:APPLICATION[:CURRENT][:NAME]?

Function	Queries the test set for the name of the currently running application.
Query	1xEV-DO Terminal Test AMPS/136 Mobile Test CDMA 2000 Lab App CDMA 2000 Mobile Test GPRS Lab App B GPRS Mobile Test GSM Mobile Test GSM_AMPS/136_GPRS_WCDMA WCDMA Mobile Test null string
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:NAME?"	

### SYSTEM:APPLICATION[:CURRENT]:REVISION?

Function	Queries the test set for the currently running application revision number.
Query	Range: Any string up to 20 characters including null. A typical example would be A.01.01 for a licensed version.
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"	

### SYSTEM:APPLICATION:CATALOG:LICENSE? Ô<application name>Õ,Õ<revision>Õ

Function	Query the license status for a selected revision.  The query must include two strings separated by a comma. The application name and revision must be entered as they appear in the Application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.  The returned values are: <ul style="list-style-type: none"><li>• "LIC" indicates this is a licensed application.</li><li>• "NLIC" indicates this is not a licensed application.</li><li>• "PART" only part of the application with multiple radio formats is licensed</li><li>• "UNKN" indicates that license status is unknown.</li></ul>
Query	Range: LIC   NLIC   UNKN
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? `GSM mobile test`,`A.05.06`"	

**SYSTem:APPLIcation:CATalog:REVision? Ô<application name>Õ**

Function	Query the test set for all of the revision numbers stored on the test set's hard drive for the specified application.  The application name must be entered as it appears in the Application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.
Query	Range: One or more comma separated strings or a null string
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? `AMPS/136 MOBILE TEST`"	

**SYSTem:APPLIcation:CATalog:REVision:COUNt? Ô<application name>Õ**

Function	Queries the test set for the number of revisions present on the hard disk for a specified application. Up to 30 revisions can be stored for an application.  The application name must be entered as it appears in the Application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.
Query	Range: 0 through 30
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? `AMPS/136 MOBILE TEST`"	

**SYSTem:APPLIcation:CATalog[:NAME]?**

Function	Queries the test set for all of the names of the applications stored on the hard drive.  This query returns one or more strings, each string is separated by a comma.
Query	Range: 1xEV-DO Terminal Test AMPS/136 Mobile Test CDMA 2000 Lab App CDMA 2000 Mobile Test GPRS Lab App B GPRS Mobile Test GSM Mobile Test GSM_AMPS/136_GPRS_WCDMA WCDMA Mobile Test
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"	

## SYSTem:APPLication

### SYSTem:APPLication:CATalog[:NAME]:COUNT?

Function	Queries the test set for the total number application names stored on the hard drive. Up to 30 applications can be stored.
Query	Range: 0 through 30
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"	

### SYSTem:APPLication:CATalog:FORMat?

Function	It's useful only when a licensed fast switching test application is currently selected. Queries the test set for the names of all formats that are available in a fast switching test application.  This query returns one or more strings, each string is separated by a comma.
Query	Range: <ul style="list-style-type: none"><li>• 'GSM'</li><li>• 'AMPS/136'</li><li>• 'GPRS'</li><li>• 'WCDMA'</li></ul>
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:FORMAT?"	

### SYSTem:APPLication:CATalog:FORMat:COUNT?

Function	It's useful only when a licensed fast switching test application is currently selected. Queries the test set for the total number of formats available in a fast switching test application.
Query	Range: 0 to 3
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:FORMAT:COUNT?"	

**SYSTem:APPLication:FORMat[:NAME] <format name>**

Function	Switches formats in a fast switching test application. A licensed fast switching test application must be selected to use this command.  Queries the test set for the name of the currently active format. This string is not case sensitive.
Setting	Range:  <ul style="list-style-type: none"> <li>• 'GSM'</li> <li>• 'AMPS/136'</li> <li>• 'GPRS'</li> <li>• 'WCDMA'</li> </ul>
Query	Same as setting
<p><b>Programming Example</b></p> <p>OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME 'GSM' "</p> <p>OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME?"</p>	

**SYSTem:APPLication:FORMat:LICense? Ô<format name>Õ**

Function	Queries the test set for the license status for the selected format of the fast switching test application.  The returned values are:  <ul style="list-style-type: none"> <li>• LIC indicates this is a licensed test application.</li> <li>• NLIC indicates this is not a licensed test application.</li> <li>• PART indicates that only part of the test application with multiple formats is licensed.</li> <li>• UNKN indicates that license status is unknown.</li> </ul>
Query	Range: LIC   NLIC   PART   UNKN
<p><b>Programming Example</b></p> <p>OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:LICENSE? 'AMPS/136' "</p>	

## SYSTEM:APPLICATION

### SYSTEM:APPLICATION:SELECT[:NAME] <application name>

<b>Function</b>	<p>Selects an application and reboots the test set. This will switch the application to the revision already selected. There is no need to re-select the revision before switching. The reboot process takes about 1 minute.</p> <p>Queries the test set for the application that is selected and will run after the next reboot of the test set. This string is not case sensitive.</p> <p>The application name must be entered as it appears in the Application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <hr/> <p><b>NOTE</b>        Selecting the correct name and the desired revision of an application is important. This information should be reviewed before proceeding. The directions for how to determine application name and revision are found in this document.</p> <hr/>
<b>Setting</b>	<p>Range:</p> <p>1xEV-DO Terminal Test</p> <p>AMPS/136 Mobile Test</p> <p>CDMA 2000 Lab App</p> <p>CDMA 2000 Mobile Test</p> <p>GPRS Lab App B</p> <p>GPRS Mobile Test</p> <p>GSM Mobile Test</p> <p>GSM_AMPS/136_GPRS_WCDMA</p> <p>WCDMA Mobile Test</p>
<b>Query</b>	Same as setting
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME `AMPS/136 MOBILE TEST` "</pre> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME? "</pre>	

**SYSTem:APPLication:SElect:REVision <application name>,<revision>**

<p>Function</p>	<p>Selects an application and a revision for the application.</p> <p>The revision does not need to be set in order to switch applications. The only time you select revisions is to change revisions.</p> <p>Queries the test set for the revision of a specified application.</p> <p>The application name and revision must be entered as they appear in the Application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <hr/> <p><b>NOTE</b> GSM Mobile Test; revisions before A.04.00 did not have application switching and provide no way to return to revisions that have switching. Users will need to reload a revision that has application switching following the download process for upgrading firmware.</p> <hr/>
<p>Setting</p>	<p>Range: A valid application name and revision number for any licensed application.</p>
<p>Query</p>	<p>Range: A string up to 20 characters, or the null string.</p>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'CDMA 2000 MOBILE TEST','01011210'" OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? 'CDMA 2000 MOBILE TEST'"</pre>	

**Related Topics**

- [“Test Application Switching” on page 785](#)
- [“Test Application Revisions and Licenses” on page 787](#)
- [“Test Application Name” on page 789](#)
- [“SYSTem:CURRent:TA” on page 616](#)

## SYSTem:BEEPer



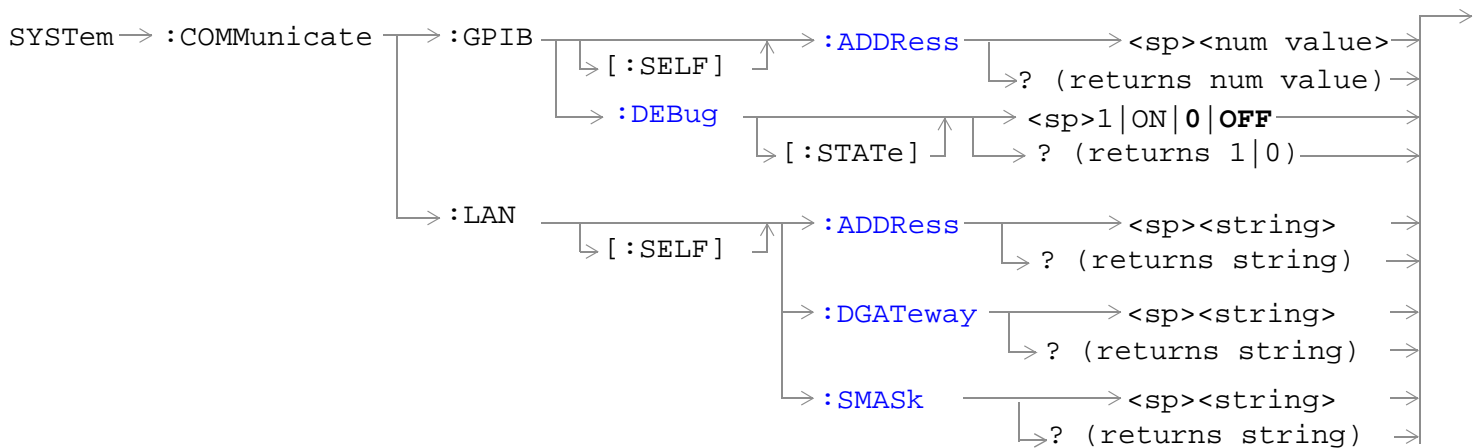
[“Diagram Conventions” on page 326](#)

### SYSTem:BEEPer:STATe

Function	Sets/queries the beeper state of the test set.
Setting	0 OFF   1 ON
Query	0 1
*RST Setting	1 (on)
Related Topics	<a href="#">“Test Set Beeper” on page 780</a>
<b>Programming Example</b> OUTPUT 714;"SYSTEM:BEEPER:STATE OFF" !Sets beeper state to off.	



## SYSTem:COMMunicate



[“Diagram Conventions” on page 326](#)

### SYSTem:COMMunicate:GPIB[:SELF]:ADDRESS

Function	Sets/queries the test set’s GPIB address.
Setting	Range: 0 to 30 Resolution: 1
Query	Range: 0 to 30 Resolution: 1
Factory setting	14 (this parameter is not affected by any reset operation and can only be changed by direct user access)
Related Topics	<a href="#">“Configuring the Test Set’s GPIB” on page 784</a>
Programming Example	
OUTPUT 714; "SYSTEM:COMMUNICATE:GPIB:SELF:ADDRESS 14" !Sets the GPIB address to 14.	

### SYSTem:COMMunicate:GPIB:DEBUg[:STATe]

Function	<p>Sets/queries the test set’s SCPI debugger state.</p> <p>When the state is on; enhanced error messages (displayed when GPIB commands with syntax errors are detected) will be displayed on the test set display. Also, all GPIB commands will be displayed in red characters at the bottom left area of the test set’s display.</p> <p>The error message is printed along with the syntax. &lt;ERR&gt; is displayed at the end of the incorrect node. Non-printable characters will be replaced with the \$ symbol.</p> <p>See <a href="#">“Error Messages” on page 728</a> for a list of the errors.</p> <p>The debugger state should be used only during GPIB code development. Test times may be longer than necessary if the debugger state is left on.</p>
----------	---

## SYSTem:COMMunicate

Setting	Range: 0   OFF   1   ON
Query	0   1
*RST setting	0   off
<b>Programming Example</b> OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:DEBUG:STATE ON" !Sets the GPIB debugger state on.	

**SYSTem:COMMunicate:LAN[:SELF]:ADDRess**

Function	Sets/queries the test set's LAN IP address. The value of A is used to determine the subnet mask, see " <a href="#">SYSTem:COMMunicate:LAN[:SELF]:SMASK</a> " on page 608.  If the LAN address is changed the subnet mask should be checked to insure that it is set to the proper class for that LAN address.
Setting	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces)
Query	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces)
Factory setting	0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access)
<i>Related Topics</i>	<a href="#">"Configuring the Test Set's LAN" on page 782</a>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:ADDRESS '130.015.156.255'" !Sets the !LAN IP !address.</pre>	

**SYSTem:COMMunicate:LAN[:SELF]:DGATeway**

Function	Sets/queries the LAN IP router/gateway address for the test set.
Setting	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces), blank field
Query	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D = 0 to 255 (no embedded spaces). blank field
Factory setting	blank field, (this parameter is not affected by any reset operation)
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:DGATEWAY '130.2.6.200'"</pre>	

**SYSTem:COMMunicate****SYSTem:COMMunicate:LAN[:SELF]:SMASK**

Function	<p>Sets/queries the subnet mask of the test set based on the LAN IP address selected. The subnet mask changes according to the value of A used for the LAN IP address.</p> <p>If A is less than or equal to 127, the subnet mask is 255.0.0.0.</p> <p>If A is greater than 127 and less or equal to 191, the subnet mask is 222.255.0.0.</p> <p>If A is grater than 191, the subnet mask is 255.255.255.0.</p> <p>If the LAN address is changed the subnet mask should be checked to insure that it is set to the proper class for that LAN address.</p>
Setting	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D are between = 0 to 255 (no embedded spaces)
Query	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D are between = 0 to 255 (no embedded spaces)
Factory setting	0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access)
<b>Programming Example</b> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:SMASK '255.2.6.200'"</pre>	

## SYSTem:CONFigure

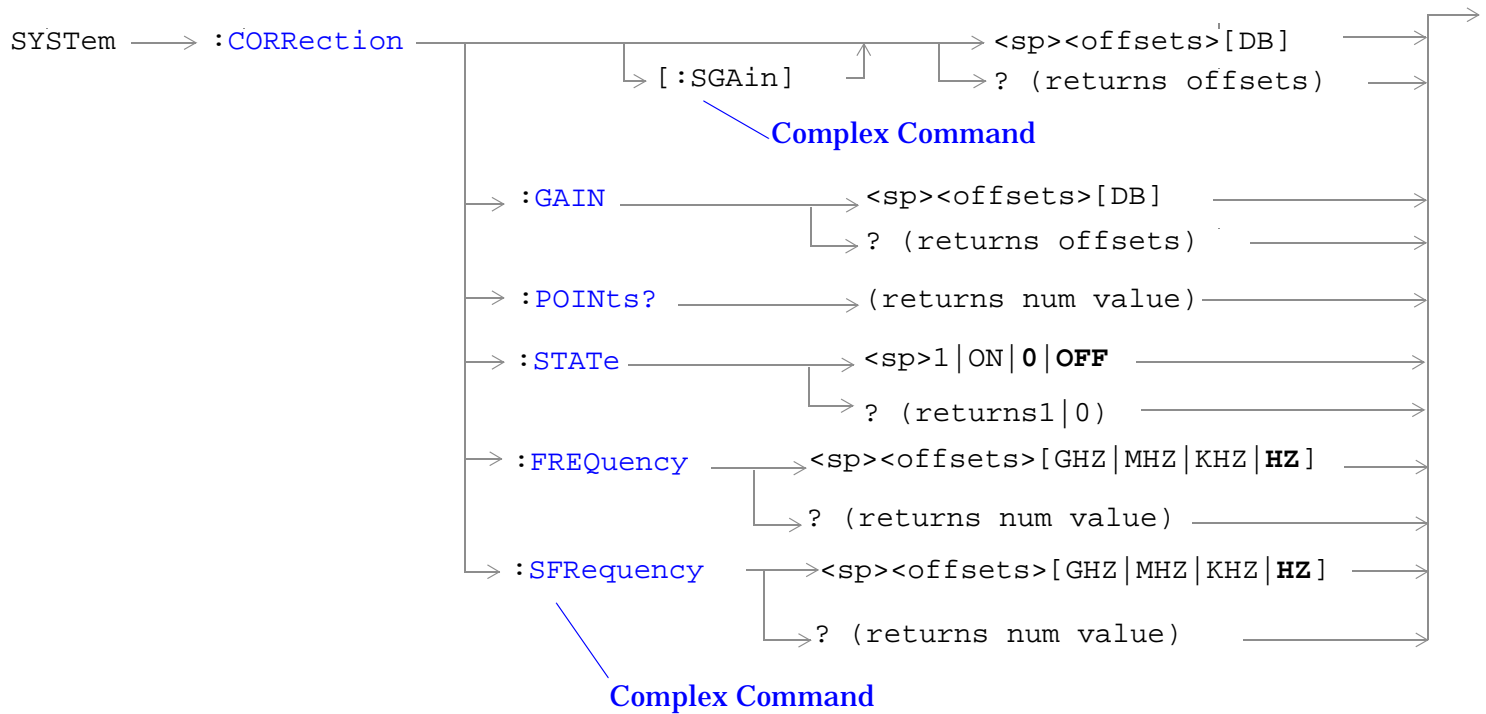
SYSTem:CONFigure → :INFormation → :HARDware → :VERBoSe? →

### “Diagram Conventions”

#### SYSTem:CONFigure:INFormation:HARDware:VERBoSe?

Function	Query the manufacturer, model number, model number of the test application running, serial number, revision, board ID, and cal file information. The information provided by the query represents the configuration that existed when the test set was powered up.
*RST Setting	Resets have no effect on this information. The information is gathered during the power up cycle.
Related topics	<a href="#">“Hardware Configuration Report”</a>
<b>Programming Example</b> OUTPUT 714; "SYSTEM:CONFIGURE:INFORMATION:HARDWARE:VERBOSE?" !Queries system hardware.	

## SYSTem:CORRection



“Diagram Conventions” on page 326

**SYSTem:CORRection[:SGain]**

Function	<p>Sets/queries up to 20 comma-separated amplitude offset values in dB. This command sets the state to On.</p> <p>See <a href="#">“Amplitude Offset” on page 102</a>.</p> <p>The units, dB, are optional. If no units are specified then units default to dB.</p> <p>Sending a null list (no values) sets the state of all offsets to Off.</p>
Setting	<p>Range: 0 to 20 values between -100 to +100</p> <p>Resolution: 0.01</p>
Query	<p>Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37)</p> <p>Resolution: 0.01</p>
Factory Setting	<p>Offsets 1 through 20, are set to 0.00 dB, state is set to Off</p>
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -2.55,-3.12,-3.68,-4.23,-4.74,-5.3" !A complex command that sets up to 20 comma separated offsets !and sets the state to On for the frequencies, offsets and !RF IN/OUT Amplitude Offset State  OUTPUT 714;"SYSTEM:CORRECTION:SGAIN" !Sets the state for all frequencies and offsets to Off                 </pre>	

## SYSTem:CORRection

### SYSTem:CORRection:FREQUency

Function	<p>Sets/queries up to 20 comma-separated frequency values in MHz. Each frequency value corresponds with a gain setting. See "SYSTem:CORRection:GAIN" .</p> <p>The units, (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to Hz.</p> <p>See "Amplitude Offset" on page 102.</p> <p>Sending a null list (no values) sets the state of all frequencies to Off.</p>
Setting	<p>Range: 0 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz</p> <p>Resolution: 1 Hz</p>
Query	<p>Range: 1 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz, and NAN (9.91E+37)</p> <p>Resolution: 1 HZ</p>
Factory Setting	<ol style="list-style-type: none"><li>1. 800.00 MHz Off</li><li>2. 810.00 MHz Off</li><li>3. 820.00 MHz Off</li><li>4. 830.00 MHz Off</li><li>5. 840.00 MHz Off</li><li>6. 850.00 MHz Off</li><li>7. 860.00 MHz Off</li><li>8. 870.00 MHz Off</li><li>9. 880.00 MHz Off</li><li>10. 890.00 MHz Off</li><li>11. 900.00 MHz Off</li><li>12. 910.00 MHz Off</li><li>13. 920.00 MHz Off</li><li>14. 930.00 MHz Off</li><li>15. 940.00 MHz Off</li><li>16. 950.00 MHz Off</li><li>17. 960.00 MHz Off</li><li>18. 970.00 MHz Off</li><li>19. 980.00 MHz Off</li><li>20. 990.00 MHz Off</li></ol>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY 1784.8 MHz,1879.8 MHz" !Sets up to 20 comma separated frequencies  OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY" !Sets the state for all frequencies and offsets to Off</pre>	



**SYSTem:CORRection:GAIN**

Function	Sets/queries the up to 20 comma separated offset gain values in units of dB. Each gain value corresponds with a frequency setting. See <a href="#">“SYSTem:CORRection:FREQUency”</a> . See <a href="#">“Amplitude Offset” on page 102.</a> The units, dB, are optional. If no units are specified, units default to dB. Sending a null list (no values) sets the state of all offsets to Off.
Setting	Range: 0 to 20 values between -100 to +100 Resolution: 0.01
Query	Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37) Resolution: 0.01
Factory Setting	Offsets 1 through 20, are set to 0.00 dB, state is set to off
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:CORRECTION:GAIN -3.12,-3.68,-4.23" !Sets up to 20 comma separated offset values.  OUTPUT 714;"SYSTEM:CORRECTION:GAIN" !Sets the state for all frequencies and offsets to Off.</pre>	

**SYSTem:CORRection:POINTs**

Function	Query returns the number of offsets that are in their On state when the RF IN/OUT Amplitude Offset State is also set to On. See <a href="#">“Amplitude Offset” on page 102.</a>
Query	Range: 1 to 20, and NAN (9.91E+37) Resolution: 1
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:CORRECTION:POINTS?" !Returns the number of frequencies and offsets with their state set to On.</pre>	

## SYSTEM:CORREction

### SYSTEM:CORREction:SFREquency

Function	Sets/queries up to 20 comma separated frequency values in MHz. This command sets the state to On. The units (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to MHz. See <a href="#">“Amplitude Offset” on page 102</a> . Sending a null list (no values) sets the state of all frequencies to Off.
Setting	Range: 0 to 20 comma separated values from 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query	Range: 1 to 20 comma separated values from 292.5 MHz to 2700 MHz, and NAN (9.91E+37) Resolution: 1 HZ
Factory Setting	<ol style="list-style-type: none"><li>1. 800.00 MHz Off</li><li>2. 810.00 MHz Off</li><li>3. 820.00 MHz Off</li><li>4. 830.00 MHz Off</li><li>5. 840.00 MHz Off</li><li>6. 850.00 MHz Off</li><li>7. 860.00 MHz Off</li><li>8. 870.00 MHz Off</li><li>9. 880.00 MHz Off</li><li>10. 890.00 MHz Off</li><li>11. 900.00 MHz Off</li><li>12. 910.00 MHz Off</li><li>13. 920.00 MHz Off</li><li>14. 930.00 MHz Off</li><li>15. 940.00 MHz Off</li><li>16. 950.00 MHz Off</li><li>17. 960.00 MHz Off</li><li>18. 970.00 MHz Off</li><li>19. 980.00 MHz Off</li><li>20. 990.00 MHz Off</li></ol>

#### Programming Example

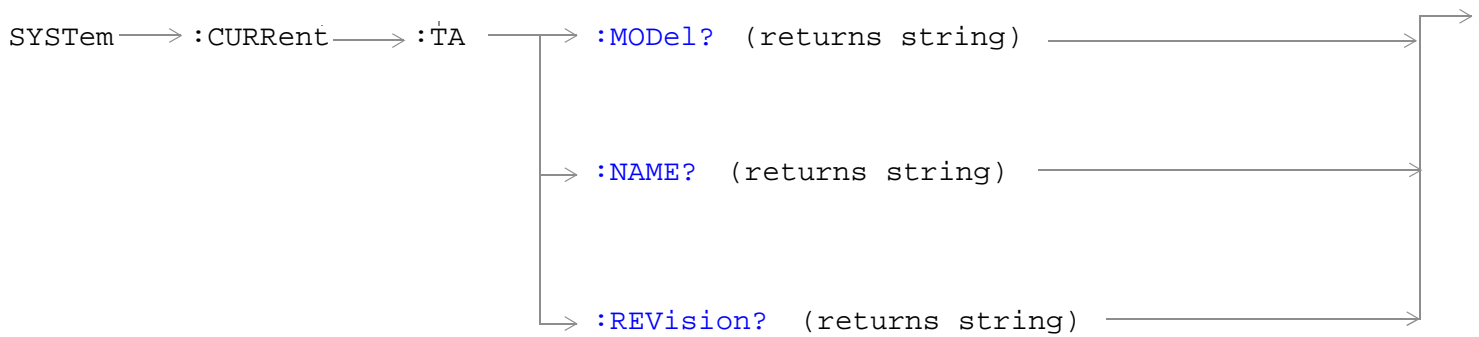
```
OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY 1710.2 MHZ,1805.2 MHZ,1784.8 MHZ,1879.8 MHZ"  
!Sets up to 20 comma separated frequencies and sets the state to On for the frequency,  
!offset, and RF IN/OUT Amplitude Offset State
```

```
OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY"  
!Sets the state for all frequencies and offsets to Off
```

**SYSTem:CORRection:STATe**

Function	<p>Sets/queries the RF IN/OUT Amplitude Offset State. The state must be On before any of the offsets are active regardless of the state for any of the frequencies or offsets.</p> <p>When the RF IN/OUT Amplitude Offset State is On, the Instrument Status Area will indicate "Offset" regardless of the state for any of the frequencies or offsets.</p> <p>Setting any of the frequency or offset states to On will set the RF IN/OUT Amplitude Offset State to On.</p> <p>See <a href="#">"Amplitude Offset" on page 102</a>.</p>
Setting	0   OFF   1   ON
Query	0   1
Factory Setting	0 (off)
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:STATE ON" !Sets the RF IN/OUT  !Amplitude Offset State to On                 </pre>	

## SYSTem:CURRent:TA



“Diagram Conventions” on page 326

### SYSTem:CURRent:TA:MODEL?

Function	Queries the model number of the test application running. Printable ASCII characters up to a 15 character string.
Query	Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting	non volatile, read from the test set’s hard disk

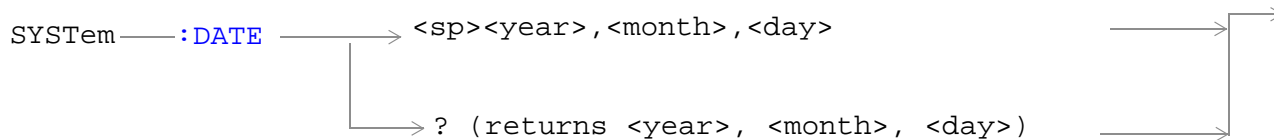
### SYSTem:CURRent:TA:NAME?

Function	Queries the name of the test application running. Printable ASCII characters up to a 25 character string. This command is not recommended see “SYSTem:APPLiCation[:CURRent][:NAME]?” .
Query	Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting	non volatile, read from the test set’s hard disk

### SYSTem:CURRent:TA:REVision?

Function	Queries the coordinated codeware revision for the test application running. Printable ASCII characters up to a 20 character string. This command is not recommended see “SYSTem:APPLiCation[:CURRent]:REVision?” .
Query	Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting	non volatile, read from the test set’s hard disk.

## SYSTEM:DATE



“Diagram Conventions” on page 326

### SYSTEM:DATE

Function	Sets/queries the date.
Setting	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;year&gt; 2000 to 2099</li> <li>• &lt;month&gt; 1 to 12 (the number 1 corresponds to January)</li> <li>• &lt;day&gt; 1 to the number of days in the month specified by the &lt;month&gt; parameter</li> </ul>
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;year&gt; 2000 to 2099</li> <li>• &lt;month&gt; 1 to 12 (the number 1 corresponds to January)</li> <li>• &lt;day&gt; 1 to the number of days in the month specified by the &lt;month&gt; parameter</li> </ul>
*RST Setting	This feature is not affected by instrument preset
Requirements	Test Application Revision: B.03.00 and above
<p><b>Programming Example</b></p> <p>OUTPUT 714;"SYSTEM:DATE 2001,9,27" !Sets the date to September 27,2001.</p> <p>OUTPUT 714;"SYSTEM:DATE? !Returns "+2001,+9,+27" if the date has been set to September 27,2001.</p>	

## SYSTem:ERRor?

SYSTem → :ERRor? → (returns num value, string) →

[“Diagram Conventions” on page 326](#)

### SYSTem:ERRor?

Function	<p>Queries the contents of the error/event queue. The error/event queue may contain one or more messages with an error or event description.</p> <p>Manual users may view the message log from the SYSTEM CONFIG screen. The contents of the error/event queue and the message log may not match. For example, manual user errors are not displayed with SYSTem:ERRor?. They are viewed from the Message Log. See <a href="#">“Error Messages”</a>.</p>
Query	<p>Error/Event Queue</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 messages up to 255 characters in length</li> </ul>
<p><b>Programming Example</b></p> <p>OUTPUT 714;"SYSTEM:ERROR?" !Query the contents of the Error/Event Queue</p>	

## SYSTem:MEASurement:RESet

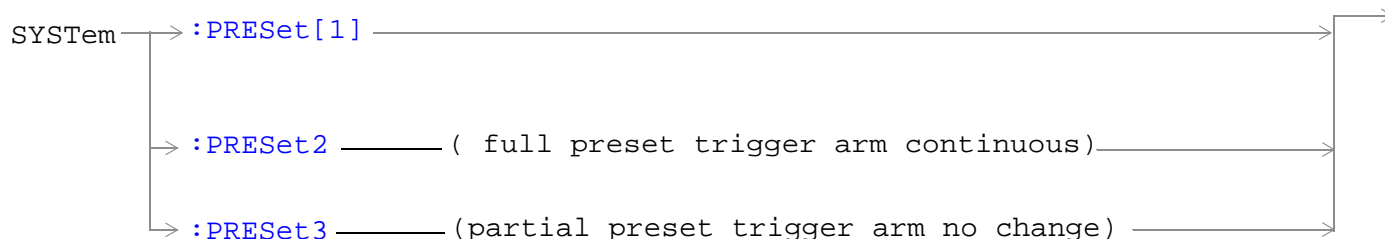


[“Diagram Conventions” on page 326](#)

### SYSTem:MEASurement:RESet

Function	Aborts all measurements. If continuous triggering is enabled, measurements will begin a new measurement cycle.
Setting	Measurement results are set to their default values when measurement reset occurs.

## SYSTem:PRESet



“Diagram Conventions” on page 326

### SYSTem:PRESet[1] (not recommended for use)

Function	<p>Not recommended for use at this time. See “<a href="#">SYSTem:PRESet3</a>” for a recommended partial preset.</p> <p>Performs a partial preset. This command is intended to be used when changing from remote operation to manual operation and a partial preset is needed.</p> <p>Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed.</p> <p>A partial preset will not modify any measurement settings including trigger arm. See “<a href="#">Trigger Arm (Single or Continuous) Description</a>” on page 253.</p>
Related Topics	See “ <a href="#">Partial Preset</a> ” on page 297 for more details
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTem:PRESet" !Partial preset when changing from remote to manual operation.</pre>	

### SYSTem:PRESet2

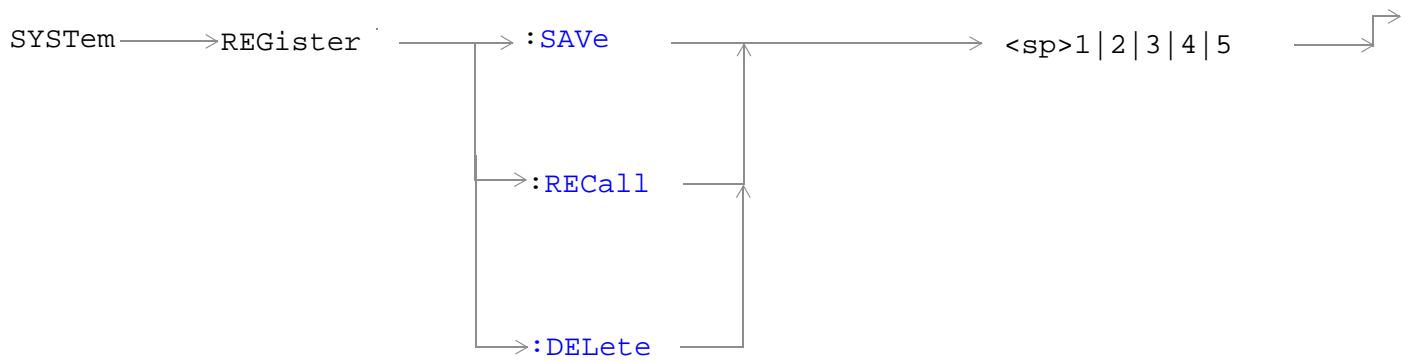
Function	<p>Performs a full preset of the test set. This is the remote equivalent of pressing the SHIFT Preset keys on the front panel of the test set.</p> <p>All parameters are set to their default values. All measurements are aborted the trigger arm is set to continuous. See “<a href="#">Trigger Arm (Single or Continuous) Description</a>” on page 253.</p> <p>The *RST command will set the trigger arm to single.</p>
Related Topics	See “ <a href="#">Full Preset</a> ” on page 298 for details about the *RST full preset.
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTem:PRESet2" !Full preset, trigger arm set to continuous.</pre>	



**SYSTem:PRESet3**

<p><b>Function</b></p>	<p>Performs a partial preset. This is the recommended command for users when a partial preset is needed during remote operation of the test set.</p> <p>Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed.</p> <p>A partial preset will not modify any measurement settings including trigger arm.</p>
<p><b>Related Topics</b></p>	<p>See "<a href="#">Partial Preset</a>" for more details.</p>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTem:PRESet3" !Partial preset when in remote operation.</pre>	

## SYSTem:REGister



“Diagram Conventions” on page 326

**SYSTem:REGister:SAVe**

Function	Saves the current test set settings to one of five available registers. If this command is used to save to a register that is already full, the old contents of the register will be overwritten.
Setting	1   2   3   4   5
Query	No query
*RST Setting	Not applicable
Requirements	Test Application Revision: A.01.20 or above
<b>Programming Example</b> OUTPUT 714;"SYSTem:REGister:SAVe 1" !Saves the current test set configuration to save register 1.	

**SYSTem:REGister:RECall**

Function	Recalls a saved register from one of five registers. If this command is used to recall a register that is empty, an error message will be displayed.
Setting	1   2   3   4   5
Query	No query
*RST Setting	Not applicable
Requirements	Test Application Revision: A.01.20 or above
<b>Programming Example</b> OUTPUT 714;"SYSTem:REGister:RECall 1" !Recalls register 1.	

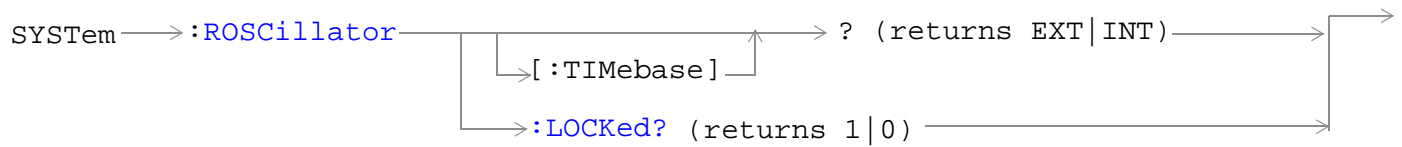
**SYSTem:REGister:DELeTe**

Function	Deletes any contents saved in the selected register.
Setting	1   2   3   4   5
Query	No query
*RST Setting	Not applicable
Requirements	Test Application Revision: A.01.20 or above
<b>Programming Example</b> OUTPUT 714;"SYSTem:REGister:DELeTe 1" !Deletes register 1.	

**Related Topics**

[“Save and Recall Registers” on page 691](#)

## SYSTem:ROSCillator



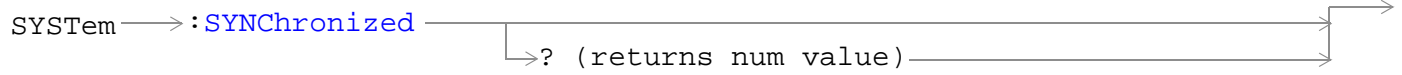
“Diagram Conventions” on page 326

### SYSTem:ROSCillator[:TIMEbase]?

Function	<p>Queries the timebase source.</p> <p>If an external timebase is used, it must have these characteristics:</p> <ul style="list-style-type: none"> <li>• an output level of 0 to +13 dBm</li> <li>• frequency of 10 MHz</li> </ul>
Query	<p>Range:</p> <p>INT = internal source</p> <p>EXT = external source</p>

### SYSTem:ROSCillator:LOCKed?

Function	<p>Queries the timebase to find out if it is locked or unlocked. Returns 0 or 1.</p>
Query	<p>Range:</p> <p>0 = unlocked</p> <p>1 = locked</p>

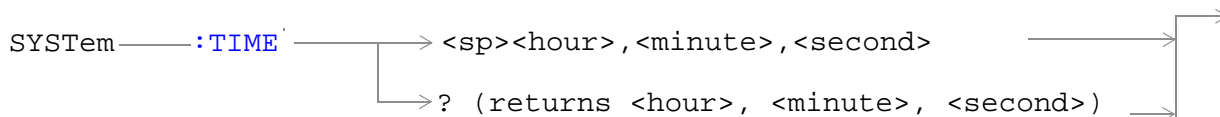
**SYSTem:SYNChronized**

[“Diagram Conventions” on page 326](#)

**SYSTem:SYNChronized**

Function	Sets/queries the test set to see that all prior sequential commands have completed or that all prior overlapped commands have started, indicating that the input buffer is synchronized.
Setting	Bit 12 of the status operation condition register is pulsed.
Query	Range: 1

## SYSTem:TIME



[“Diagram Conventions” on page 326](#)

### SYSTem:TIME

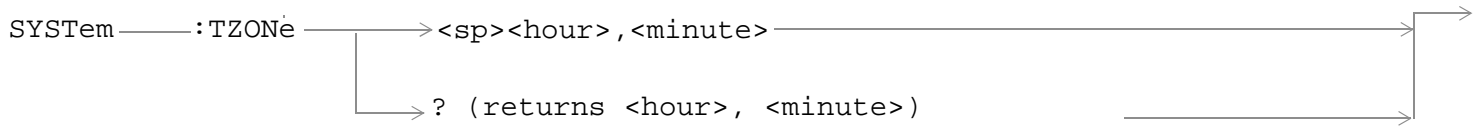
Function	<p>Sets/queries the local time of day.</p> <p>UTC time will track changes made directly to local time settings. Also, if new settings are made to UTC time, local time will track UCT time.</p> <p>Changes to time zone will cause changes to local time, but will not directly affect UTC time.</p>
Setting	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;hour&gt; 0 to 23</li> <li>• &lt;minute&gt; 0 to 59</li> <li>• &lt;second&gt; 0 to 59</li> </ul> <hr/> <p><b>NOTE</b>      The resolution of local time setting is minutes. A number within the parameter range must be entered for &lt;second&gt; but it will not affect the minute setting.</p>
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;hour&gt; 0 to 23</li> <li>• &lt;minute&gt; 0 to 59</li> <li>• &lt;second&gt; 0 to 59</li> </ul> <hr/> <p><b>NOTE</b>      The resolution of the local time setting is minutes. The value returned for &lt;second&gt; will not provide useful information.</p>
*RST Setting	This feature is not affected by instrument preset
Requirements	Test Application Revision: B.03.00 and above
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:TIME 7,30,0" !Sets local time to 7:30 OUTPUT 714;"SYSTEM:TIME?" !Returns "+7,+30,+0" if local time has been set to 7:30.         </pre>	

### Related Topics

[“SYSTem:UTC\[:TIME\]” on page 628](#)

[“SYSTem:TZONE” on page 627](#)

## SYSTem:TZONE



[“Diagram Conventions” on page 326](#)

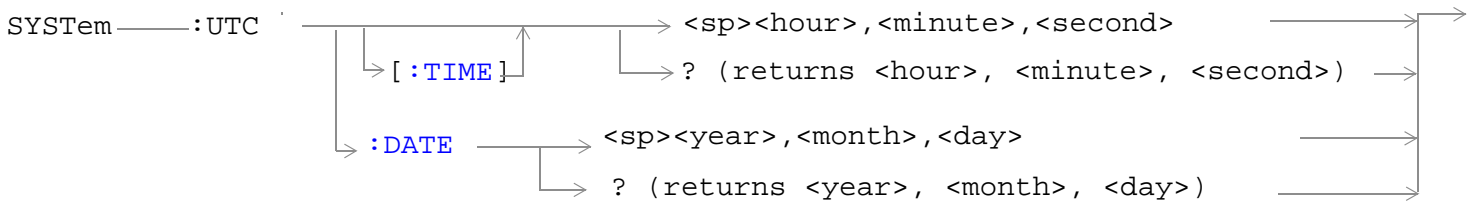
### SYSTem:TZONE

Function	Sets/queries the time zone. Changes to time zone will cause changes to local time, but will not directly affect UTC time.
Setting	Range: <ul style="list-style-type: none"> <li>• &lt;hour&gt; -12 to +15</li> <li>• &lt;minute&gt; 0 to 59</li> </ul>
Query	Range: <ul style="list-style-type: none"> <li>• &lt;hour&gt; -12 to +15</li> <li>• &lt;minute&gt; 0 to 59</li> </ul>
*RST Setting	This feature is not affected by instrument preset
Requirements	Test Application Revision: B.03.00 and above
<b>Programming Example</b> OUTPUT 714;"SYSTEM:TZONE 8,0" !Sets time zone to 8 hours and 0 minutes. OUTPUT 714;"SYSTEM:TZONE?" !Returns "+8,+0" if time zone has been set to 8 hours.	

### Related Topics

[“SYSTem:TIME” on page 626](#)

## SYSTem:UTC



“Diagram Conventions” on page 326

### SYSTem:UTC[:TIME]

Function	<p>Sets/queries the Universal Coordinated Time (UTC) time of day. (UTC is also known as UCT, Zulu, and Greenwich Mean Time.)</p> <p>Local time will track UTC time settings. Also, if new settings are made to local time, UTC time will track local time.</p>
Setting	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;hour&gt; 0 to 23</li> <li>• &lt;minute&gt; 0 to 59</li> <li>• &lt;second&gt; 0 to 59</li> </ul> <hr/> <p><b>NOTE</b> The resolution of the UTC time setting is minutes. A number within the parameter range must be entered for &lt;second&gt; but it will not affect the minute setting.</p>
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;hour&gt; 0 to 23</li> <li>• &lt;minute&gt; 0 to 59</li> <li>• &lt;second&gt; 0 to 59</li> </ul> <hr/> <p><b>NOTE</b> The resolution of the UTC time setting is minutes. The value returned for &lt;second&gt; will not provide useful information.</p>
*RST Setting	This feature is not affected by instrument preset
Requirements	Test Application Revision: A.05.05 and above
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:UTC:TIME 7,30,0" !Sets UCT time to 7:30 OUTPUT 714;"SYSTEM:UTC:TIME?" !Returns "+7,+30,+0" if UTC time has been set to 7:30.           </pre>	



**SYSTem:UTC:DATE**

Function	Sets/queries the Universal Coordinated Time (UTC) date. (UTC is also known as UCT, Zulu, and Greenwich Mean Time.)
Setting	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;year&gt; 2000 to 2099</li> <li>• &lt;month&gt; 1 to 12 (the number 1 corresponds to January)</li> <li>• &lt;day&gt; 1 to the number of days in the month specified by the &lt;month&gt; parameter</li> </ul>
Query	<p>Range:</p> <ul style="list-style-type: none"> <li>• &lt;year&gt; 2000 to 2099</li> <li>• &lt;month&gt; 1 to 12 (the number 1 corresponds to January)</li> <li>• &lt;day&gt; 1 to the number of days in the month specified by the &lt;month&gt; parameter</li> </ul>
*RST Setting	This feature is not affected by instrument preset
Requirements	Test Application Revision: B.03.00 and above
<p><b>Programming Example</b></p> <p>OUTPUT 714;"SYSTEM:UTC:DATE 2001,9,27" !Sets the UTC date to September 27,2001.</p> <p>OUTPUT 714;"SYSTEM:UTC:DATE?" !Returns "+2001,+9,+27" if the UTC date has been set to September 27,2001.</p>	

**Related Topics**

["SYSTem:DATE" on page 617](#)

["SYSTem:TIME" on page 626](#)

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## IEEE 488.2 Common Commands

### Description

#### **\*CLS**

The \*CLS, clear status command, is defined in “IEEE Std 488.2-1992”, 10.3. This command will also clear and close the error message screen on the test set’s display.

#### **\*ESE**

The \*ESE, standard event status enable command, is defined in “IEEE Std 488.2-1992”, 10.10.

#### **\*ESE?**

The \*ESE?, standard event status enable query, is defined in “IEEE Std 488.2-1992”, 10.11.

#### **\*ESR?**

The \*ESR?, standard event status register query, is defined in “IEEE Std 488.2-1992 “,10.12.

#### **\*IDN?**

The \*IDN?, identification query, is defined in “IEEE Std 488.2-1992”, 10.14.\*IDN? is used to retrieve information about the test set in ASCII format.

\*IDN?, returns ASCII codes 32 through 126 excluding comma and semicolon in four comma separated fields. Field 1 returns the manufacturer, field 2 returns the instrument model number, field 3 returns the serial number, field 4 returns 0.

#### **\*OPC**

The \*OPC, operation complete command, is defined in “IEEE 488.2-1992”, 10.18. \*OPC causes the test set to continuously sense the No Operation Pending flag. When the No Operation Pending flag becomes TRUE, the OPC event bit in the standard event status register (ESR) is set to indicate that the state of all pending operations is completed. The \*OPC common command is not recommended for use as an overlapped command.

#### **\*OPC?**

The \*OPC?, operation complete query, is defined in “IEEE Std 488.2-1992”, 10.19. The \*OPC? query allows synchronization between the controller and the test set using either the message available (MAV) bit in the status byte, or a read of the output OPC?. The \*OPC? query does not effect the OPC event bit in the Standard Event Status Register (ESR). The \*OPC? common command is not recommended for use as an overlapped command.

#### **\*OPT?**

The \*OPT?, option identification query, is defined in “IEEE Std 488.2-1992”, 10.20. Each option will have a unique name, that name will be returned with the query.

**\*RST**

The \*RST, full preset command, is defined in “IEEE Std 488.2-1992”, 10.32. \*RST is the recommended command when performing a full preset on the test set. A \*RST restores the majority of settings to their default values.

- \*RST sets trigger arm to single
- PRESet2 sets trigger arm to continuous

**\*SRE**

The \*SRE, service request enable command, is defined in “IEEE Std 488.2-1992”, 10.34. The parameter range for this command is 0 through 255.

**\*SRE?**

The \*SRE?, service request enable query, is defined in “IEEE Std 488.2-1992”, 10.35. Values returned by this query range from 0 through 255.

**\*STB?**

The \*STB?, read status byte query, is defined in “IEEE Std 488.2-1992”, 10.36. Values returned by this query range from 0 through 255.

**\*WAI**

The \*WAI, wait-to-continue command, is defined in “IEEE Std 488.2-1992”, 10.39. The \*WAI command prevents the test set from executing any further commands or queries until all pending operation flags are false. The \*WAI common command is not recommended for use as an overlapped command.

**See also**

[“Obtaining Identification Information \(\\*IDN\)” on page 772](#)

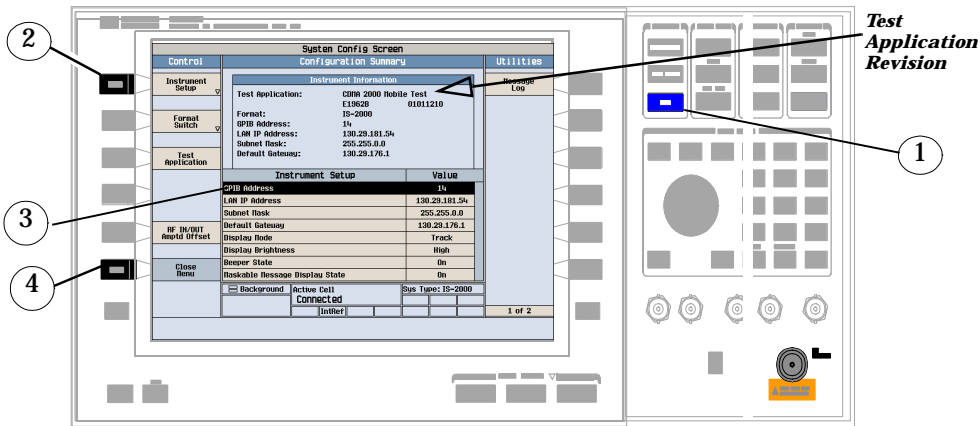
[“Preset Descriptions” on page 297](#)

## IEEE 488.2 Common Commands

# Manual Operation

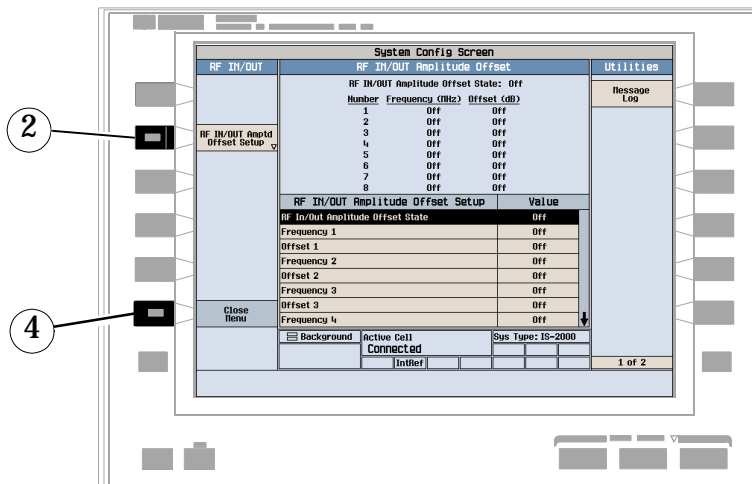
## How Do I Configure the Test Set for My Test System?

### A. Configure instrument information and setup.



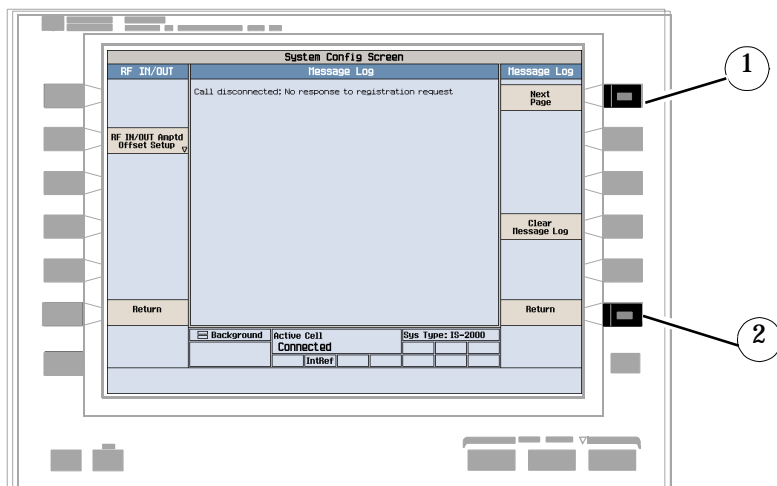
1. Press the **SYSTEM CONFIG** key.
2. Press the **Instrument Setup (F1)** key.
3. Adjust an instrument setting.
4. Press the **Close Menu (F6)** key.

### B. Set amplitude offsets.



1. On the Configuration Summary screen (not shown), press the **RF IN/OUT Amptd Offset (F5)** key.
2. On the RF IN/OUT Amplitude Offset screen, press the **RF IN/OUT Amptd Offset Setup (F2)** key.
3. Enter the amplitude offset for the test frequencies you use.
4. Press the **Close Menu (F6)** key.

## C. Check message log.



1. From any System Config screen, press the Message Log (F7) key and view the message log.
2. Press the Return (F12) key.

## Related Topics

[“Display Brightness” on page 777](#)

[“Configuring the Test Set’s GPIB” on page 784](#)

[“Configuring the Test Set’s LAN” on page 782](#)

[“Test Set Beeper” on page 780](#)

[“Test Application Switching” on page 785](#)

[“Amplitude Offset” on page 102](#)

[“Error Message Log” on page 764](#)

## How Do I Change Cell Parameters?

### A. Select the Cell Parameters Menu.

1. Press the **CALL SETUP** key.
2. Select **More** (1 of 2) under Call Control.
3. Select Access Network Info (**F2**).

Call Setup Screen																																									
AN Info	Access Network Information							Call Parms																																	
	<table border="1"> <thead> <tr> <th colspan="2">Cell Parameters</th> </tr> </thead> <tbody> <tr> <td>Sector ID (Hex):</td> <td>FEA0:0000:0000:0000:0000:0000:0001</td> </tr> <tr> <td>Country Code:</td> <td>310</td> </tr> <tr> <td>Color Code:</td> <td>64</td> </tr> <tr> <td>Subnet Mask:</td> <td>104</td> </tr> <tr> <td>Control Channel Data Rate:</td> <td>76.8 kbps</td> </tr> <tr> <td>Preferred Control Channel Cycle:</td> <td>Off</td> </tr> </tbody> </table>							Cell Parameters		Sector ID (Hex):	FEA0:0000:0000:0000:0000:0000:0001	Country Code:	310	Color Code:	64	Subnet Mask:	104	Control Channel Data Rate:	76.8 kbps	Preferred Control Channel Cycle:	Off	Cell Power	-55.00																		
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Channel Gain Parameters ▾								Channel	500																																
Access Parameters ▾	<table border="1"> <thead> <tr> <th colspan="2">Channel Gain Parameters</th> </tr> </thead> <tbody> <tr> <td>Data Offset Nom:</td> <td>0.0 dB</td> </tr> <tr> <td>Data Offset 9k6:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 19k2:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 38k4:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 76k8:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 153k6:</td> <td>0.00 dB</td> </tr> <tr> <td>Ack Channel Gain:</td> <td>3.0 dB</td> </tr> <tr> <td>DRC Channel Gain:</td> <td>3.0 dB</td> </tr> </tbody> </table>				Channel Gain Parameters		Data Offset Nom:	0.0 dB	Data Offset 9k6:	0.00 dB	Data Offset 19k2:	0.00 dB	Data Offset 38k4:	0.00 dB	Data Offset 76k8:	0.00 dB	Data Offset 153k6:	0.00 dB	Ack Channel Gain:	3.0 dB	DRC Channel Gain:	3.0 dB	<table border="1"> <thead> <tr> <th colspan="2">Access Parameters</th> </tr> </thead> <tbody> <tr> <td>Open Loop Adjust:</td> <td>81 dB</td> </tr> <tr> <td>Probe Initial Adjust:</td> <td>0 dB</td> </tr> <tr> <td>Probe Power Step:</td> <td>1.0 dB</td> </tr> <tr> <td>Probe Num Step:</td> <td>5</td> </tr> <tr> <td>Probe Sequence Max:</td> <td>1</td> </tr> <tr> <td>Preamble Length (Frames):</td> <td>2</td> </tr> </tbody> </table>			Access Parameters		Open Loop Adjust:	81 dB	Probe Initial Adjust:	0 dB	Probe Power Step:	1.0 dB	Probe Num Step:	5	Probe Sequence Max:	1	Preamble Length (Frames):	2	Application Config ▾	
Channel Gain Parameters																																									
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Return								RTAP Rate	9.6 kbps																																
	Active Cell			Sys Type: IS-856																																					
	Session Open																																								
		IntRef	Offset				FTAP	1 of 3																																	

4. Select Cell Parameters (**F2**).



**B. Set a Cell Parameter.**

1. Turn the knob to highlight a parameter and then press the knob.

Call Setup Screen						
AN Info	Access Network Information				Call Parms	
	Cell Parameters				Cell Power	-55.00
	Sector ID (Hex): FE40:0000:0000:0000:0000:0000:0000:0001				dBm/1.23 MHz	
	Country Code: 310				Cell Band	US PCS
Cell Parameters ▾	Color Code: 64					
	Subnet Mask: 104				Channel	500
	Control Channel Data Rate: 76.8 kbps					
Channel Gain Parameters ▾	Preferred Control Channel Cycle: Off					
	Cell Parameters			Value		
	Sector ID, Upper (Hex)			FE400000		
Access Parameters ▾	Sector ID, Upper Middle (Hex)			00000000		
	Sector ID, Lower Middle (Hex)			00000000		
	Sector ID, Lower (Hex)			00000001		
	Country Code			310		
	Color Code			64		
	Subnet Mask			104		
Close Menu	Control Channel Data Rate			76.8 kbps		
	Active Cell			Sys Type: IS-856		
	Session Open					
	IntRef	Offset			FTAP	
				1 of 3		

2. Enter a value or selection and press the knob.
3. Select Close Menu (F6).

**Related Topics**

- [“Color Code” on page 133](#)
- [“Control Channel Data Rate” on page 134](#)
- [“Country Code” on page 135](#)
- [“Preferred Control Channel Cycle” on page 136](#)
- [“Sector ID” on page 137](#)
- [“Subnet Mask” on page 138](#)

# How Do I Change Channel Gain Parameters?

## A. Select the Channel Gain Parameters Menu.

1. Press the **CALL SETUP** key.
2. Select **More** (1 of 2) under Call Control.
3. Select Access Network Info (**F2**).

Call Setup Screen																																									
AN Info	Access Network Information							Call Parms																																	
	<table border="1"> <thead> <tr> <th colspan="2">Cell Parameters</th> </tr> </thead> <tbody> <tr> <td>Sector ID (Hex):</td> <td>FEA0:0000:0000:0000:0000:0000:0001</td> </tr> <tr> <td>Country Code:</td> <td>310</td> </tr> <tr> <td>Color Code:</td> <td>64</td> </tr> <tr> <td>Subnet Mask:</td> <td>104</td> </tr> <tr> <td>Control Channel Data Rate:</td> <td>76.8 kbps</td> </tr> <tr> <td>Preferred Control Channel Cycle:</td> <td>Off</td> </tr> </tbody> </table>							Cell Parameters		Sector ID (Hex):	FEA0:0000:0000:0000:0000:0000:0001	Country Code:	310	Color Code:	64	Subnet Mask:	104	Control Channel Data Rate:	76.8 kbps	Preferred Control Channel Cycle:	Off	Cell Power	-55.00																		
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								Cell Band	US PCS																																
Channel Gain Parameters ▾								Channel	500																																
Access Parameters ▾	<table border="1"> <thead> <tr> <th colspan="2">Channel Gain Parameters</th> </tr> </thead> <tbody> <tr> <td>Data Offset Nom:</td> <td>0.0 dB</td> </tr> <tr> <td>Data Offset 9k6:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 19k2:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 38k4:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 76k8:</td> <td>0.00 dB</td> </tr> <tr> <td>Data Offset 153k6:</td> <td>0.00 dB</td> </tr> <tr> <td>Ack Channel Gain:</td> <td>3.0 dB</td> </tr> <tr> <td>DRC Channel Gain:</td> <td>3.0 dB</td> </tr> </tbody> </table>				Channel Gain Parameters		Data Offset Nom:	0.0 dB	Data Offset 9k6:	0.00 dB	Data Offset 19k2:	0.00 dB	Data Offset 38k4:	0.00 dB	Data Offset 76k8:	0.00 dB	Data Offset 153k6:	0.00 dB	Ack Channel Gain:	3.0 dB	DRC Channel Gain:	3.0 dB	<table border="1"> <thead> <tr> <th colspan="2">Access Parameters</th> </tr> </thead> <tbody> <tr> <td>Open Loop Adjust:</td> <td>81 dB</td> </tr> <tr> <td>Probe Initial Adjust:</td> <td>0 dB</td> </tr> <tr> <td>Probe Power Step:</td> <td>1.0 dB</td> </tr> <tr> <td>Probe Num Step:</td> <td>5</td> </tr> <tr> <td>Probe Sequence Max:</td> <td>1</td> </tr> <tr> <td>Preamble Length (Frames):</td> <td>2</td> </tr> </tbody> </table>			Access Parameters		Open Loop Adjust:	81 dB	Probe Initial Adjust:	0 dB	Probe Power Step:	1.0 dB	Probe Num Step:	5	Probe Sequence Max:	1	Preamble Length (Frames):	2	Application Config ▾	
Channel Gain Parameters																																									
Data Offset Nom:	0.0 dB																																								
Data Offset 9k6:	0.00 dB																																								
Data Offset 19k2:	0.00 dB																																								
Data Offset 38k4:	0.00 dB																																								
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Data Offset 153k6:	0.00 dB																																								
Ack Channel Gain:	3.0 dB																																								
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Probe Num Step:	5																																								
Probe Sequence Max:	1																																								
Preamble Length (Frames):	2																																								
Return								FTAP Rate	307.2 kbps																																
								(2 Slot, QPSK)																																	
								RTAP Rate	9.6 kbps																																
	Active Cell				Sys Type: IS-856																																				
	Session Open																																								
		IntRef	Offset				FTAP	1 of 3																																	

4. Select Channel Gain Parameters (**F3**).

**B. Set a Channel Gain Parameter.**

1. Turn the knob to highlight a parameter and then press the knob.

Call Setup Screen						
AN Info	Access Network Information				Call Parms	
	Cell Parameters				Cell Power	-55.00
	Sector ID (Hex): FE40:0000:0000:0000:0000:0000:0000:0001					dBm/1.23 MHz
	Country Code: 310				Cell Band	US PCS
Cell Parameters ▾	Color Code: 64					
	Subnet Mask: 104				Channel	500
Channel Gain Parameters ▾	Control Channel Data Rate: 76.8 kbps					
	Preferred Control Channel Cycle: Off				Application Config ▾	
	Channel Gain Parameters			Value		
Access Parameters ▾	Data Offset Nom			0.0 dB	FTAP Rate	307.2 kbps
	Data Offset 9k6			0.00 dB	(2 Slot, QPSK)	
	Data Offset 19k2			0.00 dB	RTAP Rate	9.6 kbps
	Data Offset 38k4			0.00 dB		
	Data Offset 76k8			0.00 dB		
	Data Offset 153k6			0.00 dB		
Close Menu	Ack Channel Gain			3.0 dB		
	DRC Channel Gain			3.0 dB		
	Active Cell Session Open			Sys Type: IS-856		
		IntRef	Offset		FTAP	1 of 3

2. Enter a value or selection and press the knob.
3. Select Close Menu (F6).

**Related Topics**

- “ACK Channel Gain” on page 139
- “DRC Channel Gain” on page 140
- “Data Offset 9k6 | 19k2 | 38k4 | 76k8 | 153k6” on page 141
- “Data Offset Nom” on page 142

## How Do I Change Access Parameters?

### A. Select the Access Parameters Menu.

1. Press the **CALL SETUP** key.
2. Select **More** (1 of 2) under Call Control.
3. Select Access Network Info (**F2**).

Call Setup Screen																							
AN Info	Access Network Information							Call Parms															
	<table border="1"> <thead> <tr> <th colspan="2">Cell Parameters</th> </tr> </thead> <tbody> <tr> <td>Sector ID (Hex):</td> <td>FEA0:0000:0000:0000:0000:0000:0001</td> </tr> <tr> <td>Country Code:</td> <td>310</td> </tr> <tr> <td>Color Code:</td> <td>64</td> </tr> <tr> <td>Subnet Mask:</td> <td>104</td> </tr> <tr> <td>Control Channel Data Rate:</td> <td>76.8 kbps</td> </tr> <tr> <td>Preferred Control Channel Cycle:</td> <td>Off</td> </tr> </tbody> </table>							Cell Parameters		Sector ID (Hex):	FEA0:0000:0000:0000:0000:0000:0001	Country Code:	310	Color Code:	64	Subnet Mask:	104	Control Channel Data Rate:	76.8 kbps	Preferred Control Channel Cycle:	Off	Cell Power	-55.00
Cell Parameters																							
Sector ID (Hex):	FEA0:0000:0000:0000:0000:0000:0001																						
Country Code:	310																						
Color Code:	64																						
Subnet Mask:	104																						
Control Channel Data Rate:	76.8 kbps																						
Preferred Control Channel Cycle:	Off																						
Cell Parameters ▾								dBm/1.23 MHz															
								Cell Band	US PCS														
Channel Gain Parameters ▾								Channel	500														
Access Parameters ▾								Application Config ▾															
								FTAP Rate	307.2 kbps														
									(2 Slot, QPSK)														
Return								RTAP Rate	9.6 kbps														
	Active Cell				Sys Type: IS-856																		
	Session Open																						
		IntRef	Offset				FTAP	1 of 3															

4. Select Access Parameters (**F4**).

**B. Set an Access Parameter.**

1. Turn the knob to highlight a parameter and then press the knob.

Call Setup Screen						
AN Info	Access Network Information				Call Parms	
	<b>Cell Parameters</b>				<b>Cell Power</b>	
	Sector ID (Hex): FE40:0000:0000:0000:0000:0000:0001				-55.00	
	Country Code: 310				dBm/1.23 MHz	
<b>Cell Parameters</b> ▾	Color Code: 64				<b>Cell Band</b>	
	Subnet Mask: 104				US PCS	
	Control Channel Data Rate: 76.8 kbps				<b>Channel</b>	
<b>Channel Gain Parameters</b> ▾	Preferred Control Channel Cycle: Off				500	
	<b>Access Parameters</b>			<b>Value</b>		
	<b>Open Loop Adjust</b>			81 dB		
<b>Access Parameters</b> ▾	Probe Initial Adjust			0 dB		<b>Application Config</b> ▾
	Probe Power Step			1.0 dB		<b>FTAP Rate</b>
	Probe Num Step			5		307.2 kbps
	Probe Sequence Max			1		(2 Slot, QPSK)
	Preamble Length (Frames)			2		<b>RTAP Rate</b>
						9.6 kbps
<b>Close Menu</b>						
	<b>Active Cell Session Open</b>			Sys Type: IS-856		
		IntRef	Offset		FTAP	<b>1 of 3</b>

2. Enter a value or selection and press the knob.
3. Select Close Menu (F6).

**Related Topics**

- [“Open Loop Adjust” on page 143](#)
- [“Preamble Length” on page 144](#)
- [“Probe Initial Adjust” on page 145](#)
- [“Probe Num Step” on page 146](#)
- [“Probe Power Step” on page 147](#)
- [“Probe Sequence Max” on page 148](#)

## How Do I Change Generator Information?

### A. Select the Generator Info Menu.

1. Press the **CALL SETUP** key.
2. Select **More** (1 of 2) under Call Control.
3. Select Generator Info (**F3**).

Call Setup Screen																			
Call Control	Active Cell Operating Mode							Call Parms											
	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AT Reported)</th> </tr> </thead> <tbody> <tr> <td>Session Seed:</td> <td>0x6D5B927A</td> </tr> <tr> <td>Hardware ID Type (Hex):</td> <td>0x010000 ESN</td> </tr> <tr> <td>Hardware ID (Hex):</td> <td>0x7403BA66</td> </tr> <tr> <td>Hardware ID (Decimal):</td> <td>116-00244326</td> </tr> </tbody> </table>							Access Terminal Information (AT Reported)		Session Seed:	0x6D5B927A	Hardware ID Type (Hex):	0x010000 ESN	Hardware ID (Hex):	0x7403BA66	Hardware ID (Decimal):	116-00244326	Cell Power	-55.00
Access Terminal Information (AT Reported)																			
Session Seed:	0x6D5B927A																		
Hardware ID Type (Hex):	0x010000 ESN																		
Hardware ID (Hex):	0x7403BA66																		
Hardware ID (Decimal):	116-00244326																		
Access Network Info								dBm/1.23 MHz	Cell Band	US PCS									
Generator Info	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AN Assigned)</th> </tr> </thead> <tbody> <tr> <td>UATI 024:</td> <td>1</td> </tr> <tr> <td>UATI Color Code:</td> <td>64</td> </tr> <tr> <td>MAC Index:</td> <td>5</td> </tr> </tbody> </table>							Access Terminal Information (AN Assigned)		UATI 024:	1	UATI Color Code:	64	MAC Index:	5	Channel	500		
Access Terminal Information (AN Assigned)																			
UATI 024:	1																		
UATI Color Code:	64																		
MAC Index:	5																		
	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (User Entered)</th> </tr> </thead> <tbody> <tr> <td>AT Max Power:</td> <td>23 dBm/1.23 MHz</td> </tr> </tbody> </table>							Access Terminal Information (User Entered)		AT Max Power:	23 dBm/1.23 MHz	Application Config	▼						
Access Terminal Information (User Entered)																			
AT Max Power:	23 dBm/1.23 MHz																		
	<table border="1"> <thead> <tr> <th colspan="2">Application Configuration</th> </tr> </thead> <tbody> <tr> <td>Application</td> <td>FTAP</td> </tr> <tr> <td>Limited TAP:</td> <td>Off</td> </tr> <tr> <td>AT Directed Packets:</td> <td>50 %</td> </tr> </tbody> </table>							Application Configuration		Application	FTAP	Limited TAP:	Off	AT Directed Packets:	50 %	FTAP Rate	307.2 kbps		
Application Configuration																			
Application	FTAP																		
Limited TAP:	Off																		
AT Directed Packets:	50 %																		
								(2 Slot, QPSK)	RTAP Rate	9.6 kbps									
	Active Cell			Sys Type: IS-856															
	Session Open																		
2 of 2		IntRef	Offset				FTAP	1 of 3											

**B. Set Generator Information.**

1. Select any Gen Info softkey (F2 to F4) to select a parameter.

Call Setup Screen						
Gen Info	Generator Information				Call Parms	
AWGN Power	Generated Power Level Information				Cell Power	-55.00
			<u>Current Level</u>	<u>Desired Level</u>	dBm/1.23 MHz	
	Cell Power (dBm/1.23 MHz):		-55.00	-55.00	Cell Band	US PCS
Off	AWGN Power (dBm/1.23 MHz):		Off	Off	Channel	500
PN Offset	Generated Cell Information				Application Config	FTAP Rate
	12	PN Offset:	12			
External Trigger Type						(2 Slot, QPSK)
Return					RTAP Rate	9.6 kbps
			Active Cell	Sys Type: IS-856		
			Session Open			
			IntRef	Offset	FTAP	1 of 3

2. Change the parameter as needed using the knob and/or keypad.

**Related Topics**

[“Cell Power, AWGN \(Additive White Gaussian Noise\) Power and Total RF Power” on page 149](#)

[“External Trigger Type” on page 152](#)

[“PN Offset” on page 153](#)





## How Do I Change Call Parameters?

Select Application Config (F10) to configure Application, Limited TAP, AT Directed Packets and ACK Channel Bit Fixed Mode Attribute.

Application Configuration	Value
Application	FTAP
Limited TAP (AT Firmware Rel 3.1)	Off
AT Directed Packets	50 %
ACK Channel Bit Fixed Mode Attribute	On

Your settings are displayed in the Application Configuration window on the Call Setup screen (and FTAP or RTAP is displayed at the bottom of the screen, to indicate the Application setting).

Application Configuration	
Application:	FTAP
Limited TAP:	Off
AT Directed Packets:	50 %
ACK Channel Bit Fixed Mode Attribute:	On

Active Cell		Sys Type: IS-856	
Idle			
	IntRef	Offset	
			FTAP

### Related Topics

[“How Do I Open a Session and Connection?” on page 647](#)

[“ACK Channel Bit Fixed Mode Attribute” on page 154](#)

[“Application” on page 155](#)

[“AT Directed Packets” on page 156](#)

[“Call Drop Timer” on page 157](#)

[“Call Limit Mode” on page 158](#)

[“Cell Band” on page 159](#)

[“Cell Power” on page 149](#)

[“Channel” on page 160](#)

## **How Do I Change Call Parameters?**

[“FTAP Rate” on page 161](#)

[“Limited TAP” on page 162](#)

[Meas Frequency \(“Manual Operation: Manual Receiver Control” on page 709\)](#)

[“Power Control Step” on page 164](#)

[Protocol Rev \(“Fixed Settings” on page 168\)](#)

[Rcvr Power Ctrl \(“Manual Operation: Manual Receiver Control” on page 709\)](#)

[“Reverse Closed Loop Power Control” on page 165](#)

[“RTAP Rate” on page 166](#)

[“System Type” on page 167](#)

## How Do I Open a Session and Connection?

1. Press the **CALL SETUP** key.
2. Select Operating Mode (F1) and set the operating mode to Active Cell.

### B. Open a Session

A session can only be established from the access terminal. The test set can not open a session.

1. Turn on the access terminal and wait for it to open a session.
2. Check for Session Open in the Active Cell status field (see [“Session Open State” on page 115](#)).

Call Setup Screen																			
Call Control		Active Cell Operating Mode						Call Parms											
Operating Mode		<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AT Reported)</th> </tr> </thead> <tbody> <tr> <td>Session Seed:</td> <td>0x6D5B927A</td> </tr> <tr> <td>Hardware ID Type (Hex):</td> <td>0x010000 ESN</td> </tr> <tr> <td>Hardware ID (Hex):</td> <td>0x7403BA66</td> </tr> <tr> <td>Hardware ID (Decimal):</td> <td>116-00244326</td> </tr> </tbody> </table>						Access Terminal Information (AT Reported)		Session Seed:	0x6D5B927A	Hardware ID Type (Hex):	0x010000 ESN	Hardware ID (Hex):	0x7403BA66	Hardware ID (Decimal):	116-00244326	Cell Power	
Access Terminal Information (AT Reported)																			
Session Seed:	0x6D5B927A																		
Hardware ID Type (Hex):	0x010000 ESN																		
Hardware ID (Hex):	0x7403BA66																		
Hardware ID (Decimal):	116-00244326																		
Active Cell								-55.00 dBm/1.23 MHz											
Start Data Connection		<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AN Assigned)</th> </tr> </thead> <tbody> <tr> <td>UATI 024:</td> <td>1</td> </tr> <tr> <td>UATI Color Code:</td> <td>64</td> </tr> <tr> <td>MAC Index:</td> <td>5</td> </tr> </tbody> </table>						Access Terminal Information (AN Assigned)		UATI 024:	1	UATI Color Code:	64	MAC Index:	5	Cell Band			
Access Terminal Information (AN Assigned)																			
UATI 024:	1																		
UATI Color Code:	64																		
MAC Index:	5																		
Close Session		<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (User Entered)</th> </tr> </thead> <tbody> <tr> <td>AT Max Power:</td> <td>23 dBm/1.23 MHz</td> </tr> </tbody> </table>						Access Terminal Information (User Entered)		AT Max Power:	23 dBm/1.23 MHz	US PCS							
Access Terminal Information (User Entered)																			
AT Max Power:	23 dBm/1.23 MHz																		
Handoff Setup		<table border="1"> <thead> <tr> <th colspan="2">Application Configuration</th> </tr> </thead> <tbody> <tr> <td>Application</td> <td>FTAP</td> </tr> <tr> <td>Limited TAP:</td> <td>Off</td> </tr> <tr> <td>AT Directed Packets:</td> <td>50 %</td> </tr> </tbody> </table>						Application Configuration		Application	FTAP	Limited TAP:	Off	AT Directed Packets:	50 %	Channel			
Application Configuration																			
Application	FTAP																		
Limited TAP:	Off																		
AT Directed Packets:	50 %																		
AT Max Power		Active Cell						Application Config											
23 dBm/1.23 MHz		Session Open						500											
						Sys Type: IS-856		FTAP Rate											
1 of 2		IntRef		Offset		FTAP		307.2 kbps (2 Slot, QPSK)											
								RTAP Rate											
								9.6 kbps											
								1 of 3											

The Access Terminal Information will also become populated with values.

## How Do I Open a Session and Connection?

### C. Configure the Connection

1. Select Application Config (F10) and set Application, Limited TAP, and AT Directed Packets as needed (see).
2. Set FTAP Rate and RTAP Rate as needed (see).

### D. Open a Connection

1. Select Start Data Connection (F3 on Call Control 1 of 2) to page the access terminal.

Call Setup Screen									
Call Control		Active Cell Operating Mode						Call Parm	
Operating Node		Access Terminal Information (AT Reported)						Cell Power	
Active Cell		Session Seed: 0x6D5B927A Hardware ID Type (Hex): 0x010000 ESN Hardware ID (Hex): 0x7403BA66 Hardware ID (Decimal): 116-00244326						-55.00	
		Access Terminal Information (AM Assigned)						dBm/1.23 MHz	
End Data Connection		UATI 024: 1 UATI Color Code: 64 MAC Index: 5						Cell Band	
		Access Terminal Information (User Entered)						US PCS	
Close Session		AT Max Power: 23 dBm/1.23 MHz						Channel	
		Application Configuration						500	
Handoff Setup		Application: FTAP Limited TAP: Off AT Directed Packets: 50 %						Application Config	
AT Max Power								FTAP Rate	
23 dBm/1.23 MHz								307.2 kbps	
								(2 Slot, QPSK)	
								RTAP Rate	
								9.6 kbps	
		Active Cell Connected				Sys Type: IS-856			
			IntRef	Offset			FTAP		
1 of 2								1 of 3	

2. Check for Connected in the Active Cell status field (see [“Connected State” on page 120](#)).

### Related Topics

- [“How Do I Close the Session?” on page 651](#)
- [“How Do I Close the Connection?” on page 652](#)
- [“Paging State” on page 116](#)

# How Do I Perform a Handoff?

1. Press the CALL SETUP key.

Call Setup Screen																					
Call Control		Active Cell Operating Mode						Call Params													
Operating Mode		<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AT Reported)</th> </tr> </thead> <tbody> <tr> <td>Session Seed:</td> <td>0x6D5B927A</td> </tr> <tr> <td>Hardware ID Type (Hex):</td> <td>0x010000 ESN</td> </tr> <tr> <td>Hardware ID (Hex):</td> <td>0x7403BA66</td> </tr> <tr> <td>Hardware ID (Decimal):</td> <td>116-00244326</td> </tr> </tbody> </table>						Access Terminal Information (AT Reported)		Session Seed:	0x6D5B927A	Hardware ID Type (Hex):	0x010000 ESN	Hardware ID (Hex):	0x7403BA66	Hardware ID (Decimal):	116-00244326	Cell Power			
Access Terminal Information (AT Reported)																					
Session Seed:	0x6D5B927A																				
Hardware ID Type (Hex):	0x010000 ESN																				
Hardware ID (Hex):	0x7403BA66																				
Hardware ID (Decimal):	116-00244326																				
Active Cell								-55.00 dBm/1.23 MHz													
End Data Connection		<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AN Assigned)</th> </tr> </thead> <tbody> <tr> <td>UATI 024:</td> <td>1</td> </tr> <tr> <td>UATI Color Code:</td> <td>64</td> </tr> <tr> <td>MAC Index:</td> <td>5</td> </tr> </tbody> </table>						Access Terminal Information (AN Assigned)		UATI 024:	1	UATI Color Code:	64	MAC Index:	5	Cell Band					
Access Terminal Information (AN Assigned)																					
UATI 024:	1																				
UATI Color Code:	64																				
MAC Index:	5																				
Close Session								US PCS													
Handoff Setup ▾		<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (User Entered)</th> </tr> </thead> <tbody> <tr> <td>AT Max Power:</td> <td>23 dBm/1.23 MHz</td> </tr> </tbody> </table>						Access Terminal Information (User Entered)		AT Max Power:	23 dBm/1.23 MHz	Channel									
Access Terminal Information (User Entered)																					
AT Max Power:	23 dBm/1.23 MHz																				
AT Max Power								500													
23 dBm/1.23 MHz		<table border="1"> <thead> <tr> <th colspan="2">Application Configuration</th> </tr> </thead> <tbody> <tr> <td>Application</td> <td>FTAP</td> </tr> <tr> <td>Limited TAP:</td> <td>Off</td> </tr> <tr> <td>AT Directed Packets:</td> <td>50 %</td> </tr> </tbody> </table>						Application Configuration		Application	FTAP	Limited TAP:	Off	AT Directed Packets:	50 %	Application Config ▾					
Application Configuration																					
Application	FTAP																				
Limited TAP:	Off																				
AT Directed Packets:	50 %																				
1 of 2		<table border="1"> <tr> <td colspan="3">Active Cell Connected</td> <td colspan="3">Sys Type: IS-856</td> </tr> <tr> <td>IntRef</td> <td>Offset</td> <td></td> <td></td> <td></td> <td>FTAP</td> </tr> </table>						Active Cell Connected			Sys Type: IS-856			IntRef	Offset				FTAP	FTAP Rate	
Active Cell Connected			Sys Type: IS-856																		
IntRef	Offset				FTAP																
								307.2 kbps (2 Slot, QPSK)													
								RTAP Rate													
								9.6 kbps													
								1 of 3													

## How Do I Perform a Handoff?

2. Select Handoff Setup (F5).

Call Setup Screen									
Handoff Setup	Active Cell Operating Mode						Call Parm		
<p>Execute Handoff</p> <p>Close Menu</p> <p>1 of 2</p>	<p>Access Terminal Information (AT Reported)</p> <p>Session Seed: 0x6D5B927A</p> <p>Hardware ID Type (Hex): 0x010000 ESN</p> <p>Hardware ID (Hex): 0x7403BA66</p> <p>Hardware ID (Decimal): 116-00244326</p>						Cell Power	-55.00	
	<p>Access Terminal Information (AN Assigned)</p> <p>UATI 024: 1</p> <p>UATI Color Code: 6L</p>						dBm/1.23 MHz		
	Handoff Setup			Value			Cell Band	US PCS	
	Handoff Cell Band			US PCS			Channel	500	
	Handoff Channel			525			Application Config	▽	
							FTAP Rate	307.2 kbps	
							(2 Slot, QPSK)		
							RTAP Rate	9.6 kbps	
			Active Cell Session Open			Sys Type: IS-856			
			IntRef			Offset		FTAP	
								1 of 3	

3. Highlight Handoff Cell Band and select the desired band.
4. Highlight Handoff Channel and select the desired channel.
5. Select Execute Handoff (F5) to complete the handoff, or Close Menu (F6) to abort the handoff.
6. Check for Connected in the Active Cell field (see [“Connected State” on page 120](#)).

You can also simply change Cell Band and/or Channel from the Call Parm menu and the test set immediately negotiates the connection to the new cell band and/or channel.

## Related Topics

[“How Do I Open a Session and Connection?” on page 647](#)

[“Handoff” on page 121](#)

## How Do I Close the Session?

1. Press the **CALL SETUP** key.

Call Setup Screen																
Call Control	Active Cell Operating Mode				Call Params											
Operating Mode	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AT Reported)</th> </tr> </thead> <tbody> <tr> <td>Session Seed:</td> <td>0x6D5B927A</td> </tr> <tr> <td>Hardware ID Type (Hex):</td> <td>0x010000 ESN</td> </tr> <tr> <td>Hardware ID (Hex):</td> <td>0x7403BA66</td> </tr> <tr> <td>Hardware ID (Decimal):</td> <td>116-00244326</td> </tr> </tbody> </table>				Access Terminal Information (AT Reported)		Session Seed:	0x6D5B927A	Hardware ID Type (Hex):	0x010000 ESN	Hardware ID (Hex):	0x7403BA66	Hardware ID (Decimal):	116-00244326	Cell Power	
Access Terminal Information (AT Reported)																
Session Seed:	0x6D5B927A															
Hardware ID Type (Hex):	0x010000 ESN															
Hardware ID (Hex):	0x7403BA66															
Hardware ID (Decimal):	116-00244326															
Active Cell					-55.00 dBm/1.23 MHz											
					Cell Band											
					US PCS											
					Channel											
Start Data Connection	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AN Assigned)</th> </tr> </thead> <tbody> <tr> <td>UATI 024:</td> <td>1</td> </tr> <tr> <td>UATI Color Code:</td> <td>64</td> </tr> <tr> <td>MAC Index:</td> <td>5</td> </tr> </tbody> </table>				Access Terminal Information (AN Assigned)		UATI 024:	1	UATI Color Code:	64	MAC Index:	5	500			
Access Terminal Information (AN Assigned)																
UATI 024:	1															
UATI Color Code:	64															
MAC Index:	5															
					Application Config ▾											
Close Session	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (User Entered)</th> </tr> </thead> <tbody> <tr> <td>AT Max Power:</td> <td>23 dBm/1.23 MHz</td> </tr> </tbody> </table>				Access Terminal Information (User Entered)		AT Max Power:	23 dBm/1.23 MHz	FTAP Rate							
Access Terminal Information (User Entered)																
AT Max Power:	23 dBm/1.23 MHz															
					307.2 kbps (2 Slot, QPSK)											
Handoff Setup ▾	<table border="1"> <thead> <tr> <th colspan="2">Application Configuration</th> </tr> </thead> <tbody> <tr> <td>Application</td> <td>FTAP</td> </tr> <tr> <td>Limited TAP:</td> <td>Off</td> </tr> <tr> <td>AT Directed Packets:</td> <td>50 %</td> </tr> </tbody> </table>				Application Configuration		Application	FTAP	Limited TAP:	Off	AT Directed Packets:	50 %	RTAP Rate			
Application Configuration																
Application	FTAP															
Limited TAP:	Off															
AT Directed Packets:	50 %															
					9.6 kbps											
AT Max Power																
23 dBm/1.23 MHz																
	Active Cell		Sys Type: IS-856													
	Session Open															
	IntRef	Offset			FTAP											
1 of 2					1 of 3											

2. Select **Close Session (F4)**.
3. Check for **Idle** in the **Active Cell** status field (see [“Idle State” on page 111](#)).

You may also simply disconnect the access terminal from the test set. The test set's session timer will then expire (see [“Fixed Settings” on page 168](#)) and the data connection will return to the idle state.

### Related Topics

- [“How Do I Close the Connection?” on page 652](#)
- [“How Do I Open a Session and Connection?” on page 647](#)
- [“Session Closing State” on page 124](#)

## How Do I Close the Connection?

1. Press the **CALL SETUP** key.

Call Setup Screen																	
Call Control	Active Cell Operating Mode					Call Params											
Operating Mode	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AT Reported)</th> </tr> </thead> <tbody> <tr> <td>Session Seed:</td> <td>0x6D5B927A</td> </tr> <tr> <td>Hardware ID Type (Hex):</td> <td>0x010000 ESN</td> </tr> <tr> <td>Hardware ID (Hex):</td> <td>0x7403BA66</td> </tr> <tr> <td>Hardware ID (Decimal):</td> <td>116-00244326</td> </tr> </tbody> </table>					Access Terminal Information (AT Reported)		Session Seed:	0x6D5B927A	Hardware ID Type (Hex):	0x010000 ESN	Hardware ID (Hex):	0x7403BA66	Hardware ID (Decimal):	116-00244326	Cell Power	
Access Terminal Information (AT Reported)																	
Session Seed:	0x6D5B927A																
Hardware ID Type (Hex):	0x010000 ESN																
Hardware ID (Hex):	0x7403BA66																
Hardware ID (Decimal):	116-00244326																
Active Cell						-55.00 dBm/1.23 MHz											
						Cell Band											
						US PCS											
						Channel											
End Data Connection	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AN Assigned)</th> </tr> </thead> <tbody> <tr> <td>UATI 024:</td> <td>1</td> </tr> <tr> <td>UATI Color Code:</td> <td>64</td> </tr> <tr> <td>MAC Index:</td> <td>5</td> </tr> </tbody> </table>					Access Terminal Information (AN Assigned)		UATI 024:	1	UATI Color Code:	64	MAC Index:	5	500			
Access Terminal Information (AN Assigned)																	
UATI 024:	1																
UATI Color Code:	64																
MAC Index:	5																
						Application Config ▾											
Close Session	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (User Entered)</th> </tr> </thead> <tbody> <tr> <td>AT Max Power:</td> <td>23 dBm/1.23 MHz</td> </tr> </tbody> </table>					Access Terminal Information (User Entered)		AT Max Power:	23 dBm/1.23 MHz	FTAP Rate							
Access Terminal Information (User Entered)																	
AT Max Power:	23 dBm/1.23 MHz																
						307.2 kbps (2 Slot, QPSK)											
Handoff Setup ▾	<table border="1"> <thead> <tr> <th colspan="2">Application Configuration</th> </tr> </thead> <tbody> <tr> <td>Application</td> <td>FTAP</td> </tr> <tr> <td>Limited TAP:</td> <td>Off</td> </tr> <tr> <td>AT Directed Packets:</td> <td>50 %</td> </tr> </tbody> </table>					Application Configuration		Application	FTAP	Limited TAP:	Off	AT Directed Packets:	50 %	RTAP Rate			
Application Configuration																	
Application	FTAP																
Limited TAP:	Off																
AT Directed Packets:	50 %																
AT Max Power						9.6 kbps											
23 dBm/1.23 MHz																	
	Active Cell Connected			Sys Type: IS-856													
		IntRef	Offset			FTAP											
1 of 2						1 of 3											

2. Select End Data Connection (**F3**).
3. Check for Session Open in the Active Cell status field (see [“Session Open State” on page 115](#)).

### Related Topics

[“How Do I Close the Session?” on page 651](#)

[“How Do I Open a Session and Connection?” on page 647](#)

[“Connection Closing State” on page 123](#)



## How Do I Make Measurements?

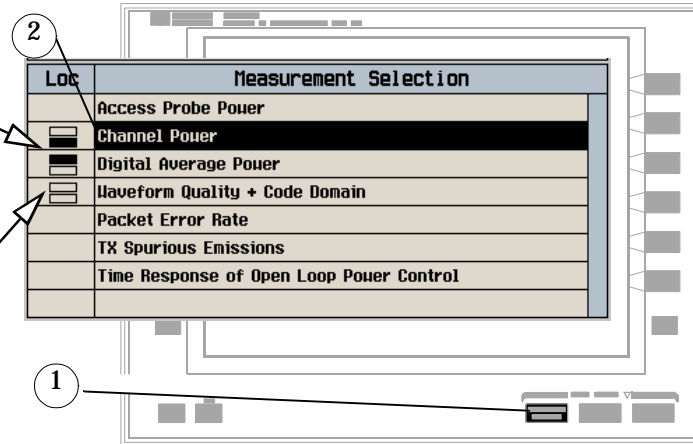
### A. Open a Data Connection

If required for your test purposes, open a session and connection. (see [“How Do I Open a Session and Connection?”](#) on page 647)

### B. Initiate Measurements.

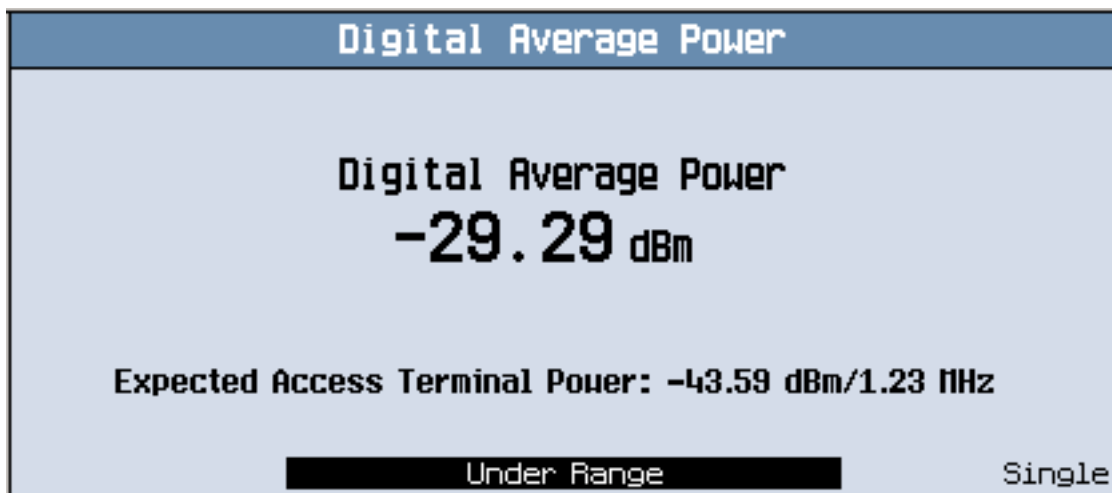
*These black boxes indicate that channel power measurement results are being displayed in the lower measurement window, and digital average power results are being displayed in the upper measurement window.*

*The gray boxes indicate that the waveform quality/code domain measurement is being made, but the results are not being displayed.*



1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to initiate additional measurements.

As the measurement executes, or when it completes, any non-zero integrity indicators (0 = normal) will be displayed below the measurement result (see [“Integrity Indicator”](#) on page 255)



## **How Do I Make Measurements?**

### **Related Topics**

[“How Do I Change the Measurement Setup?” on page 655](#)

[“How Do I Turn Off a Measurement?” on page 658](#)

[“Measuring Access Probe Power” on page 659](#)

[“Measuring Channel Power” on page 662](#)

[“Measuring Digital Average Power” on page 664](#)

[“Measuring Packet Error Rate \(PER\)” on page 667](#)

[“Measuring Time Response of Open Loop Power Control \(TROLPC\)” on page 670](#)

[“Measuring TX Spurious Emissions” on page 674](#)

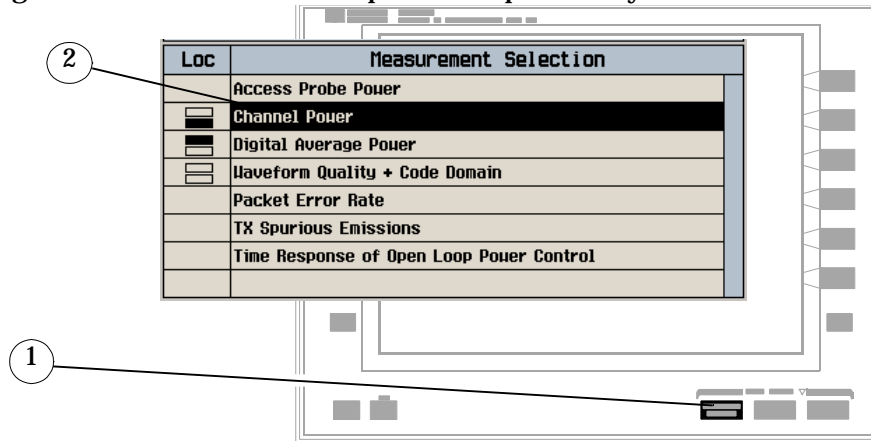
[“Measuring Waveform Quality + Code Domain Power” on page 678](#)

## How Do I Change the Measurement Setup?

### A. Select the Measurement to Set Up.

To set up a measurement, you must bring it to the top window position on the measurement screen. If the measurement you wish to set up is already in the top window position, proceed to step B below.

To bring a measurement to the top window position, you can:



1. Press the **Measurement selection** key.
2. Highlight the measurement you wish to set up, and press the knob.

## How Do I Change the Measurement Setup?

Or, if the measurement is already active but in the bottom window position, you may:

Measurement/Instrument Screen						
<b>Control</b>	<b>Channel Power</b>				<b>Call Params</b>	
<b>Channel Power Setup</b> ▾	<p style="text-align: center;">Channel Power <b>-14.89</b> dBm/1.23 MHz</p> <p style="text-align: center;">Expected Access Terminal Power: -14.96 dBm/1.23 MHz</p> <p style="text-align: right;">Single</p>				<b>Cell Power</b>	
					<b>-55.00</b>	
					<b>dBm/1.23 MHz</b>	
					<b>Cell Band</b>	
					<b>US Cellular</b>	
					<b>Channel</b>	
					<b>400</b>	
	<b>Digital Average Power</b>					
<b>Calibrate Channel Power</b>	<p style="text-align: center;">Digital Average Power <b>-14.90</b> dBm</p> <p style="text-align: center;">Expected Access Terminal Power: -14.96 dBm/1.23 MHz</p> <p style="text-align: right;">Single</p>				<b>Application Config</b> ▾	
<b>Swap Window Positions</b>					<b>FTAP Rate</b>	
					<b>307.2 kbps</b>	
					<b>(2 Slot, QPSK)</b>	
					<b>RTAP Rate</b>	
					<b>9.6 kbps</b>	
	<input type="checkbox"/> Background	<b>Active Cell Connected</b>		<b>Sys Type: IS-856</b>		
<b>1 of 2</b>		<b>IntRef</b>	<b>Offset</b>			<b>1 of 3</b>

1. Select Swap Window Positions (F5).

**B. Set Up the Measurement.**

1. Press the MEASUREMENT key.

Measurement/Instrument Screen						
Control	Channel Power				Call Parms	
Channel Power Setup ▾	<p style="text-align: center;">Channel Power <b>-17.27</b> dBm/1.23 MHz</p> <p style="text-align: center;">Expected Access Terminal Power: -17.33 dBm/1.23 MHz</p> <p style="text-align: right;">Continuous</p>				Cell Power	-55.00
					Cell Band	US PCS
	Channel Power Setup				Channel	500
	Multi-Measurement Count		Value		Application	RTAP
Calibrate Channel Power	Trigger Arm		Continuous		FTAP Rate	307.2 kbps (2 Slot, QPSK)
	Measurement Timeout		Off		RTAP Rate	9.6 kbps
Swap Window Positions						
Close Menu						
	Active Cell Connected		Sys Type: IS-856			
1 of 2		IntRef	Offset			1 of 3

2. Select (Measurement) Setup (F1) to display the measurement's setup menu.
3. Highlight a parameter and press the knob.
4. Enter a value or selection and press the knob.

---

**NOTE** For statistical measurement results, highlight the Multi-Measurement Count parameter and press the ON key. The number of averages will default to 10.

---

5. Press the Close Menu (F6) key.

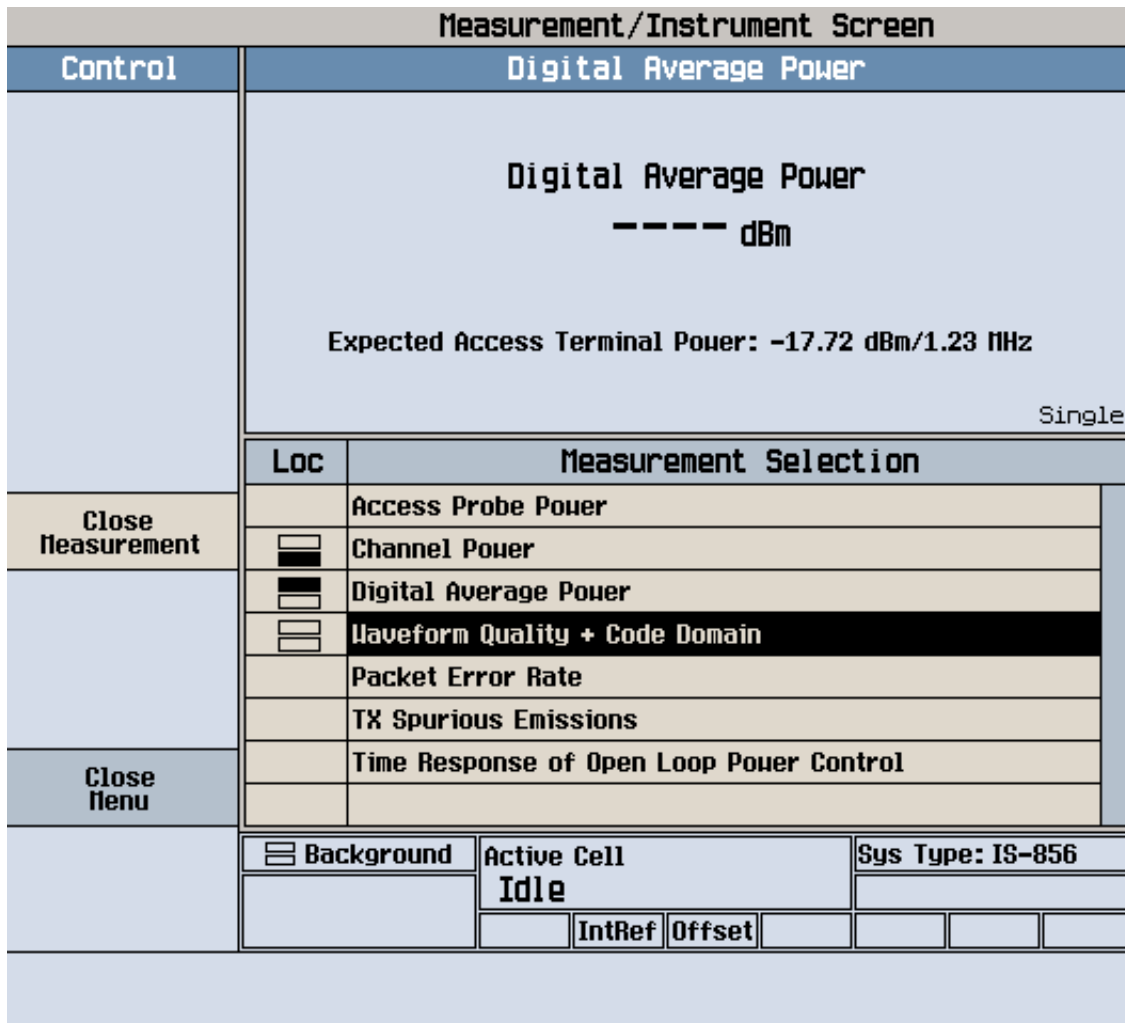
**Related Topics**

[“How Do I Make Measurements?” on page 653](#)

[“How Do I Turn Off a Measurement?” on page 658](#)

## How Do I Turn Off a Measurement?

1. Press the **Measurement selection** key.



2. Use the knob to highlight the measurement you want to turn off.
3. Select Close Measurement (**F4**).
4. Select Close Menu (**F6**).

### Related Topics

[“How Do I Make Measurements?” on page 653](#)

[“How Do I Change the Measurement Setup?” on page 655](#)

## Measuring Access Probe Power

- [“General Procedure”](#)
- [“Testing 3.1.2.3.1 Range of Open Loop Output Power”](#)

### General Procedure

**NOTE** Channel power calibration should be performed if the test set is being used for the first time or the operating environment has changed significantly since the last calibration was performed. The channel power calibration also calibrates the access probe power measurement. See [“Calibrating the Test Set” on page 98](#) for details.

1. Connect the access terminal to the test set’s front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?” on page 647](#) for more details.
2. Initialize the access probe power measurement:
  - Press the **Measurement selection** key.
  - Turn the knob to highlight the **Access Probe Power** measurement and press the knob.
3. Select **Access Probe Power Setup (F1)** to access the **Access Probe Power Setup** menu. From this menu you can configure measurement parameters such as **Measurement Timeout** and **Trigger Arm**, and also access parameters (such as **Open Loop Adjust** and **Preamble Length**), specified for some C.S0033 tests.

Access Probe Power Setup	Value
Open Loop Adjust	71 dB
Probe Power Step	0.0 dB
Probe Num Step	5
Probe Sequence Max	1
Preamble Length (Frames)	7
Trigger Arm	Continuous
Measurement Timeout	Off

4. Select **Close Menu (F6)** to close the **Access Probe Power Setup** window.
5. Set the access network to ignore all access attempts by setting **Call Limit Mode** to **On (F10)** on the **Call Params 2 of 3** menu). See [“How Do I Change Call Parameters?” on page 644](#) for more details.

## Measuring Access Probe Power

---

**NOTE** It is recommended that you always turn “**Call Limit Mode**” on when measuring access probe power. The easiest way to induce access probes from the access terminal is to page the access terminal. If you do not have call limit mode set to on, when you page the access terminal, the connection will complete, which clears the access probe power result from the measurement screen.

Set call limit mode back to off when you have finished measuring access probe power.

---

6. If you wish to only capture the first access probe, set `Trigger Arm` to `Single` and press the **START SINGLE** key. When the `Trigger Arm` is set to `Continuous`, the test set will display the power level of the most recent access probe power measurement. In either case, a measurement result will not be returned until you complete step 7.

---

**IMPORTANT** If `Trigger Arm` is set to `Single`, you must press the **Start Single** key to arm the measurement. The measurement will not operate until you arm it by pressing the **Start Single** key.

---

7. In order to perform the access probe power measurement, the access terminal must send an access probe. The easiest way to induce this is to page the AT (open a connection) by selecting `Start Data Connection` (**F3** on the `Control 2 of 2` menu). When the AT sends an access probe in response the page, its power level will be measured and displayed.

8. After finishing the measurements:

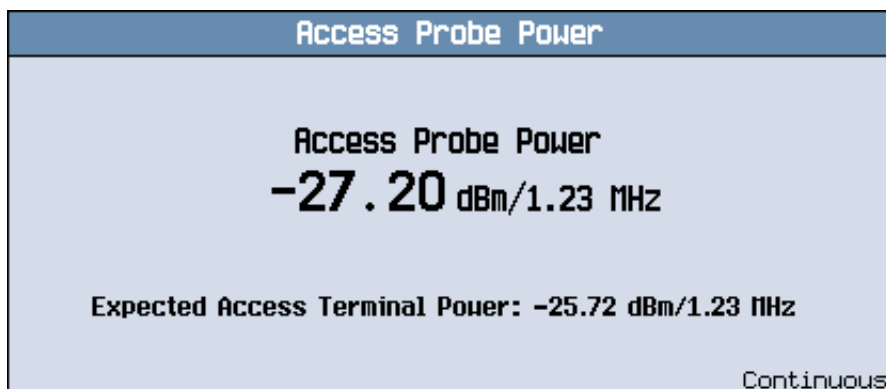
- End the connection attempt by selecting `End Data Connection` (**F3** on the `Control 2 of 2` menu).
- Turn the `Call Limit Mode` back to `Off`.
- Turn the access probe power measurement off by pressing the **Measurement selection** key, selecting `Access Probe Power`, then `Close Measurement` (**F4**).

---

**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements.

---

A typical display is shown below:





### Testing 3.1.2.3.1 Range of Open Loop Output Power

For details on performing the steps below, see the [“General Procedure” on page 659](#) above.

1. Initialize the access probe measurement.
2. Set Probe Power Step to 0 dB. This ensures that all access probes in the probe sequence will transmit at the same power level, rather than incrementing in power. This is beneficial in manual operation if you are running the measurement in continuous mode for the purpose of measuring the power level of all of the probes rather than just the first probe in the sequence.
3. Set Probe Sequence Max to 1.
4. Set Preamble Length to 7.
5. Set Open Loop Adjust to 78 dB or 81 dB, depending upon band class.
6. C.S0033 specifies to set the AN forward packet activity to 100%. Forward packet activity is fixed in the test set, always set to 100%. See [“Fixed Settings” on page 168](#).
7. Set the access network to ignore all access attempts by setting Call Limit Mode to On.
8. Set  $\hat{I}_{or}$  (Cell Power) to -25, -65 or approximately -95 dBm/1.23 MHz (value depends on band class and access terminal class) for tests 1-3 as specified by C.S0033.

---

**IMPORTANT** If Trigger Arm is set to Single, you must press the **Start Single** key to arm the measurement. The measurement will not operate until you arm it by pressing the **Start Single** key.

---

9. Send a page to the access terminal by selecting Start Data.
10. Measure access probe power.
11. Stop the page to the access terminal by selecting Stop Data Connection.
12. Perform steps 8-11 for tests 1-3.

### Related Topics

[“Access Probe Power Measurement Description” on page 38](#)

[“Programming an Access Probe Power Measurement” on page 261](#)

[“3.1.2.3.1 Range of Open Loop Output Power” on page 41](#)

[“Access Probe Power Troubleshooting” on page 712](#)

## Measuring Channel Power

- [“General Procedure”](#)
- [“Testing 3.1.2.3.5 Minimum Controlled Output Power”](#)

### General Procedure

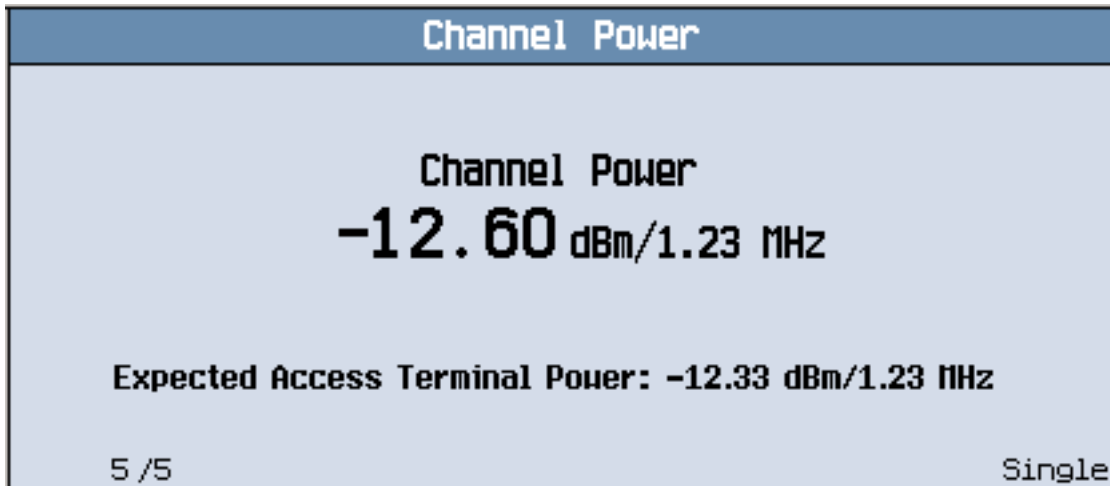
**NOTE** Channel power calibration should be performed if the test set is being used for the first time or the operating environment has changed significantly since the last calibration was performed. See [“Calibrating the Test Set” on page 98](#) for details.

1. Connect the access terminal to the test set’s front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?” on page 647](#) for more details.
2. Open an RTAP connection (see [“How Do I Open a Session and Connection?” on page 647](#) for more details):
  - Select Application Config (**F10** on the Call Params menu).
  - Set Application to RTAP. Select Close Menu (**F6**)
  - Set RTAP Rate (**F12** on the Call Params menu), as needed.
  - Select Start Data Connection (**F3** on the Control 2 of 2 menu).
3. Initialize the channel power measurement:
  - Press the **Measurement selection** key.
  - Turn the knob to highlight the Channel Power measurement and press the knob.
4. Select Channel Power Setup (**F1**) to access the Channel Power Setup menu. From this menu you can configure measurement parameters such as Multi-Measurement Count and Trigger Arm. For statistical measurement results, highlight the Multi-Measurement Count parameter and press the **ON** key. The number of averages will default to 10.

Channel Power Setup	Value
Multi-Measurement Count	5
Trigger Arm	Single
Measurement Timeout	0.5 s

5. Select Close Menu (**F6**) to close the Channel Power Setup window.
6. From the Call Params menu, configure Cell Power (**F7**), as needed.
7. Measure channel power:
  - If the Trigger Arm field is set to Single, press the **START SINGLE** key to trigger each measurement.
  - If the Trigger Arm field is set to Continuous the measurement began executing as soon as you initialized it in step 3.

A typical measurement result is shown below:



### Testing 3.1.2.3.5 Minimum Controlled Output Power

For details on performing the steps below, see the [“General Procedure” on page 662](#) above.

1. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 9.6 kbps.
2. Initialize the channel power measurement.
3. Set the Call Drop Timer to Off (**F9** on the Call Params 2 of 3 menu) to keep the test set from closing the connection based on the very low output power level of the access terminal.
4. Set  $\hat{I}_{or}$  (Cell Power, **F7** on the Call Params 1 of 3 menu) to -25 dBm/1.23 MHz.
5. Set Rvs Power Ctrl to All Down bits (**F7** on the Call Params 2 of 3 menu) to transmit continuous down power control bits.
6. Measure channel power.

### Related Topics

[“Channel Power Measurement Description” on page 50](#)

[“Programming a Channel Power Measurement” on page 272](#)

[“3.1.2.3.5 Minimum Controlled Output Power” on page 52](#)

[“Channel Power Measurement Troubleshooting” on page 715](#)

---

## Measuring Digital Average Power

- [“General Procedure”](#)
- [“Testing 3.1.2.3.4 Maximum RF Output Power”](#)

### General Procedure

---

**NOTE** Digital average power calibration should be performed if the test set is being used for the first time or the operating environment has changed significantly since the last calibration was performed. See [“Calibrating the Test Set” on page 98](#) for details.

---

1. Connect the access terminal to the test set’s front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?” on page 647](#) for more details.
2. Open an RTAP connection (see [“How Do I Open a Session and Connection?” on page 647](#) for more details):
  - Select Application Config (**F10** on the Call Params menu).
  - Set Application to RTAP. Select Close Menu (**F6**)
  - Set RTAP Rate (**F12** on the Call Params menu), as needed.
  - Select Start Data Connection (**F3** on the Control 2 of 2 menu).
3. Initialize the digital average power measurement:
  - Press the **Measurement selection** key.
  - Turn the knob to highlight the Digital Average Power measurement and press the knob.

## Measuring Digital Average Power

4. Select Digital Average Power Setup (**F1**) to access the Digital Average Power Setup menu. From this menu you can configure measurement parameters such as Multi-Measurement Count and Trigger Arm. For statistical measurement results, highlight the Multi-Measurement Count parameter and press the **ON** key. The number of averages will default to 10.

Digital Average Power Setup	Value
Multi-Measurement Count	5
Trigger Arm	Single
Measurement Timeout	1.0 s

5. Select Close Menu (**F6**) to close the Digital Average Power Setup window.
6. From the Call Params menu, configure Cell Power (**F7**), as needed.
7. Measure digital average power:
  - If the Trigger Arm field is set to Single, press the **START SINGLE** key to trigger each measurement.
  - If the Trigger Arm field is set to Continuous, the measurement began executing as soon as you initialized it in step 3.

A typical measurement result is shown below:

Digital Average Power	
Digital Average Power <b>-17.90 dBm</b>	
Expected Access Terminal Power: -17.33 dBm/1.23 MHz	
5 / 5	Single

## Measuring Digital Average Power

### Testing 3.1.2.3.4 Maximum RF Output Power

For details on performing the steps below, see the [“General Procedure” on page 664](#) above.

1. Initialize the digital average power measurement.
2. Set the following access parameters (see [“How Do I Change Access Parameters?” on page 640](#)):
  - Set `Open Loop Adjust` to 81 dB or 84 dB, depending upon band class.
  - Set `Probe Initial Adjust` to 15 dB.
  - Set `Probe Power Step` to 7.5 dB/step (this step will be removed from C.S0033 in January 2003).
  - Set `Probe Num Step` to 15 probes/sequence (this step will be removed from C.S0033 in January 2003).
  - Set `Probe Sequence Max` to 15 sequences (this step will be removed from C.S0033 in January 2003).
3. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 153.6 kbps.
4. C.S0033 specifies to configure the Test Application FTAP with a Forward Traffic Channel rate of 307.2 kbps (2-slot version), such that the ACK Channel is transmitted at all the slots. To do this, set `FTAP Rate` (**F11** on the Call Parm's menu) to 307.2 (2 Slot) and set `ACK Channel Bit Fixed Mode` to On (under Application Config, **F10**).
5. Set  $\hat{I}_{or}$  (Cell Power) to -105.5 dBm/1.23 MHz.
6. Set `Rvs Power Ctrl` to All Up bits (**F7** on the Call Parm's 2 of 3 menu) to transmit continuous up power control bits.
7. Measure digital average power.

### Related Topics

[“Digital Average Power Measurement Description” on page 53](#)

[“Programming a Digital Average Power Measurement” on page 275](#)

[“3.1.2.3.4 Maximum RF Output Power” on page 55](#)

[“Digital Average Power Troubleshooting” on page 717](#)

## Measuring Packet Error Rate (PER)

- [“General Procedure”](#)
- [“Testing 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN”](#)
- [“Testing 3.1.1.3.1 Receiver Sensitivity and Dynamic Range”](#)

### General Procedure

1. Connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?”](#) on page 647 for more details.
2. Open an FTAP connection (see [“How Do I Open a Session and Connection?”](#) on page 647 for more details):
  - Select Application Config (**F10** on the Call Params menu).
  - Set Application to FTAP. Select Close Menu (**F6**)
  - Set FTAP Rate (**F11** on the Call Params menu), as needed.
  - Select Start Data Connection (**F3** on the Control 2 of 2 menu).
3. Initialize the PER measurement:
  - Press the **Measurement selection** key.
  - Turn the knob to highlight the Packet Error Rate measurement and press the knob.
4. Select Packet Error Rate Setup (**F1**) to access the Packet Error Rate Setup menu. From this menu you can configure measurement parameters such as Confidence Level and PER Requirement, and also Control Channel Data Rate, which is specified for some C.S0033 tests. You can also set AT Directed Packets, which helps you optimize PER test throughput (see [“AT Directed Packets”](#) on page 156).

Packet Error Rate Setup	Value
Confidence Level	95.00 %
PER Requirement	1.00 %
Maximum Packet Count	10000
Control Channel Data Rate	76.8 kbps
AT Directed Packets	50 %
Trigger Arm	Continuous
Measurement Timeout	Off

5. Select Close Menu (**F6**) to close the Packet Error Rate Setup window.

## Measuring Packet Error Rate (PER)

- From the **Call Params** menu, configure **Cell Power (F7)** and **FTAP Rate (F11)**, as needed.
- From the **Control** menu, configure **AWGN Power (F3)**, as needed. (If you set **AWGN Power** too high relative to **Cell Power**, you may drop the connection).
- Measure PER:
  - If the **Trigger Arm** field is set to **Single**, press the **START SINGLE** key to trigger each measurement.
  - If the **Trigger Arm** field is set to **Continuous** the measurement began executing as soon as you initialized it in step 3.

A typical display is shown below:

Packet Error Rate	
<b>Confidence</b>	<b>PER</b>
<b>Pass</b>	<b>0.00 %</b>
<b>Packet Error Count:</b>	<b>0</b>
<b>Packets Tested:</b>	<b>327</b>
<b>Maximum Packet Count:</b>	<b>10000</b>
<b>Eb/Nt:</b>	<b>2.19 dB</b>
<b>PER Requirement:</b>	<b>1.00 %</b>
	Single

### Testing 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN

For details on performing the steps below, see the [“General Procedure” on page 667](#) above.

- C.S0033 specifies to set the AN forward packet activity to 100%. Forward packet activity is fixed in the test set, always set to 100%. See [“Fixed Settings” on page 168](#).
- Set up a Test Application session and open an FTAP connection.
- Initialize the PER measurement.
- Set **AT Directed Packets** as needed.
- Set the **Control Channel Data Rate** to 38.4 kbps.
- C.S0033 specifies to set **Pilot Drop** to -14 dB. **Pilot Drop** is a fixed parameter in the test set, always set to -14 dB. See [“Fixed Settings” on page 168](#).
- Set  $\hat{I}_{or}$  (**Cell Power**) to -55 dBm/1.23 MHz.
- Set  $I_{oc}$  (**AWGN Power**) and **Data Rate/Slots per Physical Layer Packet (FTAP Rate)** for tests 1-20 as specified by C.S0033.
- Set **Confidence Level** to 95% and **PER Requirement** as specified by C.S0033.
- Set **Maximum Packet Count** as desired.
- Measure PER for tests 1-20.



### Testing 3.1.1.3.1 Receiver Sensitivity and Dynamic Range

For details on performing the steps below, see the [“General Procedure” on page 667](#) above.

1. Set up a Test Application session and open an FTAP connection.
2. Initialize the PER measurement.
3. Set AT Directed Packets as needed.
4. Test 1 Receiver Sensitivity: Set FTAP Rate to 307.2 (2 Slot) and  $\hat{I}_{or}$  (Cell Power) to -105.5 dBm/1.23 MHz.
5. Test 2 Dynamic Range: Set FTAP Rate to 2457.6 (1 Slot) and  $\hat{I}_{or}$  (Cell Power) to -25 dBm/1.23 MHz.
6. Set Confidence Level to 95% and PER Requirement to 0.50%.
7. Set Maximum Packet Count as desired.
8. Measure PER for each test.

### Related Topics

[“Packet Error Rate \(PER\) Measurement Description” on page 56](#)

[“Programming a Packet Error Rate \(PER\) Measurement” on page 278](#)

[“3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN” on page 59](#)

[“3.1.1.3.1 Receiver Sensitivity and Dynamic Range” on page 60](#)

[“Packet Error Rate Measurement Troubleshooting” on page 719](#)

---

## Measuring Time Response of Open Loop Power Control (TROLPC)

- [“General Procedure”](#)
- [“Testing 3.1.2.3.2 Time Response of Open Loop Power Control”](#)

### General Procedure

---

**NOTE** Channel power calibration should be performed if the test set is being used for the first time or the operating environment has changed significantly since the last calibration was performed. The channel power calibration also calibrates the TROLPC measurement. See [“Calibrating the Test Set” on page 98](#) for details.

---

1. Connect the access terminal to the test set’s front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?” on page 647](#) for more details.
2. Open an RTAP connection (see [“How Do I Open a Session and Connection?” on page 647](#) for more details):
  - Select Application Config (**F10** on the Call Params menu).
    - Set Application to RTAP.
    - C.S0033 does not specify that the R-ACK Channel must be active for 3.1.2.3.2 Time Response of Open Loop Power Control. If the R-ACK Channel is active during this test, the access terminal’s power may fall outside of the mask specifications. To help ensure that your access terminal does not fail this test, you should disable the R-ACK Channel as follows:
      - Set ACK Channel Bit Fixed Mode Attribute to Off.
      - Set AT Directed Packets to 0%.

---

**IMPORTANT** After completing TROLPC testing, you must return [“ACK Channel Bit Fixed Mode Attribute”](#) to on and set [“AT Directed Packets”](#) to a non-zero value, if needed.

---

- Select Close Menu (**F6**).
  - Set RTAP Rate (**F12** on the Call Params menu), as needed.
  - Select Start Data Connection (**F3** on the Control 2 of 2 menu).
3. Initialize the TROLPC measurement:
    - Press the **Measurement selection** key.
    - Turn the knob to highlight the Time Response of Open Loop Power Control measurement and press the knob.

---

**NOTE** If any measurements are open during initiation of a TROLPC, the test set will automatically close them and display an error message indicating the last measurement that was closed.

---

## Measuring Time Response of Open Loop Power Control (TROLPC)

4. Select Time Response of OLPC Setup (F1) to access the Time Response of OLPC Setup menu. You can also configure AT directed packets and ACK channel bit fixed mode attribute from this menu.

Time Response of OLPC Setup	Value
AT Directed Packets	50 %
ACK Channel Bit Fixed Mode Attribute	Off
Measurement Timeout	Off

5. Select Close Menu (F6) to close the Time Response of OLPC Setup window.
6. From the Call Params menu, configure Cell Power (F7), as needed.
7. Measure TROLPC:
- Select Start Meas Up (F2), which automatically increases Cell Power by 20 dB and captures the resulting access terminal output power for 100 ms, or
  - Select Start Meas Down (F3) which automatically decreases Cell Power by 20 dB and captures the resulting access terminal output power for 100 ms.
  - You may also select START SINGLE to start the measurement. The cell power will increase by 20 dB if Start Meas Up was last performed (or if the test set is in a preset state), or decrease by 20 dB if Start Meas Down was last performed.
8. After the measurement has completed, select Marker (F4) and turn the knob to display power at points along the access terminal output power trace. If the test failed, next to the word "Fail," the first data point at which the test failed is displayed.

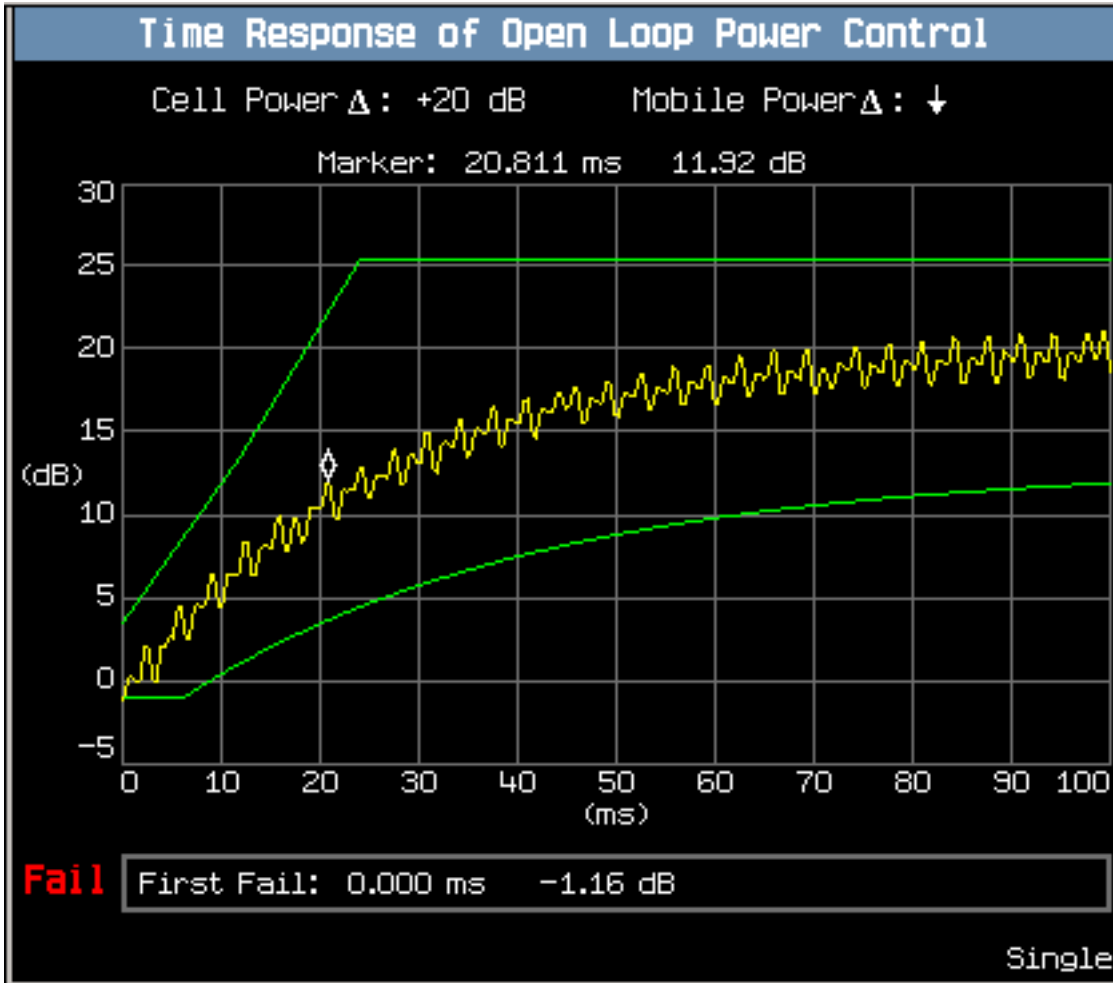
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**NOTE** As specified by C.S0033, the AT output power level curve is shown in absolute terms. The delta expressions above the display indicate the direction of power change.

---

## Measuring Time Response of Open Loop Power Control (TROLPC)

An example of a “Fail” test result is shown below.



---

**IMPORTANT** After completing TROLPC testing, you must return “[ACK Channel Bit Fixed Mode Attribute](#)” to on and set “[AT Directed Packets](#)” to a non-zero value appropriate for your test setup.

---

### Testing 3.1.2.3.2 Time Response of Open Loop Power Control

For details on performing the steps below, see the “[General Procedure](#)” on page 670 above.

1. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 9.6 kbps.
2. Configure the Test Application FTAP so that the ACK Channel is not transmitted by the access terminal, by setting ACK Channel Bit Fixed Mode Attribute to Off and AT Directed Packets to 0%.
3. Initialize the TROLPC measurement.
4. Set  $\hat{I}_{or}$  (Cell Power) to -60 dBm/1.23 MHz.

## Measuring Time Response of Open Loop Power Control (TROLPC)

5. C.S0022 specifies to send alternating '0' and '1' power control bits on the Forward Traffic Channel. When you start the TROLPC measurement, the test set automatically sends alternating closed loop power control bits during the test.
6. Measure TROLPC:
  - Select `Start Meas Up (F2)`, (cell power transitions to -40 dBm/1.23 MHz), and note the pass/fail result.
  - Select `Start Meas Down (F3)`, (cell power transitions to -60 dBm/1.23 MHz), and note the pass/fail result.
  - Select `Start Meas Down (F3)`, (cell power transitions to -80 dBm/1.23 MHz), and note the pass/fail result.
  - Select `Start Meas Up (F2)`, (cell power transitions to -60 dBm/1.23 MHz), and note the pass/fail result.

### Related Topics

[“Time Response of Open Loop Power Control \(TROLPC\) Measurement Description” on page 66](#)

[“Programming a Time Response of Open Loop Power Control \(TROLPC\) Measurement” on page 289](#)

[“3.1.2.3.2 Time Response of Open Loop Power Control” on page 71](#)

[“Time Response of Open Loop Power Control Troubleshooting” on page 722](#)

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## Measuring TX Spurious Emissions

- [“General Procedure”](#)
- [“Testing 3.1.2.4.1 Conducted Spurious Emissions”](#)

### General Procedure

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**NOTE** Channel power calibration should be performed if the test set is being used for the first time or the operating environment has changed significantly since the last calibration was performed. The channel power calibration also calibrates the TX spurious emissions measurement. See [“Calibrating the Test Set” on page 98](#) for details.

---

1. Connect the access terminal to the test set’s front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?” on page 647](#) for more details.
2. Open an RTAP connection (see [“How Do I Open a Session and Connection?” on page 647](#) for more details):
  - Select Application Config (**F10** on the Call Parm menu).
  - Set Application to RTAP. Select Close Menu (**F6**)
  - Set RTAP Rate (**F12** on the Call Parm menu), as needed.
  - Select Start Data Connection (**F3** on the Control 2 of 2 menu).
3. Initialize the TX spurious emissions measurement:
  - Press the **Measurement selection** key.
  - Turn the knob to highlight the TX Spurious Emissions measurement and press the knob.

## Measuring TX Spurious Emissions

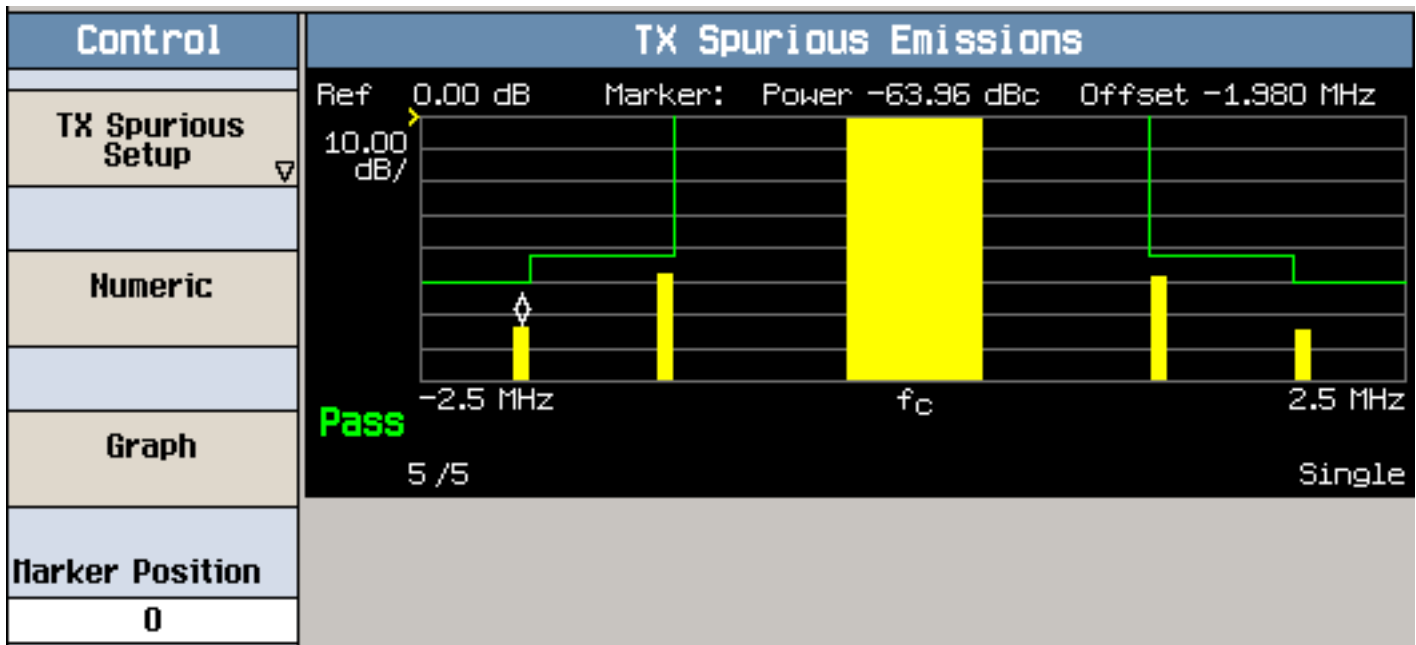
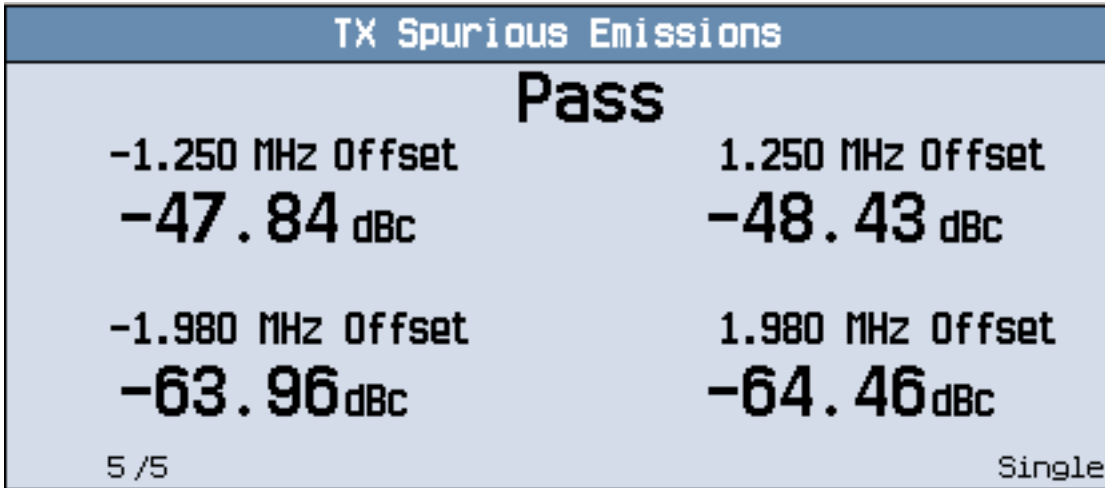
4. Select TX Spurious Emissions Setup (**F1**) to access the TX Spurious Emissions Setup menu. From this menu you can configure measurement parameters such as Mask Control and Adjacent Limit and Alternate Limit. (These parameters are only available when Mask Control is set to Manual, see “TX Spurious Emissions Measurement Parameters” on page 74 for more information.) For statistical measurement results, highlight the Multi-Measurement Count parameter and press the **ON** key. The number of averages will default to 10.

TX Spurious Emissions Setup	Value
Multi-Measurement Count	5
Open Loop Adjust	81 dB
Mask Control	Auto
Adjacent Limit	-42.00 dB
Alternate Limit	-50.00 dB
Trigger Arm	Single
Measurement Timeout	5.0 s

5. Select Close Menu (**F6**) to close the TX Spurious Emissions Setup window.
6. From the Call Params menu, configure Cell Power (**F7**), as needed.
7. Measure TX spurious emissions:
  - If the Trigger Arm field is set to Single, press the **START SINGLE** key to trigger each measurement.
  - If the Trigger Arm field is set to Continuous, the measurement began executing as soon as you initialized it in step 3.
8. Select Graph (**F3**) to display a graphical view of the results, or Numeric (**F2**) to display numeric results.
9. When viewing the graphical display, you can select Marker Position (**F4**) and turn the knob to display the spurious emissions levels at each of the frequency offsets.

## Measuring TX Spurious Emissions

Typical numeric and graphical measurement results are shown below:



### Testing 3.1.2.4.1 Conducted Spurious Emissions

For details on performing the steps below, see the [“General Procedure” on page 674](#) above.

1. Initialize the TX spurious emissions measurement.
2. Set Open Loop Adjust to 81 dB or 84 dB, depending upon band class (Open Loop Adjust is available from the TX Spurious Emissions Setup (F1) window).
3. Set the following access parameters (see [“How Do I Change Access Parameters?” on page 640](#)):
  - Set Probe Initial Adjust to 15 dB.
  - Set Probe Power Step to 7.5 dB/step (this step will be removed from C.S0033 in January 2003).



## Measuring TX Spurious Emissions

- Set Probe Num Step to 15 probes/sequence (this step will be removed from C.S0033 in January 2003).
  - Set Probe Sequence Max to 15 sequences (this step will be removed from C.S0033 in January 2003).
4. Set up a Test Application session and open an RTAP connection with a Reverse Data Channel rate of 153.6 kbps.
  5. C.S0033 specifies to configure the Test Application FTAP with a Forward Traffic Channel rate of 307.2 kbps (2-slot version), such that the ACK Channel is transmitted at all the slots. To do this, set FTAP Rate (**F11** on the Call Params menu) to 307.2 (2 Slot) and set ACK Channel Bit Fixed Mode to On (under Application Config, **F10**).
  6. Set  $\hat{I}_{or}$  (Cell Power) to -105.5 dBm/1.23 MHz.
  7. Set Rvs Power Ctrl to All Up bits (**F7** on the Call Params 2 of 3 menu) to transmit continuous up power control bits.
  8. Measure TX Spurious Emissions, and note the pass/fail result.

### Related Topics

[“TX Spurious Emissions Measurement Description” on page 74](#)

[“Programming a Tx Spurious Emissions Measurement” on page 292](#)

[“3.1.2.4.1 Conducted Spurious Emissions” on page 78](#)

[“Tx Spurious Emissions Measurement Troubleshooting” on page 724](#)

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## Measuring Waveform Quality + Code Domain Power

- [“General Procedure” on page 678](#)
- [“Testing 3.1.2.2.2 Waveform Quality and Frequency Accuracy” on page 681](#)
- [“Testing 3.1.2.3.7 RRI Channel Output Power” on page 682](#)
- [“Testing 3.1.2.3.8 Code Domain Power” on page 682](#)

### General Procedure

---

**NOTE** Channel power calibration should be performed if the test set is being used for the first time or the operating environment has changed significantly since the last calibration was performed. The channel power calibration also calibrates the waveform quality + code domain measurement. See [“Calibrating the Test Set” on page 98](#) for details.

---

1. Connect the access terminal to the test set's front panel **RF IN/OUT** connector and power it on. If the access terminal does not automatically open a session, perform whatever actions are necessary to open a session. See [“How Do I Open a Session and Connection?” on page 647](#) for more details.
2. Open an RTAP connection (see [“How Do I Open a Session and Connection?” on page 647](#) for more details):
  - Select Application Config (**F10** on the Call Params menu).
  - Set Application to RTAP. Select Close Menu (**F6**)
  - Set RTAP Rate (**F12** on the Call Params menu), as needed.
  - Select Start Data Connection (**F3** on the Control 2 of 2 menu).
3. Initialize the waveform quality + code domain measurement:
  - Press the **Measurement selection** key.
  - Turn the knob to highlight the Waveform Quality + Code Domain measurement and press the knob.

## Measuring Waveform Quality + Code Domain Power

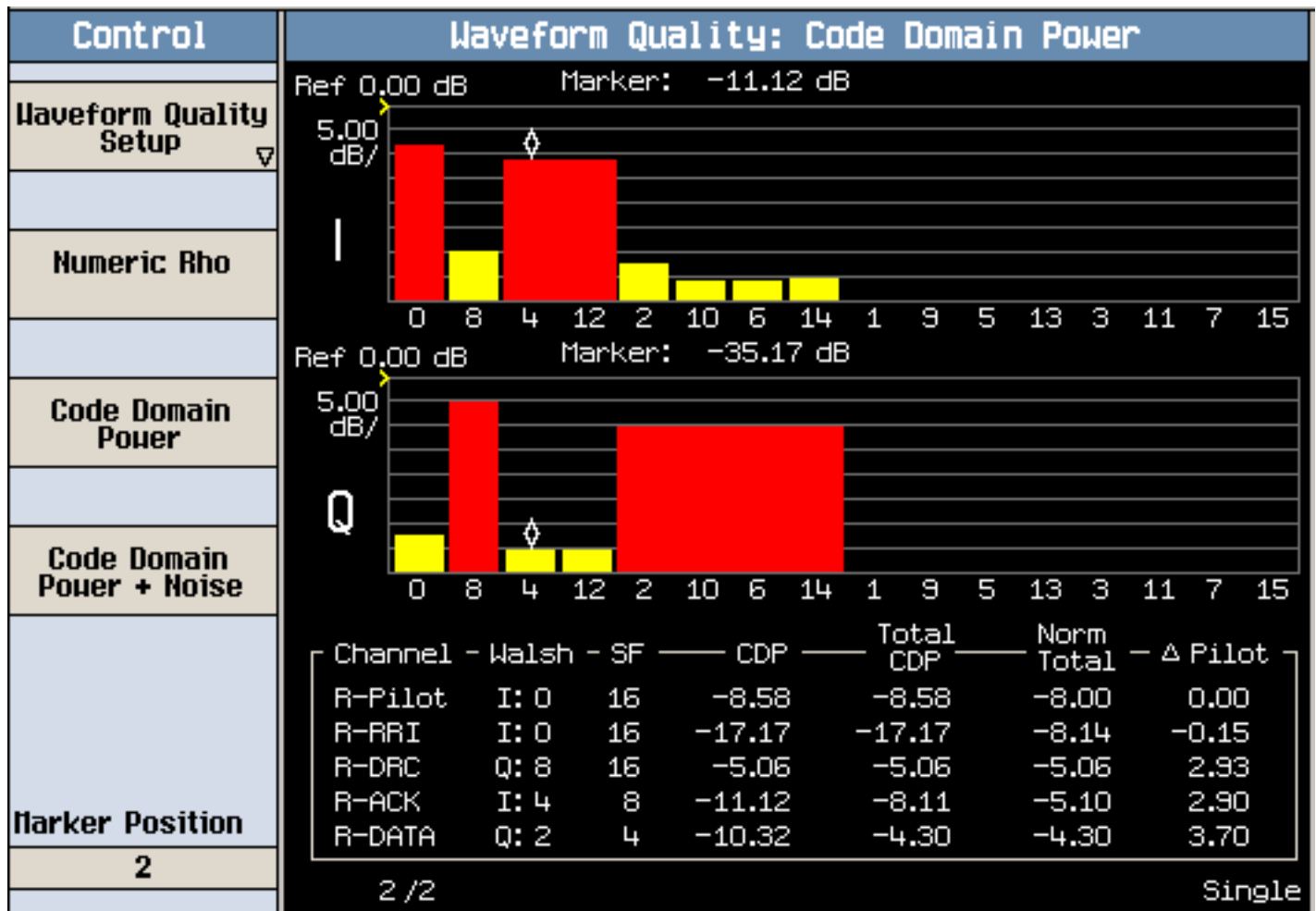
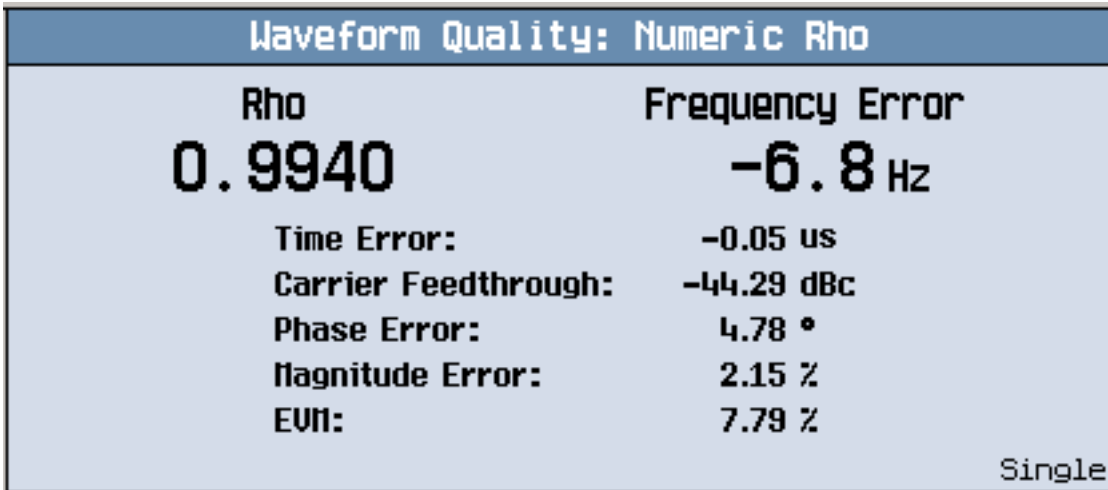
4. Select **Waveform Quality + Code Domain Setup (F1)** to access the **Waveform Quality + Code Domain Setup** menu. From this menu you can configure measurement parameters such as **Slots to Measure** and **DRC Channel Gain**. For statistical measurement results, highlight the **Multi-Measurement Count** parameter and press the **ON** key. The number of averages will default to 10.

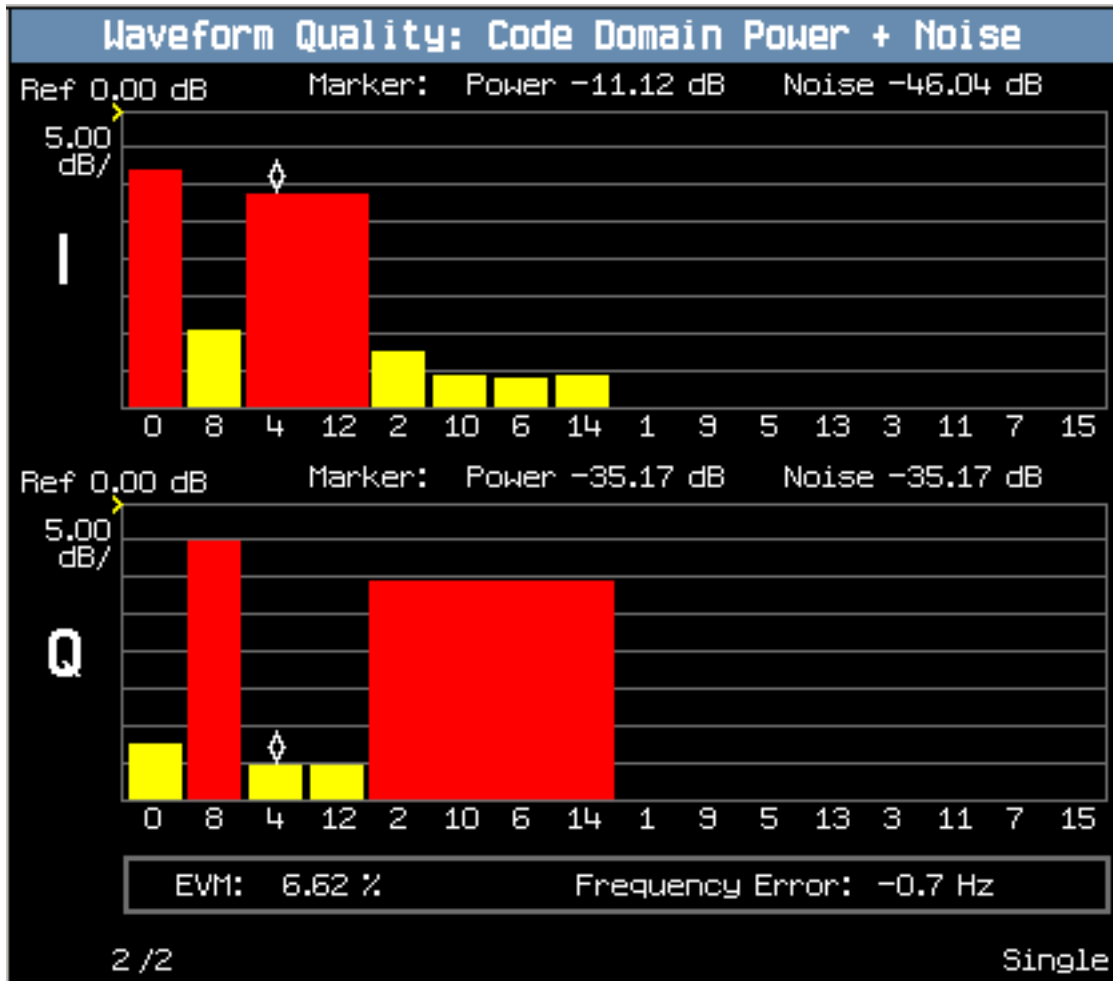
Waveform Quality Setup	Value
<b>Multi-Measurement Count</b>	<b>Off</b>
<b>Slots To Measure</b>	<b>1</b>
<b>Ack Channel Gain</b>	<b>3.0 dB</b>
<b>DRC Channel Gain</b>	<b>3.0 dB</b>
<b>Trigger Arm</b>	<b>Continuous</b>
<b>Measurement Timeout</b>	<b>Off</b>

5. Select **Close Menu (F6)** to close the **Waveform Quality + Code Domain Setup** window.
6. From the **Call Params** menu, configure **Cell Power** and **RTAP Rate**, as needed.
7. Measure waveform quality + code domain noise:
  - If the **Trigger Arm** field is set to **Single**, press the **START SINGLE** key to trigger each measurement.
  - If the **Trigger Arm** field is set to **Continuous**, the measurement began executing as soon as you initialized it in step 3.
8. Select **Numeric Rho (F2)** to view the waveform quality results, **Code Domain Power (F3)** or **Code Domain Power + Noise (F4)** to view the code domain results.
9. When viewing the code domain results, you can select **Marker Position (F6)** and turn the knob to select a Walsh code and display its power.

## Measuring Waveform Quality + Code Domain Power

Typical measurement results are shown below:





### Testing 3.1.2.2.2 Waveform Quality and Frequency Accuracy

For details on performing the steps below, see the “General Procedure” on page 678 above.

1. Set up a Test Application session and open an RTAP connection with RTAP Rate set to 9.6 kbps.
2. C.S0033 specifies to configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots. To do this, set FTAP Rate (F11) to 38.4 kbps and set ACK Channel Bit Fixed Mode to On (under Application Config, F10).
3. Initialize the waveform quality + code domain measurement.
4. Set Slots to Measure to 1.
5. Set  $\hat{I}_{or}$  (Cell Power) to -75 dBm/1.23 MHz.
6. Measure waveform quality + code domain.
7. Select Numeric Rho (F2) to view the Rho, Frequency Error and Time Error results.

## Measuring Waveform Quality + Code Domain Power

### Testing 3.1.2.3.7 RRI Channel Output Power

For details on performing the steps below, see the “General Procedure” on page 678 above.

1. Set up a Test Application session and open an RTAP connection.
2. Initialize the waveform quality + code domain measurement.
3. Set Slots to Measure to 8.
4. Set  $\hat{I}_{or}$  (Cell Power) to -75 dBm/1.23 MHz.
5. Measure waveform quality + code domain.
6. Select Code Domain Power (F3) to view the R-RRI  $\Delta$  Pilot result (available in the last column of the table of data).

### Testing 3.1.2.3.8 Code Domain Power

For details on performing the steps below, see the “General Procedure” on page 678 above.

#### Testing 3.1.2.3.8.1 DRC Channel Output Power

1. Initialize the waveform quality + code domain measurement.
2. Set Slots to Measure to 2.
3. Set DRC Channel Gain to 0 dB.
4. Set up a Test Application session and open an RTAP connection.
5. C.S0033 specifies to configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots. To do this, set FTAP Rate (F11) to 38.4 kbps and set ACK Channel Bit Fixed Mode to On (under Application Config, F10).
6. Set  $\hat{I}_{or}$  (Cell Power) to -75 dBm/1.23 MHz.
7. Measure waveform quality + code domain.
8. Select Code Domain Power (F3) to view the R-DRC  $\Delta$  Pilot result (available in the last column of the table of data).
9. Set DRC Channel Gain to 3 dB and repeat steps 5 and 6.

#### Testing 3.1.2.3.8.2 ACK Channel Output Power

1. Initialize the waveform quality + code domain measurement.
2. Set Slots to Measure to 2.
3. Set ACK Channel Gain to 0 dB.
4. Set up a Test Application session and open an RTAP connection.
5. C.S0033 specifies to configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots. To do this, set FTAP Rate (F11) to 38.4 kbps and set ACK Channel Bit Fixed Mode to On (under Application Config, F10).
6. Set  $\hat{I}_{or}$  (Cell Power) to -75 dBm/1.23 MHz.

7. Measure waveform quality + code domain.
8. Select Code Domain Power (**F3**) to view the R-ACK  $\Delta$  Pilot result (available in the last column of the table of data).
9. Set ACK Channel Gain to 3 dB and repeat steps 5 and 6.

### Testing 3.1.2.3.8.3 Data Channel Output Power

1. Initialize the waveform quality + code domain measurement.
2. Set Slots to Measure to 2.
3. Set Data Offset Nom and Data Offset <rate> (for all rates) to 0 dB (see [“How Do I Change Channel Gain Parameters?”](#) on page 638).
4. Set up a Test Application session and open an RTAP connection with RTAP Rate set to 9.6 kbps.
5. C.S0033 specifies to configure the Test Application FTAP with a Forward Traffic Channel rate of 38.4 kbps, and such that the ACK Channel is transmitted at all the slots. To do this, set FTAP Rate (**F11**) to 38.4 kbps and set ACK Channel Bit Fixed Mode to On (under Application Config, **F10**).
6. Set  $\hat{I}_{or}$  (Cell Power) to -75 dBm/1.23 MHz.
7. Measure waveform quality + code domain.
8. Select Code Domain Power (**F3**) to view the R-Data  $\Delta$  Pilot result (available in the last column of the table of data).
9. Repeat steps 5 and 6 with RTAP rates of 19.2, 38.4 and 76.8 kbps.
10. Repeat steps 5 and 6 with an RTAP rate of 153.6 kbps. Then use the marker to measure the power in all inactive Walsh codes.

## Related Topics

[“Waveform Quality + Code Domain Measurement Description”](#) on page 80

[“Programming a Waveform Quality/Code Domain Measurement”](#) on page 295

[“3.1.2.2.2 Waveform Quality and Frequency Accuracy”](#) on page 93

[“3.1.2.3.7 RRI Channel Output Power”](#) on page 94

[“3.1.2.3.8 Code Domain Power”](#) on page 95

[“Waveform Quality Measurement Troubleshooting”](#) on page 725

## How Do I Use the Spectrum Monitor?

## How Do I Use the Spectrum Monitor?

The following procedure shows a typical usage of the spectrum monitor in each of its two modes of operation; Swept Mode and Zero Span mode.

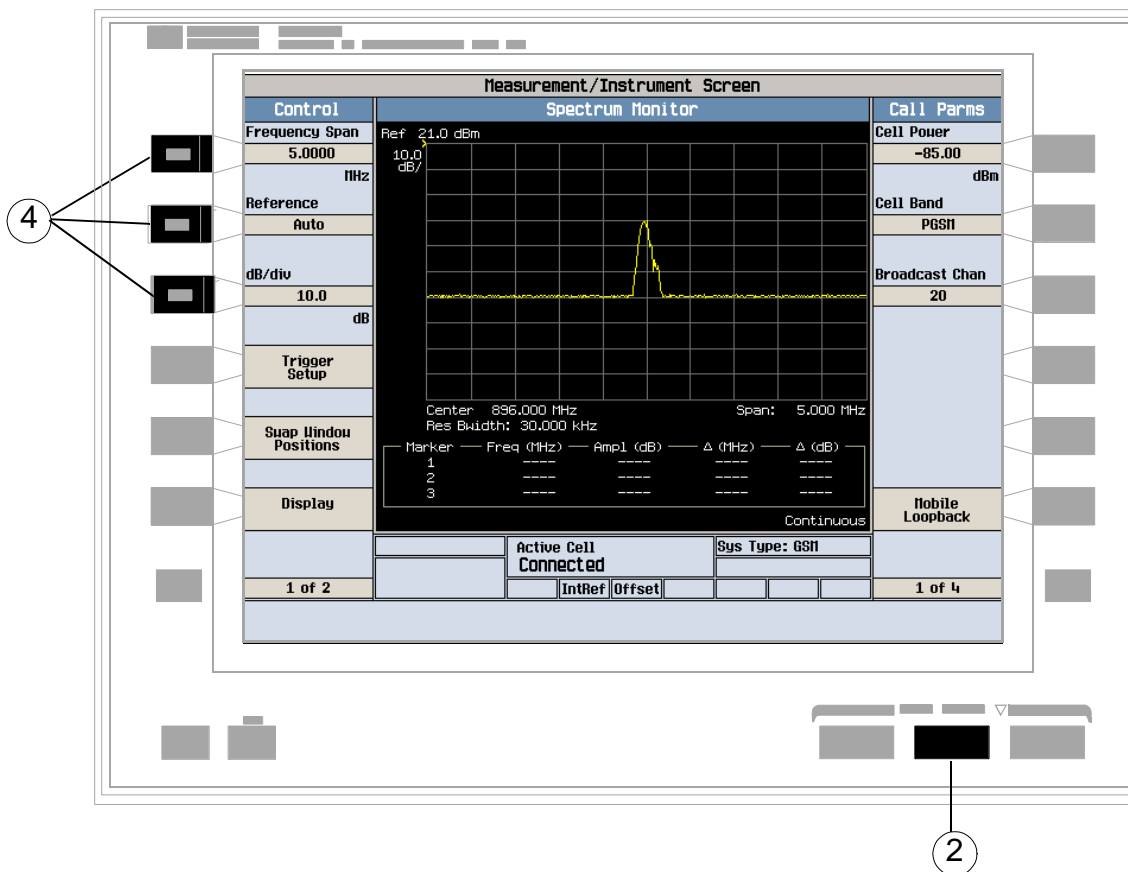
1. Establish a call with the mobile.

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**NOTE** The spectrum monitor can also be used with any of the test set's test mode operating modes.

---

2. Press the Instrument selection key.
3. Select Spectrum Monitor.

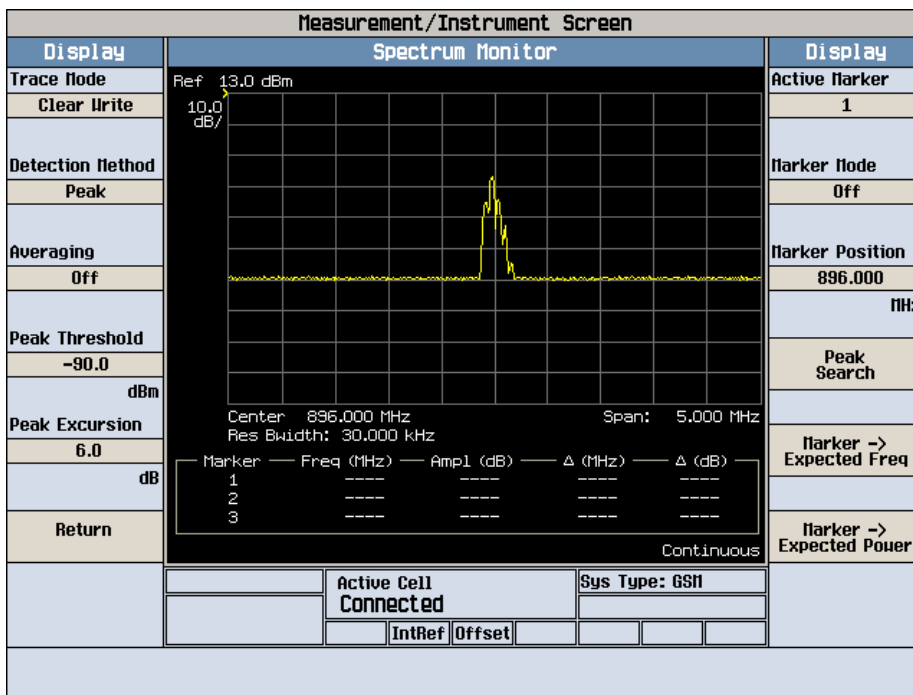


The spectrum monitor is displayed with the default settings as shown above. The center frequency is initially set at the expected frequency maintained by the test set's base station emulator. The Swap Window Positions (F5) key is only displayed when other measurements are active at the same time as the spectrum monitor.

4. Set the axis control as needed for your testing situation using the Frequency Span (F1), Reference (F2), and dB/div (F3) keys. For example, if you want to set the reference level manually (Auto is the default), press the Reference (F2) key then use the DATA ENTRY keys to enter the value you want.



5. Press the Trigger Setup (F4) key to access the Trigger Setup menu.
6. Set the trigger settings to meet your testing needs. For example:
  - If you want the Spectrum Monitor to sweep immediately and continuously, ensure that Trigger Arm (F3) is set to Continuous.
  - If you want to use external triggering, so that the Spectrum Monitor is triggered from a signal applied to the TRIG IN connector on the test set's rear panel, set Trigger Source (F1) to External.
  - Trigger Delay (F2) allows you to specify the point, relative to the trigger event where samples are taken (a negative trigger delay value collects pre-trigger samples). The same trigger delay setting is used for swept mode and zero span mode.
7. Press the Return (F6) key to exit the Trigger Setup menu.
8. Press the Display (F6) key to access the display settings.



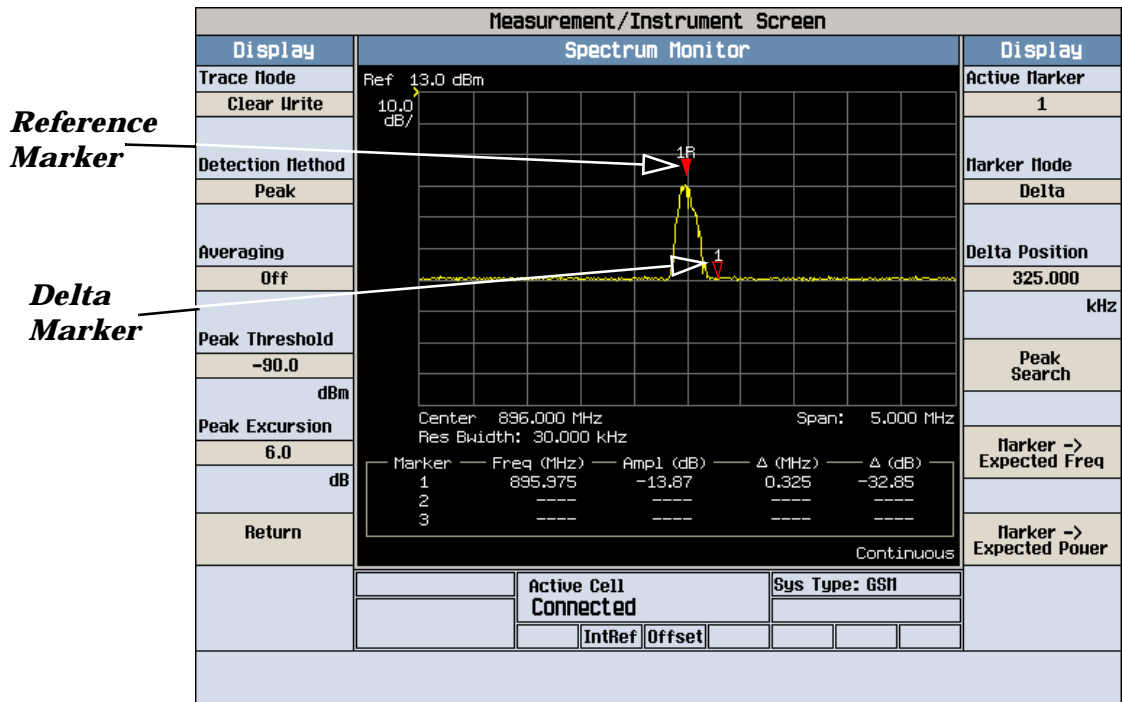
A typical spectrum monitor trace display is shown above. In this case, the Display menu is open allowing you to access all of the display control settings using the (F1) through (F12) keys.

The following list provides examples of some of the settings you may want to adjust:

- Peak Threshold (F4) and Peak Excursion (F5) set the peak threshold and peak excursion levels respectively. A peak is identified by using the peak threshold and peak excursion value. A point is only marked as a peak if it rises and falls more than the peak excursion value from the peak threshold value.
- Marker Mode (F8) sets the mode of the active marker. Position mode activates a single frequency marker at the center frequency. (Note that the center frequency can be changed by setting the Receiver Control to Manual, and changing the Manual Freq setting.) Delta mode freezes the active marker at its current location and uses it as a reference marker. A second marker is created at the position of the reference marker and is used as a delta marker, reporting any change in amplitude or frequency from that of the reference marker.

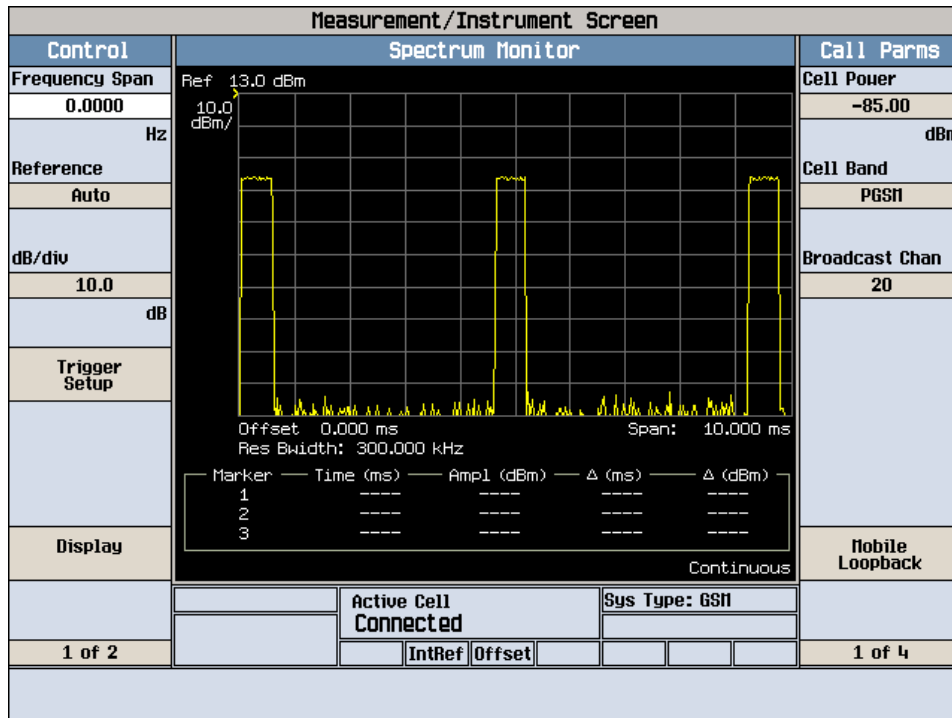
## How Do I Use the Spectrum Monitor?

- Peak Search (**F10**) moves the active marker to the highest peak on the spectrum monitor display, returning the numeric amplitude and frequency values.
- Marker -> Expected Freq (**F11**) sets the base station emulator's expected frequency to the frequency of the active marker.
- Marker -> Expected Power (**F12**) sets the base station emulator's expected power level to the amplitude of the active marker.



A typical swept mode spectrum monitor display is shown above. In this case, the active marker is marker 1, which is set to Delta mode.

9. Press the Return (**F6**) key to exit the Display menu.
10. To set the spectrum monitor to zero span mode, press the Frequency Span (**F1**) key and use the numeric DATA ENTRY keys to enter a value of 0 MHz, or use the down-arrow key to reduce the span to zero.

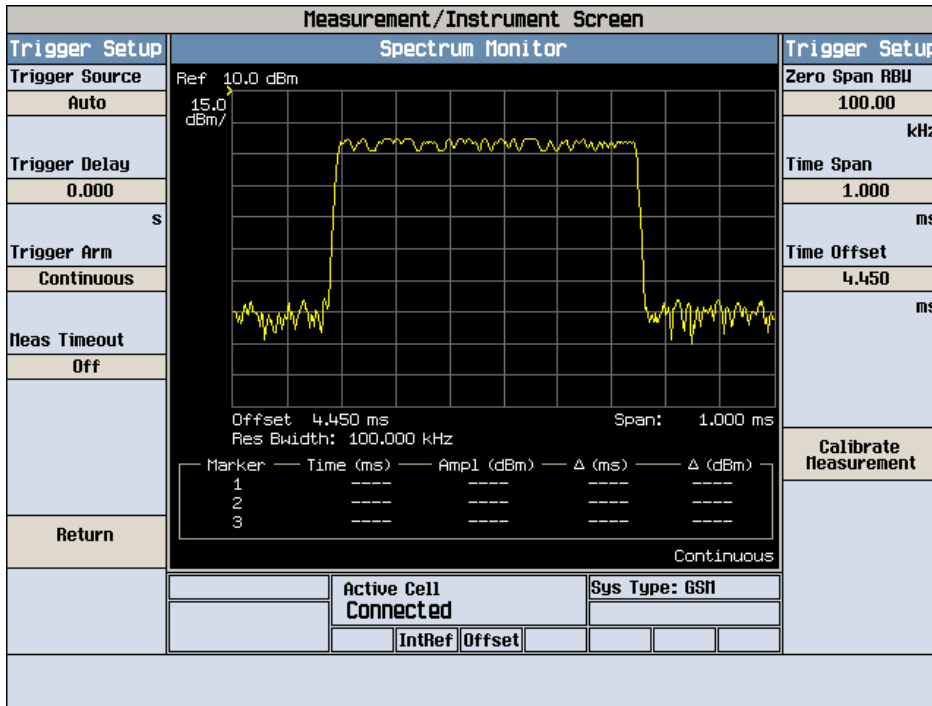


A typical zero span mode spectrum monitor display is shown above. Like swept mode, the Y-axis represents absolute amplitude. However, the X-axis now represents time rather than frequency.

11. Press the Trigger Setup (F6) key. In zero span mode, additional trigger setup controls are available to you:

- If you want to change the view window over which you are looking at the signal, use the Time Span (F8) and Time Offset (F9) keys. The measurement is made for the duration of the time span, beginning at the time defined by the trigger event plus the trigger delay plus the time offset.
- If you want to change the resolution bandwidth, press the Zero Span RBW (F7) key and select a value. (To measure the total power of a signal you must select a resolution bandwidth greater than or equal to the signal bandwidth.) Note that changing the zero span resolution bandwidth does not modify the swept mode resolution bandwidth.

## How Do I Use the Spectrum Monitor?



A typical zero span mode spectrum monitor display showing a bursted signal. The viewing window has been adjusted to zoom in on a single burst.

If the temperature of the test set drifts outwith the calibrated temperature range of the spectrum monitor, a Measurement Uncalibrated message is displayed. To calibrate the spectrum monitor for the current temperature, press the Calibrate Measurement (F11) key on the Trigger Setup menu.

---

# Help Mode

## Description

This section explains:

- “What is Help Mode?”
- “How do I use the help mode?”

## What is Help Mode?

The help mode implemented in your test set provides context sensitive GPIB command syntax assistance. When you put the test set into help mode, the test set displays the GPIB command syntax necessary to perform an action remotely for each action you perform from the front panel.

For example, if you put the test set into help mode and then select the test set's GPIB address, the GPIB command syntax for changing it remotely appears in the bottom left hand corner of the test set's screen.

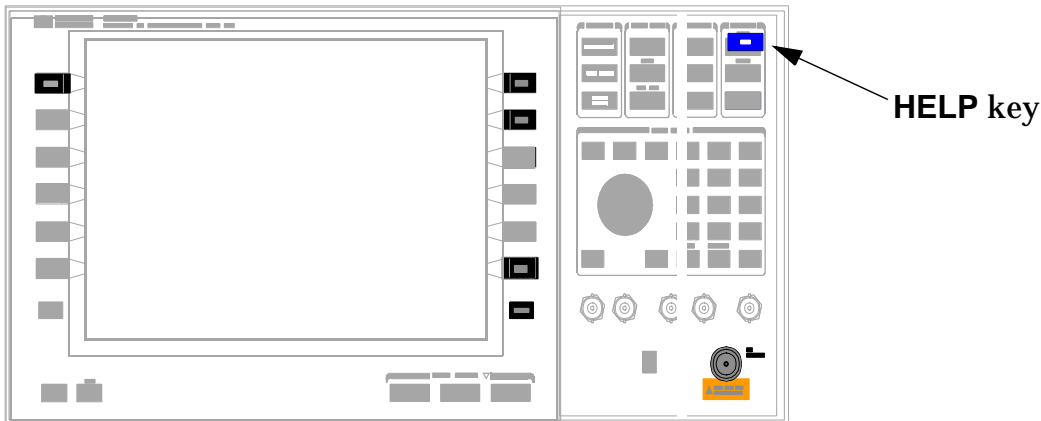
---

**NOTE** Operating the test set in Help Mode does not prevent you from changing parameters from the front panel. The parameters you change while in Help Mode are applied just as they would be normally.

---

## How do I use the help mode?

1. Put the test set into help mode by pressing the **HELP** key on the front panel.



## Help Mode

The Help annunciator should now be displayed in the bottom of the screen.

Background	Active Cell Idle	Sys Type: GPRS
		Logging: Disconnect
	Offset	Help

Indicates the test set is in HELP mode.

2. Navigate to the screen and perform the action for which you would like to know the GPIB command syntax. For example, you could navigate to the Audio Generator instrument, and select Frequency (F3). The GPIB command syntax to perform this action remotely appears in the bottom left of the screen.

Select Frequency (F3)

GPIB command syntax to set the frequency remotely.

Measurement/Instrument Screen		
Control	Audio Generator	Call Params
Amplitude	Amplitude 0.500 v Pulsed: On	Cell Power
500.00		-85.00
mV	Frequency	dBm
Pulse	1000.0 Hz	Cell Band
On		PGSM
Frequency		Broadcast Chan
1.0000		20
kHz		
Coupling		
DC		
Swap Window Position	Help; AFGenerator:FREQUENCY	
	Sys Type: GPRS	
	Logging: Disconnect	
	Offset	Help
		1 of 3

Help; AFGenerator:FREQUENCY

Refer to the user documentation on each command for more information.

---

## Save and Recall Registers

### Description

The test set provides up to five save/recall registers . Each register is identified by a number (1-5).

### Recalling Saved Registers

Press the **Register recall** hardkey.



Use the knob to scroll to a register that is labeled Full and press the knob.

When a register is recalled, the test set will clear all active measurements and display the Call Setup Screen.

---

**CAUTION** If the test set has had hardware options installed since the last time a registers were saved, delete the registers and re-save them. Failure to perform this step could result in a non-recoverable firmware “assert” when performing a register recall.

---

### Deleting Saved Registers

Pressing the **DELETE** hardkey will display a menu indicating which registers have been saved (they are labeled “Full”).



Use the knob to scroll to a register and press the knob. Select Yes to confirm the selection.

## Save and Recall Registers

### Settings that are Saved

All functions and parameters that have an associated static state or settable value will be saved. For example:

- Cell parameters (System ID, Network ID, etc.)
- Call control parameters (System Type, Operating Mode, etc.)
- Measurement setup parameters (Trigger Arm state, Measurement Timeout, etc.)
- Call Parms (Cell Power, Cell Band, etc.)

### Settings that are not Saved

Functions that trigger immediate actions, such as originating a call or calibrating a measurement are not saved.

Settings saved in non-volatile memory (settings that are unchanged when power is cycled or the test set is preset) are not saved. For example:

- LAN IP Address
- Date/Time
- RF IN/OUT Amplitude Offset
- All other settings on the Instrument Setup menu on the System Config screen.
- Measurement results
- Call status
- Active measurements

Read-only call processing results such as Mobile Station Information tables are not saved.

### Saving Current Settings to a Register

To save the current state of the test set, press the **SAVE** hardkey.



A menu will be displayed that shows the status of all five registers. If the register status is “Full”, the register has had instrument settings saved to it. If the register status is “Empty”, it does not currently contain any instrument settings.



## Save and Recall Registers

Use the knob to scroll to a register and press the knob. If the selected register is currently Full, select Yes in the Overwrite Save Reg? window and it will be overwritten.

Save Registers	Status
Save Register 1	Empty
Save Register 2	Empty
Save Register 3	Empty
Save Register 4	Empty
Save Register 5	Empty

---

**CAUTION** When a test set application is upgraded using the 8960 File Utility Program, the new revision of the application will not automatically retain save/recall registers from the old revision. Prior to the application upgrade, it is recommended that you record the critical settings (such as call setup information) from registers that you will want to re-save after the test application upgrade.

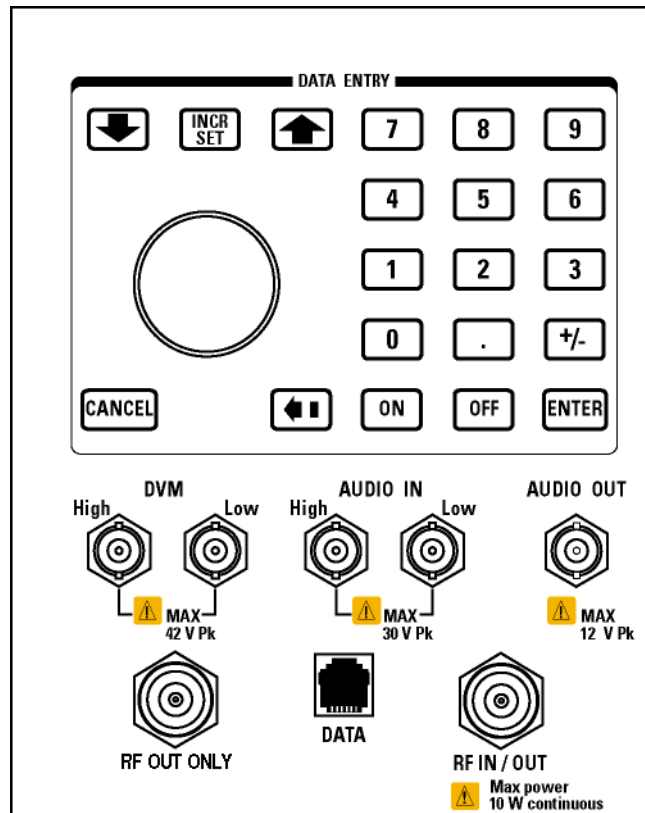
---

### Related Topics

[“SYSTEM:REGister” on page 622](#)

## Front Panel Connectors

### Description



### AUDIO IN

The input to the audio analyzer is a floating input differential amplifier. Both the AUDIO IN High and AUDIO IN Low BNC connectors should be connected to provide noise immunity. Refer to the technical specifications for more information.

### AUDIO OUT

This BNC connector accesses the test set's Audio Generator and FM Demod signals. The Audio Generator is used to stimulate a system to measure audio performance characteristics. The FM Demod allows the user to access the demodulated FM signal for external analysis and baseband processing. Refer to the technical specifications for more information.

---

**NOTE** There will be no guaranteed performance for the signal present at the AUDIO OUT connector when FM Demod signal is selected for output.

---

**DATA**

This RJ-45 connector provides front panel access to the rear panel LAN connection. This connector is used for downloading firmware upgrades, or new test applications into the test set. No other types of communication are possible with the LAN port.

The the DATA connector on the front panel is connected internally to the ETHERNET TO FRONT PANEL connector on the rear panel. In order to use the front panel DATA connector, connect the rear panel LAN PORT, to the rear panel ETHERNET TO FRONT PANEL connector with the LAN jumper cable.

The LAN jumper cable, part number E5515-61160, is supplied with the test set.

**DVM**

Not functional for this release.

**RF IN/OUT**

This Type-N connector is the default path for all RF signals out of the test set, and is *always* used as the RF input. Refer to the technical specifications for more information. See also [“RF OUT ONLY”](#) .

**RF OUT ONLY**

---

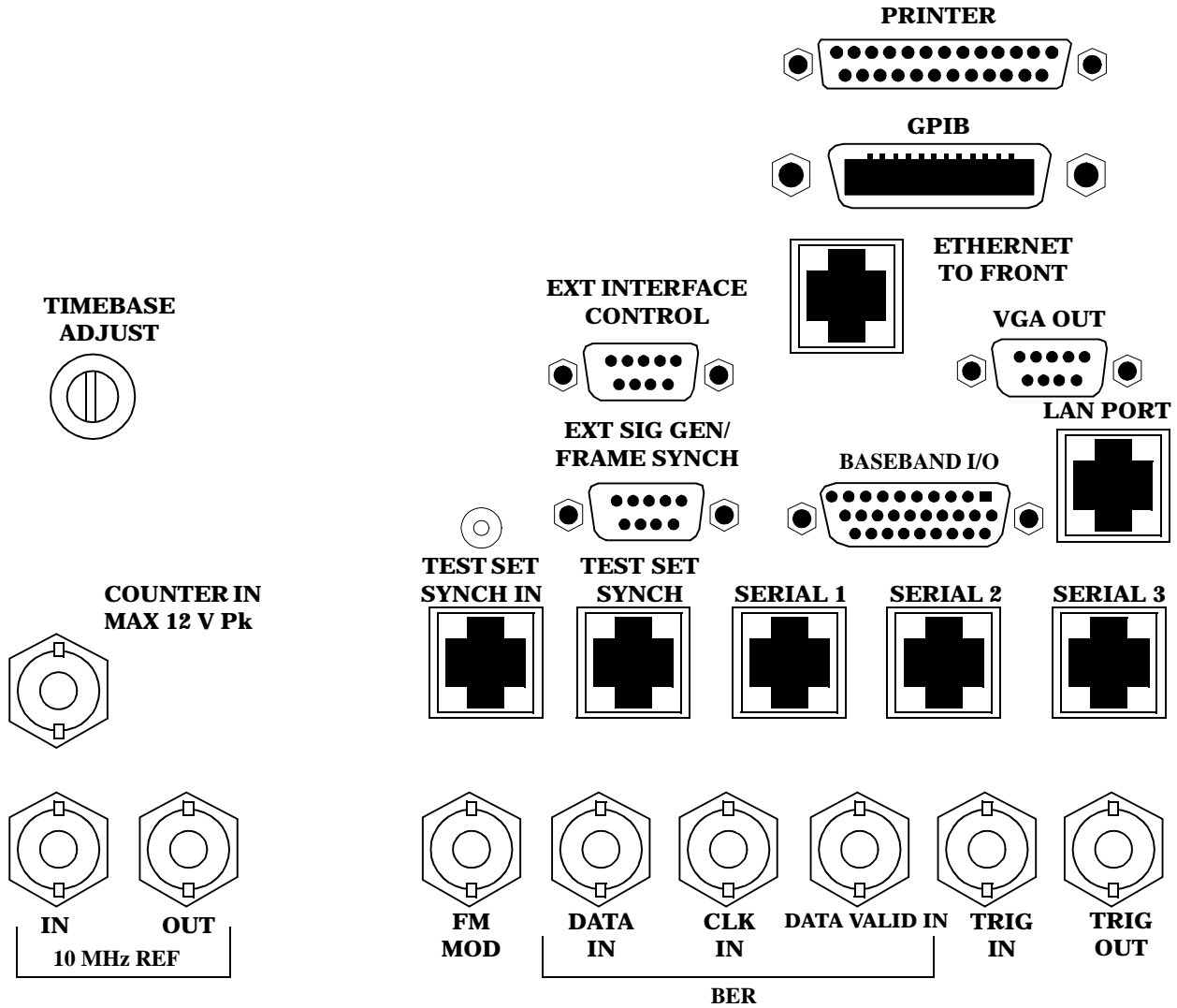
**NOTE** This port cannot be used with the E1960A GSM test application or with the GSM personality in a test application suite (such as the E1985A GSM\_AMPS/136\_GPRS suite).

---

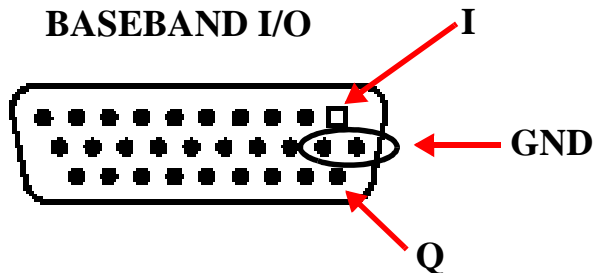
This Type-N connector is an optional path for all RF signals out of the test set. It is intended to be used for duplexed testing. Front panel selection of this port is provided by the RF Output Port (F6) control on the System Config screen, and by the RFGenerator:OUTPut[:DESTination] IO/OUT command. The same amplitude offsets and output power settings are used for either selected port (RF IN/OUT or RF OUT ONLY). Refer to the technical specifications for more information.

# Rear Panel Connectors

## Description



## BASEBAND I/O



Four pins are functional on this connector:

- I channel
- Q channel
- Ground
- Ground

## CLK IN

Not functional for this release.

## COUNTER IN

Not functional for this release.

## DATA IN

Not functional for this release.

## DATA VALID IN

Not functional for this release.

## ETHERNET TO FRONT PANEL

This RJ-45 connector is used with a separate LAN jumper cable to connect the front panel DATA connector to the rear panel LAN PORT.

The the DATA connector on the front panel is connected internally to the ETHERNET TO FRONT PANEL connector on the rear panel. In order to use the front panel DATA connector the user must connect the rear panel LAN PORT, to the rear panel ETHERNET TO FRONT PANEL connector with the LAN jumper cable.

The LAN jumper cable, part number E5515-61160, is supplied with the test set.

## **Rear Panel Connectors**

### **EXT INTERFACE CONTROL**

Not functional for this release.

### **EXT SIG GEN/FRAME SYNCH**

Not functional for this release.

### **FM MOD IN**

This BNC connector let's you use an external signal to frequency modulate the test set's RF generator. It has a fixed sensitivity of 20 KHz/volt, and a frequency range of 100Hz to 20 KHz.

### **GPIB**

The GPIB connector allows test set control with compatible devices.

### **LAN PORT**

This RJ-45 connector provides connection for down loading firmware upgrades, or new test applications into the test set. No other types of communication are possible with the LAN port.

### **PRINTER**

Not functional for this release.

### **SERIAL 1**

Not functional for this release.

### **SERIAL 2**

Not functional for this release.

### **SERIAL 3**

Not functional for this release.

### **TEST SET SYNCH IN**

Not functional for this release.

### **TEST SET SYNCH OUT**

Not functional for this release.

## **TIMEBASE ADJUST**

This is the timebase adjust cover, removing this screw allows access for timebase adjustment.

## **TRIG IN**

Not functional for this release.

## **TRIG OUT**

This BNC connector allows for synchronization of the test set to other equipment and is configured by setting Frame Trigger Parameters.

## **VGA OUT**

This DB-15 connector allows the user to simultaneously route the test set's display to another monitor.

## **10 MHZ REF IN**

This BNC connector accepts an external 10 MHz timebase signal. The nominal input impedance is 50 ohm. This version of test set can only accept a 10 MHz timebase signal.

## **10 MHZ REF OUT**

This BNC connector provides a 10 MHz timebase signal to external test equipment. The accuracy of this signal is determined by the timebase used. The nominal output impedance is 50 ohm with a typical level of 0.5 V rms.

---

## Remote/Local Mode

### Description

#### Remote Mode

When the test set is operated remotely, all of the keys on the front panel of the test set are disabled (except the LOCAL key and the power switch). During remote operation the test set is controlled by the Remote User Interface, (RUI).

Any open menus are be closed, and any manual entries are be aborted when the test set transitions from local mode to remote mode.

The remote annunciator (R) will appear in the Instrument Status Area of the test set's display indicating that the test set is in remote mode.

When the test set is in remote mode press the LOCAL key on the front panel in order to gain manual control.

#### Local Mode

During local mode all front panel keys and the knob are enabled. During local operation the test set is controlled by the Manual User Interface, (MUI).

The remote annunciator (R) is turned off when the test set is operated in local mode.



---

## Printing Screens

### Printing and Saving Screen Images

The test set's local area network (LAN) connection can be used to dump the currently-displayed screen image into a personal computer's web browser. The computer must either be connected to an existing LAN or have a LAN adapter installed that can be connected directly to the test set.

#### Computer Requirements for LAN Communications with the Test Set

The computer used to capture screen images from the test set must meet the following requirements:

- 10 Base-T, IEEE 802.3 compliant, ethernet network interface using TCP/IP protocol and configured to run in half-duplex mode.
- Windows 95, 98, 2000 or NT 4.0 (Windows 95, Windows 98, Windows 2000 and Windows NT 4.0 are U.S. registered trademarks of Microsoft Corporation.)

#### Test Set to Computer Connections

The test set's LAN connection can be made at either the rear-panel LAN PORT or at the front-panel DATA port. When using the DATA port, be sure to have the factory supplied jumper cable installed between the rear-panel LAN PORT and the ETHERNET TO FRONT PANEL port.

Connections from the test set to the computer must be made using the *correct type* of LAN cable:

- If the test set is being connected to the computer through an existing network, use a *standard* LAN cable.
- If the test set is being connected directly to the computer's LAN adapter, use a *crossover* LAN cable (such as the one shipped with the test set or with an older test application upgrade kit).

#### Capturing the Screen Image

1. Press the test set's **SYSTEM CONFIG** key to display the test set's LAN settings, and record the LAN IP Address for use later in this procedure.
2. Start a web browser application on your computer.
3. Display the test set screen that you want to capture.
4. Enter the following address/location into your web browser: `http://<lan address>/display.htm` where <lan address> is the LAN IP address of the *test set*.
5. Within a few seconds, the test set's screen image appears in your browser. If the image does not appear on your browser within 30 seconds, refer to ["Test Your LAN Connections and Configuration by "Pinging" the Test Set"](#) below.
6. To print the image, select **File, Print**.
7. To save the file:
  - a. Select **File**, or right-click on the image, and select **Save As** or **Save Picture As**.
  - b. Enter the desired file name and directory path for saving the image as a GIF file.

The image can now be retrieved from your directory and used as needed.

## Printing Screens

### Test Your LAN Connections and Configuration by “Pinging” the Test Set

*Perform this operation only if you were not successful in downloading the test set screen image into your browser.*

1. Display the Command Prompt window on your computer. This is typically done in the Microsoft Windows operating system by selecting Start -> Programs -> Command Prompts.
2. At the command prompt, enter the following command: `ping <lan address>`. The <lan address> is the test set's LAN IP address. (The command prompt does not have to be at the root (c:\) level before entering the command.)

This example shows what should happen when you enter the ping command for a test set with the LAN IP address of 111.22.333.44. The test set should reply back to the Command Prompt screen indicating that data was received.

```
Microsoft(R) Windows NT(TM)
(C) Copyright 1985-1996 Microsoft Corp.
C:\WINNT\Profiles\caesar\Desktop>ping 111.22.333.44
Pinging 111.22.333.44 with 32 bytes of data:
Reply from 111.22.333.44: bytes=32 time<10ms TTL=63
Reply from 111.22.333.44: bytes=32 time<10ms TTL=63
Reply from 111.22.333.44: bytes=32 time<10ms TTL=63
Reply from 111.22.333.44: bytes=32 time<10ms TTL=63
C:\WINNT\Profiles\caesar\Desktop>_
```

**Entering this command... should result in these messages being displayed to confirm data exchange between the test set and the computer.**

3. If the message “Request Timed Out” is displayed instead of a reply from the test set, try entering the command again. If the request times out again, your LAN connections are incorrect and/or your LAN settings for the two devices do not match.

### Troubleshooting LAN Connections

If your web browser did not display the test set's screen, or you could not “ping” your test set from your browser, refer to the following information to find the cause and fix the problem.

#### Try Altering Connections

- If you are using the test set's front panel DATA port, make sure the jumper between the rear-panel LAN PORT and ETHERNET TO FRONT PANEL port is in place; or try connecting directly to the rear-panel LAN PORT.
- Try using a different type of LAN cable. If you were using a crossover cable, try using a standard LAN cable; if using a standard LAN cable, try using a crossover cable. If this doesn't fix the problem, be sure to replace the cable with the type recommended in [“Test Set to Computer Connections”](#) above.

### Reconfigure the Computer and Test Set LAN Settings

If the test set's image is still not displayed on your web browser, and the ping command still indicates that the test set is not communicating with the computer, you need to verify that the LAN settings for the computer and the test set are compatible. The following sections provide general guidelines in getting the LAN settings configured for both instruments to communicate with each other.

Perform the configuration in the following order:

1. Configure the computer's LAN settings.
2. Restart Windows on the computer to start using the new LAN configuration.
3. Configure the test set's LAN settings to work with the computer's settings. (It is important that the computer be configured and re-started before configuring the test set's LAN settings.)
4. Turn the test set off and back on to make sure it finds the computer's newly-configured LAN card on power up.

#### *LAN Setting Guidelines*

- It is highly recommended that the Subnet Mask be set to 255.255.248.0 for the test set and the computer when using a direct computer-to-test set connection.
- The first three groups of numbers for the LAN IP Address of the test set and the computer must match. Example; if the test set's LAN IP Address is set to 130.29.189.33, the computer's LAN IP address must begin with 130.29.189.

The number in the fourth group of digits in the computer's and test set's LAN IP Addresses must NOT match. Example; if the test set is set to LAN IP Address 130.29.189.33, set the computer's LAN IP Address to 130.29.183.34 (or 130.29.183.77, 130.29.183.42...- just so the last number is not also set to 33). The last entry in the IP Address must not be >254 or 0.

#### **Changing the LAN Setting on Your Computer**

Network configuration procedures vary between operating systems. You may have to refer to your computer's help system, or your LAN adapter card's documentation, for assistance.

Perform the following steps to alter the network settings for most PCs using a Microsoft Windows operating system.

#### **Access the Network Settings**

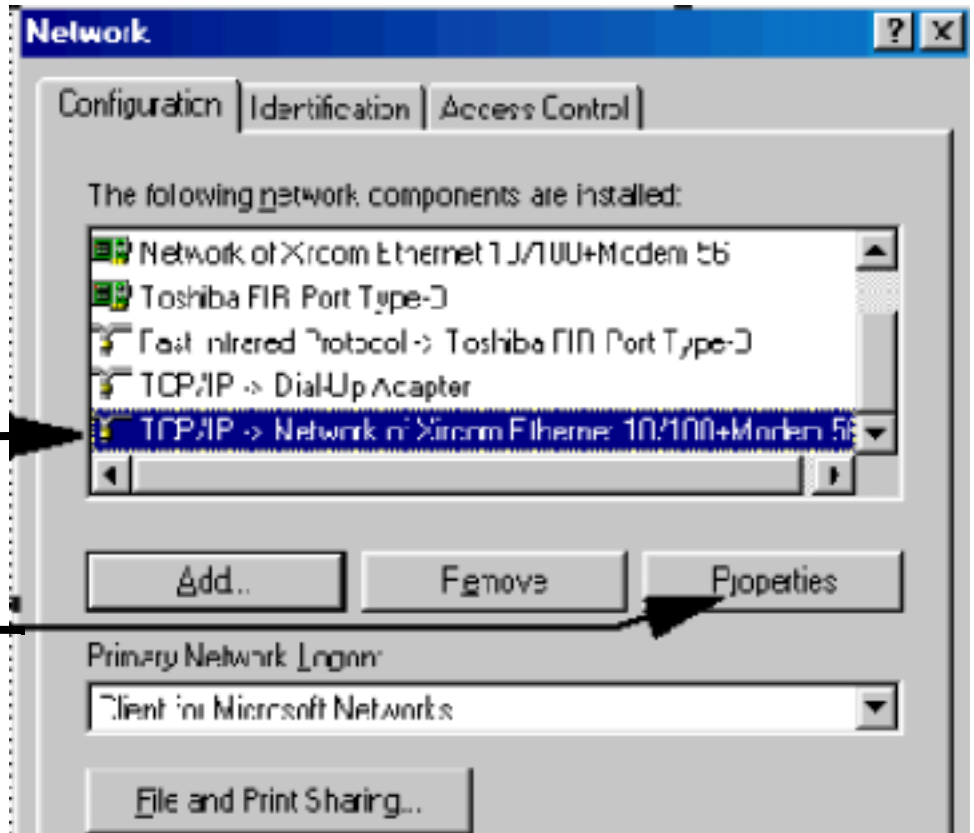
1. Double-click on the `My Computer` icon on the Windows desk top.
2. Double-click on the `Control Panel` icon.
3. Double-click on the `Network` icon.
4. Select the `TCP/IP-> [your Ethernet network adapter]` entry from the list of components. Note: Do not select `TCP/IP Dial-Up Adapter settings` if present.
5. Select `Properties` to access the TCP/IP settings screen.

## Printing Screens

**Figure 18. Accessing Your Computer's LAN Settings**

Select the entry for your Ethernet network adapter, then...

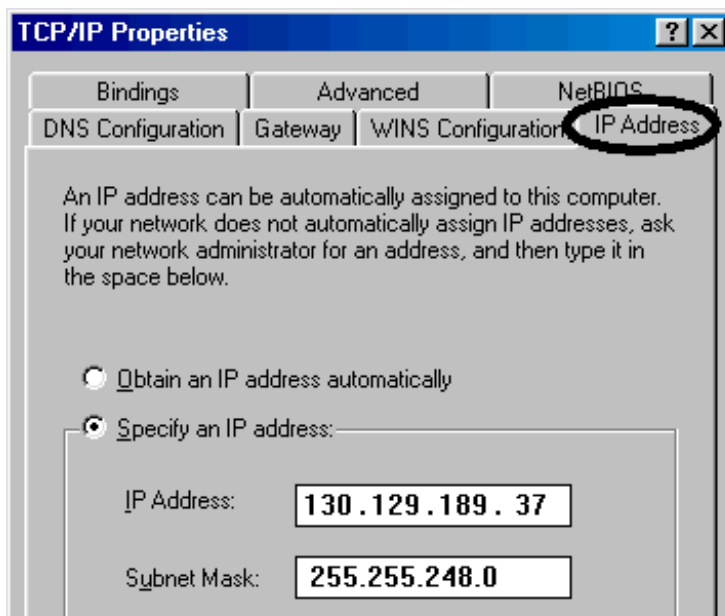
select Properties to list the TCP/IP settings for your adapter.



### Set the IP Address and Subnet Mask

1. Select the IP Address tab on the TCP/IP Properties screen.
2. Select Specify an IP Address.
3. Enter the IP Address for the computer. Remember, the last entry in the IP Address must not be >254 or 0.
4. Enter the Subnet Mask (255.255.248.0).

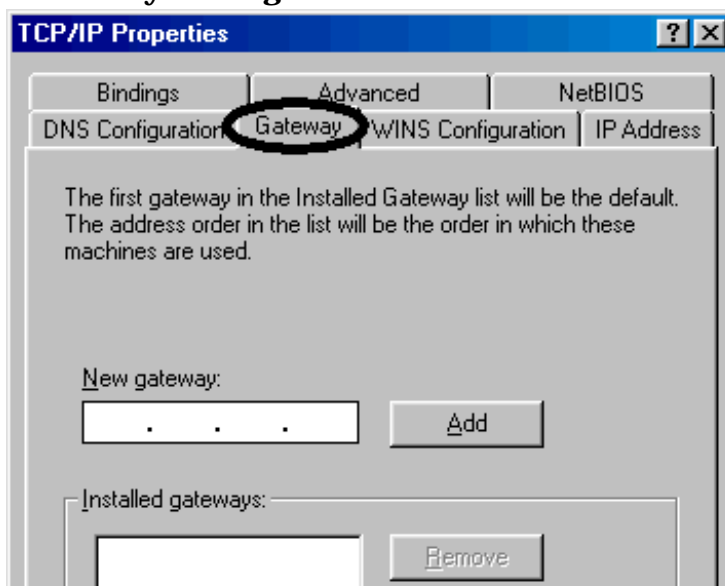
**Figure 19. Specifying the Computer's IP Address and Subnet Mask**



**Remove Any Gateway Setting**

1. Select the Gateway tab.
2. If present, remove any existing setting.
3. Click OK until you have closed the Network settings window.

**Figure 20. Accessing the Gateway Setting**



## Printing Screens

### Restart Windows

Depending on your LAN network adapter, your computer may or may not apply the network configuration changes as they are made. It is important that you restart Windows NOW to make sure new LAN settings are in effect when you try to connect to the test set.

### Changing the LAN Settings on Your Test Set

1. Press the **SYSTEM CONFIG** key on the test set to display the current LAN settings.

System Config Screen																
Control	Configuration Summary	Utilities														
Instrument Setup ▾	<table border="1"><thead><tr><th colspan="2">Instrument Information</th></tr></thead><tbody><tr><td>Test Application:</td><td>GSM Mobile Test E1960A      A.03.01</td></tr><tr><td> GPIB Address:</td><td>20</td></tr><tr><td> LAN IP Address:</td><td>130.29.183.40</td></tr><tr><td> Subnet Mask:</td><td>255.255.255.0</td></tr><tr><td> Default Gateway:</td><td></td></tr><tr><td> Last Calibration:</td><td>10 Sep 1999</td></tr></tbody></table>	Instrument Information		Test Application:	GSM Mobile Test E1960A      A.03.01	GPIB Address:	20	LAN IP Address:	130.29.183.40	Subnet Mask:	255.255.255.0	Default Gateway:		Last Calibration:	10 Sep 1999	Message Log
Instrument Information																
Test Application:	GSM Mobile Test E1960A      A.03.01															
GPIB Address:	20															
LAN IP Address:	130.29.183.40															
Subnet Mask:	255.255.255.0															
Default Gateway:																
Last Calibration:	10 Sep 1999															
External Trigger Setup ▾	<table border="1"><thead><tr><th>Instrument Setup</th><th>Value</th></tr></thead><tbody><tr><td>GPIB Address</td><td>20</td></tr><tr><td>LAN IP Address</td><td>130.29.183.40</td></tr><tr><td>Subnet Mask</td><td>255.255.248.0</td></tr><tr><td>Default Gateway</td><td></td></tr><tr><td>Display Mode</td><td>Track</td></tr><tr><td>Display Brightness</td><td>High</td></tr></tbody></table>	Instrument Setup	Value	GPIB Address	20	LAN IP Address	130.29.183.40	Subnet Mask	255.255.248.0	Default Gateway		Display Mode	Track	Display Brightness	High	
Instrument Setup	Value															
GPIB Address	20															
LAN IP Address	130.29.183.40															
Subnet Mask	255.255.248.0															
Default Gateway																
Display Mode	Track															
Display Brightness	High															
Port Configuration ▾																

2. Press the **F1** (Instrument Setup) key.

---

**NOTE**      Changing the LAN IP Address may alter the Subnet Mask setting. Therefore, change the LAN IP Address first, then change the Subnet Mask. Also, The last entry in the IP Address must not be >254 or 0.

---

3. Turn the knob to highlight the setting you want to change.
4. Press the knob to select the setting.
5. Enter the new value using the keypad, and press the knob to complete the setting.
6. Turn the test set off and back on to start using the new settings.

## Related Topics

[“Configuring the Test Set’s LAN” on page 782](#)

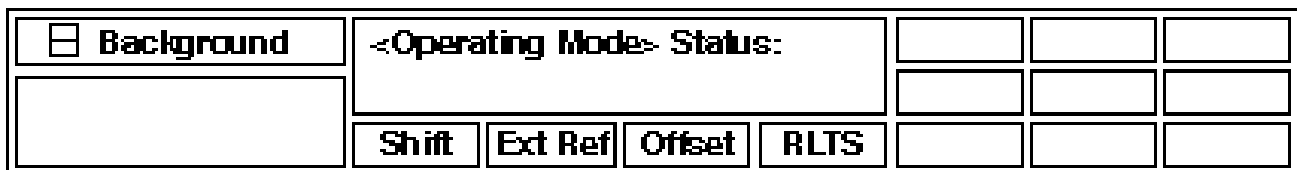
## Instrument Status Area

January 15, 2003

### Description

The Instrument status area is found on the bottom center of the test set's display.

**Figure 21. Status Area of the Test Set Display**



### Background

Users are able to initiate more than one measurement at a time with the test set. The test set's display will show a maximum of 2 measurements. When 3 or more measurements are initiated, or the MEASUREMENT screen is not displayed, the Background annunciator reminds you that measurements are active but not displayed.

### <Operating Mode> Status

The call processing status and the operating modes are displayed in this area. This area may change (depending on the TA that is active) in order to provide TA specific information.

### Shift

This annunciator indicates that the blue SHIFT key has been pressed, and that the next key you press will perform the shifted function indicated, also in blue.

### Ext Ref

When a suitable external time base is connected to the rear panel 10MHz REF IN connector, this annunciator will turn on.

### Int Ref

When a suitable external time base is not connected to the rear panel 10MHz REF IN connector, this annunciator will turn on.

### Offset

Indicates that the Amplitude Offset state is set to On.

## **Instrument Status Area**

### **R L T S**

This annunciator indicates the state of four different conditions of the test set:

- Remote annunciator. 'R' turns on when the test set is operated remotely.
- Listen annunciator. 'L' turns on when the test set is listening to a command.
- Talk annunciator. 'T' turns on when the test set is providing information over GPIB.
- SRQ annunciator. 'S' turns on when an SRQ is active.

### **Related Topics**

["Data Connection Processing States" on page 108](#)



# Manual Operation: Manual Receiver Control

## Manual Receiver Control in Active Cell or Cell Off Operating Mode

As shown in figure below, to access receiver control settings while in Active Cell or Cell Off operating mode, press the **CALL SETUP** key, press the Call Parm's **More** key until 3 of 3 is displayed. Select Manual in the Rcvr Power Ctrl (**F8**), then select Receiver Power (**F9**) and enter a new value to manually set the receiver's expected power. To manually set the receiver's measurement downconverter tune frequency, select Meas Frequency (**F10**) and enter a new value to replace the Auto.

Call Setup Screen																																				
Call Control	Active Cell Operating Mode					Call Parm's																														
Operating Mode	<table border="1"> <thead> <tr> <th colspan="2">Access Terminal Information (AT Reported)</th> </tr> </thead> <tbody> <tr> <td>Session Seed:</td> <td>0x605B927A</td> </tr> <tr> <td>Hardware ID Type (Hex):</td> <td>0x010000 ESN</td> </tr> <tr> <td>Hardware ID (Hex):</td> <td>0x7403BA66</td> </tr> <tr> <td>Hardware ID (Decimal):</td> <td>116-00244326</td> </tr> <tr> <th colspan="2">Access Terminal Information (AN Assigned)</th> </tr> <tr> <td>UATI 024:</td> <td>1</td> </tr> <tr> <td>UATI Color Code:</td> <td>64</td> </tr> <tr> <td>NAC Index:</td> <td>5</td> </tr> <tr> <th colspan="2">Access Terminal Information (User Entered)</th> </tr> <tr> <td>AT Max Power:</td> <td>23 dBm/1.23 MHz</td> </tr> <tr> <th colspan="2">Application Configuration</th> </tr> <tr> <td>Application</td> <td>FTAP</td> </tr> <tr> <td>Limited TAP:</td> <td>Off</td> </tr> <tr> <td>AT Directed Packets:</td> <td>50 %</td> </tr> </tbody> </table>					Access Terminal Information (AT Reported)		Session Seed:	0x605B927A	Hardware ID Type (Hex):	0x010000 ESN	Hardware ID (Hex):	0x7403BA66	Hardware ID (Decimal):	116-00244326	Access Terminal Information (AN Assigned)		UATI 024:	1	UATI Color Code:	64	NAC Index:	5	Access Terminal Information (User Entered)		AT Max Power:	23 dBm/1.23 MHz	Application Configuration		Application	FTAP	Limited TAP:	Off	AT Directed Packets:	50 %	Rcvr Power Ctrl
Access Terminal Information (AT Reported)																																				
Session Seed:						0x605B927A																														
Hardware ID Type (Hex):						0x010000 ESN																														
Hardware ID (Hex):						0x7403BA66																														
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Access Terminal Information (User Entered)																																				
AT Max Power:	23 dBm/1.23 MHz																																			
Application Configuration																																				
Application	FTAP																																			
Limited TAP:	Off																																			
AT Directed Packets:	50 %																																			
Active Cell						Manual																														
Start Data Connection						Receiver Power																														
Close Session						0.00																														
Handoff Setup						dBm																														
AT Max Power						Meas Frequency																														
23 dBm/1.23 MHz						Auto																														
1 of 2	Active Cell Session Open			Sys Type: IS-856																																
	IntRef	Offset			FTAP	3 of 3																														



# Troubleshooting

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## Access Probe Power Troubleshooting

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**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements. To optimize access probe power measurement speed, it is also recommended that you turn off all other measurements when performing an access probe power measurement.

---

### Possible Setup Issues

- If `Trigger Arm` is set to `Single` during manual operation, you must press the **START SINGLE** key to arm the measurement before it can measure the power of an access probe.
- During remote operation of this measurement, you should configure the `Trigger Arm` to `Single`. See [“SETup:CAPPower:CONTinuous”](#) or [“SETup\[:ALL\]:CONTinuous:OFF | :ON”](#) on page 483.
- It is recommended that you always turn **“Call Limit Mode”** on when measuring access probe power. The easiest way to induce access probes from the access terminal is to page the access terminal. If you do not have call limit mode set to on, the connection will complete, which clears the access probe power result from the measurement screen. Set call limit mode back to off when you have finished measuring access probe power.
- There are several parameters that affect the access probe measurement results, such as `Call Limit Mode`, `Probe Initial Adjust`, and `Probe Power Step`. See [“Considerations when Making Access Probe Power Measurements”](#) on page 38 for details.
- Access probe power measurements are triggered by a rise in RF power that must cross at least -45 dBm/1.23 MHz. See [“How is an Access Probe Power Measurement Made?”](#) on page 38 for details.

### Troubleshooting Techniques

- Turn off the access probe power measurement. Turn on the channel power measurement and page the access terminal. Check to see if any access probes are detected by the channel power measurement. You can also use the spectrum monitor or an external spectrum analyzer to try to detect the access probes.
- Turn call limit mode off and try to open a connection with the current setup.
- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see Channel Power [“Troubleshooting Techniques”](#) on page 715).

## Other Considerations

- To help avoid over range or under range integrity indicators, correct for system path loss (see [“Amplitude Offset” on page 102](#)).
- If you are manually controlling the test set’s receiver, be certain that you have entered the correct frequency and power values for your test setup (see [“Receiver Control” on page 182](#)).
- [“Calibrating the Access Probe Power Measurement” on page 39](#)

## Related Topics

[“Access Probe Power Measurement Description” on page 38](#)

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## Audio Analyzer Troubleshooting

### Possible Setup Issues

During remote operation of the Audio Analyzer, you should always set the Trigger Arm to Single. The length of time required to return a measurement over GPIB using continuous triggering varies, but is always longer than when using single triggering. Continuous triggering can also cause problems when the INITiate:DONE? query is used.

If digital measurements are active, turn them off or set their trigger source to Immediate. See [“Triggering of Measurements” on page 251](#).

The Detector Type selected (peak or rms) also sets how Audio Level measurements are displayed; as a peak value or an rms value. When comparing returned values over GPIB to your specifications, be sure to take into account the type of detector being used.

The Expected Peak Voltage is always set in  $V_{\text{peak}}$ , regardless of the Detector Type selected, and cannot exceed  $20 V_{\text{peak}}$  ( $14.1 V_{\text{rms}}$ ).

For accurate measurements, always set all Audio Analyzer setup parameters to their proper settings for the measurement being made. The SINAD and Distortion measurements typically use different settings than the Audio Level measurement. See [“Audio Analyzer Measurement Description” on page 42](#) and [“Audio Analyzer Block Diagram” on page 45](#).

For very low level audio signals, use the 100 Hz BW BPF filter to reduce the affects of noise (see [“Audio Level Measurement Description” on page 47](#)).

For accurate Audio Frequency measurements where more than one signal may be present, use the 100 Hz BW BPF filter to isolate the desired signal (see [“Audio Level Measurement Description” on page 47](#)).

### Interpreting Integrity Indicator Values

See [“Integrity Indicator” on page 255](#).

If over range (5) is returned, the input level is greater than 4.9 dB above the Expected Peak Amplitude value or the maximum input level of 20 volts peak.

If under range (6) is returned, the input level is lower than 8 dB below the Expected Peak Amplitude value.

If the signal has both over range and under range conditions, only the over range condition (5) is indicated.

---

## Channel Power Measurement Troubleshooting

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**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements.

---

### Possible Setup Issues

- If the channel power result is not what you expected, consider whether you intend for the R-ACK Channel to be active. In order for the R-ACK Channel to be active, you must set “[ACK Channel Bit Fixed Mode Attribute](#)” to on, and set “[AT Directed Packets](#)” to a non-zero value.
- During remote operation of this measurement, you should configure the Trigger Arm to Single. See “[SETup:CPOWer:CONTInuous](#)” or “[SETup\[:ALL\]:CONTInuous:OFF | :ON](#)” on page 483. If single triggering is used during manual operation, press the **START SINGLE** key to trigger each measurement.

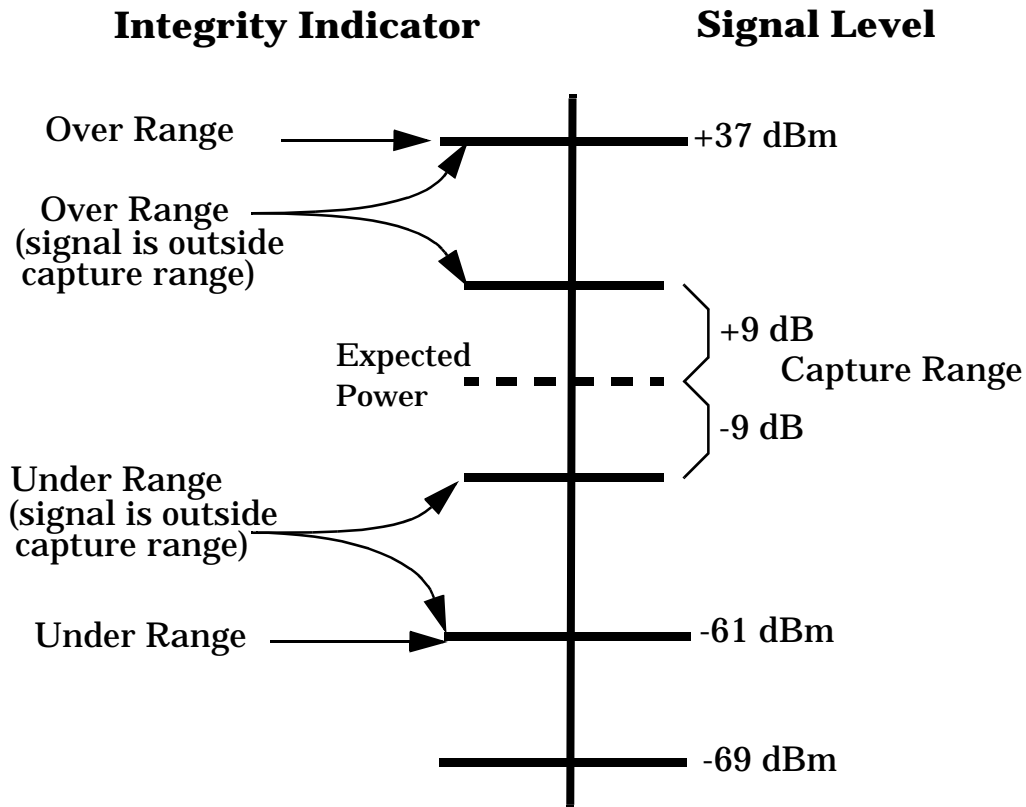
### Troubleshooting Techniques

- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see “[Integrity Indicator](#)” on page 255).

If Over Range (5) is returned; the input power has exceeded +37 dBm or is greater than +9 dB above the expected power level of the receiver.

If Under Range (6) is returned; the input power is below -61 dBm or is less than -9 dB below the expected power level of the receiver.

**Figure 22.** Channel Power Under Range/Over Range Integrity Indicators



### Other Considerations

- To help avoid over range or under range integrity indicators, correct for system path loss (see [“Amplitude Offset” on page 102](#)).
- If you are manually controlling the test set’s receiver, be certain that you have entered the correct frequency and power values for your test setup (see [“Receiver Control” on page 182](#)).
- [“Calibrating the Channel Power Measurement” on page 51](#)

### Related Topics

[“Channel Power Measurement Description” on page 50](#)



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## Digital Average Power Troubleshooting

### Possible Setup Issues

- The digital average power measurement has a bandwidth of approximately 4 GHz. For this reason, significant signal energy outside the 1.23 MHz access terminal transmit bandwidth will increase the measured value.
- C.S0033 “[3.1.2.3.4 Maximum RF Output Power](#)” requires that the R-ACK Channel be active. In order for the R-ACK Channel to be active, you must set “[ACK Channel Bit Fixed Mode Attribute](#)” to on, and set “[AT Directed Packets](#)” to a non-zero value.
- During remote operation of this measurement, you should configure the Trigger Arm to Single. See “[SETup:DAPower:CONTinuous](#)” on page 512 or “[SETup\[:ALL\]:CONTinuous:OFF|:ON](#)” on page 483. If single triggering is used during manual operation, press the **START SINGLE** key to trigger each measurement.

### Troubleshooting Techniques

- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see “[Integrity Indicator](#)” on page 255).

If over range (5) is returned the input power has exceeded the test set’s internal sampler maximum value during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector.

If under range (6) is returned the measurement result is below the expected input power level. Under range is also indicated if the input power is below the calibrated range of the test set’s power detector.

### Other Considerations

- To avoid over range or under range integrity indicators, correct for system path loss (see “[Amplitude Offset](#)” on page 102).
- If you are manually controlling the test set’s receiver, be certain that you have entered the correct frequency and power values for your test setup (see “[Receiver Control](#)” on page 182).
- “[Digital Average Power Input Signal Requirements](#)” on page 54
- “[Calibrating the Digital Average Power Measurement](#)” on page 54

### Related Topics

“[Digital Average Power Measurement Description](#)” on page 53

# Digital Average Power Troubleshooting

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## Packet Error Rate Measurement Troubleshooting

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**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements.

---

### Possible Setup Issues

- You must establish an FTAP connection to perform the Packet Error Rate (PER) measurement (see [“How Do I Open a Session and Connection?”](#) on page 647).
- [“AT Directed Packets”](#) must be set to a non-zero value.
- If the PER measurement is returning the `Missing Loopback Packets` or `AT Overflow (26)` integrity indicator, you may need to decrease the [“AT Directed Packets”](#) value.
- Before turning AWGN on, verify that cell power is not set to a level significantly below the AWGN level, or the connection may be dropped (see [“Troubleshooting Setting Power Levels”](#) on page 727).
- Confidence level is only available when confidence state is set to on (see [“PER Measurement Parameters”](#) on page 57).

### Troubleshooting Techniques

- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see [“Integrity Indicator”](#) on page 255).

### Other Considerations

- To avoid over range or under range integrity indicators, correct for system path loss (see [“Amplitude Offset”](#) on page 102).
- If you are manually controlling the test set's receiver, be certain that you have entered the correct frequency and power values for your test setup (see [“Receiver Control”](#) on page 182).
- [“PER Input Signal Requirements”](#) on page 58

### Related Topics

[“Packet Error Rate \(PER\) Measurement Description”](#) on page 56

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## Spectrum Monitor Troubleshooting

### Possible Setup Issues

During remote operation of the Spectrum Monitor you should configure the trigger arm to single, see [“SETup:SMONitor” on page 530](#).

If the trigger arm is not set to single, the Spectrum Monitor may not return a result. When trigger arm is continuous the Spectrum Monitor rearms itself and starts another measurement cycle, during remote operation the fetch query may not be synchronized to the measurement cycle, see [“Measurement States” on page 252](#).

If trigger source immediate is used for burst modulated signals the results returned will be unreliable. Burst modulated signals should be measured with Trigger Source set to RF Rise or Auto. For RF Rise triggering to work correctly, the signal should be no less than 20 dB below the reference and greater than -20 dBm.

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 255](#).

---

## Swept Audio Measurement Troubleshooting

### Possible Setup Issues

During remote operation of the Swept Audio measurement, you should always set the Trigger Arm setting to Single. The length of time required to return a measurement over GPIB using continuous triggering varies, but is always longer than when using single triggering. Continuous triggering can also cause problems when the INITiate:DONE? query is used.

If digital measurements are active, turn them off or set their trigger source to Immediate. See [“Triggering of Measurements” on page 251](#).

The Detector Type selected (peak or rms) also sets how Audio Level measurements are displayed; as a peak value or an rms value. When comparing returned values over GPIB to your specifications, be sure to take into account the type of detector being used.

The Expected Peak Voltage is always set in  $V_{\text{peak}}$ , regardless of the Detector Type selected, and cannot exceed  $20 V_{\text{peak}}$  ( $14.1 V_{\text{rms}}$ ).

For accurate measurements, always set the Detector Type, Filter Type, and other audio analyzer settings for the type of measurement being made. The SINAD and Distortion measurements typically use different settings than the Audio Level measurement. See [“Audio Analyzer Measurement Description” on page 42](#) and [“Audio Analyzer Block Diagram” on page 45](#).

For very low level audio signals, or for measurements made in a noisy environment, use the 100 Hz BW BPF filter to reduce the affects of noise (see [“Audio Analyzer Measurement Description” on page 42](#)).

### Interpreting Integrity Indicator Values

See [“Integrity Indicator” on page 255](#).

If over range (5) is returned, the input level is greater than 4.9 dB above the Expected Peak Amplitude value or the maximum input level of 20 volts peak.

If under range (6) is returned, the input level is lower than 8 dB below the Expected Peak Amplitude value.

If the signal has both over range and under range conditions, only the over range condition (5) is indicated.

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## Time Response of Open Loop Power Control Troubleshooting

---

**IMPORTANT** No other measurements can be running while the TROLPC measurement is active. If any measurements are running, they are closed when TROLPC is initiated, and a message is displayed indicating that a measurement has been closed. Activating another measurement inactivates the TROLPC measurement.

---

### Possible Setup Issues

- You must establish an RTAP connection to perform the TROLPC measurement (see [“How Do I Open a Session and Connection?”](#) on page 647).
  - C.S0033 does not specify that the R-ACK Channel must be active for 3.1.2.3.2 Time Response of Open Loop Power Control. If the R-ACK Channel is active during this test, the access terminal's power may fall outside of the mask specifications. To help ensure that your access terminal does not fail this test, you should disable the R-ACK Channel by setting [“ACK Channel Bit Fixed Mode Attribute”](#) to on and setting [“AT Directed Packets”](#) to 0%.
- 

**IMPORTANT** After completing TROLPC testing, you must return [“ACK Channel Bit Fixed Mode Attribute”](#) to on and set [“AT Directed Packets”](#) to a non-zero value appropriate for your test setup.

---

- Cell power must be at least 20 dB below the maximum cell power level to perform a TROLPC measurement with a +20 dB step change in cell power. Cell power must be at least 20 dB above the minimum cell power level to perform a TROLPC measurement with a -20 dB step change in cell power. The cell power range is affected by amplitude offsets (see [“Cell Power, AWGN \(Additive White Gaussian Noise\) Power and Total RF Power”](#) on page 149).
- AWGN power must be off (see [“Cell Power, AWGN \(Additive White Gaussian Noise\) Power and Total RF Power”](#) on page 149).
- Receiver power must be set to auto (see [“Receiver Control”](#) on page 182).
- During remote operation of this measurement, you must specify the cell power step change direction using the `SETup:TROPower:STEP` command, and then start the measurement using either the `INITiate:<measurement mnemonic>[:ON]` or `READ:TROPower[:ALL]?` command. During manual operation, you must select either `Start Meas Up (F2)` or `Start Meas Down (F3)`, or press the **START SINGLE** key to trigger each measurement. Each time you start the measurement, one 20 dB step change is performed.

### Troubleshooting Techniques

- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see [“Integrity Indicator”](#) on page 255).

### Other Considerations

- To avoid over range or under range integrity indicators, correct for system path loss (see [“Amplitude Offset” on page 102](#)).
- If you are manually controlling the test set’s receiver, be certain that you have entered the correct frequency value for your test setup (see [“Receiver Control” on page 182](#)).
- [“TROLPC Input Signal Requirements” on page 70](#)
- [“Calibrating the TROLPC Measurement” on page 70](#)

### Related Topics

[“Time Response of Open Loop Power Control \(TROLPC\) Measurement Description” on page 66](#)

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## Tx Spurious Emissions Measurement Troubleshooting

---

**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements.

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### Possible Setup Issues

- You must establish an RTAP connection to perform the TX Spurious emissions measurement (see [“How Do I Open a Session and Connection?”](#) on page 647).
- C.S0033 [“3.1.2.4.1 Conducted Spurious Emissions”](#) requires that the R-ACK Channel be active. In order for the R-ACK Channel to be active, you must set [“ACK Channel Bit Fixed Mode Attribute”](#) to on, and set [“AT Directed Packets”](#) to a non-zero value..
- During remote operation of this measurement, you should configure the Trigger Arm to Single. See [“SETup:CTXSpurious:CONTinuous”](#) on page 506 or [“SETup\[:ALL\]:CONTinuous:OFF | :ON”](#) on page 483. If single triggering is used during manual operation, press the **START SINGLE** key to trigger each measurement.

### Troubleshooting Techniques

- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see [“Integrity Indicator”](#) on page 255).

### Other Considerations

- To avoid over range or under range integrity indicators, correct for system path loss (see [“Amplitude Offset”](#) on page 102).
- If you are manually controlling the test set's receiver, be certain that you have entered the correct frequency and power values for your test setup (see [“Receiver Control”](#) on page 182).
- [“TX Spurious Emissions Input Signal Requirements”](#) on page 77
- [“Calibrating the TX Spurious Emissions Measurement”](#) on page 77

### Related Topics

[“TX Spurious Emissions Measurement Description”](#) on page 74



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## Waveform Quality Measurement Troubleshooting

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**IMPORTANT** If the access probe power measurement is on and waiting to measure a probe, all other measurements (except digital average power) will not be able to execute. It is therefore recommended that you turn off the access probe power measurement before attempting any other measurements.

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### Possible Setup Issues

- You must establish an RTAP connection to perform the waveform quality + code domain power measurement (see [“How Do I Open a Session and Connection?”](#) on page 647).
- C.S0033 [“3.1.2.3.8.2 ACK Channel Output Power”](#) on page 95 and test 5 of [“3.1.2.3.8.3 Data Channel Output Power”](#) on page 96 require that the R-ACK Channel be active. In order for the R-ACK Channel to be active, you must set [“ACK Channel Bit Fixed Mode Attribute”](#) to on, and set [“AT Directed Packets”](#) to a non-zero value.
- During remote operation of this measurement, you should configure the Trigger Arm to Single. See [“SETup:DOWQuality:CONTinuous”](#) on page 517 or [“SETup\[:ALL\]:CONTinuous:OFF|:ON”](#) on page 483. If single triggering is used during manual operation, press the **START SINGLE** key to trigger each measurement.

### Troubleshooting Techniques

- Check to see if an integrity indicator other than 0 (normal) was returned with a measurement result (see [“Integrity Indicator”](#) on page 255).

### Other Considerations

- To avoid over range or under range integrity indicators, correct for system path loss (see [“Amplitude Offset”](#) on page 102).
- If you are manually controlling the test set’s receiver, be certain that you have entered the correct frequency and power values for your test setup (see [“Receiver Control”](#) on page 182).
- [“Waveform Quality + Code Domain Input Signal Requirements”](#) on page 91
- [“Calibrating the Waveform Quality + Code Domain Measurement”](#) on page 92

### Related Topics

[“Waveform Quality + Code Domain Measurement Description”](#) on page 80

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# Troubleshooting Data Connection Processing

## Possible Setup Issues

- If you are trying to establish a session or connection:
  - Cell band and channel must be set to the proper values for your access terminal (see [“How Do I Change Call Parameters?” on page 644](#)).
  - [“Call Limit Mode”](#) must be set to off.
  - [“Cell Power”](#) must be set to an adequate level and [“AWGN Power”](#) must be set to an adequately low level to allow for successful data connection processing.
  - The input signal from the access terminal must meet the [“Input Signal Requirements”](#).
  - If you are manually controlling the receiver, you must have the expected power and frequency set to the proper values (see [“Receiver Control” on page 182](#)).
- Ensure that [“Application”](#) is set to the correct value for your test conditions.
- Ensure that [“Reverse Closed Loop Power Control”](#) mode is set to the correct setting for your test conditions.

## Other Considerations

- While on a connection, if you change a parameter which is configured during the [“Session Negotiate State”](#), the connection is closed. You must re-open the connection. This behavior is specified by C.S0024.
- You can not change a parameter which is configured during the [“Session Negotiate State”](#) when a session is open and [“Call Limit Mode”](#) is set to on.
- When testing an access terminal that requires setting [“Limited TAP”](#) to on:
  - The access terminal may not implement the parameter settings sent in the Traffic Channel Assignment message (see [“Establishing a Data Connection” on page 125](#)). In this case, to change a parameter that is sent in the Traffic Channel Assignment message, you must close the connection, change the parameter, and then re-open the connection (this includes a handoff to a new band and/or channel).

## Related Topics

[“Data Connection Processing States” on page 108](#)

[“Establishing a Data Connection” on page 125](#)

[“Fixed Settings” on page 168](#)

[“Troubleshooting Setting Power Levels” on page 727](#)

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## Troubleshooting Setting Power Levels

Before turning AWGN on, be sure cell power is not set to a level significantly below the AWGN level, or the connection may be dropped.

A power level may be within the settable range but cause an error message to be displayed. Possible causes are:

- The difference between cell power and AWGN power is greater than 20 dB (and both powers are ON).
- The total RF power and amplitude offset set the source outside its valid hardware range.

See [“Cell Power, AWGN \(Additive White Gaussian Noise\) Power and Total RF Power” on page 149](#) for more information about valid hardware ranges.

### Related Topics

[“Cell Power, AWGN \(Additive White Gaussian Noise\) Power and Total RF Power” on page 149](#)

## Error Messages

### Error Message Descriptions

[“Fixed Timer Messages” on page 730](#)

[“Manual User Error Messages” on page 733](#)

[“-400 through -499 Error Message Descriptions” on page 737](#)

[“-300 through -399 Error Message Descriptions” on page 738](#)

[“-200 through -299 Error Message Descriptions” on page 740](#)

[“-100 through -199 Error Message Descriptions” on page 743](#)

[“+100 through +199 Error Message Descriptions” on page 747](#)

[“+200 through +299 Error Message Descriptions” on page 752](#)

[“+300 through +399 Link Control Device-Specific Error” on page 755](#)

[“+400 through +499 Error Message Descriptions” on page 756](#)

[“+500 through +599 Test Application Hardware Device-Specific Error” on page 759](#)

[“+600 through +699 Error Message Descriptions” on page 760](#)

[“+700 through +799 Error Message Descriptions” on page 761](#)

[“+800 through +899 Error Message Descriptions” on page 763](#)

## Description

### Reading Error Messages

Each error message that is generated is recorded in either the error/event queue or the message log or both. Error messages are shown in a message window at the center of the test set's display.

When an error message is displayed an audio beep occurs, the beeper state of the test set can be set to on or off.

The error/event queue is read remotely using the `SYSTEM:ERROR?` query. The error/event queue is able to hold 100 messages. To read the entire error/event queue use the following program.

```
10 DIM Err_msg$(255)
20 REPEAT
30 OUTPUT 714;"SYSTEM:ERROR?"
40 ENTER 714; Err_num,Err_msg$
50 PRINT Err_num,Err_msg$
60 UNTIL Err_num = 0
```

The message log may be viewed on the test set's display by pressing the SYSTEM CONFIG screen's Message Log key. The message log can display up to 24 entries over two pages.

Error messages can be cleared from the test set's display using the `DISPlay:WINDow:ERRor:CLear` command. Pressing any functional front panel key, i.e. the LOCAL key, will clear an error message for the test set's display.

## Classes of Errors

Error messages are divided into classes, each class of error is handled differently by the test set. The message log is cleared when the test set is power cycled.

**Measurement Integrity Indicators** These messages occur as a result of a measurement, they indicate the validity of the measurement. Measurement integrity indicators are read with the FETCh command.

**Non-Persistent Errors** These messages are generated when a condition occurs that is incorrect, but has no serious or long lasting effect on the test set's operation. Examples could include an out of range value to a parameter, or an invalid GPIB mnemonic. The message window is cleared when any front panel key is pressed.

**Persistent Errors** These errors are generated when a non-transitory error condition exists. Persistent errors occur when a hardware failure is found, or when damage or injury to a person or the test set may occur.

The test set displays these errors in the error message window and as a prompt at the bottom of the display screen where it remains until the error condition no longer exists.

**Fatal Errors** When these errors occur no further operation of the test set is possible without cycling the power switch. Fatal errors are not saved in the error message log. The test set display will provide the user with information about what to do next and some details about what the test set was doing when the fatal error occurred.

**Maskable Messages** These messages are intended to inform the user of a condition within the test set. They are generally meant to provide information to the user. The user will need to decide if this condition is undesirable and if they want the message to appear.

**Maskable Message Display State** The Maskable Messages Display State found in the Instrument Setup menu gives users a way to block these messages and the associated beep from ever happening. When the state is Off these messages and their associated beep will be blocked. The Maskable Message Display State can be set manually or with the following GPIB command:

```
OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.
```

## Instrument Maskable Messages

- Instrument warning: Audio Generator instrument has been closed.
- Instrument warning: Audio Analyzer instrument has been closed.
- Instrument warning: Analog Audio instrument has been closed.

## Related Topics

["SYSTem:ERRor?" on page 618](#)

## Fixed Timer Messages

### Description

This is the list of fixed timers with a brief explanation and their values. A timer expiry message appears in its own window, on the test set display. The user has no access to these values and can not change them. None of the fixed timers are active when operating mode is Test Mode.

Timer Name	Description	Value
T100 RADIO-LINK-TIMEOUT	Detects the presence of the radio link by detecting SACCH frames every 480 ms.	4 SACCH multiframes. That is 1.92 seconds if the SACCH is completely absent.
T200 Data link timer	Used for re-transmission on the data link. The value varies depending on the message type.	155 ms for FACCH
T301 Alerting (ringing) timer	Timer used to limit the amount of time a user has to answer a call.	20 seconds
T303 Mobility Management connection timer	Time the network waits after sending a CM SERVICE REQUEST until receiving a response. This occurs before initiating call clearing procedures towards the MS.	10 seconds
T305 Release timer	Time the network waits after transmitting a DISCONNECT message until receiving a RELEASE message.	10 seconds
T306 In-band tones release timer	Time the network waits after transmitting a DISCONNECT message while in-band tones/announcements are provided, until receiving a RELEASE message.	10 seconds
T308 Release timer	Time the network waits after sending a RELEASE message until receiving a RELEASE COMPLETE message. This occurs before re-transmitting the RELEASE or releasing the Mobility Management connection.	10 seconds
T310 Call proceeding timer	Time the network waits after receiving a CALL CONFIRMED message until receiving a ALERTING, CONNECT, or DISCONNECT message before initiating clearing procedures towards the MS.	10 seconds

## Fixed Timer Messages

Timer Name	Description	Value
T313 Connect acknowledge timer	Time the network waits after transmitting a CONNECT message until receiving the CONNECT ACKNOWLEDGE message before performing clearing procedures with the MS.	10 seconds
T323 Modify complete timer	Time the network waits after sending a MODIFY message during call mode changes, until receiving a MODIFY COMPLETE or MODIFY REJECT message before initiating call clearing procedures.	10 seconds
T3101 Immediate assignment timer	Time the network waits after sending the IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message until the main signalling link is established before releasing the newly allocated channels.	1 second
T3103 Handover timer	Time the network waits after transmitting a HANOVER COMMAND message until receiving HANOVER COMPLETE or HANOVER FAILURE or the MS re-establishes the call before the old channels are released. If the timer expires and the network has not received a correctly decoded L2 (format A or B) or TCH frame, then the newly allocated channels are released.	2 seconds
T3105 Physical information repetition timer	Time the network waits after sending the PHYSICAL INFORMATION message until receiving a correctly decoded L2 (format A or B) or TCH frame. This occur before re-transmitting the PHYSICAL INFORMATION message or releasing the newly allocated channels.	50 ms
T3107 Channel assignment timer	Time the network waits after transmitting an ASSIGNMENT COMMAND message until receiving the ASSESSMENT FAILURE message or the MS re-establishes the call before releasing the old and the new channels.	3 seconds
T3109 Signalling disconnection timer	Time the network waits after sending the CHANNEL RELEASE message before disconnecting the signalling link.	5 seconds
T3111 Channel deactivation after disconnection timer	Time the network waits after disconnecting the signalling link before deactivating the channel.	500 ms

## Fixed Timer Messages

Timer Name	Description	Value
T3113 Paging timer	Time the network waits after transmitting the PAGING REQUEST message until receiving the PAGING RESPONSE message. This occurs before re-transmitting the PAGING REQUEST (if the maximum number of re-transmissions have not been exceeded).	5 seconds
T3212 Location update timer	The location update timer is set to zero, periodic location update by the MS are disabled. If the MS camps to the BCH and decodes a new MCC or MNC from the one it last camped on, it should perform a location update.	zero = infinite time
T3250 TMSI reallocation timer	Time the network waits after sending the TMSI REALLOCATION COMMAND until receiving TMSI REALLOCATION COMPLETE. This occurs before aborting the procedure and releasing the Radio Resource connection.	5 seconds
T3260 Authentication response timer	Time the network waits after an AUTHENTICATION REQUEST until receiving AUTHENTICATION RESPONSE. This occurs before aborting the procedure and releasing the Radio Resource connection.	5 seconds



## Manual User Error Messages

### Description

These messages are intended to be displayed on the manual user interface only, and are not entered into the Error/Event Queue.

Error Message	Description
The function you requested is not yet available.	The test set does not have this capability.
IQ Calibration completed successfully for modulator <N>	<N> is the IQ modulator number that you are attempting to calibrate, <N> is 1 or 2.
IQ Calibration failed for modulator <N>	<N> is the IQ modulator number that you are attempting to calibrate, <N> is 1 or 2.
The function you requested is not available in this TA.	This function is used in another Test Application.
IQ Calibration for modulator 1 in progress (10 minutes). Call processing disabled.	This error is cleared by either the; IQ Calibration completed successfully for modulator <N>, or IQ Calibration failed for modulator <N>.
IQ Calibration for modulator 2 in progress (6 minutes). Call processing disabled.	This error is cleared by either the; IQ Calibration completed successfully for modulator <N>, or IQ Calibration failed for modulator <N>.
Instrument warning: Audio generator instrument has been closed.	The audio generator instrument was closed automatically by the test set.
Measurement warning: Audio Analyzer instrument has been closed.	The audio analyzer instrument was closed automatically by the test set.
Measurement warning: Analog audio measurement has been closed.	Analog audio measurements have been closed by the test set.
Protocol warning: Setting change has terminated the link with the DUT	Some setting change has caused the call to disconnect.
Warning: Call processing disabled	The call processing functions are not active because the test set is performing calibration operations.
IQ first modulator calibration X%	IQ modulator calibration in progress, X represents the percent complete.
IQ second modulator calibration X%	IQ modulator calibration in progress, X represents the percent complete.

## Manual User Error Messages

### Device Specific MUI Errors

#### TA2000 MUI Errors

Error Message	Description
Call processing disabled	<p>This error, during calibration, is part of the test set's normal operation.</p> <p>If this error occurs during mobile station testing, an internal error has occurred in the test set's firmware.</p>

#### CDMA MUI Errors

Error Message	Description
Call processing disabled	<p>This error, during calibration, is part of the test set's normal operation.</p> <p>If this error occurs during mobile station testing, an internal error has occurred in the test set's firmware.</p>
Channel power calibration completed successfully	
Channel power calibration failed due to oven out of range	<p>This error message occurs when the internal temperature of the test set has drifted more than +/- 10 deg C since the last calibration. Normally, letting the test set fully warm up before calibrating will eliminate this problem.</p>
Channel power calibration failed due to loopback switch problem	<p>The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.</p>
Channel power calibration failed due to under range condition	<p>The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.</p>
Channel power calibration failed due to over range condition	<p>The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.</p>
Channel power calibration failed due to correlation problem	<p>The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.</p>

## CDMA MUI Errors (Continued)

Error Message	Description
Channel power calibration failed	The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.
Channel power calibration in progress. Do not apply RF power during calibration.	This error message is displayed for information purposes only.
Channel power calibration<x>%.	This error message is displayed for information purposes only.
Digital average power calibration completed successfully. Cycle power to continue.	This error message is displayed for information purposes only.
Digital average power calibration failed due to temperature drift. Wait for temperature to stabilize.	This error message occurs when the internal temperature of the test set has drifted more that +/- 10 deg C since the last calibration. Normally, letting the test set fully warm up before calibrating will eliminate this problem.
Digital average power calibration failed due to oven out of range	This error message occurs when the internal temperature of the test set has drifted more that +/- 10 deg C since the last calibration. Normally, letting the test set fully warm up before calibrating will eliminate this problem.
Digital average power calibration failed due to loopback switch problem	The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.
Digital average power calibration failed	The only user requirement for performing calibration is to make sure the test set is warmed up and to remove RF power to the front panel RF IN/OUT connector. If these requirements have been met and this message appears a test set failure condition exists.
Digital average power calibration in progress. Do not apply RF power during calibration	This error message is displayed for information purposes only.
Digital average power calibration <x>%.	This error message is displayed for information purposes only.
Digital average power measurement has been closed	This error message is displayed for information purposes only.
Waveform quality measurement has been closed	This error message is displayed for information purposes only.
Channel power measurement has been closed	This error message is displayed for information purposes only.

## Manual User Error Messages

### CDMA MUI Errors (Continued)

Error Message	Description
Frame error rate measurement has been closed	This error message is displayed for information purposes only.
Access probe power measurement has been closed	This error message is displayed for information purposes only.
Time response of open loop power control measurement has been closed	This error message is displayed for information purposes only.
Gated power measurement has been closed	This error message is displayed for information purposes only.
Tx spurious emissions measurement has been closed	This error message is displayed for information purposes only.
CDMA measurement warning; TX spurious emissions measurement requires MS to transmit in non-gated mode. Verify loopback service option and full traffic data rate	Select "Full" in the Traffic Data Rate field before attempting TX Spurious measurements.
Channel power calibration failed due to source level problem	

### Digital2000 MUI Errors

Error Message	Description
Call processing disabled	This error, during calibration, is part of the test set's normal operation.  If this error occurs during mobile station testing, an internal error has occurred in the test set's firmware.
Handoff waveform quality measurement has been closed	This error message is displayed for information purposes only.
Code channel time/phase measurement has been closed	This error message is displayed for information purposes only.
TDSO frame error rate measurement has been closed	This error message is displayed for information purposes only.

### Digital95 MUI Errors

Error Message	Description
Call processing disabled	This error, during calibration, is part of the test set's normal operation.  If this error occurs during mobile station testing, an internal error has occurred in the test set's firmware.

## -400 through -499 Error Message Descriptions

### Description

A Query error is generated either when data in the instrument's GPIB output queue has been lost, or when an attempt is being made to read data from the output queue when no output is present or pending.

Error Message	Description
-400 Query error	This event bit (Bit 2) indicates that an attempt to read data from the Output Queues when no output is present or pending, to data in the Output Queue has been lost see IEEE488.2, 11.5.1.1.7.
-410 Query INTERRUPTED	Indicates the test set has been interrupted by a new program message before it finishes sending a RESPONSE MESSAGE see IEEE 488.2, 6.3.2.3.
-420 Query UNTERMINATED	Indicates an incomplete Query in the program see IEEE 488.2, 6.3.2.2.
-430 Query DEADLOCKED	Indicates that the Input Buffer and Output Queue are full see IEEE 488.2, 6.3.1.7.
-440 Query UNTERMINATED after indefinite response	Indicates that a query was received in the same program message after a query requesting an indefinite response was executed see IEEE 488.2, 6.5.7.5.

## -300 through -399 Error Message Descriptions

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. When one of these errors is generated, the device specific error bit in the event status register is set.

Error Message	Description
-300 Device specific error	This event bit (Bit 3) indicates that a device operation did not properly complete due to some condition, such as overrange see IEEE 488.2, 11.5.1.1.6.
-311 Memory error	Indicates some physical fault in the devices memory, such as a parity error.
-312 PUD memory lost	Indicates protected user data saved by the *PUD command has been lost, see IEEE 488.2, 10.27.
-313 Calibration memory lost	Indicates that nonvolatile calibration data used by the *CAL? command has been lost, see IEEE 488.2, 10.2.
-314 Save/recall memory lost	Indicates that the nonvolatile data saved by the *SAV command has been lost, see IEEE 488.2, 10.33.
-315 Configuration memory lost	Indicates that nonvolatile configuration data saved by the device has been lost.
-320 Storage fault	Indicates that the firmware detected a fault when using data storage. This is not an indication of physical damage or failure of any mass storage element.
-321 Out of memory	An internal operation needed more memory than was available
-330 Self test failed	Indicates a problem with the device that is not covered by a specific error message. The device may require service.
-340 Calibration failed	Indicates a problem during calibration of the device that is not covered by a specific error.
-350 Queue overflow	Indicates that there is no room in the queue and an error occurred but was not recorded. This code is entered into the queue in lieu of the code that caused the error.
-360 Communication error	This is the generic communication error for devices that cannot detect the more specific errors described for error -361 through -363.

## -300 through -399 Error Message Descriptions

Error Message	Description
-361 Parity error in program message	Parity bit not correct when data received for example, on a serial port.
-362 Framing error in program message	A stop bit was not detected when data was received for example, on a serial port (for example, a baud rate mismatch).
-363 Input buffer overrun	Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing.

## -200 through -299 Error Message Descriptions

### Description

These errors are generated when something occurs that is incorrect in the current state of the instrument. These errors may be generated by a user action from either the remote or the manual user interface.

Error Message	Description
-200 Execution error	This event bit (Bit 4) indicates a PROGRAM DATA element following a header was outside the legal input range or otherwise inconsistent with the device's capabilities, see IEEE 488.2, 11.5.1.1.5.
-203 Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-220 Parameter error	Indicates that a program data element related error occurred.
-221 Setting conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state.
-222 Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range defined by the devices
-223 Too much data	Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.
-224 Illegal parameter value	Indicates that the value selected was not part of the list of values given.
-225 Out of memory	The device has insufficient memory to perform the requested operation.
-226 Lists not the same length	Attempted to use LIST structure having individual LIST's of unequal lengths.
-230 Data corrupt or stale	Indicates invalid data, a new reading started but not completed since the last access.
-231 Data questionable	Indicates that measurement accuracy is suspect.
-233 Invalid version	Indicates that a legal program data element was parsed but could not be executed because the version of the data is incorrect to the device. For example, a not supported file version, a not supported instrument version.



**-200 through -299 Error Message Descriptions**

<b>Error Message</b>	<b>Description</b>
-240 Hardware error	Indicates that a legal program command or query could not be executed because of a hardware problem in the device.
-241 Hardware missing	Indicates that a legal program command or query could not be executed because of missing device hardware. For example, an option was not installed.
-250 Mass storage error	Indicates that a mass storage error occurred. The device cannot detect the more specific errors described for errors -251 through -259.
-251 Missing mass storage	Indicates that a legal program command or query could not be executed because of missing mass storage.
-252 Missing media	Indicates that a legal program command or query could not be executed because of missing media. For example, no disk.
-253 Corrupt media	Indicates that a legal program command or query could not be executed because of corrupt media. For example, bad disk or wrong format.
-254 Media full	Indicates that a legal program command or query could not be executed because the media is full. For example, there is no room left on the disk.
-255 Directory full	Indicates that a legal program command or query could not be executed because the media directory was full.
-256 File name not found	Indicates that a legal program command or query could not be executed because the file name was not found on the media.
-257 File name error	Indicates that a legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to read or copy a nonexistent file.
-258 Media protected	Indicates that a legal program command or query could not be executed because the media was protected. For example, the write-protect switch on a memory card was set.
-270 Macro error	Indicates that a macro related execution error occurred.
-271 Macro syntax error	Indicates that a syntactically legal macro program data sequence, according to IEEE 488.2, 10.7.2, could not be executed due to a syntax error within the macro definition.
-272 Macro execution error	Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition, see IEEE 488.2, 10.7.6.3.

## **-200 through -299 Error Message Descriptions**

<b>Error Message</b>	<b>Description</b>
-273 Illegal macro label	Indicates that the macro label was not accepted, it did not agree with the definition in IEEE 488.2, 10.7.3
-274 Macro parameter error	Indicates that the macro definition improperly used a macro parameter placeholder, see IEEE 488.2, 10.7.3.
-275 Macro definition too long	Indicates that a syntactically legal macro program data sequence could not be executed because the string of block contents were too long for the device to handle, IEEE 488.2, 10.7.6.1.
-276 Macro recursion error	Indicates that a syntactically legal macro program data sequence could not be executed because it would be recursive, see IEEE 488.2, 10.7.6.6.
-277 Macro redefinition not allowed	Indicates that redefining an existing macro label, see IEEE 488.2, 10.7.6.4.
-278 Macro header not found	Indicates that a legal macro label in the *GMS?, see IEEE 488.2, 10.13, could not be executed because the header was not previously defined.

## -100 through -199 Error Message Descriptions

### Description

A command error indicates that the test set's GPIB parser has detected an IEEE 488.2 syntax error.

When one of these errors is generated, the command error bit in the event status register is set.

Error Message	Description
-100 Command error	This event bit (Bit 5) indicates a syntax error, or a semantic error, or a GET command was entered, see IEEE 488.2, 11.5.1.1.4.
-101 Invalid character	Indicates a syntactic elements contains a character which is invalid for that type.
-102 Syntax error	Indicates that an unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings.
-103 Invalid separator	The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit.
-104 Data type error	The parser recognized a data element different than one allowed. For example, numeric or string data was expected but block data was encountered.
-105 Get not allowed	Indicates a Group Execute Trigger was received within a program message. Correct the program so that the GET does not occur within the program code.
-108 Parameter not allowed	Indicates that more parameters were received than expected for the header. For example, *ESE common command only accepts one parameter, so *ESE 0,1 is not allowed.
-109 Missing parameter	Indicates that less parameters were received than required for the header. For example, *ESE requires one parameter, *ESE is not allowed.
-110 Command header error	Indicates an error was detected in the header. This error is used when the device cannot detect the more specific errors -111 through -119.
-111 Header separator error	Indicates that a character that is not a legal header separator was encountered while parsing the header.
-112 Program mnemonic too long	Indicates that the header contains more than twelve characters, see IEEE 488.2, 7.6.1.4.1.

## -100 through -199 Error Message Descriptions

Error Message	Description
-113 Undefined header	Indicates the header is syntactically correct, but it is undefined for this specific device. For example, *XYZ is not defined for any device.
-114 Header suffix out of range	Indicates the value of a header suffix attached to a program mnemonic makes the header invalid.
-120 Numeric data error	This error, as well as errors -121 through -129, are generated when parsing a data element which appears to be numeric, including non-decimal numeric types. This particular error is used if the device cannot detect a more specific error.
-121 Invalid character in number	Indicates an invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a “9” in octal data.
-123 Exponent too large	Indicates the magnitude of an exponent was greater than 32000, see IEEE 488.2, 7.7.2.4.1.
-124 Too many digits	Indicates the mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros, see IEEE 488.2, 7.7.2.4.1.
-128 Numeric data not allowed	Indicates that a legal numeric data element was received, but the device does not accept one in this position for the header.
-130 Suffix error	This error, as well as errors -131 through -139, are generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error.
-131 Invalid suffix	Indicates the suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.
-134 Suffix too long	Indicates the suffix contain more than 12 characters, see IEEE 488.2, 7.7.3.4.
-138 Suffix not allowed	Indicates that a suffix was encountered after a numeric element that does not allow suffixes.
-140 Character data error	This error, as well as errors -141 through -149, are generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error.
-141 Invalid character data	Indicates that the character data element contains an invalid character or the particular element received is not valid for the header.
-144 Character data too long	Indicates the character data element contains more than twelve characters, see IEEE 488.2, 7.7.1.4.

## -100 through -199 Error Message Descriptions

Error Message	Description
-148 Character not allowed	Indicates a legal character data element was encountered where prohibited by the device.
-150 String data error	This error, as well as errors -151 through -159, are generated when parsing a string data element. This particular error message is used if the device cannot detect a more specific error.
-151 Invalid string data	Indicates that a string data element was expected, but was invalid, see IEEE 488.2, 7.7.5.2. For example, an END message was received before the terminal quote character.
-158 String data not allowed	Indicates that a string data element was encountered but was not allowed by the device at this point in parsing.
-160 Block data error	This error, as well as errors -161 through -169, are generated when parsing a block data element. This particular error message is used if the device cannot detect a more specific error.
-161 Invalid block data	Indicates a block data element was expected, but was invalid, see IEEE 488.2, 7.7.6.2. For example, an END message was received before the end length was satisfied.
-168 Block data not allowed	Indicates a legal block data element was encountered, but not allowed by the device at this point in parsing.
-170 Expression error	This error, as well as errors -171 through -179, are generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error.
-171 Invalid expression	Indicates the expression data element was invalid, see IEEE 488.2, 7.7.7.2. For example, unmatched parentheses or an illegal character.
-178 Expression data not allowed	Indicates a legal expression data was encountered, but was not allowed by the device at this point in parsing.
-180 Macro error	This error, as well as error -181 through -189, are generated when defining a macro or execution a macro. This particular error message is used if the device cannot detect a more specific error.
-181 Invalid output macro definition	Indicates that a macro parameter place holder was encountered outside of a macro definition.
-183 Invalid inside macro definition	Indicates that the program message unit sequence, sent with a *DDT or a *DMC command, is syntactically invalid, see IEEE 488.2, 10.7.6.3.

## **-100 through -199 Error Message Descriptions**

<b>Error Message</b>	<b>Description</b>
-184 Macro parameter error	Indicates that a command inside the macro definition had the wrong number or type of parameters.

## +100 through +199 Error Message Descriptions

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error.

These are general errors generated by the core instrument. When one of these errors is generated, the '+100 errors' bit in the questionable error status register is set.

Error Message	Description
+101 Assert; Cycle power. Assert message<message1>	<p>&lt;message1&gt; will appear as:</p> <p>If the DSP generated the assert:  ;P:DSP T:&lt;task ID&gt; E:&lt;error code&gt; C:&lt;error  classif.&gt; F1:&lt;flag 1&gt; F2:&lt;flag 2&gt;</p> <p>If the Protocol processor generated the assert:  ;P:Protocol T:&lt;task ID&gt; L:&lt;line number&gt; F:&lt;file  name&gt;</p> <p>If the Host processor generated the assert:  ;P:Host T:&lt;task ID&gt; L:&lt;line number&gt; F:&lt;file  name&gt;</p>
+102 Exception; Cycle power. Exception message<message2>	<p>&lt;message2&gt; will appear as: T:&lt;task ID&gt; or V:&lt;vector  number&gt; or PC:&lt;program counter&gt; or DA:&lt;data adrs  reg value&gt;.</p> <p>Vector number, program counter and data address  register values are hexadecimal format.</p>
+103 Failure; No measurements or settings can be made	Indicates none of the VI's are operational because a serious problem exists.
+104 Failure; No settling operations will take place	Indicates none of the VI's are operational because a serious problem exists.
+105 Failure; No measurements or setting can be made for the function selected	Indicates none of the VI's are operational because a serious problem exists.
+110 Input pacing; Internal communication queue overflow likely	Indicates that GPIB commands are too fast for the device input queue and should be slowed.
+111 Input pacing; Internal communication queue overflow imminent. Pacing increased	Indicates that GPIB commands were too fast and the device input queue has not kept pace.
+112 Internal error; Protocol error <message3>	<message3> is an eight digit hexadecimal number that is the error code reported by protocol.

## +100 through +199 Error Message Descriptions

Error Message	Description
+113 Internal error; <VI NAME> forced inactive	Indicates that a VI is inactivated when not executed. <VI NAME> includes : "IntVmVI", "GprsBsEmulVI", "GsmComBsEmulVI", "GSMFixedVI", "MiscVI", "GSMSacchMriVI", "IQSelfCalVI1", "IQSelfCalVI2", "TA RevisionVI", "TdmaTaBsEmulVI".
+114 Internal error; <VI NAME> not responding	Indicates that a VI has not been instantiated or the state is not available. <VI NAME> includes : "IntVmVI", "GprsBsEmulVI", "GsmComBsEmulVI", "GSMFixedVI", "MiscVI", "GSMSacchMriVI", "IQSelfCalVI1", "IQSelfCalVI2", "TA RevisionVI", "TdmaTaBsEmulVI", "RfHwAccessVI".
+115 Internal error; <VI NAME> inactive	Indicates that a VI has been made inactive. <VI NAME> includes : "IntVmVI", "GSMFixedVI", "MiscVI", "GSMSacchMriVI", "IQSelfCalVI1", "IQSelfCalVI2", "TA RevisionVI".
+120 Warning; Receiver over range due to requested settings	Indicates the total received power (a combination of received power and amplitude offset) is above the range of the test set.
+121 Warning; Receiver under range due to requested settings	Indicates the total received power (a combination of received power and amplitude offset) is below the range of the test set.
+122 Warning; Reference out of lock	Indicates the test set's internal reference is out of lock.
+123 Warning; Duplicate RF IN/OUT Amplitude Offset Frequency entry. First frequency entry in RF IN/OUT Amplitude Offset table will be used.	Indicates that an amplitude offset value for that frequency has already been entered. The test set will use the amplitude offset value entered first.
+124 Warning; Source over range due to requested settings	The setting selected for total transmit power (a combination of cell power, awgn power, amplitude offset) is above the test set's range.
+125 Warning; Source under range due to requested settings	The setting selected for total transmit power (a combination of cell power, awgn power, amplitude offset) is below the test set's range.
+130 Configuration error; Unable to switch to indicated Test Application	The test application selected is not available for this test set.
+131 Configuration error; Current Test Application is not licensed (License = N). Select another Test Application	The test application selected is not licensed. Select another revision or test application that is licensed (License = L).



## +100 through +199 Error Message Descriptions

Error Message	Description
+132 Configuration error; Selected Test Application Format is not available.	Indicates that the fast switching operation will not activate a particular radio format. Check the revision number of the test application associated with the radio format, does the revision correspond with what the fast switching test application needs?
+133 Configuration error; Selected Test Application Format is not licensed, (License = N).	The radio format selected is not licensed. Select another revision or obtain a licensed revision of the test application test application that is licensed (License = L).
+134 Configuration error; Unable to switch to selected Test Application Format	The Test Application Format name used is correct but for some reason the test set can not switch to that format.
+142 Configuration error; Functionality not available	An attempt has been made to access lab application functions from a test application.
+150 Calibration operation; Recalibrating due to present temperature	Indicates that the test set is recalibrating due to hardware inaccuracies based on temperature changes. Any measurements that are running will be temporarily aborted and then restarted after the recalibration is complete.
+160 Save/Recall error; File operation error	Occurs if there is any disk read or write problems when trying to save, recall or delete a register.
+161 Save/Recall error; Recalling available (empty) register	Occurs if an attempt is made to recall any register that has not been saved.
+162 Save/Recall error; Functionality is not yet available for current application.	Occurs when an attempt to save a save/recall register while using an application that has not implemented this feature.

## Device Specific General Errors

### Digital2000 General Errors

Error Message	Description
+181 Setting deferred: Cell power and AWGN power >10 dB apart	A setting is deferred when that setting causes incompatibility between related settings. The test set will allow the entry of incompatible settings but the change will not affect signal levels until the incompatibility is resolved.
+182 Setting deferred: One or more code channel levels >30 dB below total RF power	A setting is deferred when that setting causes incompatibility between related settings. The test set will allow the entry of incompatible settings but the change will not affect signal levels until the incompatibility is resolved.

## +100 through +199 Error Message Descriptions

### Digital2000 General Errors

Error Message	Description
+183 Setting deferred: Cell power and AWGN power >10 dB apart	A setting is deferred when that setting causes incompatibility between related settings. The test set will allow the entry of incompatible settings but the change will not affect signal levels until the incompatibility is resolved.
+190 Settings conflict: F-FCH level changed due to rate set change	Lowering Traffic Data Rate with the Traffic Level set too high, or increasing the Traffic level at low (for example, eighth) Traffic Data Rate can cause this error message. The test set will decreased Traffic Level to a setting compatible with the current Traffic Data Rate.
+190 Settings conflict: F-FCH level changed due to traffic data rate change	Lowering Traffic Data Rate with the Traffic Level set too high, or increasing the Traffic level at low (for example, eighth) Traffic Data Rate can cause this error message. The test set will decreased Traffic Level to a setting compatible with the current Traffic Data Rate.

### Digital95 General Errors

Error Message	Description
+181 Setting deferred: Cell power and AWGN power >10 dB apart	A setting is deferred when that setting causes incompatibility between related settings. The test set will allow the entry of incompatible settings but the change will not affect signal levels until the incompatibility is resolved.
+182 Setting deferred: One or more code channel levels >30 dB below total RF power	A setting is deferred when that setting causes incompatibility between related settings. The test set will allow the entry of incompatible settings but the change will not affect signal levels until the incompatibility is resolved.
+183 Setting deferred: Cell power and AWGN power >10 dB apart	A setting is deferred when that setting causes incompatibility between related settings. The test set will allow the entry of incompatible settings but the change will not affect signal levels until the incompatibility is resolved.
+190 Settings conflict: Traffic level changed due to rate set change	Lowering Traffic Data Rate with the Traffic Level set too high, or increasing the Traffic level at low (for example, eighth) Traffic Data Rate can cause this error message. The test set will decreased Traffic Level to a setting compatible with the current Traffic Data Rate.

**Digital95 General Errors**

Error Message	Description
+190 Settings conflict: Traffic level changed due to traffic data rate change	Lowering Traffic Data Rate with the Traffic Level set too high, or increasing the Traffic level at low (for example, eighth) Traffic Data Rate can cause this error message. The test set will decreased Traffic Level to a setting compatible with the current Traffic Data Rate.

## +200 through +299 Error Message Descriptions

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. Errors are categorized as follows:

- TA2000: errors with test application scope
- CDMA: errors common to the IS-95 and IS-2000 System Types
- Digital2000: errors applicable to only the IS-2000 System Type
- Digital95: errors applicable to only the IS-95 System Type

When one of these errors is generated, the +200 errors bit in the questionable error status register is set.

**Table 32. TA2000 Call Processing Errors**

Error Message	Description
+271 Release order not received	This error message is displayed for information purposes only.
+272 Handoff completion not received	This error message is displayed for information purposes only.
+273 Carrier not detected on new channel	This error message is associated with a dropped or released call.
+274 MS reject order received <reason>	This error message is displayed for information purposes only.
+275 Unexpected message received and ignored	This error message is displayed for information purposes only.
+277 TA2000 call processing error; Operation rejected due to call status change in progress.	This error message is displayed for information purposes only.

**Table 33. CDMA Call Processing Errors**

Error Message	Description
+270 Traffic channel preamble not received	This error message is associated with a failed call attempt.
+271 MS ack of initial BS ack order not received	This error message is displayed for information purposes only.
+272 MS ack order not received	This error message is displayed for information purposes only.

**Table 33. CDMA Call Processing Errors (Continued)**

Error Message	Description
+273 Service Option or Radio Configuration rejected by MS	Some mobile stations do not support all service options provided for a given radio configuration. Use the FCH Service Option Setup (F12) key to select a different service option.
+274 Service response not received	This error message is associated with a failed call attempt or dropped call.
+275 Service request not received	This error message is associated with a failed call attempt or dropped call.
+276 Service connect completion not received	This error message is associated with a failed call attempt or dropped call.
+277 Call drop timer timed out	This error message is associated with a dropped call.
+278 Status response not received	This error message is displayed for information purposes only.
+279 Walsh code cannot be changed while a call is connected	This error message is displayed for information purposes only.
+280 PN Offset cannot be changed while a call is connected	This error message is displayed for information purposes only.
+281 Origination failed due to F-FCH/Traffic state off	This error message is associated with a failed call attempt.
+282 Power control step size rejected	This error message is displayed for information purposes only.

**Table 34. Digital2000 Call Processing Errors**

Error Message	Description
+ 230 Command is not supported in this radio configuration	This error message is displayed for information purposes only.
+270 F-SCH assign ignored due to F-SCH state off	This error message is displayed for information purposes only.
+271 F-SCH assign ignored due to no call connected	This error message is displayed for information purposes only.
+272 F-SCH assign ignored due to lack of support in current radio configuration	This error message is displayed for information purposes only.
+275 Radio configuration cannot be changed while a data connection is established	This error message is displayed for information purposes only.
+273 Query MS capability info ignored due to no call connected	This error message is displayed for information purposes only.

## +200 through +299 Error Message Descriptions

**Table 34. Digital2000 Call Processing Errors**

Error Message	Description
+276 F-FCH service option cannot be changed while a data connection is established	This error message is displayed for information purposes only.
+277 SCH data rate cannot be changed while a data connection is established	This error message is displayed for information purposes only.
+278 SCH encoder cannot be changed while a data connection is established	This error message is displayed for information purposes only.
+279 SCH service option cannot be changed while a data connection is established	This error message is displayed for information purposes only.
+280 Service option change to SO32 not allowed while a call is connected	This error message is displayed for information purposes only.
+281 Radio configuration change causing service option SO32 not allowed while a call is connected	This error message is displayed for information purposes only.
+282 F-SCH assign rejected	This error message is associated with a failed call attempt.
+283 Service option control message not received	This error message is displayed for information purposes only.
+284 F-SCH SO32 data change not allowed while a data connection is established	This error message is displayed for information purposes only.

---

## **+300 through +399 Link Control Device-Specific Error**

These errors are generated when a problem occurs in maintaining the link between the test set and a DUT. These errors generally occur when a message is received from the DUT that is unexpected.

When one of these errors is generated, the '+300 errors' bit in the questionable error status register is set. Refer to "[Standard Event Status Register](#)" on page 593 for information on this register.

**No link control errors are currently defined for this test application.**

## +400 through +499 Error Message Descriptions

### Description

These errors are generated when a problem occurs in one of the test set's hardware modules that is part of the test set's core instrument.

When one of these errors is generated, the '+400 errors' bit in the questionable error status register is set.

Error Message	Description
+400 Hardware failure; Hardware is not available	
+401 Hardware failure; Protocol processor hardware is not responding	
+402 Hardware failure; Demod receiver hardware is not responding	
+403 Hardware failure; Measurement receiver hardware is not responding	
+404 Hardware failure; RF source 1 hardware is not responding	
+405 Hardware failure; RF source 1 digital modulation hardware is not responding	
+406 Hardware failure; RF source 1 level hardware is not responding	
+407 Hardware failure; DSP demod control hardware is not responding	
+408 Hardware failure; 2nd demod receiver hardware is not responding	
+409 Hardware failure; Base station emulator trigger hardware is not responding	
+410 Hardware failure; Audio source hardware is not responding	
+411 Hardware failure; RF source 2 hardware is not responding	
+412 Hardware failure; Internal voltmeter hardware is not responding	
+413 Hardware failure; Fixed timebase input is not responding	
+414 Hardware failure; Fixed external reference output is not responding	



## +400 through +499 Error Message Descriptions

Error Message	Description
+415 Hardware failure; Instrument reference is not responding	
+416 Hardware failure; Bit clock A is not responding	
+417 Hardware failure; RF source 2 frequency hardware is not responding	
+418 Hardware failure; RF source 2 digital modulation hardware is not responding	
+419 Hardware failure; RF source 2 level hardware is not responding	
+420 Hardware failure; RF source hopping hardware is not responding	
+421 Hardware failure; Digital demod hopping hardware is not responding	
+422 Hardware failure; Misc VI hardware is not responding	
+423 Hardware failure; Unable to access networking information	
+424 Hardware failure; Bit clock B is not responding	
+425 Hardware failure; Invalid EEPROM checksum <EEPROM board ID>	See the list of EEPROM board ID names below.
+426 Hardware failure; Unable to write to EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+427 Hardware failure; Unable to read from EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+428 Hardware failure; Board not identified <board ID>	See the list of board ID names below.
+429 Hardware failure; Could not create board identification <board ID>	See the list of board ID names below.
+430 Hardware failure; Control version not compatible with FW <board ID>	See the list of board ID names below.
+431 Hardware failure; RF IO DAC cannot be calibrated due to present temperature	
+432 Hardware failure; RF hardware is not responding	
+433 Hardware failure; RF source FM hardware is not responding	
+434 Hardware failure; Audio source FM hardware is not responding	

## +400 through +499 Error Message Descriptions

Error Message	Description
+460 Hardware failure; Hardware doesn't support requested operation	This error occurs when a setting is attempted that is not possible with the test set's hardware. The current firmware needs new hardware in order to work.
+461 Hardware failure; Link subsystem hardware is not responding. Call processing functionality not operational.	This error occurs any time the link subsystem is not operating correctly. The message is persistent to warn the user that any call processing operations will not work.
+462 Hardware error; Hardware not supported; <board ID><part_number>	This error appears when an operation was attempted that requires hardware that is not installed in the test set.
+463 Hardware error: RFIO version does not support loopback switching.	
+464 Hardware error: RFIO version does not support RF out only selection.	This error occurs when trying to select the RF OUT ONLY port when the test set has the RF I/O module that only has the RF IN/OUT port.

### <board ID> names

3 GHZ ATTENUATOR 1 | ;3GHZ ATTENUATOR 2 | ;AUDIO BD | ;ROM BASEBAND GENERATOR 1 | ;ROM BASEBAND GENERATOR 2 | ;DEMOD DOWNCONVERTER | ;VECTOR OUTPUT BOARD 1 | ;VECTOR OUTPUT BOARD 2 | ;IVF MEASUREMENT | ;MEASUREMENT DOWCONVERTER | ;RF POWER DETECTORS | ;REFERENCE MODULE | ;SYNTH DOUBLER 1 | ;SYNTH DOUBLER 2 | ;TIMING REF | ;MOMENTUM INSTRUMENT | ;RF MOTHER BOARD | ;JUMPER BOARD | ;DIGITAL MOTHER BOARD | ;FLAT PANEL ADAPTER | ;REAR PANEL BOARD

### <EEPROM board ID> names

Instrument Eeprom ID State | ;Atten 1 Eeprom ID State | ;Atten 2 Eeprom ID State | ;Audio Eeprom ID State | ;BaseBandGen 1 Eeprom ID State | ;BaseBandGen 2 Eeprom ID State | ;Demod DC Eeprom ID State | ;Digital Mother Board Eeprom ID State | ;IQ Output 1 Eeprom ID State | ;IQ Output 2 Eeprom ID State | ;IVF Meas Eeprom ID State | ; Jumper Board Eeprom ID State | ; Meas DC Eeprom ID State | ;RF Mother Board Eeprom ID State | ;RF Interface Eeprom ID State | ; Ref Mod Eeprom ID State | ;Sig Gen 1 Eeprom ID State | ; Sig Gen 2 Eeprom ID State | ;Time Ref Eeprom ID State | ;Display Interface Eeprom ID State | ;Rear Panel Eeprom ID State

---

## **+500 through +599 Test Application Hardware Device-Specific Error**

### **Description**

These errors are generated when a problem occurs with a hardware module that is required for a particular test application.

When one of these errors is generated, the '+500 errors' bit in the questionable error status register is set.

**No hardware specific errors are currently defined for this test application.**

---

## +600 through +699 Error Message Descriptions

### Description

These errors are generated when a problem occurs that is specific to one of the test set's instruments. These errors are part of the test set's core. Note that these measurements may not be present in every test application and therefore, these errors may not be present in every test application. There is no plan at present to support test application specific instruments.

An instrument in this context refers to the measurement-like functionality such as the audio generator and not to the test set as a whole.

When one of these errors is generated, the '+600 errors' bit in the questionable error status register is set.

Error Message	Description
+601 Instrument failure; Audio generator hardware is not responding	Indicates a problem occurs when attempting to control the test set's audio generator.
+603 Measurement failure; Spectrum Monitor hardware is not responding	Indicates that there is a problem with the hardware associated with the spectrum monitor measurement.

## +700 through +799 Error Message Descriptions

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. Errors are categorized as follows:

- TA2000: errors common to the test application
- CDMA: errors common to the IS-95 and IS-2000 system type
- Digital2000: errors applicable to only the IS-2000 system type
- Digital95: errors applicable to only the IS-95 system type

When one of these errors is generated, the +700 errors bit in the questionable error status register is set.

**Table 35. CDMA Measurement Errors**

Error Message	Description
+701 Digital average power measurement is not responding	This error message indicates an internal software or hardware error.
+702 Waveform quality measurement is not responding	This error message indicates an internal software or hardware error.
+703 Channel power measurement is not responding	This error message indicates an internal software or hardware error.
+704 Frame error rate measurement is not responding	This error message indicates an internal software or hardware error.
+705 Access probe power measurement is not responding	This error message indicates an internal software or hardware error.
+706 Time response of open loop power control measurement is not responding	This error message indicates an internal software or hardware error.
+707 Gated power measurement is not responding	This error message indicates an internal software or hardware error.
+708 Tx spurious emissions measurement is not responding	This error message indicates an internal software or hardware error.
+721 "CDMA measurement failure; Gated power measurement requires MS to transmit in eighth traffic data rate (gated mode). Verify loopback service option and eighth traffic data rate"	Select an IS-95 loopback service option using the Service Option (F12) key, or select an IS-2000 radio configuration 1 or 2 loopback service option using the FCH Service Option Setup (F12) key.  Select "Eighth" in the Traffic Data Rate field before attempting Gated Power measurements.

## +700 through +799 Error Message Descriptions

**Table 35. CDMA Measurement Errors**

Error Message	Description
+727 “CDMA measurement failure; Time response of open loop power control measurement requires receiver power control set to auto”	See <a href="#">“Automatic Receiver Control” on page 182</a> to set receiver power control to auto.
+728 “CDMA measurement failure; Time response of open loop power control measurement requires receiver power to be within range before and after the measurement”	See <a href="#">“Automatic Receiver Control” on page 182</a> .
+729 “CDMA measurement failure; Time response of open loop power control measurement requires cell power to be within range before and after the measurement”	See <a href="#">“Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149</a> for power range.
+730 “CDMA measurement failure; Time response of open loop power control measurement requires AWGN state off”	See <a href="#">“Cell Power, AWGN (Additive White Gaussian Noise) Power and Total RF Power” on page 149</a> .

**Table 36. Digital2000 Measurement Errors**

Error Message	Description
+701 Handoff waveform quality measurement is not responding	This error message indicates an internal software or hardware error.
+702 Code channel time/phase error measurement is not responding	This error message indicates an internal software or hardware error.
+703 TDSO frame error rate measurement is not responding	This error message indicates an internal software or hardware error.
+721 Handoff waveform quality measurement first PN offset handoff failure	This error message indicates an internal software or hardware error.
+722 Handoff waveform quality measurement second PN offset handoff failure	This error message indicates an internal software or hardware error.

---

## +800 through +899 Error Message Descriptions

### Description

These errors are generated when a problem occurs that is specific to one of the test set's core measurements (such as analog audio).

When one of these errors is generated, the '+800 errors' bit in the questionable error status register is set.

Error Message	Description
+801 Measurement failure; Analog audio hardware is not responding	Indicates that a problem occurs when attempting to control the measurement's hardware.
+802 Measurement failure; Audio analyzer hardware is not responding	Indicates that a problem occurs when attempting to control the measurement's hardware.

---

## Error Message Log

### Description

When an error message is displayed, it is also logged in the error message log. This log is only accessible manually; it is not available through GPIB. The error message log can be displayed by pressing the F7 menu key from the SYSTEM CONFIG screen. Next Page and Previous Page controls are provided.

All errors and events that are generated are displayed in the error message log. When the log is full a new message is sent to the log and the oldest message is removed from the log. The log is cleared when the test set powers up or when you press F10 (Clear Error Message Log).

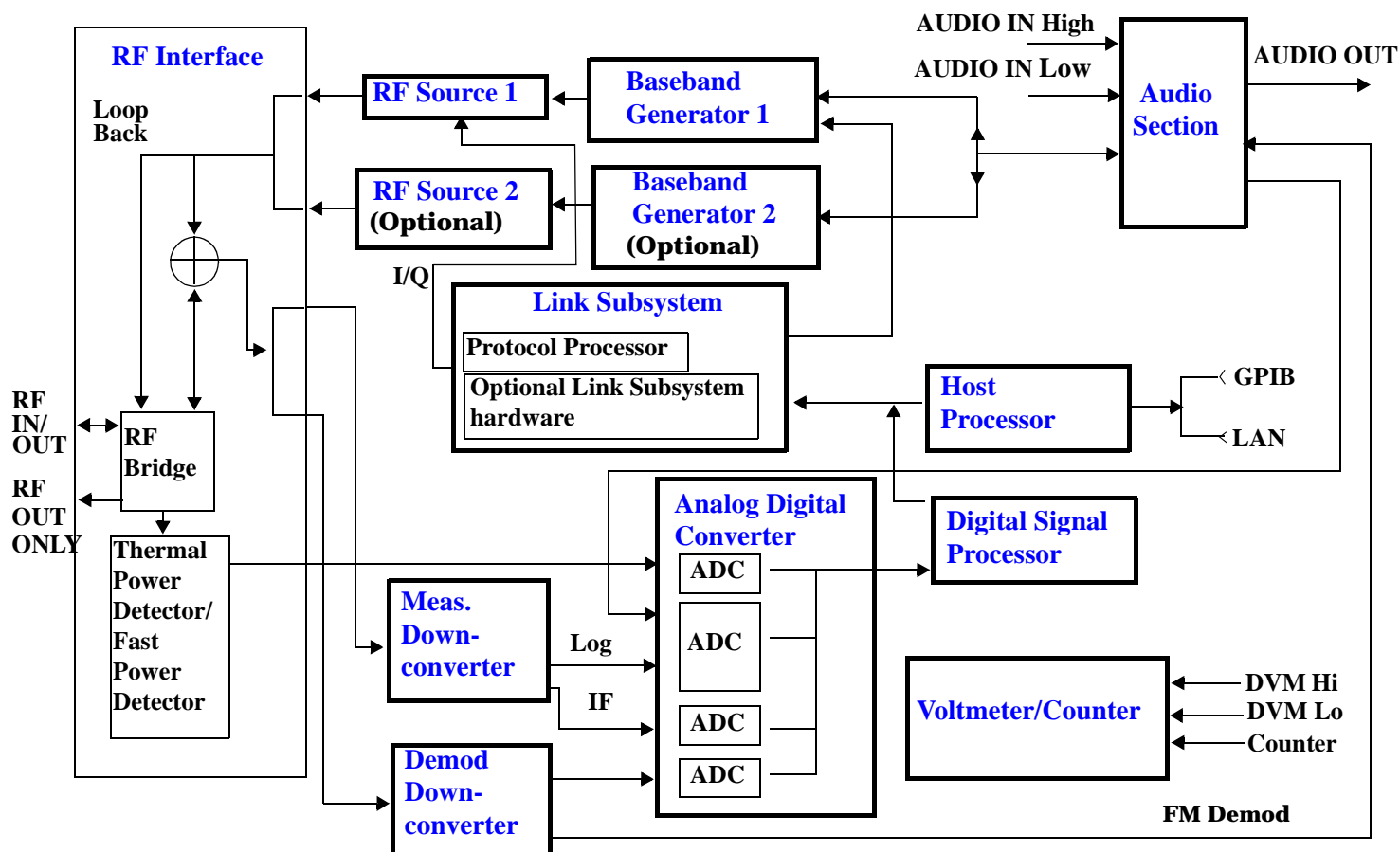
### Related Topics

[“Error Messages” on page 728](#)



## Block Diagram

### Description



### RF Interface Module

Input and output signals are routed through the RF Interface module. The RF Interface module consists of:

- A directional bridge for sampling incoming power.
- Hybrid power splitters which create 4 bidirectional ports (two receiver ports and two source ports). The directional bridge couples power to the Power Detector.
- RF amplifiers.
- Video gain circuits.
- Fast and thermal power detectors.

## **Block Diagram**

The RF Interface module provides two identical RF Source path connections to the In/Out port of the instrument. There is about 25 dB of isolation between the two source paths. There is about 35 dB of isolation between the source paths and either receiver path. The RFIO module has nominally 23 dB of insertion loss in the source path. A temperature sensing circuit facilitates compensation for path loss variation with temperature.

The source signals can be looped back through the input signal path to cross-calibrate the Measurement Downconverter and the Power Detector.

The sampled input power from the directional bridge can be amplified by as many as two 18 dB range amplifiers and then can be directed to the fast detector or the thermal detector. The input power to the fast detector is detected by a diode detector that is part of a feedback loop. The input to the thermal detector is measured in a bridge using a pair of RMS thermal detectors in a feedback loop.

## **Signal Downconversion**

The test set's downconversion receiver section has two downconversion modules; a Measurement Downconversion Module for making measurements, and a Demodulation Downconversion Module for maintaining the radio link.

### **Demodulation Downconverter Module**

The Demodulation Downconverter module is used as part of the demodulation receiver that maintains the radio link.

### **Measurement Downconverter Module**

The Measurement Downconverter module provides high quality (wide dynamic range, spurious free) signals to the Analog To Digital Converter module's measurement sampler input.

The Measurement Downconverter module is designed for very high performance operation to ensure accurate and repeatable measurement results. The Measurement Downconverter module contains two downconversion stages, two local oscillators, and a logarithmic IF envelope detector . Both first and second LO synthesizers are tunable. The first LO is used when tuning to the RF input frequency, and the second LO is used when setting second IF frequency, which is fed to the measurement sampler on the Analog To Digital Converter module.

## **Link Subsystem**

The Link Subsystem maintains the radio link for all CDMA formats. The Link Subsystem has two parts:

- Protocol Processor
- Optional Link Subsystem hardware

The Protocol Processor module is responsible for maintaining the radio link between the test set and the mobile station under test. The primary tasks of the Protocol Processor module are:

- Generating the protocol messaging necessary for the forward channel and sending that protocol stream to the test set's RF source for transmission to the mobile station.
- Decoding the protocol messaging received from the mobile station under test on the reverse channel.
- Computing measurement results which are associated with data bits contained within the mobile stations messaging, such as bit error ratio and frame error rate.

The optional Link Subsystem hardware provides additional signaling link control for CDMA signaling formats. These include:

- Layer 1 digital signal processing.
- Providing I/Q baseband signals which are sent to the I/Q modulator in the RF Source

### **Analog To Digital Converter Module**

Following the Measurement Downconverter and Demodulation Downconverter IF 1 is the Analog to Digital Converter module. The purpose of the Analog to Digital Converter module is to convert the downconverted analog signals into digital data streams which can be processed by the Digital Signal Processing module.

In order to maintain the radio link of non-CDMA formats, the downconversion path through the Demodulation Downconverter module has a dedicated A/D conversion path.

To optimize measurement throughput, the fast RF power detector also has a single dedicated A/D path. This allows power measurements, in many cases, to be made concurrently with other measurements. The two outputs from the Measurement Downconverter module and the Audio In signal share a single multiplexed A/D path.

The outputs of the various analog to digital converters on the Analog to Digital Converter module share a common data bus with the Digital Signal Processing module.

### **Digital Signal Processing Module**

The Digital Signal Processing (DSP) module is responsible for a variety of tasks within the overall test set architecture. These tasks are:

- Demodulate data from the radio under test (data received from the Demodulation Downconverter module) and sending the demodulated data bits to the Protocol Processor module.
- For some systems, perform audio measurements using audio information sent to the DSP module from the Protocol Processor module.
- Execute a variety of signal processing algorithms to perform measurements on the radio system of the currently loaded TA (data received from the power detector ADC, the measurement ADC and, in some cases, data received from the Demodulation Downconverter ADC).

The DSP processor communicates with the Host Processor and the Protocol Processor, as well as controlling the configuration and synchronization of the Analog To Digital Converter module.

## **Block Diagram**

### **Host Processor Module**

The Host Processor module is responsible for a variety of tasks within the overall test set architecture. These tasks include:

- Control of the manual user interface (MUI).
- Executing commands and processing data received from the LAN interface.
- Executing commands and processing data received from the GPIB interface.
- Controlling hard disk access.
- Control of all RF and audio hardware modules.
- Routing measurement results received from the Digital Signal Processing and Protocol Processor modules to the appropriate output device (display, GPIB, LAN, serial, etc.).

### **Voltmeter/Counter**

#### **Voltmeter**

The voltmeter is used to measure internal voltages for instrument self-diagnostics.

#### **Frequency Counter**

The Frequency Counter is used to measure external frequencies from the front panel Audio IN, High or Low BNC connectors, and to measure internal signals for diagnostics. The external input can receive a signal between 20 Hz and 50 MHz, with a level from 25 mV to 8 V rms.

### **Audio Section**

#### **Audio Analysis Path**

Externally applied audio signals can be analyzed through the test set's DSP module for such characteristics as AC level, SINAD, or distortion.

The audio signal to be analyzed is input to the test set using the front panel Audio IN High/Low connectors. The signal is then routed to the Analog To Digital Converter module's measurement sampler for analysis by the DSP module.

The Audio In connector accepts signals from 20 Hz to 15 KHz, at input levels from 10 mV to 20 V peak.

#### **Audio 1 Path**

The Audio 1 path provides analog baseband signals used for frequency modulation of the test set's RF sources. Up to four separate audio sources may be summed together in any combination to provide the composite Audio 1 output. These include the external FM input, internal direct digital synthesis (DDS,) regenerated SAT, and audio echo input.

The external FM input accepts an externally supplied audio signal with a peak voltage between 0.25 and 2 V peak.

The internal DDS generates low distortion audio signals from DC to 20 KHz with 0.1 Hz resolution. One to four signals may be generated and internally summed, with independent level control of each waveform.

The SAT regeneration circuit outputs a signal which is phase-locked to a received SAT signal. This is useful for testing situations where the test set needs to emulate a mobile station.

The audio echo input is used for retransmitting the received audio after a selectable time delay, to check both radio transmit and receive paths simultaneously.

For most applications, only one or two of these Audio 1 path sources are enabled at any given time.

### **Audio 2 Path**

The Audio 2 path provides a secondary means for sending analog baseband signals to the FM modulator. Audio 2 contains only one source, a DDS similar to that used for Audio 1.

Typically, the Audio 2 path DDS is used for cases where multiple signals must be summed together with the lowest possible distortion. Another potential use of Audio 2 would be to obtain higher output levels than Audio 1 is capable of (up to twice as much), assuming the two outputs are set to the same frequency and phase, and then summed together at the Baseband Generator module.

Audio 2 is rarely used in practice because the DDS used for Audio 2 is the same DDS that is used for the front panel audio output.

### **Audio Out Path**

Any one of four inputs may be coupled to the front panel audio output connector. These include a 4 channel DDS (shared with Audio 2), receiver discriminator audio from the Demodulation Downconverter module, audio echo from the Analog To Digital Converter module, and audio vocoder.

The front panel output is capable of providing signal levels up to 9 V peak into > 600 ohm loads, and up to 0.8 V peak into an 8 ohm load (e.g. speaker). The output level is calibrated for all modes except discriminator audio,

The discriminator audio has an uncalibrated volume control provided due to the high tolerances involved.

Typically the DDS mode is used to feed the MIC input of a radio, or it may simply be used as a general purpose low distortion function generator.

Audio echo can be selected to route the received audio to the front panel audio output connector.

### **RF Sources**

The test set has up to two identical RF sources. The RF sources are used to provide analog or digitally modulated RF carriers for use in parametric testing of mobile stations encompassing a variety of cellular radio formats. In general, the sources have a frequency range of 292 MHz to 2.7 GHz and an amplitude range of -10 dBm to -127 dBm.

The RF sources consist of a Synthesized Signal Generator module followed by a Vector Output module and an RF Attenuator module. Baseband modulation information is supplied to the RF sources from a Baseband Generator module preceded by an Audio Section module.

### **Baseband Generators**

The purpose of the Baseband Generator module is to provide, for the modulation type currently in effect, properly formatted baseband signals to the modulation circuits on the RF Source modules.

## **Block Diagram**

The Baseband Generator performs several functions related to the generation and processing of these base-band modulation signals. These are:

- Transform data and clock signals from the Protocol Processor module into base-band analog I/Q modulation signals for the I/Q modulator in the Vector Output module
- Transform data from the Protocol Processor module into baseband FSK modulation for the FM modulator in the Signal Generator module
- Provide baseband FM path source selection, gain adjustment and summing node for analog FM signals from the Audio module and internally generated baseband FSK signals which are output to the FM modulator in the Signal Generator module
- Transform burst and adjacent timeslot signals from the Protocol Processor module into baseband burst modulation signals for the burst modulator in the Vector Output module

# Configuration

---

## Obtaining Identification Information (\*IDN)

### Description

Test set information is returned from a \*IDN? query. The \*IDN? query provides information about the Manufacturer, Model Number, Serial Number, and Firmware Revision. \*IDN? is defined in IEEE Std. 488.2-1992, 10.14.

### Test Set Information

\*IDN? query returns identification information as a comma separated string.

```
DIM A$[100]
OUTPUT 714;"*IDN?" !returns manufacturer,model number, serial number and "0"
                !separated by commas
ENTER 714;A$
PRINT A$          !prints, for example "Agilent Technologies, 8960 Series 10 E5515B,
                !US38020105,0
```

- Agilent Technologies is the manufacturer.
- Printable ASCII characters excluding comma and semicolon up to a 25-character string.  
Model number example: 8960 Series 10 E5515B
- Printable ASCII characters excluding comma and semicolon up to a 10-character string.  
Serial number example: US00000123
- Printable ASCII characters excluding comma and semicolon up to a 20-character string.  
Firmware revision example: 0

---

**NOTE**        The \*IDN? query will always indicate that the firmware revision is zero.  
              SYSTEM:APPLication[:CURRent]:REVision? is the recommended way to query the firmware revision.

---

### Related Topics

[“Hardware Configuration Report” on page 773](#)



# Hardware Configuration Report

## Description

You can generate a list of the test set's hardware configuration over the LAN or GPIB.

The LAN query is the easiest and most direct way to query the test set's hardware configuration. This method uses your web browser to display a formatted report.

The GPIB query returns an unformatted character string that must be buffered and saved to an HTML file to provide formatted text.

## LAN Query

1. Refer to the SYSTEM CONFIG screen to determine the LAN address.
2. Open a web browser and enter <LAN address>/iconfig. For example, if your LAN address is 130.2.2.147, you would enter:  
130.2.2.147/iconfig
3. The web browser will then display formatted text. A partial list of the hardware configuration information is shown below:

<p><b>Agilent Technologies 8960 Series 10 E5515A</b></p> <p><b>Serial Number: US00000097</b></p> <p><b>Current Test Application:</b> E1960A, GSM Mobile Test, A.04.01</p> <p><b>Instrument Options Installed:</b> RF Source 2</p> <p>HOST BOOT ROM REV: A.02.03_BOOT          PROTOCOL BOOT ROM REV: MOM_PROTOCOL_BSP_1.7          DSP BOOT ROM REV: A.00.01</p>
--

## GPIB Query

Use the following Basic example as a model to store the test set's configuration as an HTML file.

### GPIB Example:

```

10   DIM Buf1$(20000),Buf2$(20000) ! This is the minimum space for the arrays
20   OUTPUT 714;"SYSTEM:CONFIGURE:INFORMATION:HARDWARE:VERBOSE?"
30   ENTER 714;Buf1$,Buf2$
40   CREATE "HW.htm",1           ! Create an HTML file
50   ASSIGN @File TO "HW.htm"
60   OUTPUT @File;Buf1$,Buf2$
70   END

```

## Hardware Configuration Report

In the future, the hardware configuration report may increase in length. More space would then need to be allocated for the arrays.

Display the HTML file using a web browser or HTML text editor.

## Related Topics

[“SYSTEM:CONFIGure” on page 609](#)

[“Obtaining Identification Information \(\\*IDN\)” on page 772](#)

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## E1966A 1xEV-DO Terminal Test Application Revision Information

This document describes features and functionality that are part of the Agilent Technologies E1966A 1xEV-DO Terminal Test Application releases. This document contains the original features, as well as enhancements that have been added over time.

Select the appropriate link below to view the required release.

- [“A.01 release”](#)

### A.01 release

These are the original features of the Agilent E1966A.

#### Call Processing Functionality

- Call Processing
  - Start Data Connection
  - End Data Connection
  - Close Session
  - Hard Handoff (Cell Band and Channel)
- Access Network Emulation
  - Cell Power: Pilot, Traffic, Control, and MAC Channels
  - AWGN
  - Cell Bands (see [“Cell Band” on page 159](#))
- Test Application Protocol (TAP) support:
  - Forward Test Application Protocol (FTAP)
  - Reverse Test Application Protocol (RTAP)

#### Transmitter Measurements

- 1xEV-DO:
  - Channel Power
  - Digital Average Power
  - Access Probe Power
  - Waveform Quality + Code Domain Power
  - Time Response of Open Loop Power Control (TROLPC)
  - Tx Spurious Emissions

## **E1966A 1xEV-DO Terminal Test Application Revision Information**

- Analog:
  - Frequency Modulation
    - FM Deviation
    - Distortion
    - Modulation Frequency
  - Frequency Stability
    - Frequency Error
    - Frequency
  - Analog Transmit Power

### **Receiver Measurements**

- Packet Error Rate (PER)

### **Instruments**

- Swept Audio
  - Audio generator
  - Audio analyzer
  - SINAD meter
  - Distortion meter
- Audio Generator
  - Amplitude measurements
  - Frequency measurements
- Audio Analyzer
  - Audio level measurements
  - Audio frequency measurements
  - SINAD measurements
  - Distortion measurements

### **Other Features**

- The ability to print test set screens over a LAN connection to a PC web browser and save directly as .GIF

### **Features Not Supported**

---

## Display Brightness

### Description

This parameter allows you to adjust the brightness of the test set's display. The test set's display screen has two brightness settings:

- medium brightness
- high brightness

### Example

```
OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" ! sets screen brightness to medium.
```

### Related Topics

["DISPlay" on page 411](#)

---

## Display Mode (Track/Fast)

### Description

There are two display modes to select from when operating the test set remotely.

- Display mode fast
- Display mode track

### Fast Mode

When operating remotely, there is often no need for the display to be updated as measurements are made. Using the fast display mode will increase the speed of the test set when it is operated remotely.

Fast mode is designed for remote use only. The test set returns to track mode if you change to manual operation.

- No screen or menu items are visible (except error messages).
- Error messages will be displayed in their normal location.
- “This instrument is being operated remotely” will be displayed at the bottom of the screen.

### Example

```
OUTPUT 714;"DISPLAY:MODE FAST" !Selects fast mode
```

### Track Mode

The track display mode is used to allow users to see what the test set is doing while it is being controlled remotely. Track mode is the default mode of the test set.

- Any changes made remotely will be updated on the screen if that screen is displayed.
- The error message window will be displayed as required when an error occurs.

### Example

```
OUTPUT 714;"DISPLAY:MODE TRACK"!Selects track mode
```

## Writing Messages to the Display

The capability to write up to four 30-character lines of text to the front panel display for operator messages is available when the display is in “[Fast Mode](#)”. This feature can be used to control the flow of software running on an external controller by pressing softkeys on the test set’s front panel.

For example, by displaying a message that prompts the operator to press a front panel softkey and then monitoring that softkey through status register bits, the programmer can design code that starts measurements, stops measurements, or branches to a selected routine or function without the need for access to the external computer’s keyboard.

The GPIB commands for writing messages to the display are found in the “[DISPlay:OPERator:MESSAge](#)” table.

The status bit register GPIB commands and bit definitions for monitoring the test set’s softkeys are found in

the [“STATUS:OPERation:KEYPressed Condition Register Bit Assignments”](#) table.

## **Related Topics**

[“DISPlay”](#) on page 411

[“STATUS:OPERation:KEYPressed Condition Register Bit Assignments”](#) on page 559

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## Test Set Beeper

### Description

This parameter allows you to change the beeper state to on or off. A beep will indicate error conditions caused during manual or remote operation of the test set.

A 100 ms, 1.24 kHz audible tone (beep) is generated when an error message is logged and the beeper state is set to on. If two errors are generated in quick succession, two beeps are generated to indicate that more than one error has been logged.

The beeper state can be manually set in the Instrument Setup window found in the SYSTEM CONFIG screen.

#### Example

```
OUTPUT 714;"SYSTEM:BEEPER:STATE OFF"
```

### Related Topics

["SYSTem:BEEPer" on page 604](#)



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## Timebase Description/Configuration

### Description

The time base source is selected by the test set, either an internal time base or an external source (if a suitable signal is detected) is used as the reference oscillator. If a 10 MHz +/- 100 ppm signal, that has an input level from 0 to +13 dBm is connected to the 10 MHz REF IN connector on the rear panel, the test set will automatically select the external timebase.

You can read the status window at the bottom of the test set display for the EXT REF indicator, or query the test set to verify if it is using an external time base or an internal time base. You may also query the test set to verify if the time base is locked. The reference oscillator functionality is controlled through the SYSTEM subsystem.

Example:

```
OUTPUT 714;"SYSTEM:ROSCILLATOR[:TIMEBASE]?" !returns INT or EXT
                                                !(internal or external) timebase.
OUTPUT 714;"SYSTEM:ROSCILLATOR:LOCKED?" !returns 1 or 0 (locked or unlocked)
                                                !condition for timebase
```

### Related Topics

["SYSTEM:ROSCillator" on page 624](#)

["Rear Panel Connectors"](#)

---

## Configuring the Test Set's LAN

### Description

#### LAN IP Address

The LAN address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223, and B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN address can be set/queried using the SYSTem subsystem.

The LAN address is a non-volatile parameter. The LAN address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

---

**NOTE** If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

---

For convenience the DATA port on the front panel may be configured as a LAN port. When a RJ45 jumper cable, (part number E5515-61160) is connected from the LAN PORT on the rear panel, to the ETHERNET TO FRONT PANEL port also on the rear panel, the user has LAN access from the front panel of the test set. Without the RJ45 jumper cable, the test set connection to a LAN is the rear-panel, LAN PORT connector.

#### LAN Default Gateway

The LAN router, (default gateway), is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223, and B, C, and D are between 0 and 255, no embedded spaces are allowed. If the default gateway is set to a format not allowed with the LAN address or the subnet mask that have been selected, the default gateway will be set to a null string, indicated by a blank field on the test set display. The address may be manually set/viewed in the system configuration screen. The LAN default gateway can be set/queried using the SYSTem subsystem.

The LAN default gateway is the address of a router that routes messages between networks and or subnets. If this value is not specified, LAN communications will be limited to the network and subnet specified by the LAN IP address and the subnet mask. Your network administrator will know if a default gateway is needed and if so, the address of the router. If the default gateway address is not needed by your network, it may be disabled by entering any of the following values: "0" (zero), "" (null string), "0.0.0.0"

The LAN default gateway is a non-volatile parameter. The LAN default gateway is not affected by any reset operation and can only be changed by direct access to the parameter itself.

#### LAN Subnet Mask

The LAN subnet mask address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A, B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN subnet mask address can be set/queried using the SYSTem subsystem.

The subnet mask number combined with the IP address identifies which network and subnet your computer is on. Contact your system administrator for the correct subnet mask for your network.

The subnet mask determines the boundaries between the subnet ID and the host ID.

The LAN subnet mask is a non-volatile parameter. The LAN subnet mask is not affected by any reset operation and can only be changed by direct access to the parameter itself.

---

**NOTE** If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

---

The subnet mask number is obtained from your network administrator.

### Related Topics

[“SYSTEM:COMMunicate” on page 605](#)

## Configuring the Test Set's GPIB

### Description

The GPIB address is an integer between 0 and 30. The test set comes with a default address of 14 and may be set/queried using the `SYSTem` subsystem or manually through the system configuration screen by selecting the parameter and changing the number with the knob or the keypad.

The GPIB address is a non-volatile parameter. The GPIB address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

### Related Topics

[“SYSTem:COMMunicate” on page 605](#)

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## Test Application Switching

### Description

Different radio formats (such as GSM, AMPS, CDMA 2000 or TIA/EIA 136) can be tested when the optional test applications are purchased from Agilent Technologies. The test set allows you to select a different test application and switch to it, a reboot makes the test application functional. The reboot will happen automatically when the you tell the test set to switch test applications. Switching to another test application takes about one minute.

Some radio formats are combined as fast switching test applications. Switching formats in a fast switching test application takes less than 2 seconds.

### Test Application Switching GPIB Command

In order to switch to another test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'GSM MOBILE TEST' "
```

Sending this command causes the test set to reboot.

### Test Application Revision and Licensing

Each test application must have a valid license and revision to function. Licensed revisions of test applications are available from Agilent Technologies.

It may take several seconds before revision, model, and name information is returned.

## Test Application Switching

### Test Application Switching Programming Example

This program example shows you how to switch to the GSM test application.

1. Query the list of test application names to get exact spelling of the GSM test application. This is not necessary if you already know the exact name.
2. Query the test set to get a list of all revisions for “GSM Mobile Test.” This is not necessary if you are not changing revisions.
3. Select a revision of “GSM Mobile Test.” This is required if you are changing revisions.
4. Select the GSM test application. This will switch test applications and cause the test set to reboot.

```
10  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"
20  !Queries all of the test application names
30  ENTER 714;N$
40  PRINT "The CATALOG names that are loaded are ";N$
50  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'GSM MOBILE TEST'"
60  !Queries all revisions of GSM MOBILE TEST
70  ENTER 714;Cat_rev$
80  PRINT "The revisions for the GSM Mobile Test Application are ";Cat_rev$
90  OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM MOBILE TEST','A.04.01'"
100 !Selects a revision
110 OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'GSM MOBILE TEST'"
120 !Switches the test application to GSM MOBILE TEST
130  END
```

## Related Topics

[“Test Application Revisions and Licenses” on page 787](#)

[“SYSTEM:APPLication” on page 597](#)

[“SYSTEM:CURRent:TA” on page 616](#)

[“Test Application Name” on page 789](#)

---

## Test Application Revisions and Licenses

### Description

Different revisions of the test applications in your test set provide different capabilities. The selected test application revision is loaded after the next test application switch or power cycle of the test set. Once you select a revision the revision does not change unless you select another revision.

You can query the selected revision, all available revisions, and the total count of available revisions for a selected test application. These queries are helpful when selecting revisions but are not usually necessary when switching test applications.

---

**NOTE** The Agilent E1960A GSM mobile test application revisions prior to A.04.00 do not support test application switching. If you select a revision prior to A.04.00 you will not have a path to switch back to later revisions.

If you accidentally switch to a non-supported revision, use the firmware upgrade process to load firmware with the correct revision.

---

### Test Application Revision Queries and Commands

These are commands to query revision information or select a revision.

- To query a **selected** test application revision (running or not) use this GPIB command:  

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? `AMPS/136 MOBILE TEST`"
```
- To query the revision of the test application **currently running** use this GPIB command:  

```
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"
```
- To query **all** of the revisions available for a test application use this GPIB command:  

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? `AMPS/136 MOBILE TEST`"
```
- To **select** a revision of a test application use this GPIB command:  

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION `GSM mobile test`,`A.04.01`"
```
- To query the number of revisions for a specified test application:  

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? `GSM MOBILE TEST`"
```

### Test Application License Status Query

The test application license status can be queried for a particular test application and revision using the following GPIB query:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? `GSM mobile test`,`A.04.01`"
```

## Test Application Revisions and Licenses

This query returns one of the following:

- “LIC” - This revision of test application appears to have a LICense. The test application may have been developed before licensing and therefore needs no license.
- “NLIC” - This test application does not appear to have a license. Selecting a Not LICensed revision will result in an error +130.
- “PART” - Some PART of the test application does not appear to have a license.
- “UNKN” - This test application has UNKNown license status.

---

**NOTE**        If you switch to a not licensed revision the test set will reboot to the SYSTEM CONFIG screen. You will be unable to select any other screen or make any measurements. Query or view the Test Application Setup menu to determine the licensed versions of test applications available.

---

Revision and license information can be viewed and selected from the SYSTEM CONFIG screen, by selecting the Test Application Setup menu. Revisions are shown with their license status. After the revision number is a letter. That letter indicates the revision license status; Licensed “L”, Not Licensed “N”, or Unknown “U”.

- “L”- This revision of test application appears to have a License. The test application may have been developed before licensing and therefore needs no license.
- “N” - This test application does not appear to have a license. Selecting a Not licensed revision will result in an error +130.
- “P” - Some Part of the test application does not appear to have a license.
- “U” - This test application has Unknown license status.

## Related Topics

[“Test Application Switching” on page 785](#)

[“SYSTEM:APPLication” on page 597](#)



---

## Test Application Name

### Description

The following queries give you details about the test application name. To query or switch test applications you must use the test application name as it appears in the catalog (without regard to case).

- To query the name of the all test applications installed in the test set use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"
```

- To query the name of the selected test application (running or not) use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME?"
```

- To query the name of the currently running test application use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:NAME?"
```

- To query the number of test applications installed in the test set use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"
```

The test application names can also be displayed in the Test Application Setup menu on the test set's display.

### Related Topics

["SYSTEM:APPLICATION" on page 597](#)

["Test Application Switching" on page 785](#)