

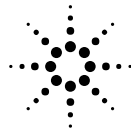
**Agilent Technologies 8960 Series 10 Wireless Communications Test Set  
Agilent Technologies AMPS/136 Mobile Test Application**

# Reference Guide

**AMPS/136 Test Application** Revision A.07  
1000-1843 (not orderable)

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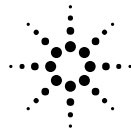
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## **Edition/Print Date**

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January 2001 - AMPS/136 Test Application Revision A.02

March 2001 - AMPS/136 Test Application Revision A.03

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November 2001 - AMPS/136 Test Application Revision A.05

February 2002 - AMPS/136 Test Application Revisions A.06

July 2002 - AMPS/136 Test Application Revisions A.07

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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.

### 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.

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## 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:

### **United States Test and Measurement Call Center**

(Toll free in US)

(800) 452-4844

### **Europe**

(31 20) 547 9900

### **Canada**

(905) 206-4725

### **Japan Measurement Assistance Center**

(81) 426 56 7832

(81) 426 56 7840 (FAX)

### **Latin America**

(305) 267 4288 (FAX)

### **Australia/New Zealand**

1 800 629 485 (Australia)

0800 738 378 (New Zealand)

### **Asia-Pacific**

(852) 2599 7777

(852) 2506 9285 (FAX)

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## Regional Sales Offices

### United States of America:

Agilent Technologies(tel) 1 800 452 4844  
Test and Measurement Call Center  
P.O. Box 4026  
Englewood, CO 80155-4026

### Canada:

Agilent Technologies Canada Inc.(tel) 1 877 894 4414  
2660 Matheson Blvd. E  
Mississauga, Ontario  
L4W 5M2

### Europe:

Agilent Technologies(tel) (3120) 547 9999  
European Marketing Organization  
P.O. Box 999  
1180 AZ Amstelveen  
The Netherlands

### Japan:

Agilent Technologies Japan Ltd.(tel) (81) 456-56-7832  
Measurement Assistance Center(fax) (81) 426-56-7840  
9-1 Takakura-Cho, Hachioji-Shi,  
Tokyo 192-8510, Japan

### Latin America:

Agilent Technologies(tel) (305) 267 4245  
Latin America Region Headquarters(fax) (305) 267 4286  
5200 Blue Lagoon Drive,  
Suite #950  
Miami, Florida 33126  
U.S. A.

### Australia/New Zealand:

Agilent Technologies Australia Pty Ltd.AustraliaNew Zealand  
347 Burwood Highway(tel) 1 800 629 485 (tel) 0 800 738 378  
Forest Hill, Victoria 3131(fax) (61 3) 9272 0749(fax) (64 4) 802 6881

### Asia Pacific:

Agilent Technologies(tel) (852) 3197 7777  
24/F, Cityplaza One,(fax) (852) 2506 9233  
111 Kings Road,  
Taikoo Shing, Hong Kong

Table 1.

## 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.

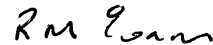
EMC	Standard	Limit
	IEC 61326-1:1997+A1:1998/EN 61326-1:1997+A1:1998	
	CISPR 11:1990 / EN 55011:1991	Group 1 Class A <sup>[1]</sup>
	IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995	4kV CD, 8kV AD
	IEC 61000-4-3:1995 / EN 61000-4-3:1995	3 V/m, 80-1000 MHz
	IEC 61000-4-4:1995 / EN 61000-4-4:1995	0.5V signal 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%

**Safety:** 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 StraBe 130, D71034 Boblingen, Germany

Table 2.

## 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.

**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 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 0.5kV 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

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 StraBe 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).

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## Herstellerbescheinigung

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

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



# 1 Measurements

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## Adjacent Channel Power Measurement Description

### How is an Adjacent Channel Power measurement made?

Adjacent Channel Power measures the average power in the three channels immediately above and below the transmitter's expected frequency that are caused by modulation and switching transients. Results for the adjacent ( $\pm 30$  kHz), 1st alternate ( $\pm 60$  kHz) and 2nd alternate ( $\pm 90$  kHz) channels are returned in dBc (the power in each channel relative to the mean output power in the carrier).

The transmitter's expected frequency is specified using either of these methods:

- By using the DTC channel number you specify in the call setup parameters. The base station emulator assumes your mobile is transmitting on the assigned digital traffic channel and sets the receiver accordingly.
- By using manual receiver control and setting the manual measurement frequency.

Refer to IS-137, 3.4.1.2.1 or 3.4.1.2.2, for more information on measuring adjacent channel power.

This measurement is only made on digital traffic channels. Measurement performance is only specified for normal, full-length DTC bursts; however, measurement values and an integrity indicator are always returned when the measurement is triggered, regardless of the input signal characteristics.

### Related Topics

“Programming an Adjacent Channel Power Measurement” on page 137

“Adjacent Channel Power Troubleshooting” on page 609

“Measurement Timeouts” on page 197

“Statistical Measurement Results” on page 205

“Triggering of Measurements” on page 200

“Test Adherence to Standards” on page 60

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## Analog Transmit Power Measurement Description

### How is an Analog Transmit Power measurement made?

Analog Transmit Power measures the mean power from the mobile at the test set's RF IN/OUT port when transmitting an analog carrier. The test set correctly measures the level with or without frequency modulation (FM) present to make AMPS power measurements. Tests can be made with the mobile in the analog test mode or when connected on an active voice channel. See IS-137A, section 3.2.1.1, Analog RF Power.

The trigger source for this measurement is always immediate.

### Input Signal Requirements

The Analog Transmit Power measurement meets or exceeds specifications when the following requirements are met:

- The frequency of the signal being measured must be in the range of 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 in the range of -25 dBm to +43 dBm peak, and within 3 dBm of the expected input power to meet specifications. Results are provided for signals within +5 dB to -10 dB of the expected power, but performance is not warranted.

See "Active Cell Operating Mode" on page 71, "AVC Test Operating Mode" on page 75, and "Receiver Control" on page 169 for information on setting the expected input frequency and power level.

### Considerations When Making Manual Analog Transmit Power 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

"Analog Transmit Power Troubleshooting" on page 610

"Programming an Analog Transmit Power Measurement" on page 139

"Digital Transmit Power Measurement Description" on page 41

"Test Adherence to Standards" on page 60

"Statistical Measurement Results" on page 205

"Triggering of Measurements" on page 200

"Measurement Timeouts" on page 197

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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 37.

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.

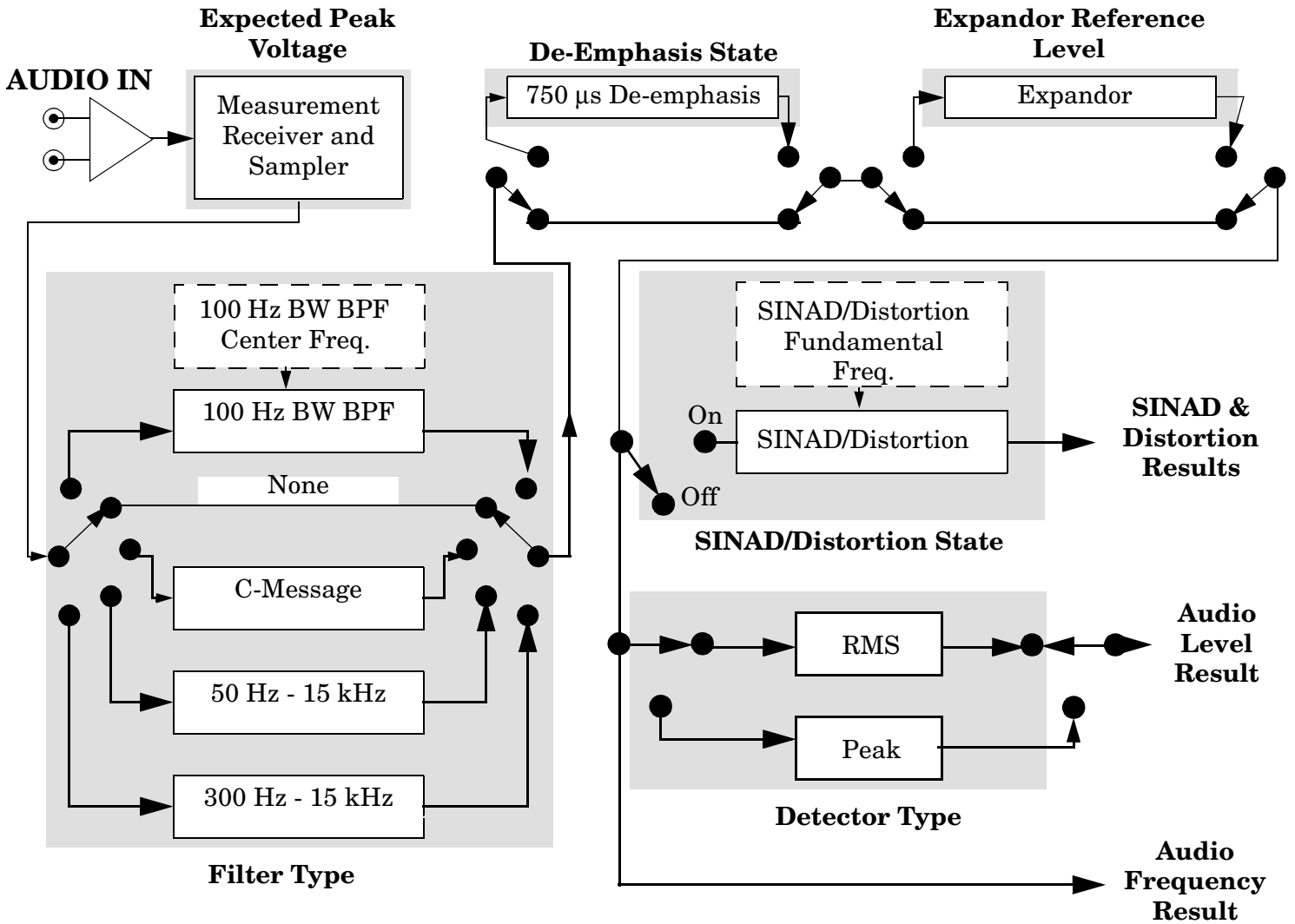
## **Audio Analyzer Measurement Description**

### **Related Topics**

- “Audio Analyzer Block Diagram” on page 37
- “AFANalyzer Troubleshooting” on page 611
- “Audio Level Measurement Description” on page 39
- “Audio Frequency Measurement Description” on page 38
- “SINAD Measurement Description” on page 53
- “Distortion Measurement Description” on page 40
- “Programming an Audio Frequency Measurement” on page 143
- “Programming an Audio Level Measurement” on page 141
- “Programming a SINAD Measurement” on page 160
- “Programming a Distortion Measurement” on page 144
- “Statistical Measurement Results” on page 205 (Multi-measurements)
- “Triggering of Measurements” on page 200
- “Measurement Timeouts” on page 197



# Audio Analyzer Block Diagram



## Related Topics

“Audio Analyzer Measurement Description” on page 34

## 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 143

"Audio Analyzer Measurement Description" on page 34

"Audio Analyzer Block Diagram" on page 37

"AFANalyzer Troubleshooting" on page 611

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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 34.

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 141

“AFANalyzer Troubleshooting” on page 611

“Audio Analyzer Measurement Description” on page 34

“Audio Analyzer Block Diagram” on page 37

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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 34.

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 34

“AFANalyzer Troubleshooting” on page 611

“Programming a Distortion Measurement” on page 144

“Test Adherence to Standards” on page 60

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## Digital Transmit Power Measurement Description

### How is a Digital Transmit Power measurement made?

Digital Transmit Power measures the mean RF burst power from the mobile when transmitting on a Digital Traffic channel in TDMA mode. Power is measured over 140 consecutive symbols, between symbols 6 and 162 in the burst. Measurements can be made with the mobile in active or test mode. See TIA/EIA IS-137, 3.2.1.2, Digital RF Power Output, and 3.2.2, RF Power Output 1900 MHz Equipment.

The Digital Transmit Power measurement meets or exceeds specifications when the following requirements are met:

### Input Signal Requirements

- Normal, full-rate DTC bursts, with a valid sync word, in the frequency range of 800 MHz to 960 MHz or 1.7 GHz to 2.0 GHz, and within 1 kHz of the expected frequency. Abbreviated slot formats are not supported.
- The signal level into the test set's RF IN/OUT connector must be in the range of -25 dBm to +43 dBm peak, and within 3 dBm of the expected input power.

See "Active Cell Operating Mode" on page 71, "DTC Test Operating Mode" on page 78, and "Receiver Control" on page 169 for information on setting the expected input frequency and power level.

### Trigger Source

Accurate measurements rely on detecting a valid sync word. Use Auto triggering when possible for best results. See "Triggering of Measurements" on page 200.

### Related Topics

"Description" on page 63

"Digital Transmit Power Troubleshooting" on page 612

"Programming a Digital Transmit Power Measurement" on page 146

"Test Adherence to Standards" on page 60

"Triggering of Measurements" on page 200

"Statistical Measurement Results" on page 205

"Measurement Timeouts" on page 197

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## Digital Modulation Accuracy Measurements Description

### How are Digital Modulation Accuracy measurements made?

The Digital Modulation Accuracy measurements measure modulation characteristics of the mobile's transmitted Pi/4 DQPSK modulated signal and the carrier Frequency Error. These measurements can only be made on normal, full-rate, DTC bursts with a valid sync word. See TIA/EIA IS-137, 3.3.2.1, Modulation Type and Accuracy. These measurements are not used with analog signals.

The following measurements are made for Digital Modulation Accuracy:

- **RMS EVM1** - the RMS Error Vector Magnitude over one burst. EVM is the difference (in percent) between the mobile's transmitted waveform and an ideal waveform. EVM1 is always measured, regardless of the EVM10 measurement state.
- **Origin Offset** - the magnitude of the RF carrier relative to the magnitude of the modulated carrier at the detection point (in dB). It is an indication of the amount of imbalance in the mobile's I/Q modulator.
- **RMS Phase Error** - this is the vector phase difference (in degrees) between the mobile's transmitted waveform and an ideal waveform.
- **RMS Magnitude Error** - this is the vector magnitude difference (in percent) between the mobile's transmitted waveform and an ideal waveform.
- **RMS EVM10** - measures the EVM of the first 10 symbols of 10 bursts. This measurement is only enabled if the EVM 10 Measurement setup parameter is set to On.
- **Frequency Error** - is the difference (in Hz) between the frequency of the received mobile signal and the frequency expected by the test set's base station emulator.

These measurements are not affected by the Amplitude Offset setting.

### Multi-Measurement Count

When the EVM10 measurement is off, the number of bursts measured is one (with multi-measurements off) or is equal to the multi-measurement count specified. If the EVM10 measurement is on, the number of bursts measured is equal to 10 times the multi-measurement count (if specified) or at least 10 bursts. Therefore, using multi-measurements with the EVM10 measurement enabled significantly increases measurement times.

### Related Topics

“Programming Digital Modulation Accuracy Measurements” on page 158

“Digital Modulation Accuracy Troubleshooting” on page 619

“Test Adherence to Standards” on page 60

See “Triggering of Measurements” on page 200.

See “Measurement Timeouts” on page 197.

See “Statistical Measurement Results” on page 205.

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## Dynamic Power Measurement Description

### How is a Dynamic Power Measurement Made?

The Dynamic Power measurement performs a series of consecutive power measurements on a mobile station returning a power measurement and an integrity value for each burst measured. Dynamic Power is only available via the test set's remote user interface.

Dynamic Power is not a TIA/EIA specified measurement.

The signal is measured at the RF IN/OUT port.

### Single or Multi Measurements

The Dynamic Power measurement does not use the multi-measurement state parameter, and so does not return minimum, maximum, and standard deviation values. Instead, you specify the number of bursts that you want to measure using the Number of Bursts parameter (see "SETup:DPOWER:COUNT:NUMBER[:SElected]" on page 429). A single measurement returns the integrity indicator and power level for every burst measured. For example, if you set the number of bursts to 15, the returned comma-separated list contains 15 integrity values followed by 15 corresponding measurement values.

### Types of Signals Dynamic Power can Measure

Dynamic Power measurements can be made on normal (DTC) bursts transmitted twice every TDMA frame. The average power is measured across the useful part of the normal burst (140 symbol periods).

### Input Signal Requirements

The Dynamic Power measurement will complete and meet its measurement accuracy specifications when the signal meets the following input signal conditions.

- Input signal level is between -30 dBm and +43 dBm.
- Input signal level is within +3 dB and -3 dB of the expected input level.
- Input signal is within 100 kHz of the measurement frequency.
- The measurement frequency is in the range of 800 MHz to 960 MHz or 1.7 GHz to 2.0 GHz.

### Trigger Source

The only trigger source that the Dynamic Power measurement supports is RF Rise.

### Related Topics

"SETup:DPOWER" on page 428

"FETCh:DPOWER" on page 344

## Frequency Modulation (FM) Measurement Description

### How is a frequency modulation measurement made?

The Analog Frequency Modulation measurement measures the frequency deviation and, if enabled, the total harmonic distortion and modulation frequency, for frequency modulated analog signals (such as AMPS transmitters). Measurements are performed after any filtering, de-emphasis, and expansion are performed (selected by the user in the setup parameters).

The distortion value is not returned if the Distortion State is set to OFF. The modulation frequency value is not returned if the Modulation Frequency State is set to OFF.

The FM deviation and distortion measurements are not affected by a static (constant) frequency error on the input signal as long as the input signal is within 2.5 kHz of the expected frequency.

This measurement is not used for digital signals.

Refer to IS-137, 3.3.1, for more information on measuring analog modulation characteristics.

### Triggering

Triggering is always immediate for this measurement. Trigger Delay and other trigger sources are not used.

### Considerations When Making Manual FM 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.

### Distortion State and Distortion Fundamental Frequency Operation

The Distortion Fundamental Frequency value specifies the demodulated audio frequency to use when making a distortion measurement, and must be entered to make a valid measurement. However, specifying the fundamental frequency does not affect the measurement state. The Distortion State must be turned On separately to make the measurement.

### Modulation Frequency State

The modulation frequency measurement is enabled and disabled using the Mod Freq State setting. The modulation frequency measurement is made after any filtering is applied, and can be used to make measurements such as SAT frequency.



### Filter Type

The following filters are available to make measurements on the demodulated FM (baseband) signal.

- 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 the type of detector to use when making FM deviation measurements: RMS, Peak+, Peak-. The Peak+ and Peak- detectors measure the greatest positive or negative frequency excursion in carrier frequency during the sample. The RMS detector measures the root mean squared value. This setting does not affect the distortion measurement.

### De-emphasis State

Select On or Off to enable or disable (respectively) 750  $\mu$ s de-emphasis.

### Expander State

Select On to compensate for signal compression on the mobile's transmitted signal.

### Related Topics

“Programming a Frequency Modulation (FM) Measurement” on page 148

“Frequency Modulation (FM) Troubleshooting” on page 613

“Statistical Measurement Results” on page 205

“Measurement Timeouts” on page 197

“Triggering of Measurements” on page 200

“Test Adherence to Standards” on page 60

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## Frequency Stability Measurement Description

### How is a frequency stability measurement made?

The Analog Frequency Stability measurement measures the transmitter frequency and frequency error of analog signals (including AMPS) with a 1 Hz resolution. Frequency Error is derived by comparing the frequency of the measured signal to the expected frequency (as determined by the base station emulator or manual receiver control settings). Measurements can be made with the mobile in test mode or on an active AVC (Analog Voice Channel), and with or without SAT and/or other frequency modulation. The received signal's frequency must be within 200 kHz of the expected frequency to make this measurement.

This measurement is not used for digital signals.

Refer to IS-137, 3.1.1.2, for more information.

### Worst Case Frequency Error

Frequency and Frequency Error measurement results are returned over GPIB in units of Hz. Worst Case Frequency Error, the greatest error measured during the total sample(s), is returned in units of ppm (parts per million). Worst Case Frequency error is only displayed on the test set's display when multi-measurements are used, but is always available via GPIB (regardless of the multi-measurement state).

### Triggering

Triggering is always immediate for this measurement. Trigger Delay and other trigger sources are not used.

### Considerations When Making Manual Frequency Stability 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 Frequency Stability Measurement" on page 150

"Frequency Stability Troubleshooting" on page 615

"Statistical Measurement Results" on page 205

"Measurement Timeouts" on page 197

"Test Adherence to Standards" on page 60

## IQ Tuning Measurement Description

### How is an IQ Tuning Measurement Made?

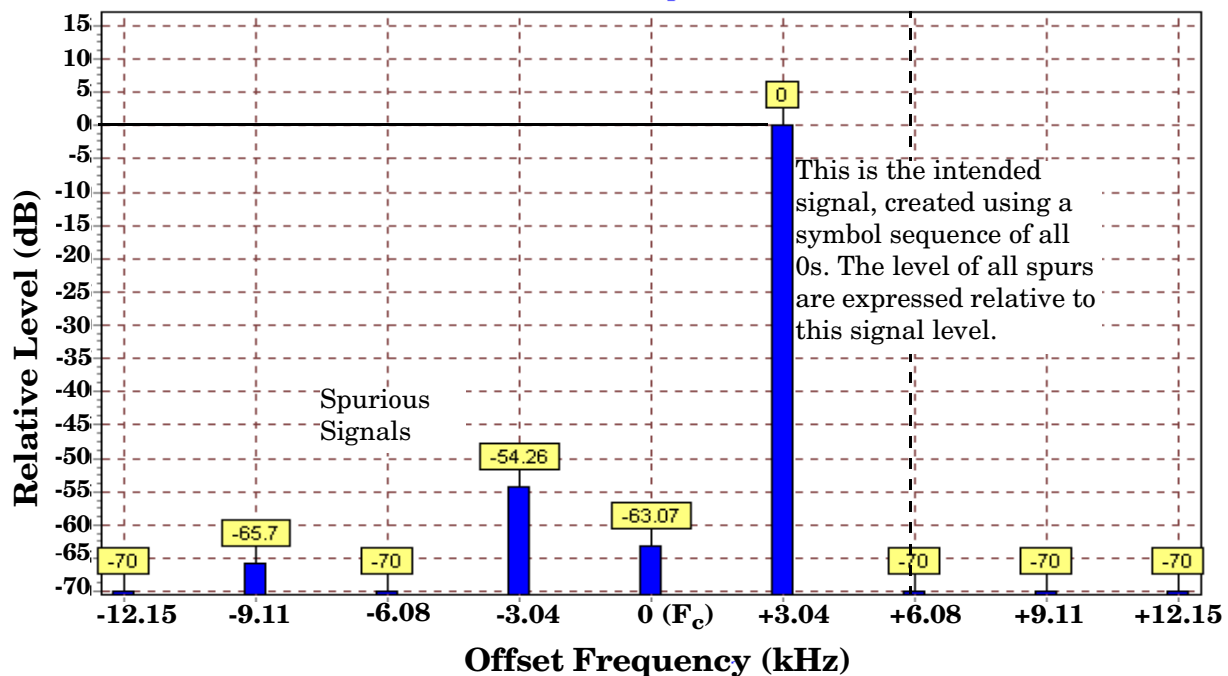
The IQ Tuning measurement looks at spurious signals that may be present because of an unbalanced IQ modulator in the mobile's transmitter. The measurement is normally performed with the mobile station in test mode and sending a repeating sequence of symbols (such as 00,00,00,00,00..., or 10,10,10,10...) into the mobile's Pi/4 DQPSK modulator. The 00 symbol causes the transmitted frequency to go up by 3.0375 kHz, and the 10 pattern causes the frequency to go down by 3.0375 kHz. The mobile can be transmitting either a burst signal or a continuous wave signal.

I/Q Tuning is not a TIA/EIA specified measurement.

The accuracy of the mobile's I/Q modulator is determined by measuring the level of spurious signals relative to the level of the intended signal (the intended signal is the carrier frequency ( $F_c$ )  $\pm$  3.0375 kHz). The spurious signals normally measured are the carrier frequency and up to three other user-selectable offset frequencies. The user-selectable frequencies are typically set to  $F_c \pm n \cdot 3.0375$  kHz ( $n=1,2,3,\dots,8$ ), but can be set to any value in the range of -16.00 kHz to +16.00 kHz. The returned power values at these frequencies are relative to the power of the intended frequency (in dB). These signals are measured at the RF IN/OUT port. The figure below illustrates a spectrum caused by a symbol sequence of repeating 00s.

The I/Q Tuning measurement also allows you to make an additional relative power measurement in the range of -15.0 MHz to -1.0 MHz and +1.0 MHz to +15.0 MHz relative to the carrier frequency (not shown in Figure 1.)

**Figure 1. Spectrum of a mobile transmitting a sequence of all 0s**



## **IQ Tuning Measurement Description**

### **Types of Signals IQ Tuning can Measure**

I/Q Tuning measurements can be made on these types of input signals.

- Normal DTC bursts (without SYNC, SACCH, and CDVCC). The burst must conform to the burst specification in TIA/EIA 136.2, Section 2.1.2.1.2. The frame repetition rate must be no greater than 25 Hz. The burst length must be at least 140 symbols (excluding guard and ramp symbols). Variations on burst modulation, such as higher repetition rates or unusual burst lengths, will produce unreliable results.
- Non-bursted Pi/4 DQPSK modulated signals.
- CW signal (not bursted or modulated)

### **IQ Tuning Input Signal Requirements**

The I/Q Tuning measurement will complete and meet its measurement accuracy specifications under the following input signal conditions.

- Input signal level is between -15 dBm and +43 dBm.
- Input signal level is within 3 dB of the expected input level.<sup>1</sup>
- Input signal must be within 200 Hz of the expected frequency to meet specified performance.

### **Setup Parameters**

The following parameters define how the measurement is made.

#### **IQ Tuning Offset Frequencies**

These four settings, IQ Tuning Offset 1 through IQ Tuning Offset 4, define the frequency offsets from the carrier frequency where you want to make spur level measurements. IQ Tuning Offset 1 is typically left at its default value of 0.000 Hz, which measures the relative power at the carrier frequency. IQ Tuning Offsets 2,3, and 4 are typically set to intervals of +/-3.0375 kHz above and below the carrier frequency to measure the relative power at those offsets.

#### **Single or Multi Measurements**

The I/Q Tuning measurement can return either single or averaged measurement results.

- If you set the multi-measurement state OFF then only a single measurement is made at each offset.
- If you set the multi-measurement state ON, and the multi-measurement count number to a value greater than one, then multiple measurements are made at each offset. The returned results are an average of these measurements.

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1. This measurement is designed to operate if the input signal is within +3 dB to -10 dB of the expected input level, but performance is only specified for operating at +/- 3dB of the expected input level.

**Reference Offset Frequency**

This is the frequency offset from the carrier frequency ( $F_c$ ) that is used as the reference for spur level measurements. This value usually corresponds to the frequency change expected when transmitting the repeating symbols.

For example, the default of +3.0375 kHz indicates that the repeating symbols into the mobile’s IQ modulator are expected to cause a frequency change in the carrier of +3.0375 kHz. The test set uses the level measured at the resulting frequency ( $F_c + 3.0375$  kHz) as the reference for all spurious signal level measurements. See Figure 1. on page 47.

**Spur Measurement Frequency**

This is the carrier frequency offset used to make a spur measurement at a frequency that is not spaced an interval of +/- 3.0375 kHz from the carrier (such as 10 MHz).

**Trigger Source**

The trigger source depends on the type of input signal.

**Recommended Trigger Source Settings**

Input Signal Type	Recommended Trigger Source
Normal DTC bursts (without SYNC, SACCH, and CDVCC)	RF Rise <sup>a</sup>
Non bursted Pi/4 DQPSK modulated and CW signals	Immediate <sup>b</sup>

- a. If the input signal is > 10dB below the expected input level, or is below -30 dBm, there may not be enough power to cause an RF Rise trigger.
- b. Using RF Rise triggering will cause the measurement to wait indefinitely, or cause a time-out (if time-outs have been enabled). Always use Immediate triggering for these signal types.

**Related Topics**

- “Programming an IQ Tuning Measurement” on page 152
- “IQ Tuning Troubleshooting” on page 616
- “Statistical Measurement Results” on page 205
- “Measurement Timeouts” on page 197
- “Triggering of Measurements” on page 200
- “Test Adherence to Standards” on page 60

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## Loopback Bit Error Ratio Measurement Description

### How is a Loopback Bit Error Ratio (LBER) measurement made?

Loopback BER sends digital data on the forward DTC to a mobile (in loopback mode) that echoes the data back to the test set on the reverse DTC. The test set compares the data received on the reverse DTC to the data sent on the forward DTC. The measurement result is the ratio of the number of bit errors in the returned signal to the number of bits sent, expressed as a percentage.

This measurement can only be made on a mobile station in digital loopback mode on a digital traffic channel (DTC) transmitting full-length DTC bursts and synchronized to the test set's base station emulator in DTC Test operating mode. See "DTC Test Operating Mode" on page 78.

By varying the cell power level into the mobile station, the sensitivity of the mobile's receiver can be determined. Refer to IS-137, section 2.3.2.1, Receiver Signal Level Range Capability (static testing portion) for more information on this test.

The number of bits to test is selectable by the user, in the range of 1,000 to 999,000 bits. The actual number of bits tested is a multiple of 260, the number of bits in a complete burst. If the specified number of bits to count is reached before the end of burst, the count is continued until the number of bits tested reaches the next multiple of 260. For example, if you specify the number of bits to test of 2400, the test set will actually test 2600 bits (since it is an even multiple of 260), and will return '2600' when queried.

The greater the number of bits to test, the longer the measurement takes to complete. Measurement progress is displayed as the number of bits counted over the number of bits to test (such as 10140/30000). Both the number of bits to test and the number of bit errors can be queried. Be sure to set a measurement time-out value large enough for the number of bits to test so the measurement doesn't time-out before all of the bits are checked.

The trigger source is not selectable. Multi-measurements are not available for this measurement.

### Related Topics

"Programming a Loopback Bit Error Ratio (BER) Measurement" on page 154

"Loopback Bit Error Ratio (BER) Troubleshooting" on page 617

"Measurement Timeouts" on page 197

"Test Adherence to Standards" on page 60

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## MAHO BER/RSSI Measurement Description

### How is a Mobile Assisted HandOff (MAHO) BER/RSSI measurement made?

Mobile Assisted Handoff (MAHO) bit error ratio (BER) is the number of error bits received by the mobile compared to the number of correct bits, expressed as a percentage. It is calculated by the mobile by monitoring the correctness of the data into its channel decoder on the current forward digital traffic channel (DTC).

MAHO BER is reported back to the base station (on the reverse DTC) and the mobile switching center to help determine when a handoff to another cell site should happen. In this case the forward DTC is generated by the test set during an active call, and the MAHO BER measurement is reported to the test set on its reverse DTC.

Using the DTC Induced Err function, the test set creates the forward DTC with a user-specified percentage of bit errors to test the mobile's ability to correctly measure the BER.

The received signal strength indicator (RSSI) is a measurement of the received DTC signal strength at the mobile. Like the MAHO BER measurement, it is reported back to the base station and mobile switching center to help determine when a handoff to another cell site should happen.

The RSSI for neighboring cell channels can also be measured by specifying the neighboring cell band and channel number. This helps the MSC determine which cell, band, and channel number to hand the mobile off to when the MAHO BER and RSSI values indicate that a handoff is needed.

Because MAHO BER and RSSI values use signaling over the Slow Associated Control Channel (SACCH) to report back to the test set, these measurements can only be made on a DTC while using the Active Cell operating mode.

### Querying Last and New Measurements

When the test set first sends a command to the mobile to make a MAHO measurement, the mobile requires a minimum of 1.28 seconds to respond. This is due solely to the requirements of the AMPS/136 protocol in the mobile requiring that the measurement to be made over 40 frames (1 second) plus the 12 timeslots needed to transmit the values to the test set. Once a measurement has been made and is reported back to the test set, the measurement value in the test set remains the same until a new measurement is made.

If you change the level into the mobile to affect the MAHO values, but do not allow the mobile the full time needed to make the new measurement and report the new results before querying the measurement, the returned measurement will be inaccurate. This is because the previous measurement remains in the test set and is immediately returned until a new measurement is made, or because a new measurement started but some of the frames were measured at the old level and some of the frames were measured at the new level.

To help prevent measurement errors, two types of queries are provided to make sure you are querying the correct measurement.

- `CALL:MS:REPorted:MAHO:<BERR | RSSI>[:LAST]?` - returns the last BER or RSSI measurement made. The measurement result is returned immediately. Use this syntax when you know the mobile has had time to report a valid new measurement before querying the result.
- `CALL:MS:REPorted:MAHO:<BERR | RSSI>:NEW?` - clears the past measurement value and waits for another measurement to be made. The measurement value is not returned until a completely new measurement is made (requiring at least 1.28 seconds). Use this syntax when you change signal conditions into the mobile and immediately query the results.

## MAHO BER/RSSI Measurement Description

To make sure the values returned by the NEW? syntax reflect fully settled measurements from the mobile, you should discard the first queried results and query the results again for the final values.

## MAHO BER Reported Values

The mobile does not report an exact bit error ratio measurement (such as 1.54%) back to the test set. Instead, the value reported back to the base station indicates which of eight measurement intervals the measurement value falls into. This value is returned via GPIB as a corresponding interval number (such as BERI5 for interval number 5). The table below describes the mobile reported BER intervals and the test set's returned values. Refer to IS-137, section 2.3.2.5, Mobile Assisted Handoff/Mobile Assisted Channel Allocation Bit Error Rate for additional information.

Mobile Returned BER Interval (%)	GPIB Returned Value (string)
less than 0.01	BERI0
0.01 to less than 0.1	BERI1
0.1 to less than 0.5	BERI2
0.5 to less than 1.0	BERI3
1.0 to less than 2.0	BERI4
2.0 to less than 4.0	BERI5
4.0 to less than 8.0	BERI6
greater than 8.0	BERI7

## Related Topics

“Programming a MAHO BER/RSSI Measurement” on page 156

“MAHO BER/RSSI Troubleshooting” on page 618

“Test Adherence to Standards” on page 60



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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 34.

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.

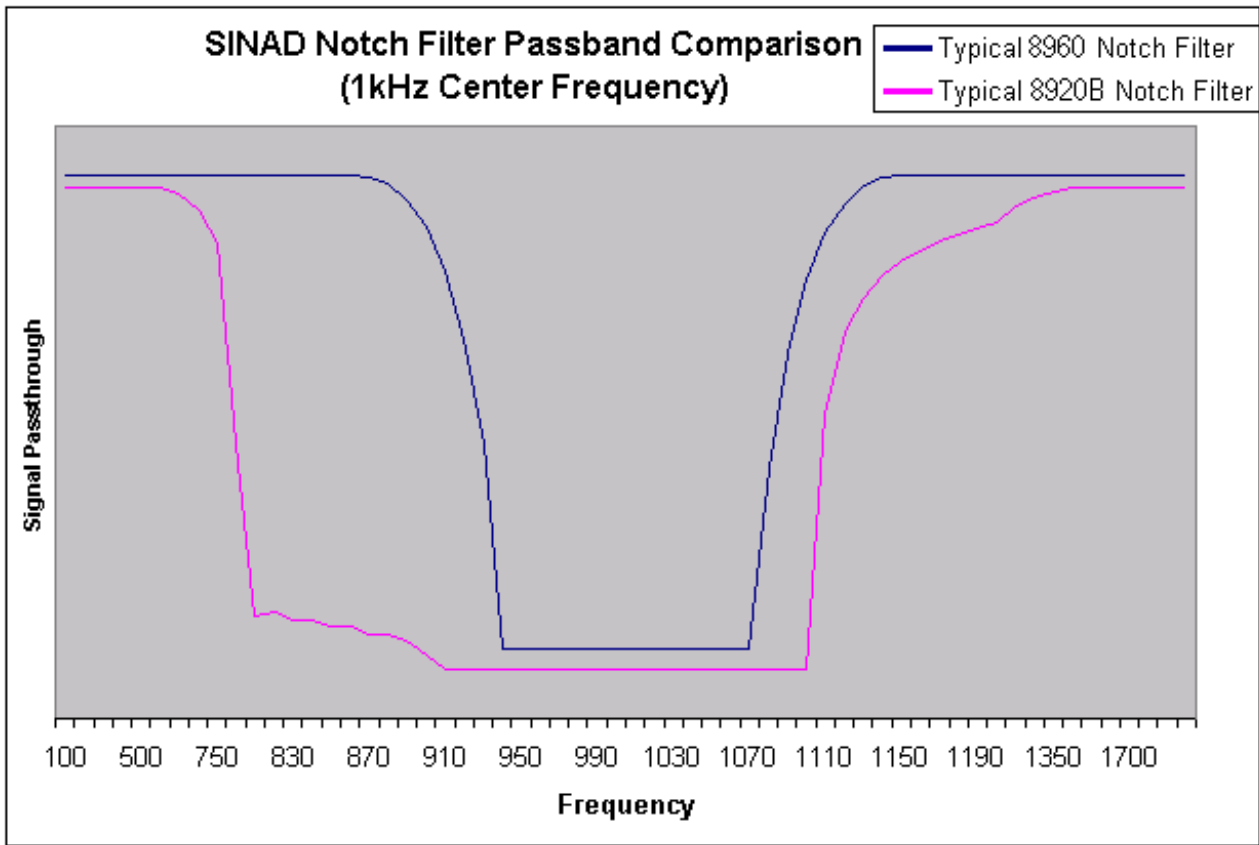
### Considerations When Making Manual SINAD Measurements

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.

### 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's filter. The additional noise the 8920B filters out causes the measurement to look better on the 8920B (see the filter response chart below).

## SINAD Measurement Description



## Related Topics

“Programming a SINAD Measurement” on page 160

“AFANalyzer Troubleshooting” on page 611

“Audio Analyzer Measurement Description” on page 34

“Test Adherence to Standards” on page 60

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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 583.

### 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 200.

### **Related Topics**

“Programming the Spectrum Monitor” on page 162

“Test Adherence to Standards” on page 60

“Spectrum Monitor Troubleshooting” on page 621

## Swept Audio Measurements Description

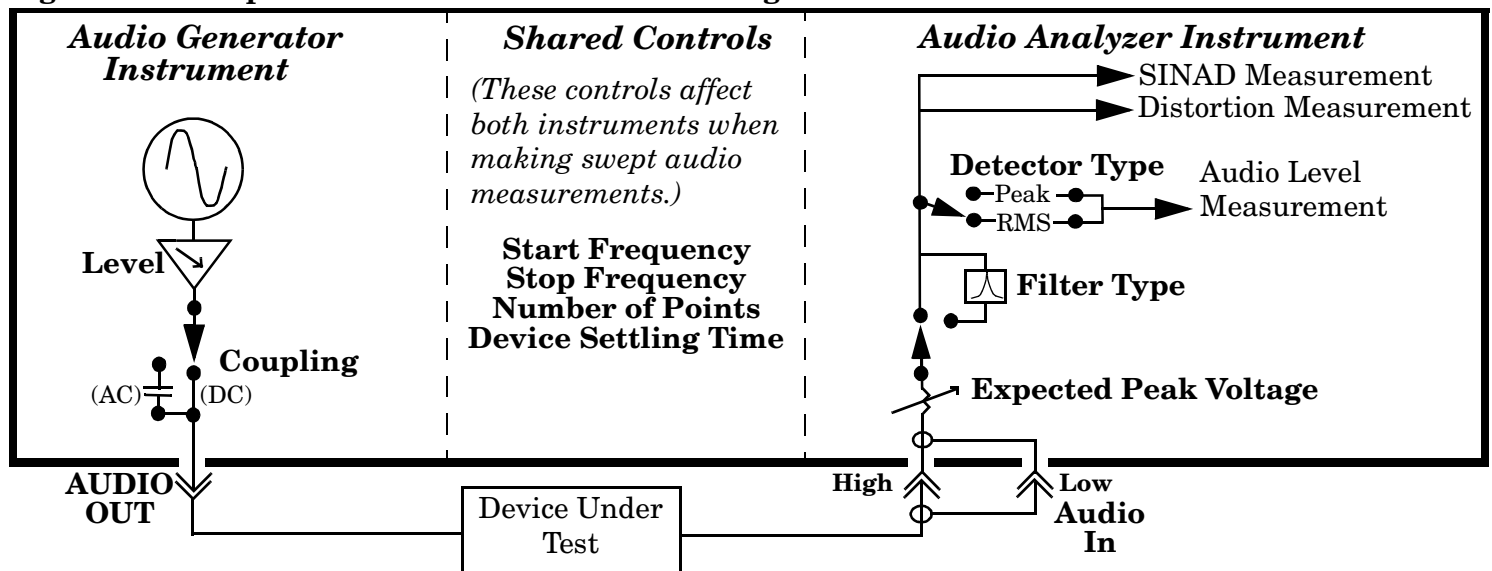
### Description

#### 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 2. Swept Audio Measurements Block Diagram**



The audio generator's signal is output through the front panel AUDIO OUT port to the device under test. 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.

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

## Swept Audio Measurements Description

### Operating Considerations

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

**Mutli-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** 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 ( $Emin$ ), 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 164
- “Swept Audio Measurement Troubleshooting” on page 620
- “Audio Analyzer Measurement Description” on page 34
- “Audio Level Measurement Description” on page 39
- “Distortion Measurement Description” on page 40
- “SINAD Measurement Description” on page 53
- “Test Adherence to Standards” on page 60

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## Test Adherence to Standards

The following information describes the implementation of the measurements in the E1961A Mobile Test Application and their compliance with established standards.

### Audio Frequency (AF Analyzer)

The Audio Frequency measurement in the AF Analyzer provides an accurate general purpose frequency measurement for audio signals at the test set's AUDIO IN connectors.

### Audio Level (AF Analyzer)

The AC Level measurement in the AF Analyzer is suitable for making measurements such as RX Hum and Noise in IS-137A section 2.2.2.4 and TX FM Hum and Noise in IS-137A section 3.3.1.6.

### Analog Transmit Power

Analog Transmit Power measures the mean power of a continuous (not bursted) signal of constant envelope. CW or AMPS signals can be measured with or without modulation. Refer to IS-137A section 3.2.1.1, Analog RF Power Output.

### Audio Distortion (AF Analyzer)

The test set makes two measurements to determine total harmonic 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.

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.

### Digital Transmit Power

Digital Transmit Power measures the mean power of a TDMA mobile burst at the test set's RF IN/OUT connector. Power is measured on at least 140 symbols in the burst between symbols 6 and 162. The measurement is designed to operate on a bursted signal using a normal time slot with a valid sync word. This measurement conforms to IS-137A section 3.2.1.2.2, Digital RF Power, Method of Measurement.

### Digital Modulation Accuracy

Digital Modulation Accuracy measures the RMS error vector magnitude for 1 burst (EVM1) and for ten bursts (EVM10), and the origin offset, as specified in IS-137A section 3.3.2.1.2, Digital Modulation Accuracy, Method of Measurement. Also measured is digital frequency error as specified in IS-137A section 3.1.2.2.2, Digital Frequency Stability, Method of Measurement.

Also measured, but not required in the standards, are the RMS phase error and RMS magnitude error.



## Digital Adjacent Channel Power

Digital Adjacent Channel Power simultaneously measures the RF power at 30 kHz (adjacent), 60 kHz (alternate), and 90 kHz (second alternate) frequency offsets above and below the selected channel. Definitions and limits for these offsets are defined in IS-137 section 3.4.1.2.1.3, Adjacent and Alternate Channel Power due to Modulation, Minimum Standard. Results are reported in dBc, relative to the mean output power.

The Digital Adjacent Channel Power measurement as implemented in this instrument does not strictly conform to IS-137 section 3.4.1.2.1, Adjacent and Alternate Channel Power due to Modulation, or section 3.4.1.2.2, Out of Band Power Arising from Switching Transients. The IS-137 standard specifies the measurement of out-of-band *average* power due to modulation only, *excluding* the effects of switching transients or *peak* out-of-band power including the effects of switching transients. This instrument measures the out-of-band average power due to modulation *and* switching transients. This method is the same used in the 8920B TDMA systems, and has proven an effective means of measuring transmitter adjacent channel power performance.

## FM Deviation and FM Distortion

FM deviation and distortion can be made on analog signals where the carrier is within 2.5 kHz of the expected frequency. Filtering and other signal processing is selectable to perform the Analog Modulation Requirements measurement as specified in IS-137A section 3.3.1.1.2, SAT deviation in section 3.3.1.4, Signaling Tone deviation in section 3.3.1.5, and Modulation Deviation Limiting in section 3.3.1.2.3.

## Frequency Stability

Frequency Stability measures the absolute frequency and frequency error of an analog RF signal. The signal may be modulated by SAT and/or additional FM. Refer to IS-137A section 3.1.1.2, Analog Frequency Stability, for more information on making this measurement. Measurement resolution is 1.0 Hz, meeting the requirements in IS-137A section 6.6.1.1, Analog General Equipment, Radio frequency.

## IQ Tuning

This measurement is not specified in the TIA/EIA 136 or IS-137 standards, but is useful when adjusting or verifying the balance of the mobile transmitter's IQ modulator.

## MAHO BER and RSSI

Mobile Assisted Handoff Bit Error Ratio and Received Signal Strength Indicator measurements are made in compliance with IS-137A section 2.3.2.5, Mobile Assisted Handoff/Mobile Assisted Channel Allocation Bit Error Rate.

## Loopback Bit Error Ratio

Loopback Bit Error Ratio compares the data sent on a forward digital channel to the returned digital data from a mobile in digital loopback mode. This measurement meets the requirements for IS-137A, section 2.3.2.1, Receiver Signal Level Range Capability (static testing portion).

## Test Adherence to Standards

### SINAD (AF Analyzer)

SINAD is the ratio of Signal+Noise+Distortion divided by Noise+Distortion, expressed in dB. It is used when testing receiver performance. The SINAD measurement in the test set is suitable for making the Analog RF Sensitivity measurement in IS-137A section 2.3.1.1.2.

### Spectrum Monitor

The Spectrum Monitor measurement is not specified in either TIA/EIA 136 or IS-137A.

### Related Topics

- “Spectrum Monitor Description”
- “Programming the Spectrum Monitor”
- “How Do I Use the Spectrum Monitor?”

### Swept Audio Measurements

The swept audio measurement provides a way to generate and analyze audio signals at the same frequency simultaneously over a range of frequencies. The Audio Level (AF Analyzer), Audio Distortion (AF Analyzer), and SINAD (AF Analyzer) measurements performed during the sweep meet the same standards indicated in the descriptions of those measurements in this section.

---

## 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 Amptd Offset key, F5.

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.

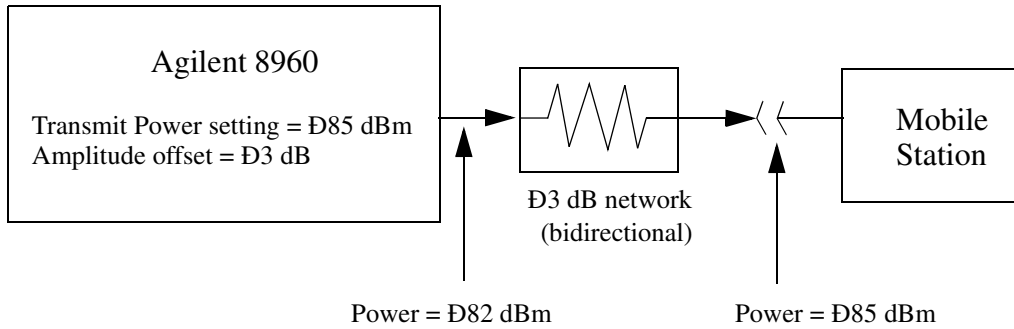
## Amplitude Offset

### 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.

For 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**



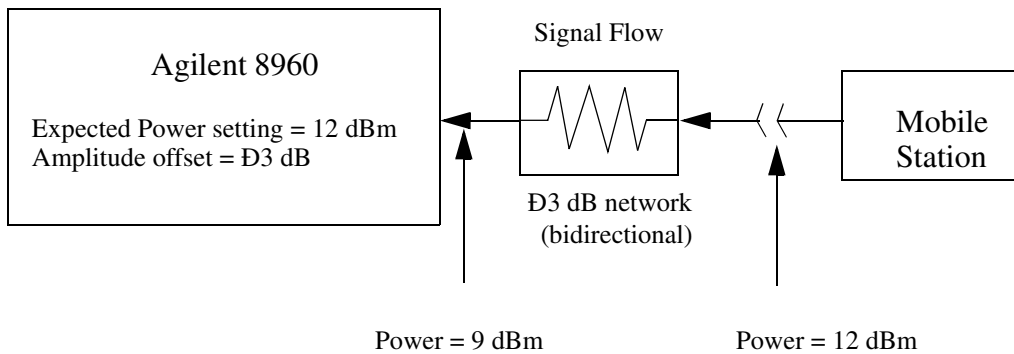
### Mobile Station Transmitter Example

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

For 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 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

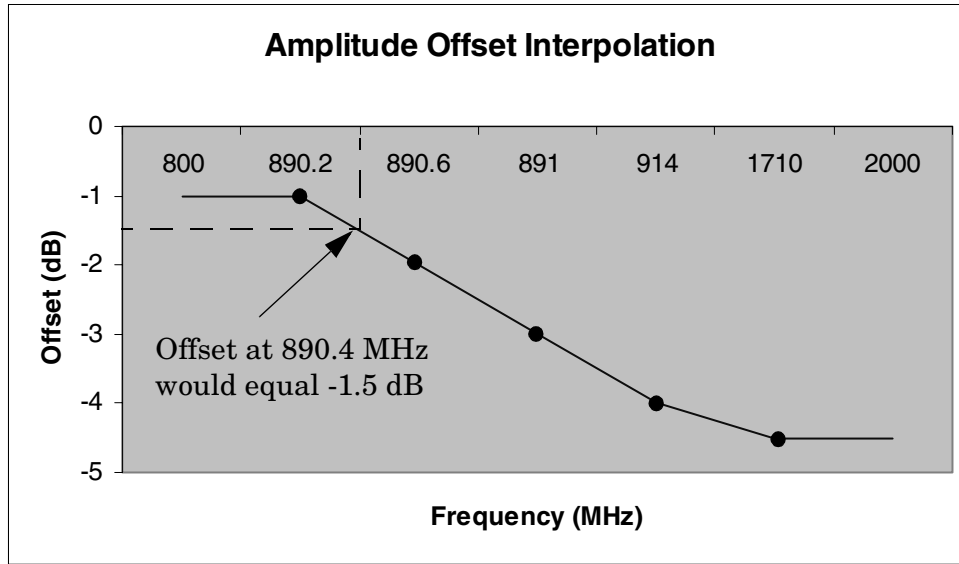
System Config Screen										
RF IN/OUT	RF IN/OUT Amplitude Offset							Utilities		
	RF IN/OUT Amplitude Offset State: On							Message Log		
	<u>Number</u>	<u>Frequency (MHz)</u>					<u>Offset (dB)</u>			
	1	890.20					-1.00			
	2	890.60					-2.00			
	3	891.00					-3.00			
	4	914.00					-4.00			
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

## Amplitude Offset

**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 539

## 2 Call Processing

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## Configuring Mobile Station Operating Parameters

The mobile station operating parameters are configured using the following call processing subsystem commands.

For a complete list of command syntax, refer to GPIB commands CALL subsystem.

### Mobile Station Operating Parameters

- Mobile Station (MS) TX Level (for an AVC). Takes effect after origination or handoff.  
OUTPUT 714;"CALL:SETup:MS:ANALog:TXLevel 3" !Specifies mobile power level 3.
- Mobile Station (MS) TX Level (for a DTC). Takes effect after origination or handoff.  
OUTPUT 714;"CALL:SETup:MS:DIGital:TXLevel 3" !Specifies mobile power level 3.
- Mobile Station (MS) TX Level (for an AVC). Immediately changes the AVC MS TX Level.  
OUTPUT 714;"CALL:MS:ANALog:TXLevel 5" !Specifies mobile power level 5.
- Mobile Station (MS) TX Level (for a DTC). Immediately changes the DTC MS TX Level.  
OUTPUT 714;"CALL:MS:DIGital:TXLevel 5" !Specifies mobile power level 5.

### Operating Considerations

The command to change the MS TX Level is not issued to the mobile until one of the following actions is performed:

- The mobile is brought up on a traffic channel after camping on a control channel.
- A handoff is performed. See "Programming Handoffs" on page 69.
- A command is sent to immediately change the level without performing a handoff.

There are a number of parameters for the control channel (see "Configuring the Control Channel (CCH)" on page 85) and the traffic channel (see "Configuring the Traffic Channel (TCH)" on page 83) that can be configured, however the test set's default parameters should allow a properly functioning mobile station to successfully camp on the cell and make a call under most circumstances.

The MS TX Level parameter, besides informing the mobile station what uplink power to transmit to the test set, also updates the Expected Power parameter. See "Receiver Control" on page 169.

The CALL:SETup:MS:DIGital|ANALog:TXLevel commands set the MS TX Level for the active band. See "Frequency Banded Parameters" on page 88.

### Related Topics

"CALL:SETup" on page 305

"CALL:MS" on page 276



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## Programming Handoffs

### Description

The TIA/EIA 136 standard specifies that mobiles shall be able to use both analog control channels (ACC) and digital control channels (DCCH) to provide call processing, and analog voice channels (AVC) and digital traffic channels (DTC) for conversation. Once on an AVC or DTC, the mobile must be able to change to another channel without dropping the call. This is known as a handoff, and typically occurs when the signal level at the mobile is reduced to the point where signal quality may cause the call to be dropped, or where the voice quality is unacceptable. Handoffs can be made between two analog voice channels, between analog and digital channels, between two digital channels, and between cellular (800 MHz) and PCS band (1900 MHz) digital channels. Handoffs from an AVC to a PCS-band DTC are not supported by the standard, and cannot be performed.

### How the Test Set Performs a Handoff

To perform a handoff, the mobile must first be camped on a control channel (generated by the test set) and then brought up on an AVC or a DTC in Active Cell operating mode. This involves specifying parameters for the control channel and the DTC or AVC you want the mobile to go to and originating the call. See “Establishing an Active Link with the Mobile Station” on page 90.

After the mobile is up on a call (AVC or DTC), you can re-configure the AVC or DTC setup parameters for the channel to hand off to. Issuing the handoff command sends an overhead message to the mobile on the current AVC or DTC, telling it to change to the new AVC or DTC (or DTC band).

Unless Receiver Control is set to manual, the test set automatically sets its RF generator and receivers to tune to the new AVC or DTC. Unless you have a specific need to manually control the RF generator or receivers, you should leave all Receiver Control settings to auto when using Active Cell operating mode.

### Program Example

The following program example assumes the mobile is already on a DTC:

```
10 OUTPUT 714;"CALL:SETup:DTC:BAND PCS;CHANnel 789" !Configure a new DTC in
!the PCS band on channel 789.

20 OUTPUT 714;"CALL:HANDoff" !Perform the handoff.
```

### Power Level Changes for the Current AVC or DTC

As mobiles encounter signal attenuation during use, the base station commands the mobile to raise or lower its power level to prevent signal degradation or inter-cell interference. The test set does this by sending an overhead message to the mobile on the current AVC or DTC when you issue the appropriate command.

The commands for issuing a power change command are CALL:MS:ANALog:TXLevel and CALL:MS:DIGital:TXLevel. Both commands immediately send the message to the mobile to change power level.

## **Programming Handoffs**

### **Operating Considerations**

The commands to cause an immediate mobile power change (shown above) are NOT the same commands used to set up the AVC or DTC MS TX Level before performing a handoff or originating a call. The CALL:SETup:MS:ANALog:TXLevel and CALL:SETup:MS:DIGital:TXLevel commands, and other mobile station parameters, require the handoff command to be sent after they are issued to send the power change order to the mobile. See “Configuring Mobile Station Operating Parameters” on page 68.

### **Related Topics**

“Configuring the Control Channel (CCH)” on page 85

“Configuring the Traffic Channel (TCH)” on page 83

“Configuring Mobile Station Operating Parameters” on page 68

“CALL:HANDoff” on page 274

“CALL:MS:ANALog:TXLevel[:IMM ediate]” on page 278

“CALL:MS:DIGital:TXLevel[:IMMediate]” on page 279

---

## Active Cell Operating Mode

Active cell mode is used to emulate a normal AMPS/136 cell interacting with the mobile station (MS), and is the default operating mode. Active cell mode is used to provide mobile operations such as camping, registering, paging, handoffs, and releasing calls, using over-the-air signaling. Except for the Loopback BER measurement (which is made in DTC test mode), all mobile measurements can be made using active cell mode. Subscriber information about the MS is also returned after registration and origination.

Call processing can be performed using a digital control channel (DCCH) or an analog control channel (ACC), and measurements can be made on a digital traffic channel (DTC) or on an analog voice channel (AVC). For more detail on the contents of these signals, see “DCCH and DTC Descriptions” on page 73 and “ACC and AVC Descriptions” on page 73.

DTC and AVC test operating modes are used if it is not possible, or not desired, to communicate with the mobile station via over-the-air signaling to make measurements. See “DTC Test Operating Mode” on page 78 and “AVC Test Operating Mode” on page 75.

## Active Cell Features

The basic features provided by active cell operating mode are:

- Generation of an analog or digital control channel.
- Call setup, both mobile station originated and base station emulator originated (paging).
- Registration of the mobile station, resulting in the following mobile station information being returned: ESN (Decimal and Hex), MIN1 (Hex), MIN2 (Hex), phone number, SCM, rate capability, digital MS protocol version, and MS called party number (for mobile-originated calls).
- Handoffs between channels of the same type (AVC to AVC, or DTC to DTC), handoffs between a DTC and an AVC, and handoffs between a cellular band DTC or AVC and a PCS band DTC.
- Changing traffic or voice channel parameters during a call using over-the-air signaling (such as MS transmit power level changes).
- Voice echoing through the mobile’s earpiece is available when the mobile is on a DTC.
- Base station emulator initiated and mobile station initiated call disconnection.
- Most measurements supported in the test application are available.
- The base station emulator automatically controls the test set’s demodulation receiver.
- The status of the call can be queried and used for program control.

## Setting the Test Set’s Operating Mode to Active Cell Mode

The active cell operating mode is set using the following test set command:  
OUTPUT 714;”CALL:OPERating:MODE CALL”

## Typical Operating Steps for Active Mode Testing

The exact order of testing an AMPS/136 mobile can vary greatly. The following steps provide a general order of testing to verify mobile station operation. For a step-by-step programming description, see “Programming: Getting Started Guide for AMPS/136 Mobile Test” on page 95.

## Active Cell Operating Mode

1. Enter any path loss between the mobile station and the test set as an Amplitude Offset. See “Amplitude Offset” on page 63.
2. Select the Active Cell operating mode.
3. Select the Control Channel Type.
4. Set the control channel parameters. For a DCCH, these include the DCCH band, DCCH Channel, DCCH DVCC, and DCCH Burst Size (see “Operating Considerations - DCCH Settling Time” on page 72). For an ACC, set the ACC Channel number.
5. Set the Cell Power level. This level will be used for both control and traffic (voice) channels unless you change this level in your program. (The Cell Power level you set during Active Cell operation is independent of the Cell Power level you specify while using CW operating mode.)
6. Set the traffic or voice channel parameters to use when setting up a call. For a DTC, these include the band, DTC channel number, Dig MS TX Level, DTC DVCC, DTC timeslot, DTC burst size, and vocoder type. For an AVC, these include the MS TX Level, SAT color code, AVC channel number, and FM frequency and deviation (if desired).
7. Connect the antenna port of the mobile to the test set’s RF IN/OUT port and turn the mobile on.
8. Setup the measurements you want to make using the SETup syntax for each measurement.
9. After the mobile has camped on the control channel, originate a call from the test set or from the mobile. To originate a call from the test set, enter a paging number and issue the command to originate the call. To originate a call from the mobile, dial a number on the mobile’s keypad and initiate the call (such as pressing SEND).
10. Use the CALL STATus and CALL CONNected subsystems to determine when the mobile is in the connect state (connected on a traffic or voice channel). See “Call Processing State Synchronization” on page 225.
11. If needed, query the returned mobile station information to verify correct mobile programming or to enter mobile information into a data base. See “CALL:MS” on page 276.
12. Start each measurement using the INITiate syntax for each measurement.
13. Use the FETCh syntax to query each measurement result.
14. Enter the traffic or voice channel settings for the channel you want to hand off to.
15. Issue the handoff command to change the mobile’s traffic or voice channel.
16. Repeat steps 9 through 14 until all measurements are completed.

## Operating Considerations - DCCH Settling Time

Digital Control Channel (DCCH) parameters take up to five seconds to take effect when using the Active Cell operating mode. A protocol error will result if your test program does not allow enough time for the settings to take effect before attempting to originate a call. To provide settling time without using WAIT statements in your program, set up the DCCH at the start of your program before setting up measurement parameters or other test set settings. You can also use the repeat registration and repeat paging commands to prevent errors from occurring during registration or origination immediately after changing DCCH parameters. See “CALL:PAGing:REPeat” on page 293 and “CALL:REGister” on page 302.

## Related Topics

“CALL[:CELL]:OPERating:MODE” on page 290

“AVC Test Operating Mode” on page 75

“DTC Test Operating Mode” on page 78

“Configuring the Traffic Channel (TCH)” on page 83

## DCCH and DTC Descriptions

The following paragraphs describe the contents of the DCCH and DTC. Refer to the TIA/EIA-136.1 standard for a description of the various frame types, their contents, and their functions.

- The **digital control channel (DCCH)** is a full-rate non-bursted signal on a user-selectable channel number. DCCH overhead messaging uses timeslots 1 and 4; with all other timeslots containing forward DTC filler data.

Each DCCH hyperframe is segmented into F-BCCH, E-BCCH, and SPACH slots, with no S-BCCH or Reserved slots allocated. The F-BCCH logical channel transmits the following messages: DCCH Structure, Access Parameters, Control Channel Selection Parameters, Registration Parameters, System Operator Code, and System Identity. The E-BCCH logical channel transmits the Neighbor Cell, System Operator Code, and Regulatory Configuration information. All remaining hyperframe slots are allocated to the PCH subchannel of the SPACH logical channel.

DCCH settings can take up to five seconds to take effect (see “Operating Considerations - DCCH Settling Time” on page 72).

- The **digital traffic channel (DTC)** is a full-rate, non-bursted channel on a user-selectable channel number and on a user-selectable timeslot pair (1 and 4, 2 and 5, or 3 and 6). The remaining two unused forward DTC timeslot pairs contain forward DTC filler data.

## ACC and AVC Descriptions

The following paragraphs describe the contents of the ACC and AVC. Refer to the TIA/EIA-136.2 standard for a description analog control and voice channel operation.

- The **analog control channel (ACC)** is a continuous wideband data stream. Overhead and control-filler messages are sent on streams A and B. Mobile station control messages are sent on either stream A or stream B, depending on the mobile’s mobile identification number (MIN). Busy/idle bits are all set to 1 (idle). The BIS bit of the Access Type Parameters Global Action Message is set to 0 (zero), causing the mobile to ignore the state of the busy/idle bit during access attempts.

The overhead message train contains the following messages: System Parameter Overhead message, Access Type Parameters Global Action message, and Registration Identification Message (transmitted only during forced registration).

If the overhead message train or a mobile control message is not being sent, the Control-Filler Message is sent instead.

## Active Cell Operating Mode

### ACC to DTC Burst Size Considerations

When a mobile that is camped on an ACC is commanded to go to a DTC, the mobile is *always* commanded to use shortened bursts on the DTC, regardless of the DTC Burst Size control setting. However, when originating a call from a DCCH to a DTC, or anytime a handoff to a DTC is performed, the DTC Burst Size you specify is used. See “CALL:DTC:BURSt” on page 266.

- The **analog voice channel (AVC)** is a frequency modulated (FM) carrier containing one or more of the following signals:
  - Supervisory audio tone (SAT) - is settable to three frequencies: SAT1 (5970 Hz), SAT2 (6000 Hz), SAT3 (6030 Hz). Unless wideband data is being sent, SAT is always being transmitted on the AVC.
  - Wideband data - is used for sending digital messages to the mobile, and is only on while a message is being sent. The SAT and Audio signals are muted while wideband data is being sent. Messages are sent using Manchester-encoded FSK at a rate of 10 kbps and 8 kHz deviation.
  - Audio (voice) - is controlled by the user by allowing or muting the audio signal from the mobile. The audio received by the test set on the mobile's reverse analog voice channel (RVC) is re-transmitted by the test set on the forward AVC. The audio signal from the test set is muted while wideband data is being sent.

See “Forward Channel FM Operation” on page 75 for more information on using internal and external FM.

---

## AVC Test Operating Mode

Analog Voice Channel (AVC) test mode provides a forward voice channel for operating AMPS mobiles in test mode. This allows you to get the mobile transmitting on an AVC and test many functions in the mobile without the need to register or page the mobile.

### AVC Test Mode Operation

When the test set's operating mode is AVC test mode:

- No over the air signaling is available.
- Changes to the test set's AVC channel assignment occur immediately.
- When the test set's AVC channel is changed, the base station emulator is automatically reconfigured to receive the corresponding reverse AVC signal from the mobile. If needed, you can disable this operation by selecting manual receiver frequency control. See "Receiver Control" on page 169.
- Changes to the MS TX Level automatically set the expected analog input power. If needed, you can disable this operation by selecting manual receiver power control. See "Receiver Control" on page 169.
- SAT modulation of the test set's forward AVC can be turned on or off, and can be set to any of the three color code frequencies.
- Internal FM of the forward AVC is available for various audio frequency tests.
- An external FM source can be used to provide addition frequency modulation of the forward AVC.

### Forward Channel FM Operation

Frequency modulation of the forward channel in AVC test mode is a combination of the SAT, internal FM, and external FM settings. No wideband data is present.

To meet specifications, the total peak FM deviation cannot exceed 20 kHz. Limitations for each FM source are as follows:

- SAT - can be turned on or off, and has three color code selections: SAT1 (5970 Hz), SAT2 (6000 Hz), SAT3 (6030 Hz). Peak deviation is fixed at 2 kHz.
- Internal FM - can be turned on or off, has a rate range of 100 Hz to 20 kHz, and a peak deviation range of 0 Hz to 20 kHz.
- External FM - uses the test set's rear-panel FM Mod In port to connect an external modulation source. The fixed peak deviation for a 100 Hz to 20 kHz tone is 20 kHz/Volt.

### AVC Test Mode Operation Using Automated Receiver Control

The following procedure demonstrates the use of AVC test mode where the base station emulator's RF generator frequency, measurement receiver frequency, and expected input power are automatically set by the call control settings used. This is the most common way to use test mode because it requires less individual configuration of call parameters.

This procedure provides general programming steps, but is not written around any specific test requirements. Some of the settings shown are the default power up settings for AVC Test mode.

## AVC Test Operating Mode

Putting the mobile in analog test mode at the correct channel number and power setting is the responsibility of the user.

1. Select AVC Test mode.

```
OUTPUT 714;"CALL:OPERating:MODE AVCT"
```

2. Turn on the base station emulator's RF Generator and set the output level to -50 dBm. (The Cell Power level you set during AVC Test mode is also used during Active Cell and DTC Test operation, but is independent of the Cell Power level set while using CW operating mode.)

```
OUTPUT 714;"CALL:POWer -50"
```

3. Set the AVC channel number to 777.

```
OUTPUT 714;"CALL:SETup:AVC 777"
```

4. Set the MS TX Level to two (2). (This is the mobile's power level setting, not the expected power in dBm.)

```
OUTPUT 714;"CALL:SETup:MS:ANALog:TXLevel:CELLular 2"
```

5. Turn the forward channel AVC SAT on.

```
OUTPUT 714;"CALL:AVCTest:AVC:SATone:STATE ON"
```

6. Set the SAT color code to SAT1 (5970 Hz).

```
OUTPUT 714;"CALL:SETup:AVC:SATone SAT1"
```

7. Turn on internal FM, and set the deviation to 8.0 kHz and the rate to 1004 Hz.

```
OUTPUT 714;"CALL:FM:INTernal 8 KHZ;INT:FREQuency 1004 HZ"
```

If you do not want internal FM on, use the FM State command to turn it off:

```
OUTPUT 714;"CALL:FM:INTernal:STATE OFF"
```

8. Turn external FM off.

```
OUTPUT 714;"CALL:FM:EXTernal:STATE OFF"
```

9. Connect the mobile's antenna port to the test set's RF IN/OUT port and put the mobile in analog test mode, transmitting at power level two on channel 777.

If your mobile's audio is not muted, you should hear a 1004 Hz tone out of its speaker. If you have an acoustic or direct connection to the mobile's audio output, you can make audio measurements through the test set's AUDIO IN connections. See "Audio Analyzer Measurement Description" on page 34.

You can also make analog transmit power and frequency stability measurements on the mobile's reverse channel carrier. If you modulate your mobile's carrier, you can measure the frequency modulation characteristics. See "Analog Transmit Power Measurement Description" on page 33, "Frequency Stability Measurement Description" on page 46, and "Frequency Modulation (FM) Measurement Description" on page 44.

## AVC Test Mode Operation Using Manual Receiver Control

Note: Changing the operating mode affects manual receiver control parameters. See "Effects on Receiver Control When Changing Operating Mode" on page 172.

The following procedure demonstrates the use of AVC test mode where the base station emulator's RF generator frequency, measurement receiver frequency, and expected input power are manually configured. Manual control is not commonly used in production testing, but is provided to allow the measurement receiver and RF generator to be used to perform tests where automated control may not be used; such as when tuning the receiver to make measurements outside of the cellular band during AMPS testing.

This procedure provides general programming steps, but is not written around any specific test requirements. Some of the settings shown are the default power up settings for AVC Test mode.



Putting the mobile in analog test mode at the correct channel number and power setting is the responsibility of the user.

1. Select AVC Test mode.

```
OUTPUT 714;"CALL:OPERating:MODE AVCT"
```

2. Turn on the base station emulator's RF Generator and set the output level to -50 dBm.

```
OUTPUT 714;"CALL:POWer -50"
```

3. Set the base station emulator's RF generator to 893.310 MHz; the forward channel frequency for channel 777.

```
OUTPUT 714;"CALL:RFGenerator:FREQuency 893.310 MHZ"
```

4. Enable manual receiver frequency control and tune the measurement receiver to 848.31 MHz (reverse channel 777).

```
OUTPUT 714;"RFANalyzer:MANual:MEASurement 848.310 MHZ"
```

5. Enable manual control of the receiver's expected analog input level power setting.

```
OUTPUT 714;"RFANalyzer:CONTRol:POWer:AUTO OFF"
```

6. Set the expected input level value to correspond to mobile station power level two.

```
OUTPUT 714;"RFANalyzer:MANual:ANALog:POWer 28 DBM"
```

7. Turn the forward channel AVC SAT on.

```
OUTPUT 714;"CALL:AVCTest:AVC:SATone:STATE ON"
```

8. Set the SAT color code to SAT1 (5970 Hz).

```
OUTPUT 714;"CALL:SETup:AVC:SATone SAT1"
```

9. Turn on internal FM, and set the deviation to 8.0 kHz and the rate to 1004 Hz.

```
OUTPUT 714;"CALL:FM:INTernal 8 KHZ;INT:FREQuency 1004 HZ"
```

If you do not want internal FM on, use the FM State command to turn it off:

```
OUTPUT 714;"CALL:FM:INTernal:STATE OFF"
```

10. Turn external FM off.

```
OUTPUT 714;"CALL:FM:EXTernal:STATE OFF"
```

11. Connect the mobile's antenna port to the test set's RF IN/OUT port and put the mobile in analog test mode, transmitting at power level two and channel 777.

If your mobile's audio is not muted, you should hear a 1004 Hz tone out of the speaker. If you have an acoustic or direct connection to the mobile's audio output, you can make audio measurements through the test set's AUDIO IN connections. See "Audio Analyzer Measurement Description" on page 34.

You can also make analog transmit power and frequency stability measurements on the mobile's reverse channel carrier. If you modulate your mobile's carrier, you can measure the frequency modulation characteristics. See "Analog Transmit Power Measurement Description" on page 33, "Frequency Stability Measurement Description" on page 46, and "Frequency Modulation (FM) Measurement Description" on page 44.

## Related Topics

"Programming: Getting Started Guide for AMPS/136 Mobile Test" on page 95

"Receiver Control" on page 169

"DTC Test Operating Mode" on page 78

## DTC Test Operating Mode

Digital Traffic Channel (DTC) test mode provides a forward digital traffic channel (FDTC) for operating TDMA mobiles in test mode in the cellular and PCS bands.

### DTC Test Mode Operation

When the test set's operating mode is DTC test mode:

- No over the air signaling or message decoding is available.
- The generated DTC contains a repeating random pattern (voice echoing is not supported).
- Changes to the test set's DTC channel assignment and band occur immediately.
- When the test set's DTC channel or band is changed, the base station emulator is automatically reconfigured to receive the corresponding reverse DTC signal from the mobile. If needed, you can disable this operation by selecting manual receiver frequency control. See "Receiver Control" on page 169.
- Changes to the MS TX Level automatically set the expected digital input power for the selected band. If needed, you can disable this operation by selecting manual receiver power control. See "Receiver Control" on page 169.
- It is the user's responsibility to match the mobile's test mode settings to the test set's base station emulator settings in order to synchronize the mobile to the test set's FDTC. These settings include the DTC band and channel number, DTC timeslot, DTC vocoder, DTC digital verification color code (DVCC), and MS TX Level.
- Digital transmit power, modulation accuracy, adjacent channel power, and loopback BER measurements can all be made on the reverse DTC if the mobile is synchronized properly to the test set.

### DTC Test Mode Operation Using Automated Receiver Control

The following procedure demonstrates the use of DTC test mode where the base station emulator's RF generator frequency, measurement receiver frequency, and expected input power are automatically set by the call control settings used. This is the most common way to use test mode because it requires less individual configuration of call parameters.

This procedure provides general programming steps, but is not written around any specific test requirements. Some of the settings shown are the default power up settings for DTC test mode, and may not need to be changed in your program.

Putting the mobile in digital test mode and configuring it to match the settings used in the actual DTC test mode program is the user's responsibility.

1. Select DTC Test operating mode.

```
OUTPUT 714;"CALL:OPERating:MODE DTCT"
```

2. Turn on the base station emulator's RF Generator and set the output level to -50 dBm. (The Cell Power level you set during DTC Test mode is also used during Active Cell and AVC Test operation, but is independent of the Cell Power level set while using CW operating mode.)

```
OUTPUT 714;"CALL:POWer -50"
```

3. Set the DTC band to Cellular (800 MHz).

```
OUTPUT 714;"CALL:SETup:DTC:BAND CELLular"
```

4. Set the DTC channel number to 777.  
OUTPUT 714;"CALL:SETup:DTC 777"
5. Set the MS TX Level to two (2). (This is the mobile's power level setting, not the expected power in dBm.)  
OUTPUT 714;"CALL:SETup:MS:DIGital:TXLevel 2"
6. Set the DTC Timeslot to 1 & 4.  
OUTPUT 714;"CALL:SETup:DTC:TSLot 1"
7. Set the DTC Digital Verification Color Code (DVCC) to 1.  
OUTPUT 714;"CALL:SETup:DTC:DVCCCode 1"
8. Set the vocoder type to ACELP (CC1)  
OUTPUT 714;"CALL:SETup:DTC:VOCoder ACEL1"
9. Connect the mobile's antenna port to the test set's RF IN/OUT port and put the mobile in digital test mode, transmitting at power level two on channel 777 in the cellular (800 MHz) band.

If the mobile synchronized properly to the test set, you can now make measurements on the mobile's reverse digital traffic channel. See "Adjacent Channel Power Measurement Description" on page 32, "Digital Modulation Accuracy Measurements Description" on page 42, and "Digital Transmit Power Measurement Description" on page 41. Loopback BER can be measured by selecting the Loopback BER measurement and then reducing the cell power to the desired measurement level.

### **DTC Test Mode Operation Using Manual Receiver Control**

Note: Changing the operating mode affects manual receiver control parameters. See "Effects on Receiver Control When Changing Operating Mode" on page 172.

The following procedure demonstrates the use of DTC test mode where the base station emulator's RF generator frequency, measurement receiver frequency, and expected input power are manually configured. Manual is provided to allow the measurement receiver and RF generator to be used to perform tests where automated control may not be used.

This procedure provides general programming steps, but is not written around any specific test requirements. Some of the settings shown are the default power up settings for DTC Test mode.

Putting the mobile in digital test mode and configuring it to match the settings used in the actual DTC test mode program is the user's responsibility.

1. Select DTC Test mode.  
OUTPUT 714;"CALL:OPERating:MODE DTCT"
2. Turn on the base station emulator's RF Generator and set the output level to -50 dBm.  
OUTPUT 714;"CALL:POWer -50"
3. Set the base station emulator's RF generator to 893.310 MHz; the forward channel frequency for channel 777.  
OUTPUT 714;"CALL:RFGenerator:FREQuency 893.310 MHZ"
4. Enable manual receiver frequency control and tune the measurement receiver to 848.310 MHz (reverse channel 777).  
OUTPUT 714;"RFANalyzer:MANual:MEASurement 848.310 MHZ"
5. Enable manual control of the receiver's expected cellular (800 MHz) band digital input power setting.  
OUTPUT 714;"RFANalyzer:CONTRol:POWer:AUTO OFF"
6. Set the expected power value to correspond to mobile station power level two.  
OUTPUT 714;"RFANalyzer:MANual:DIGital:POWer 28 DBM"

## DTC Test Operating Mode

7. Set the DTC Timeslot to 1 & 4.

OUTPUT 714;"CALL:SETup:DTC:TSLot 1"

8. Set the DTC Digital Verification Color Code (DVCC) to 1.

OUTPUT 714;"CALL:SETup:DTC:DVCCCode 1"

9. Set the vocoder type to ACELP (CC1)

OUTPUT 714;"CALL:SETup:DTC:VOCoder ACEL1"

10. Connect the mobile's antenna port to the test set's RF IN/OUT port and put the mobile in digital test mode, transmitting at power level two and channel 777 in the cellular band.

If the mobile synchronized properly to the test set, you can now make measurements on the mobile's reverse digital traffic channel. See "Adjacent Channel Power Measurement Description" on page 32, "Digital Modulation Accuracy Measurements Description" on page 42, and "Digital Transmit Power Measurement Description" on page 41. Loopback BER can be measured by selecting the Loopback BER measurement and then reducing the cell power to the desired measurement level.

## Related Topics

"Programming: Getting Started Guide for AMPS/136 Mobile Test" on page 95

"Receiver Control" on page 169

"AVC Test Operating Mode" on page 75

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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.

Note: Changing the operating mode affects manual receiver control parameters. See “Effects on Receiver Control When Changing Operating Mode” on page 172.

## CW Test Mode Operation

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.
- With the exception of mobile reported values, all test set measurements are accessible. Immediate triggering should be used for most measurements because no overhead signaling is occurring. Protocol triggering will time-out (if time-outs are enabled) or report an integrity indicator other than zero (0) and not provide valid results. RF Rise triggering may or may not work, depending on the type of signal being measured.
- Expected CW power, measurement receiver frequency, and uplink receiver frequency are available as manual settings only; no automatic control is provided.

## CW Mode Operation

The following command examples show you how to control each function for CW operating mode:

1. Select CW operating mode:  
OUTPUT 714;”CALL:OPERating:MODE CW”
2. Set the cell power output level to be transmitted by the test set while using CW operating mode (this level will only be used while in CW operating mode):  
OUTPUT 714;”CALL:POWER:CW -45 DBM”
3. Set the RF generator frequency:  
OUTPUT 714;”CALL:RFGenerator:FREQuency 870 MHZ”
4. Set the expected CW power level to be received by the test set:  
OUTPUT 714;”RFANalyzer:CW:EXPEcted:POWER 23 DBM”
5. Set the measurement receiver frequency:  
OUTPUT 714;”RFANalyzer:MANual:MEASurement 870.030 MHZ”
6. Set the uplink (demodulation) receiver frequency. (Not typically used in CW operating mode):  
OUTPUT 714;”RFANalyzer:MANual:UPLink 870.030 MHZ”

## **CW Operating Mode**

### **Related Topics**

“Active Cell Operating Mode” on page 71

“AVC Test Operating Mode” on page 75

“DTC Test Operating Mode” on page 78

## Configuring the Traffic Channel (TCH)

The digital traffic channel (DTC) and analog voice channel (AVC) parameters are configured using the call processing subsystem commands shown in the following sections.

See “Active Cell Operating Mode” on page 71, “AVC Test Operating Mode” on page 75, “DTC Test Operating Mode” on page 78, and “CW Operating Mode” on page 81 for details about using each mode for mobile test.

### Selecting the Traffic Channel Type: DTC or AVC

The mobile can be initially assigned to, or later handed off to, an AVC or a DTC when using Active Cell operating mode. Parameters for the DTC and AVC can be sent to the test set at any time. However, a handoff to a different type of traffic channel cannot occur unless you specify the type of traffic channel to use before performing the handoff.

For example, if you bring the mobile up on a DTC, you can send commands to the test set to configure an AVC without interfering with mobile operation. To hand off the mobile to the AVC you configured, you must first change the traffic channel type to AVC, then issue the handoff command.

The following GPIB example illustrates selecting an analog voice channel (AVC) before a handoff:

```
OUTPUT 714;"CALL:TCHannel:TYPE AVC"
```

### AVC (Analog Voice Channel) Parameters

- AVC Channel

```
OUTPUT 714;"CALL:SETup:AVC 777" !Specifies channel number 777 for the AVC.
```

- SAT Color Code

```
OUTPUT 714;"CALL:SETup:AVC:SATone SAT2" !Specifies SAT2 (6000Hz) .
```

### Using Additional Frequency Modulation (FM) on the Forward AVC

The test set can use both internal and external signals to provide FM on the forward AVC. During Active Cell operating mode, this feature is only available when FM is enabled and the mobile is on an active AVC. It does not affect DTC operation. This feature is also available with AVC Test operating mode. See “Forward Channel FM Operation” on page 75.

## Configuring the Traffic Channel (TCH)

### DTC (Digital Traffic Channel) Parameters

- DTC Band

OUTPUT 714;"CALL:SETup:DTC:BAND PCS" !Specifies PCS band (1900 MHZ) operation.

- DTC Channel (see "Frequency Banded Parameters" on page 88)

OUTPUT 714;"CALL:SETup:DTC 890" !Specifies channel 890 in the active band for the DTC.

- Vocoder Type

OUTPUT 714;"CALL:SETup:DTC:VOCoder ACELP1" !Specifies the ACELP1 vocoder.

- DTC Burst Size.

OUTPUT 714;"CALL:DTC:BURSt SHORtened" !Specifies to use shortened DTC bursts.

- DTC Digital Verification Color Code (DVCC).

OUTPUT 714;"CALL:SETup:DTC:DVCC 4" !Specifies a DVCC of 4.

- DTC Timeslot.

OUTPUT 714;"CALL:SETup:DTC:TSLot 3" !Specifies timeslots 3 and 5.

### Operating Considerations

The traffic channel parameters do not affect the output of the test set's base station emulator until the mobile is commanded by the test set (over the control channel) to go to the defined traffic channel.

Changes made to the traffic channel parameters while the mobile is on a DTC or an AVC do not take effect until a handoff is performed.

When a call is ended, the output of the test set is set to the current control channel settings.

### Related Topics

"Configuring the Control Channel (CCH)" on page 85

"Configuring Mobile Station Operating Parameters" on page 68

"Frequency Banded Parameters" on page 88

"Receiver Control" on page 169

"CALL:SETup" on page 305

"Programming Handoffs" on page 69



---

## Configuring the Control Channel (CCH)

The control channel parameters are configured using the following call processing subsystem functions and commands.

### CCH Parameters

- Cell Power - for both digital control channel (DCCH) and analog control channel (ACC) level.
- Cell Power State
- Control Channel Type: DCCH or ACC
- DCCH Band: Cellular (800 MHz) or PCS
- DCCH Channel number
- ACC Channel number
- System ID
- SOC (System Operator Code)
- MCC (Mobile Country Code)

### GPIB Examples:

#### Cell Power and State (complex command)

```
OUTPUT 714;"CALL:POWer -85 DBM"
```

would set the cell power state to on and set the cell's RF transmitter power to -85 dBm. See "CALL:POWer" on page 294.

#### Cell Power

```
OUTPUT 714;"CALL:POWer:AMPLitude -85 DBM"
```

would set the cell's RF transmitter power to -85 dBm if the cell power state is set to on. If the cell power state is set of off, this command is remembered by the test set but does not take effect until the cell power state is changed to on. See "CALL:POWer" on page 294.

#### Cell Power State

```
OUTPUT 714;"CALL:POW:STAT ON"
```

would turn on the cell's RF transmitter. See "CALL[:CELL]:POWer:STATe[:SElected]" on page 300.

#### Control Channel Type

```
OUTPUT 714;"CALL:CCHannel:TYPE DCCH"
```

would select a digital control channel (DCCH). See "CALL:CCHannel" on page 258.

## Configuring the Control Channel (CCH)

### DCCH Band

OUTPUT 714;"CALL:DCCH:BAND CELLular"

would select the cellular (800 MHz) band for the DCCH. See "CALL:DCCH" on page 263.

### DCCH Channel Number

See "CALL:DCCH" on page 263.

OUTPUT 714;"CALL:DCCH 777"

would set the active digital control channel to 777.

OUTPUT 714;"CALL:DCCH:CELLular 556"

would set the cellular band (800 MHz) digital control channel to 556.

OUTPUT 714;"CALL:DCCH:PCS 588"

would set the PCS band (1900 MHz) digital control channel to 588.

### ACC Channel Number

OUTPUT 714;"CALL:ACC 334"

would set the analog control channel to 334. See "CALL:ACC" on page 256.

### System ID

OUTPUT 714;"CALL:SID 231"

would set the system ID number to 231. See "CALL:SID" on page 316.

### SOC

OUTPUT 714;"CALL:SOC 479"

would set the system operator code to 479. See "CALL:SOCCode" on page 317.

### MCC

OUTPUT 714;"CALL:MCC 777"

would set the mobile country code to 777. See "CALL:MCCCode" on page 275.

## Operating Considerations

There are a number of parameters for the control channel and the traffic channel (see "Configuring the Traffic Channel (TCH)" on page 83) that can be configured, however the test set's default parameters should allow a properly functioning mobile station to successfully camp on the cell and make a call under most circumstances.

Changes to the DCCH do not take effect immediately. See "Operating Considerations - DCCH Settling Time" on page 72.

Parameters can be queried from the test set regardless of the state of the test set.

**Related Topics**

“Frequency Banded Parameters” on page 88

“Configuring the Traffic Channel (TCH)” on page 83

## Frequency Banded Parameters

Several parameters only affect test set operation in a particular frequency band. These are referred to as frequency banded parameters. The two bands used for the AMPS/136 Mobile Test Application are Cellular (800 MHz) and PCS (1900 MHz).

The user can set values for parameters that are activated by a band that is not currently selected, and the test set will store the setting for future use. For example, during a call on the PCS band, the MS TX level can be set to 4 for the Cellular frequency band without affecting the mobile's output. When a handover to the Cellular band is made, the MS TX level of 4 for Cellular band will already be set and take effect.

If the user does not specify a frequency band when setting frequency banded parameters, settings to the parameter will be made in the currently selected (active) band. In the same way, querying a frequency banded parameter without specifying the band returns the value for the active band.

### List of Frequency Banded Parameters

The following are frequency banded parameters:

- DCCH Channel Number - See "CALL:DCCH" on page 263.
- DTC Channel Number - See "CALL:SETup" on page 305.
- Digital MS Power Level - See "CALL:SETup" on page 305.
- Manual Digital Expected Power Level - See "RFANalyzer" on page 403.
- ACC Channel Number (currently restricted to cellular band operation). See "CALL:ACC" on page 256
- AVC Channel Number (currently restricted to cellular band operation). See "CALL:SETup" on page 305.
- Analog MS Power Level (currently restricted to cellular band operation). See "CALL:SETup" on page 305.
- Manual Analog Expected Power Level (currently restricted to cellular band operation). See "RFANalyzer" on page 403.

**GPIB Examples of Frequency Banded Parameters**

```

10  OUTPUT 714;"CALL:DCCH:BAND PCS" !Select PCS band for the digital control channel.
20  OUTPUT 714;"CALL:DCCH:PCS 789" !Set the channel number for the PCS band DCCH. This
30  !value only affects PCS band DCCH operation, not Cellular band DCCH operation.
40  !
50  OUTPUT 714;"CALL:SETup:DTC:BAND PCS" !Select PCS band for digital traffic channel.
60  OUTPUT 714;"CALL:SETup:DTC:PCS 777" !Set the channel number for the PCS band DTC.
70  !This value only affects PCS band DTC operation, not Cellular band DTC operation.
80  !
90  OUTPUT 714;"CALL:SETup:MS:DiGital:TXLevel:PCS 1" !Set the MS TX level for
100 !the mobile station operating in PCS band to MS level 1. This value only affects
110 !PCS band DTC operation, not Cellular band DTC operation.
120 !
130 OUTPUT 714;"RFANalyzer:MANual:DiGital:POWer:PCS 28 DBM" ! Set the expected power
140 !for digital PCS band signals to 28 dBm. This command only sets the manual expected
141 !power for PCS band digital signals, and does not affect the expected power for
142 !cellular band digital signals. This command only affects test set operation when
150 !the command "RFANalyzer:CONTRol:POW:AUTO OFF" is sent to enable manual RF analyzer
151 !control.
180 !
190  END

```

**Related Topics**

"Programming Handoffs" on page 69

"Configuring the Control Channel (CCH)" on page 85

"Configuring the Traffic Channel (TCH)" on page 83

"Receiver Control" on page 169

---

## Establishing an Active Link with the Mobile Station

### Making a Base Station Originated Call

The following general process is used to make a base station originated call to a connected mobile using the Active Cell operating mode. See “Active Cell Operating Mode” on page 71.

In most cases, the test set’s power-on default values for the control and traffic channel should work correctly to get an AMPS/136 mobile on a digital traffic channel (DTC). If necessary, you can change the control and traffic channel parameters for analog or PCS band operation.

1. If necessary, configure the control channel that the mobile will camp on (DCCH is default). See “Configuring the Control Channel (CCH)” on page 85.
2. If necessary, configure the traffic channel that the mobile will be commanded to go to (DTC is default). See “Configuring the Traffic Channel (TCH)” on page 83.
3. Configure the necessary call processing connect/disconnect synchronization conditions to allow your program to detect if the mobile went to its assigned traffic channel. See “Call Processing State Synchronization” on page 225.
4. Enter the mobile’s paging (phone) number. See “CALL:PAGing:PNUMBER” on page 292.
5. Verify that the mobile has camped on the control channel.
6. Send the command to originate the call. See “CALL:ORIGinate” on page 291.
7. Verify that the mobile is on its assigned traffic channel. “Call Processing State Synchronization” on page 225.

### Making a Mobile Station Originated Call

The following process is used to make a mobile station originated call:

1. If necessary, configure the control channel that the mobile will camp on (DCCH is default). See “Configuring the Control Channel (CCH)” on page 85.
2. If necessary, configure the traffic channel that the mobile will be commanded to go to (DTC is default). See “Configuring the Traffic Channel (TCH)” on page 83.
3. Configure the necessary call processing connect/disconnect synchronization conditions to allow your program to detect if the mobile went to its assigned traffic channel. See “Call Processing State Synchronization” on page 225.
4. Initiate a call from the mobile station.

---

**NOTE** There is no facility in the test set to initiate a call from the mobile station. This must be accomplished manually or through a test bus built-in to the mobile station.

---

5. Verify that the mobile is on its assigned traffic channel. “Call Processing State Synchronization” on page 225.

## **Operating Considerations**

- The test set must be in active cell operating mode for any call processing operations.
- Be sure to verify the correct frequency band for DCCH and DTC operation (Cellular or PCS). Default channel numbers for these bands are different.

## Establishing an Active Link with the Mobile Station



# 3 Programming



# Programming: Getting Started Guide for AMPS/136 Mobile Test

---

## 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 E1961A AMPS/136 mobile test application installed.

The variable `Testset` 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.

### Introduction

- The control program explained in the Getting Started Guide is also available here for you to download. It is a fully functional control program.

## About the Programming Examples Presented in this Guide

### Programming Language:

Programming examples presented in this guide are written in the HP BASIC programming language, also known as RMB or Rocky Mountain BASIC. The use of HP BASIC is not an endorsement of the HP BASIC product.

### Line Numbers

All of the programming examples in the guide with line numbers are sections from a control program example available on-line for you to download.

Code that is not part of the download control 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 shortened form of the command syntax 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:POW -80dBm
```

- Programming examples make extensive 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:DTXP:TIM:STAT ON"
```

- The syntax below is used to assign a value to the parameter.

```
OUTPUT Test_set;"SET:DTXP:TIM:TIME 10 S"
```

- Both of the above actions can be accomplished with one syntax command:

```
OUTPUT Test_set;"SET:DTXP: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.

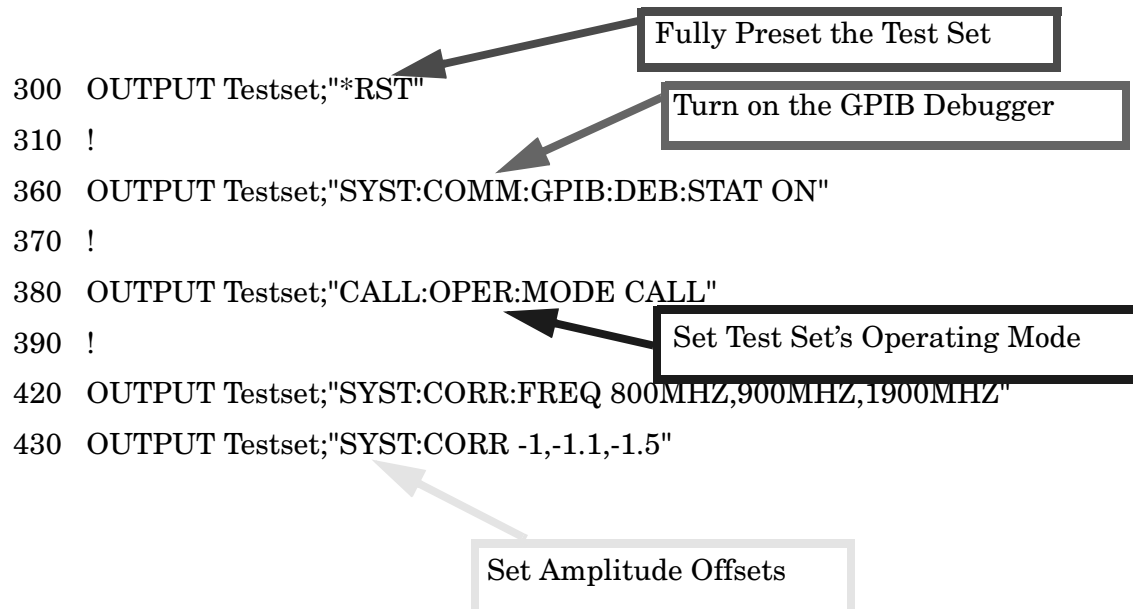
```
OUTPUT Test_set;"SET:DTXP:TIM 10 S"
```

This is the format that will be used throughout this guide.

## Step 1: Set up the Test Set

This step explains how to:

- “Fully Preset the Test Set”
- “Turn on the GPIB Debugger”
- “Set Test Set’s Operating Mode”
- “Set Amplitude Offsets”



### Fully Preset the Test Set

To set up the test set, you begin by sending the `*RST` command. `*RST` is used to perform a full preset of the test set, restoring the majority of settings to their default values. `*RST` also sets all measurements to single trigger. More information about presets is available on the Internet.

## Turn on the GPIB Debugger

Another useful tool that you may want to turn on at this time is the GPIB command debugger. While turned on, error messages appear on the test set's screen when the test set receives an unknown GPIB command. The message contains information about what type of error was caused and indicates where in the syntax the error occurred. Troubleshooting, like locating and fixing typing errors for example, becomes easier using the GPIB command debugger.

---

**NOTE** The `SYST:COMM:GPIB:DEB:STAT ON` command assists you when debugging code. This command should be taken out of your code once development is completed.

---

## Set Test Set's Operating Mode

The `CALL:OPER:MODE` command in the diagram is used to set the test set's operating mode to active cell. This means call processing is used to maintain a link between the test set and the mobile station.

There are also three test mode operating modes available. These modes are useful when you are operating the mobile station in test mode.

## Set Amplitude Offsets

You can compensate for fixture loss or cable loss by using the RF IN/OUT port's amplitude offset parameter. It is possible to set twenty offsets corresponding to twenty frequencies. Use the `SYST:CORR:FREQ` command to specify frequencies. Then, use the `SYST:CORR` complex command to set the offset values for the respective frequencies and turn the amplitude state to ON. The amplitude offset for frequencies not specified is determined by linear interpolation.

---

**NOTE** The amplitude offset state is not turned OFF when you cycle power or sent the `*RST` command. Therefore, when you set amplitude offset values in a test set, you must turn this state off either manually or via GPIB if you no longer want to use the offsets.

---

---

## Step 2: Configure the Test Set and Mobile Station Parameters

This step explains how to:

- “Configure the Control Channel Parameters”
- “Configure the Traffic Channel Parameters”
- “Configure the Mobile Station Parameters”

---

**NOTE** Many of the parameters configured below are being configured to their default values. In a manufacturing environment it may be desirable to explicitly configure these parameters to ensure that the required settings have not been changed by someone setting a parameter's value through the test set's front panel. However, greater code efficiency can be achieved by not configuring them.

---

### Configure the Control Channel Parameters

The programming example below illustrates setting the cell power to -75 dBm, specified at the beginning of the program in the variable `Rf_level`, setting the control channel type to a Digital Control Channel (DCCH), setting the DCCH band to the 800MHz band, and specifying the DCCH channel to be 1013.

Many other control channel parameters can also be configured. Refer to the User Documentation, either on the Internet or the CD-ROM, or the GPIB syntax guide for information about these parameters.

```
500 OUTPUT Testset;"CALL:POW ";Rf_level! Set the cell power to -75 dBm
510 OUTPUT Testset;"CALL:CCH:TYPE DCCH"! Set the Control Channel Type
520 OUTPUT Testset;"CALL:DCCH:BAND CELL"! Set the DCCH band to 800 MHz
530 OUTPUT Testset;"CALL:DCCH 1013" ! Set the DCCH channel to 1013
```

### Configure the Traffic Channel Parameters

The example below illustrates how you can set some of the traffic channel parameters. In this example, the traffic channel type is being set to a Digital Traffic Channel (DTC). This command is also used when you want to perform a handoff to an Analog Voice Channel (AVC). The DTC band is set to the 800MHz band and the channel to 542. In addition, it is possible for you to specify parameters to be used later when handoffs are performed. Here, the DTC channel for the PCS (1900MHz) band is set to 1000. Parameters for an AVC are also established at this time. These parameters are stored in the test set and become active when the band or channel type become active. Internal FM parameters to modulate the AVC for the audio harmonic distortion measurement are set up below. Internal FM has also been turned off because you will not want to use it until the connection is on an AVC.

Refer to the User Documentation, either on the Internet or the CD-ROM, or the GPIB syntax guide for other traffic channel parameters you can configure.

```
570 OUTPUT Testset;"CALL:TCH:TYPE DTC"
580 OUTPUT Testset;"CALL:SET:DTC:BAND CELL"
590 OUTPUT Testset;"CALL:SET:DTC:CHAN:CELL 542"
600 OUTPUT Testset;"CALL:SET:DTC:CHAN:PCS 1000"
610 OUTPUT Testset;"CALL:SET:AVC 387"! Set the Analog Voice Channel
```



## Step 2: Configure the Test Set and Mobile Station Parameters

```
620 OUTPUT Testset;"CALL:SET:AVC:SAT SAT2"! Set the SAT tone to 6KHZ
630 ! Set up the AVC for the Audio Harmonic Distortion measurement.
640 ! Turn off the internal FM until connection is on an AVC.
650 OUTPUT Testset;"CALL:FM:INT:STAT OFF;DEV 8KHZ;FREQ 1004HZ"
```

### Configure the Mobile Station Parameters

The example below illustrates how to assign mobile station transmit levels. In this example, the mobile station is being assigned to Level 2 for digital tests in both bands and for analog testing.

```
690 OUTPUT Testset;"CALL:SET:MS:DIG:TXL:CELL 2"
700 OUTPUT Testset;"CALL:SET:MS:DIG:TXL:PCS 2"
710 OUTPUT Testset;"CALL:SET:MS:ANAL:TXL 2"
```

---

## Step 3: Set the Measurement Parameters

This step gives an example of how you can configure measurement parameters. Notice both digital and analog measurement parameters can be configured simultaneously. For more information about measurement parameters being configured, refer to the additional details about this step available on the Internet.

```
770    ! Set the trigger to single for all measurements
780    OUTPUT Testset;"SET:CONT:OFF"
790    !
800    ! Configure the Digital Measurements
810    OUTPUT Testset;"SET:DTXP:TIM 3"
820    OUTPUT Testset;"SET:MACC:TIM 3;EVM10:STAT OFF"
830    OUTPUT Testset;"SET:ACP:TIM 3"
840    !
850    ! Configure the Analog Measurements
860    OUTPUT Testset;"SET:FST:TIM 3"
870    OUTPUT Testset;"SET:ATXP:TIM 3"
880    OUTPUT Testset;"SET:FM:TIM 3"
890    OUTPUT Testset;"SET:FM:DIST:STAT ON;FREQ 6000"
900    OUTPUT Testset;"SET:FM:DET PPE"
910    OUTPUT Testset;"SET:FM:FILT TBP"
920    !OUTPUT Testset;"SET:FM:FILT:TBP 6000"
930    !
940    ! Configure the Audio Measurements
950    OUTPUT Testset;"SET:AFAN:FILT CMES;TIM 3;COUN 5;PEAK:VOLT 1"
960    OUTPUT Testset;"SET:AFAN:SDIS:STATE ON;FREQ 1004"
```

## Step 4: Make a Connection

There are several ways to establish a connection with the mobile station.

- “Originating a Call from the Mobile Station”
- “Originating a Call from the Test Set”
- “Make a Connection using Test Mode Commands”

### Originating a Call from the Mobile Station

The code below illustrates how to make a connection by originating a call with the mobile station.

Synchronization between the control program and the test set is maintained by querying the test set for the state of the connection between it and the mobile station. When a Mobile Station origination occurs, the CALL:CONN? hanging query is used. It will return a 1 when the call is connected and a 0 otherwise. A state change detector is also armed to ensure the query does not stop hanging before the state transition from IDLE to CONNected is able to begin. Finally, to prevent the query from hanging indefinitely, which could occur if the mobile station is not turned on, badly broken, or no one pushes the “send” button on the mobile, a timeout is set for this query. In this example, 15 seconds is the value assigned to the timeout. After 15 seconds, the change detector is disarmed and the query returns either a 1 or 0. For more information about call synchronization, refer to the additional information about this step available on the Internet.

```
1050 PRINT "Turn the phone on now."
1060 PRINT "When the phone camps on DCCH 1013, press F2 to continue."
1070 PAUSE
1080 CLEAR SCREEN
1090 PRINT "Originate a call on the Mobile now."
1100 OUTPUT Testset;"CALL:CONN:TIM 15"
1110 OUTPUT Testset;"CALL:CONN:ARM"!Arm Call-State-Change Detector
1120 OUTPUT Testset;"CALL:CONN?"!Query State
1130 ENTER Testset;Callstate
1140 IF NOT Callstate THEN Orig_failed
```

### Originating a Call from the Test Set

The code below illustrates how to make a connection by originating a call from the test set.

Synchronization for a test set origination is very similar to that for a mobile station originated call. The primary difference is the default timeout value associated with test set originated events and the automatic arming of the timer when a command is sent to originate an event from the test set.

```
OUTPUT Testset;"CALL:PAG:PNUM '0000574016'" ! Set paging number
OUTPUT Testset;"CALL:PAG:REP ON" ! Set paging repeat state
OUTPUT Testset;"CALL:ORIG" ! Start a base station originated call
OUTPUT Testset;"CALL:CONN?" ! Hanging GPIB query
ENTER Testset;Call_connected ! Program will hang here until
! origination passes or fails

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
    Orig_failed
END IF
```

## Step 4: Make a Connection

### Make a Connection using Test Mode Commands

When both the mobile station and the test set are operating in test mode, the test set provides forward channel stimulus but has no control over or communication with the mobile station. At this point, either the control program via a serial bus or other interface, or the user with the mobile's keypad, must set up the mobile station in order for the test set to make measurements.

---

**NOTE** The method used to synchronize the mobile station with the test set is proprietary to the mobile station manufacturer. The test set has no direct control of synchronization when the mobile station is operating in test mode.

---

## Step 5: INITiate and FETCh Measurements

- “Digital Measurements”
- “Analog Measurements”
- “Validate Measurement Results”
- “Printing Results”

### Digital Measurements

The programming example below illustrates how to make a transmitter and receiver measurement simultaneously. First, set up the test set to begin a mobile-reported receiver measurement. Then initiate and fetch the transmitter measurements. After the transmitter testing is complete, the receiver measurements are queried. These are Mobile Assisted Hand Off (MAHO) values. Performing the digital measurements in this manner allows the mobile receiver measurements to be performed at the same time as the transmitter measurements. You may want to take advantage of opportunities like this to shorten test time and make test code more efficient.

For more information about using INIT:DONE? to perform concurrent measurements, refer to the additional details about the step available on the Internet.

```

1260 OUTPUT Testset;"CALL:MS:REP:MAHO ON"
1270 OUTPUT Testset;"CALL:POW ";Maho_level
1280 !
1290 OUTPUT Testset;"INIT:DTXP;MACC;ACP"
1300 REPEAT
1310 OUTPUT Testset;"INIT:DONE?"
1320 ENTER Testset;Measdone$
1330 SELECT Measdone$
1340 CASE "DTXP"
1350 OUTPUT Testset;"FETC:DTXP?"
1360 ENTER Testset;Integrity,Power
1370 IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
1380 Print_res(Measdone$,Power)
1390 CASE "MACC"
1400 OUTPUT Testset;"FETC:MACC?"
1410 ENTER Testset;Integrity,Evm,Ferr,Ooff,Perr,Mag
1420 IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
1430 Print_res(Measdone$,Evm,Ferr,Ooff,Perr,Mag)
1440 CASE "ACP"
1450 OUTPUT Testset;"FETC:ACP?"
1460 ENTER Testset;Integrity,Adj1,Adjh,Alt1l,Alt1h,Alt2l,Alt2h
1470 IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
1480 Print_res(Measdone$,Adj1,Adjh,Alt1l,Alt1h,Alt2l,Alt2h)
1490 END SELECT
1500 UNTIL Measdone$="NONE"
1510 !
1520 OUTPUT Testset;"CALL:MS:REP:MAHO:BERR:NEW?"!First MAHO Report
1530 ENTER Testset;Discard$ !Discard the first mobile report.
1540 OUTPUT Testset;"CALL:MS:REP:MAHO:BERR:NEW?"!Get NEXT MAHO Report

```

## Step 5: INITiate and FETCh Measurements

```
1550 ENTER Testset;Ber$ !These values are more stable than the first
1560 OUTPUT Testset;"CALL:MS:REP:MAHO:RSSI?"
1570 ENTER Testset;Rssi
1580 Print_maho(Ber$,Rssi,Maho_level)
1590 OUTPUT Testset;"CALL:POW ";Rf_level
1600 OUTPUT Testset;"CALL:MS:REP:MAHO OFF"
```

## Analog Measurements

The example below for analog measurements illustrates the same technique used above for digital measurements. Again, the test set is set up for receiver measurements, allowing the measurements to settle while initiating and fetching transmitter measurements.

For more information about using INIT:DONE? to perform concurrent measurements, refer to the additional details about the step available on the Internet.

```
1890 OUTPUT Testset;"CALL:FM:INT:STAT ON"
1900 OUTPUT Testset;"CALL:POW ";Sinad_level
1910 OUTPUT Testset;"INIT:ATXP;FST;AFAN;FM"
1920 REPEAT
1930     OUTPUT Testset;"INIT:DONE?"
1940     ENTER Testset;Measdone$
1950     SELECT Measdone$
1960     CASE "ATXP"
1970         OUTPUT Testset;"FETC:ATXP?"
1980         ENTER Testset;Integrity,Power
1990         IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
2000         Print_res(Measdone$,Power)
2010     CASE "FST"
2020         OUTPUT Testset;"FETC:FST?"
2030         ENTER Testset;Integrity,Ferr,Freq
2040         IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
2050         Print_res(Measdone$,Ferr,Freq)
2060     CASE "AFAN"
2070         OUTPUT Testset;"FETC:AFAN?"
2080         ENTER Testset;Integrity,Level,Sinad,Dist
2090         IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
2100         Print_res(Measdone$,Level,Dist,Sinad)
2110     CASE "FM"
2120         OUTPUT Testset;"FETC:FM?"
2130         ENTER Testset;Integrity,Dev,Dist
2140         IF Integrity<>0 THEN CALL Bad_measurement(Integrity,Measdone$)
2150         Print_res(Measdone$,Dev,Dist)
2160     END SELECT
2170 UNTIL Measdone$="NONE"
```

## Validate Measurement Results

Validating measurement results is extremely important. The test set will return a result if it is capable of making a measurement, even if this result is obtained under adverse conditions.

The test set provides an integrity indicator to inform you if any errors occurred during the measurement process. You can query the integrity indicator as a measurement result, using the FETC? query. A value of 0 indicates that the measurement is valid. See your GPIB syntax guide for ways to query the integrity indicator and the User Documentation on the Internet for possible returned values and the error they indicate.

## Printing Results

The example below shows how you might create a subroutine to handle processes that are repeated. The variable Meas\_name\$ is used to pass the name of the measurement to the subroutine. Res1 contains measurement results. Res2, Res3, Res4, Res5, and Res6 can contain measurement results if there are more than one for a particular measurement.

```

2420 SUB Print_res (Meas_name$, Res1, OPTIONAL Res2, Res3, Res4, Res5, Res6)
2430   SELECT Meas_name$
2440   CASE "DTXP"
2450     PRINT USING "5X, ""Ave Digital Power: "" , 5X, M2D.2D, "" dBm "" ; Res1
2460   CASE "MACC"
2470     PRINT USING "5X, ""Max EVM1: "" , 14X, M2D.2D, "" % "" ; Res1
2480     PRINT USING "5X, ""Worst Freq Error: "" , 5X, M3D.2D, "" Hz "" ; Res2
2490     PRINT USING "5X, ""Max Mag. Error: "" , 8X, M2D.2D, "" % "" ; Res5
2500     PRINT USING "5X, ""Max Origin Offset: "" , 5X, M2D.2D, "" dB "" ; Res3
2510     PRINT USING "5X, ""Max Phase Error: "" , 7X, M2D.2D, "" Deg "" ; Res4
2520   CASE "ACP"
2530     PRINT USING "5X, ""ACP Adj Lo: "" , 12X, M2D.2D, "" dBc "" ; Res1
2540     PRINT USING "5X, ""ACP Adj Hi: "" , 12X, M2D.2D, "" dBc "" ; Res2
2550     PRINT USING "5X, ""ACP Alt1 Lo: "" , 11X, M2D.2D, "" dBc "" ; Res3
2560     PRINT USING "5X, ""ACP Alt1 Hi: "" , 11X, M2D.2D, "" dBc "" ; Res4
2570     PRINT USING "5X, ""ACP Alt2 Lo: "" , 11X, M2D.2D, "" dBc "" ; Res5
2580     PRINT USING "5X, ""ACP Alt2 Hi: "" , 11X, M2D.2D, "" dBc "" ; Res6
2590   CASE "ATXP"
2600     PRINT USING "5X, ""Ave Analog Power: "" , 6X, M2D.2D, "" dBm "" ; Res1
2610   CASE "FST"
2620     PRINT USING "5X, ""Worst Freq Error: "" , 5X, M3D.2D, "" ppm "" ; Res1
2630     PRINT USING "5X, ""Average Freq: "" , 6X, M3D.2DESZ, "" Hz "" ; Res2
2640   CASE "FM"
2650     PRINT USING "5X, ""SAT Deviation: "" , 9X, M5D, "" Hz "" ; Res1
2660     PRINT USING "5X, ""Distortion: "" , 11X, M3D.2D, "" % "" ; Res2
2670   CASE "AFAN"
2680     PRINT USING "5X, ""Audio Level: "" , 11X, M3D.2D, "" V "" ; Res1
2690     PRINT USING "5X, ""Audio Distortion: "" , 6X, M3D.2D, "" % "" ; Res2
2700     PRINT USING "5X, ""SINAD: "" , 16X, M3D.2D, "" dB "" ; Res3
2710   END SELECT
2720 SUBEND

```

## Step 6: Reconfigure Test Set and Mobile Station Parameters

There are multiple ways that you may want to reconfigure the connection parameters. Some examples are:

- “Reconfigure the Connection to a New Channel”
- “Reconfigure the Connection to a New Band”
- “Reconfigure the Connection to a New Traffic Channel Type”
- “Reconfigure the Connection when using Test Mode”

### Reconfigure the Connection to a New Channel

The example below illustrates how to change the digital traffic channel to 556. It also illustrates changing the mobile station transmit level to 4. The process used to reconfigure the connection is to first change the parameter settings with `CALL:SET` commands. These new parameters are activated when the `CALL:HAND` command is sent. The `CALL:STAT:STAT?` query is used to ensure that the call is still connected. If the connection is compromised, the subroutine `Dropped_call` is called.

```
OUTPUT Testset;"CALL:SET:DTC 556"
OUTPUT Testset;"CALL:SET:MS:DIG:TXL 4"
OUTPUT Testset;"CALL:HAND"
!
OUTPUT Testset;"CALL:STAT:STAT?"
ENTER Testset;Call_state$
IF Call_state$<>"CONN" THEN Dropped_call
```

### Reconfigure the Connection to a New Band

Again, the process for changing the connection parameters involves using the `CALL:SET` commands to set the DTC to a new band and then the `CALL:HAND` command to activate them.

```
1630 OUTPUT Testset;"CALL:SET:DTC:BAND PCS"
1730 !
1740 OUTPUT Testset;"CALL:HAND"
1750 OUTPUT Testset;"CALL:STAT:STAT?"
1760 ENTER Testset;Connected$
1770 IF Connected$<>"CONN" THEN
1780     Dropped_call
1790 END IF
```



## **Reconfigure the Connection to a New Traffic Channel Type**

If you want to reconfigure the connection from a DTC to an AVC or from an AVC to a DTC, you must specify the new channel type. The example below illustrates how to reconfigure the connection to an AVC.

```
1670 OUTPUT Testset;"CALL:TCH:TYPE AVC"  
1730 !  
1740 OUTPUT Testset;"CALL:HAND"  
1750 OUTPUT Testset;"CALL:STAT:STAT?"  
1760 ENTER Testset;Connected$  
1770 IF Connected$<>"CONN" THEN  
1780     Dropped_call  
1790 END IF
```

## **Reconfigure the Connection when using Test Mode**

The test set must be put into any new configuration before the mobile station in order for the mobile station to be able to synchronize to the test set. This involves repeating steps 1 or 2 or both. It is not necessary to use the CALL:HAND command used when the mobile station is on an active call.

---

## Step 7: End the Connection

You can end the connection in one of two ways:

- “Ending the Connection from the Test Set”
- “Ending the Connection from the Mobile Station”

### Ending the Connection from the Test Set

Before you can end the connection, the power level must be returned to its normal level to ensure the mobile station receives the signals to end the call correctly. The `CALL:END` command is used to end the connection. Here you use the `CALL:CONN?` query for call synchronization. This query returns a 0 if the call ended successfully and a 1 if the call is not ended.

```
2280 OUTPUT Testset;"CALL:POW ";Rf_level
2290 OUTPUT Testset;"CALL:END"
2300 OUTPUT Testset;"CALL:CONN?"
2310 ENTER Testset;Callstate
2320 IF Callstate=1 THEN
2330     PRINT "Make sure the phone has released the call."
2340     OUTPUT Testset;"SYST:PRES3"
2350 END IF
```

### Ending the Connection from the Mobile Station

Because the connection is being ended from the mobile station, it is important to set a timeout value and arm the change detector. More information about using these commands to achieve call synchronization is available in the additional details about this step available on the Internet.

```
OUTPUT Testset;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Testset;"CALL:CONN:ARM"    !Arm the change detector.
DISP "Terminate the call from the mobile station."
OUTPUT Testset;"CALL:CONN?" !Initiate call connect state query.
ENTER Testset;Call_connected      !Program will hang here until state
                                   !change or timer expires.

!Check if disconnect successful.
IF Call_connected THEN OUTPUT Testset;"SYST:PRES3"
```

---

## 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.

## Step 1: Set Up the Test Set

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 CELL

- 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):

**Table 3. 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.

If you specify channels in advance as described, the only time you need to specify a channel during testing

## Step 2: Configure Test Set and Mobile Station Parameters

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):

**Table 4. 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:

**Table 5. 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.

### Set Cell Power

To set the output power of the test set, use the following command:

**Table 6. Command to Set Cell Power**

Command	Example
CALL:POW <num value>	CALL:POW -75

- **Active Cell and Test Mode Considerations**

## Step 2: Configure Test Set and Mobile Station Parameters

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):

**Table 7. 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 7., "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).

### 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.

**Table 8. 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.

**Table 9. 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.

**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).

### Step 3: Set Measurement Parameters

- 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.

---

**Table 10. 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:
!
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:
```

### Step 3: Set Measurement Parameters

```
!  
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.

**Table 11. 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.

**Table 12. 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

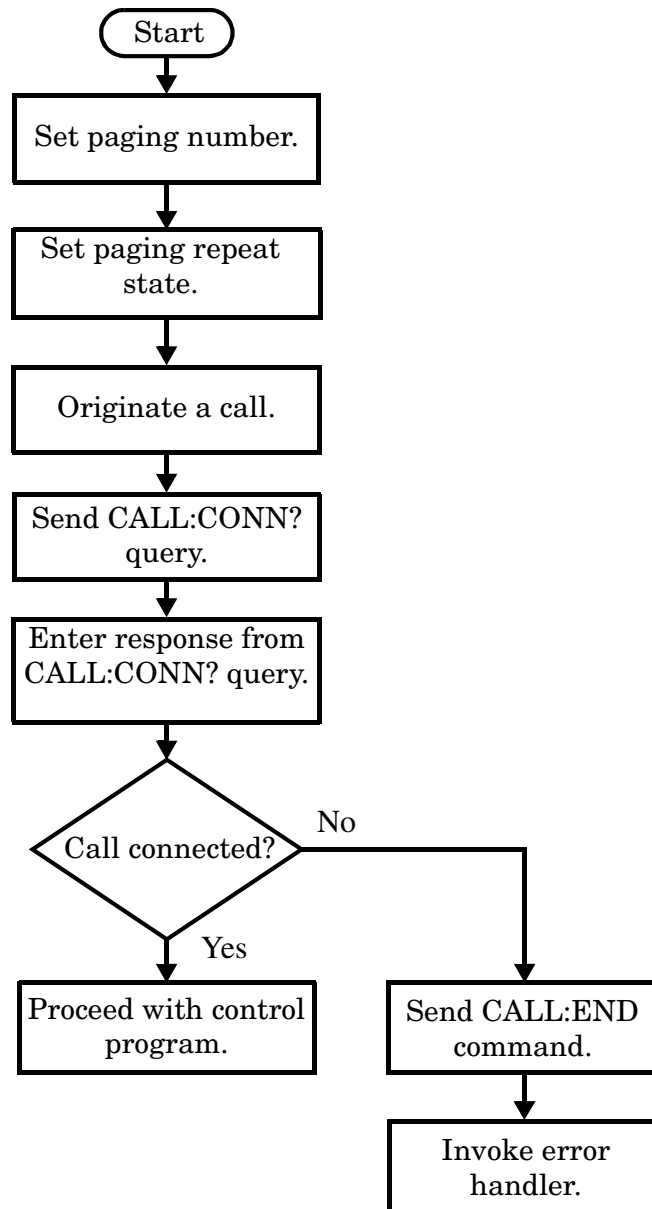
If the call-state-change detector is armed and a call connection is attempted but the call state never changes from the idle state, the CALL:CONN? query hangs the bus. This easily happens if the mobile is badly broken, the mobile is not connected to the test set, or no one pushes the send button on the 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 7. 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.

---

### Example 10. Programming Example

```

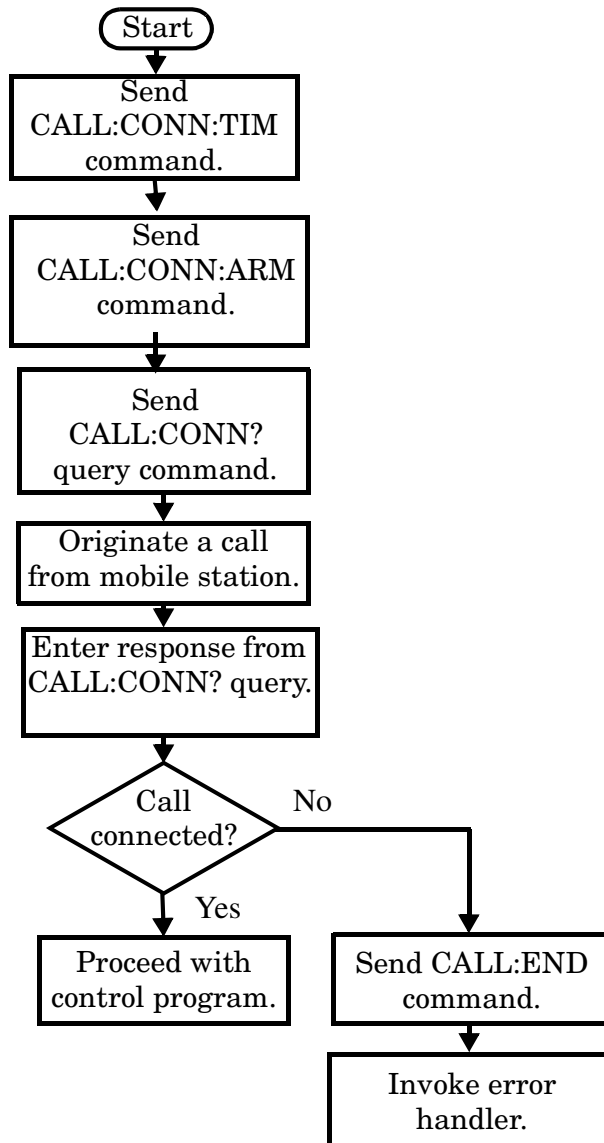
OUTPUT Test_set;"CALL:PAG:PNUM `0000574016`"! Set paging number
OUTPUT Test_set;"CALL:PAG:REP ON" ! Set paging repeat state
OUTPUT Test_set;"CALL:ORIG" ! Start a base station originated call
  
```

#### Step 4: Make Connection

```
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 8. 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.

---

**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.

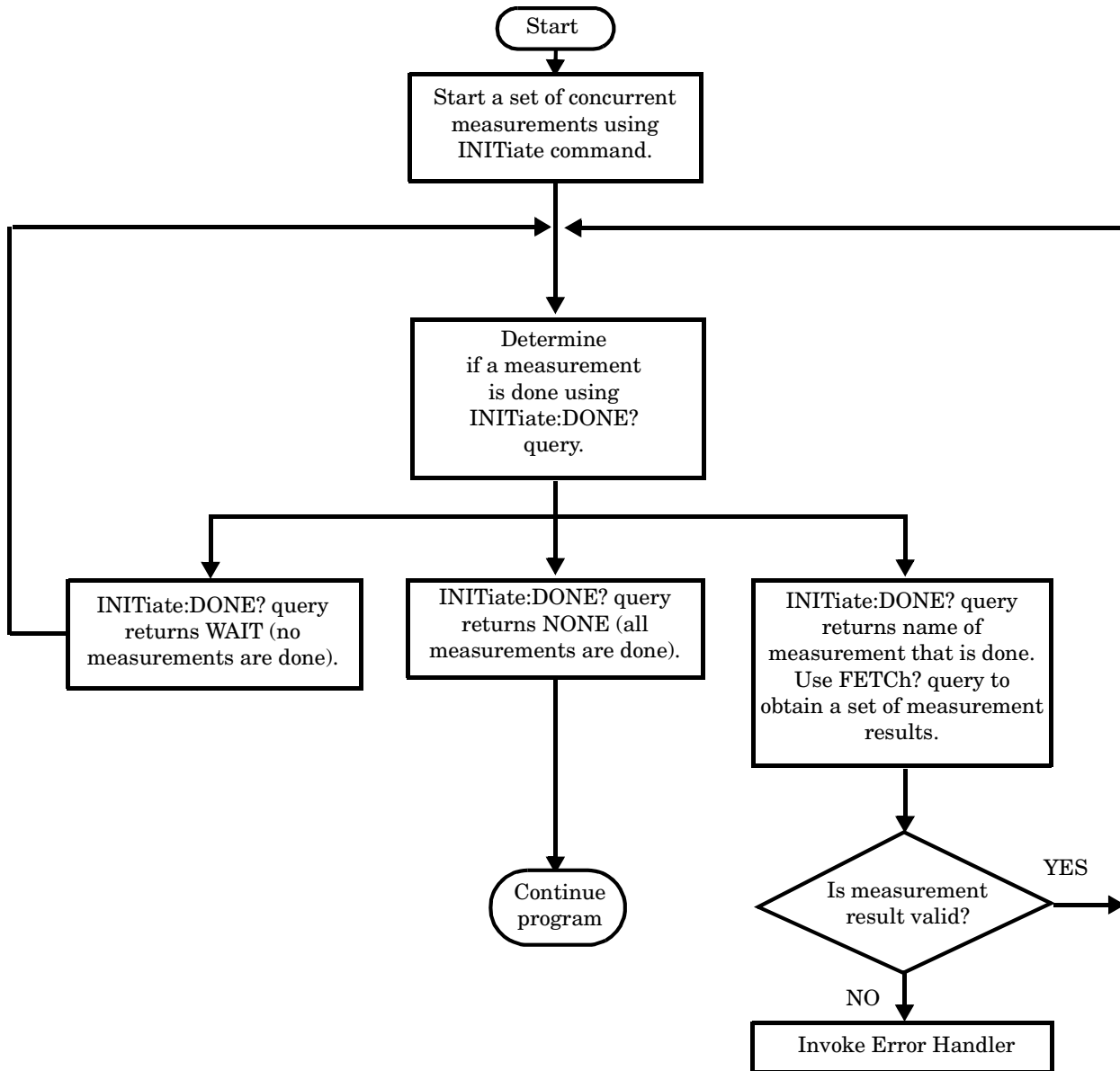
The test set has multiple signal paths and processors, which means you can make measurements concurrently and reduce test time. Making concurrent measurements involves starting a group of measurements, fetching the results of the measurements as they complete, and then verifying that the results are valid.

### Contents

- “Concurrent Measurement Process”
- “Alternative Measurement Process”

Concurrent Measurement Process

Figure 9. 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]

More than one measurement can be started using a single INITiate command. For example:

## Step 5: INITiate and FETCh Measurements

```
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 13. 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:

**Table 14. Example FETCh? Result Formats**

Command	Results Returned
FETC:TXP?	Measurement integrity and average value

**Table 14. 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.

**Table 15. Example Integrity Indicators**

Value Returned	Description (message also appears on test set)
0	Normal

## Step 5: INITiate and FETCh Measurements

**Table 15. Example Integrity Indicators**

Value Returned	Description (message also appears on test set)
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.

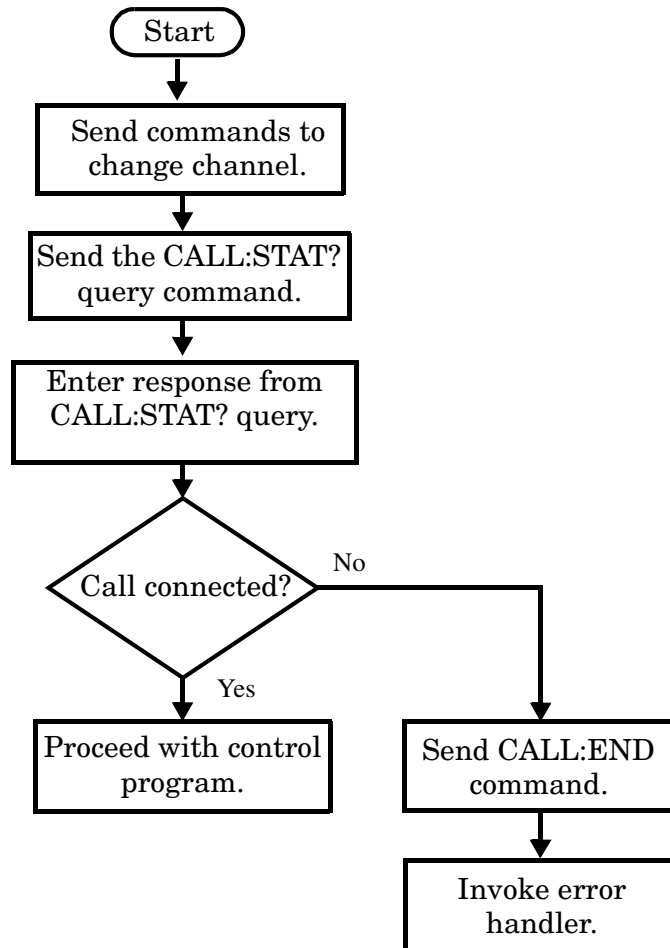
**Table 16. Example Responses Returned from the CALL:STAT? Query**

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 10. 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

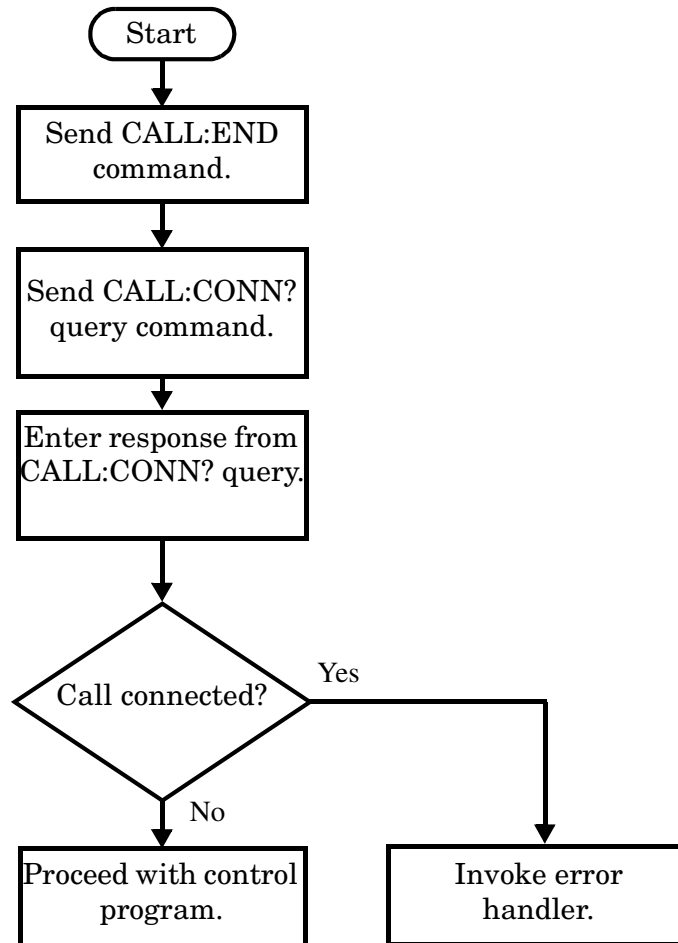
In active cell mode, you can release the call with the mobile station in one of two ways:

- Release from the Base Station
- Release from the Mobile Station

### Releasing an Active Call from the Base Station **Figure 11. Process for Releasing an Active Call**

## Step 7: End Connection

from the Base Station

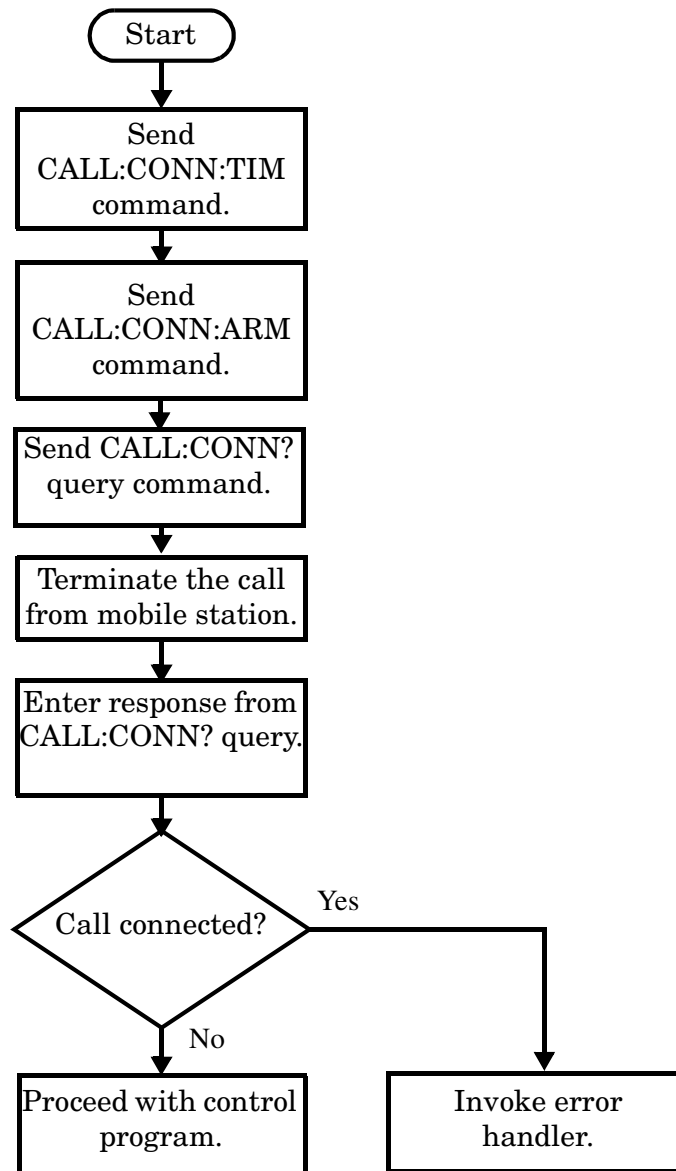


### Example 15. Programming Example

```
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
```

**Releasing an Active Call from the Mobile Station Figure 12. 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."
  
```

## Step 7: End Connection

```
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.

## Programming an Adjacent Channel Power Measurement

This section provides an example of how to make Adjacent Channel Power measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on a Digital Traffic Channel (DTC). For information on configuring the test set to get the mobile on an DTC, see "Establishing an Active Link with the Mobile Station" on page 90 or "DTC Test Operating Mode" on page 78.

The basic procedure to test Adjacent Channel Power is as follows:

1. Enter the expected frequency and power level.
2. Configure the Adjacent Channel Power Setup parameters using the SETup subsystem.
3. Start the Adjacent Channel Power measurement using the INITiate subsystem.
4. Use the FETCh? command to obtain the measurement results. When multi-measurements are used, the minimum, maximum, and standard deviation values for each of the six adjacent channel power measurements can be queried. Even though the following program does use multi-measurements, it queries only the average value for each of the six measurements.

### Programming Example

```

10 !Set the expected frequency and power.
20 OUTPUT 714;"SETup:ACPower:COUNT 5" !Turn multi-measurements on
30                                     !and set to 5.
40 OUTPUT 714;"SETup:ACPower:CONTinuous OFF" !Set the Adjacent Channel Power
50                                     !measurement to single trigger mode.
60 OUTPUT 714;"SETup:ACPower:TRIGger:SOURce AUTO" !Select Auto trigger.
70 OUTPUT 714;"SETup:ACPower:TImeout 5 S" !Turn on measurement timeouts
80                                     !and set a value of 5 seconds in case the measurement cannot be made.
90 OUTPUT 714;"INITiate:ACPower" !Start the measurement.
100 OUTPUT 714;"FETCh:ACPower?" !Query the integrity indicator and all average adjacent,
110     ! 1st alternate, and 2nd alternate results.
120 ENTER 714;Integrity,Low_adj,Up_adj,Low_1alt,Up_1alt,Low_2alt,Up_2alt !Enter
130     !the returned integrity and measurement results into variables.
140 IF Integrity<>0 THEN !Measurement results are invalid.
150 PRINT "Measurement problem; check for over/under range or trigger problems."
160 END IF
170 END

```

## Programming an Adjacent Channel Power Measurement

### Returned Values

The results returned by this program are:

- **Integrity** returns the measurement integrity indicator (see “Integrity Indicator” on page 206); 0 means a successful measurement with no errors.
- **Low\_adj** and **Up\_adj** are the lower and upper adjacent channel results, respectively. **Low\_1alt** and **Up\_1alt** are the lower and upper first alternate channel results. **Low\_2alt** and **Up\_2alt** are the lower and upper second alternate channel results. All returned values are in dBc - the power in each channel relative to the power of the carrier.

### Related Topics

“Adjacent Channel Power Measurement Description” on page 32

“Adjacent Channel Power Troubleshooting” on page 609

“INITiate” on page 389

“FETCh:ACPower” on page 329

“SETup:ACPower” on page 413

“Control Program Example” on page 1

“Receiver Control” on page 169

## Programming an Analog Transmit Power Measurement

This section provides an example of how to make Analog Transmit Power (ATXP) measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on an analog voice channel (AVC). For information on configuring the test set to get the mobile on an active call, see "Establishing an Active Link with the Mobile Station" on page 90.

The basic procedure to test Analog Transmit Power is as follows:

1. Enter the expected power level (see "Expected Power" on page 171).
2. Define the Analog Transmit Power Setup parameters as desired for triggering, measurement timeout, and multi-measurements.
3. Use the INITiate:ATXPower command to trigger the measurement.
4. Use the FETCh? command to obtain the measurement results.

### Programming Example

```

10 !Set the expected power level.
20 OUTPUT 714;"SETup:ATXPower:CONTinuous Off" !Set the analog transmit power
30                                     !measurement to single trigger mode.
40 OUTPUT 714;"SETup:ATXPower:TIMEout 1S" !Set a timeout value of 1 second
50                                     !in case the measurement cannot be made.
60 OUTPUT 714;"SETup:ATXPower:COUNT:NUMBer 5" !Set multi-measurements to 5.
70 OUTPUT 714;"INITiate:ATXPower" !Start the measurement.
80 OUTPUT 714;"FETCh:ATXPower?" !Query the returned integrity indicator and the
90                                     !Average analog transmit power measurement.
100 ENTER 714;Integrity,Atxpower !Enter the returned values into variables.
110 IF Integrity=0 THEN !See if the integrity value = 0 (valid measurement).
120 ELSE
130 PRINT "Measurement problem; check for signal level over/under range condition."
140 END IF
150 END

```

### Returned Values

The measurements returned by this program are:

- `Integrity` returns the measurement integrity indicator (see "Integrity Indicator" on page 206); 0 means a successful measurement with no errors.
- `Atxpower` returns the Average Analog Transmit Power measurement value in dBm.

## **Programming an Analog Transmit Power Measurement**

### **Related Topics**

“Analog Transmit Power Measurement Description” on page 33

“Analog Transmit Power Troubleshooting” on page 610

“INITiate” on page 389

“SETup:ATXPower” on page 424

“Description” on page 63

“FETCh:ATXPower” on page 341

“Control Program Example” on page 1

“Receiver Control” on page 169



## 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 34.

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 206.
- `Audio_level` returns the analog audio level in volts rms.

## **Programming an Audio Level Measurement**

### **Related Topics**

“Audio Analyzer Measurement Description” on page 34

“AFANalyzer Troubleshooting” on page 611

“INITiate” on page 389

“SETup:AFANalyzer” on page 417

“FETCh:AFANalyzer” on page 332

“Control Program Example” on page 1

## 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 34.

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 38

“AFANalyzer Troubleshooting” on page 611

“Audio Analyzer Measurement Description” on page 34

“INITiate” on page 389

“SETup:AFANalyzer” on page 417

“FETCh:AFANalyzer” on page 332

“Control Program Example” on page 1

## 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 34.

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 expandor.
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 206.
- `Distortion` returns the Distortion measurement value in percent (%).

### Related Topics

“Audio Analyzer Measurement Description” on page 34

“AFANalyzer Troubleshooting” on page 611

“Distortion Measurement Description” on page 40

“INITiate” on page 389

“SETup:AFANalyzer” on page 417

“FETCh:AFANalyzer” on page 332

“Control Program Example” on page 1

## Programming a Digital Transmit Power Measurement

This section provides an example of how to make Digital Transmit Power measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on a Digital Traffic Channel (DTC). For information on configuring the test set to get the mobile on an DTC, see "Establishing an Active Link with the Mobile Station" on page 90 or "DTC Test Operating Mode" on page 78.

The basic procedure to test Digital Transmit Power is as follows:

1. Enter the expected power level (see "Expected Power" on page 171).
2. Configure the Digital Transmit Power Setup parameters using the SETup subsystem.
3. Start the Digital Transmit Power measurement using the INITiate subsystem.
4. Use the FETCh? command to obtain the measurement results.

### Programming Example

```

10 !Set the expected power level.
20 OUTPUT 714;"SETup:DTXPower:TRIGger:SOURce AUTO" !Select AUTO trigger mode.
30 OUTPUT 714;"SETup:DTXPower:CONTinuous OFF" !Set the digital transmit power
40                                     !measurement to single trigger mode.
50 OUTPUT 714;"SETup:DTXPower:TIMEout 1S" !Set a timeout value of 1 second
60                                     !in case the measurement cannot be made.
70 OUTPUT 714;"SETup:DTXPower:COUNt:NUMBer 5" !Set mult-measurements to 5.
80 OUTPUT 714;"INITiate:DTXPower" !Start the measurement.
90 OUTPUT 714;"FETCh:DTXPower?" !Query the returned integrity indicator and the
100                                     !Average digital transmit power measurement.
110 ENTER 714;Integrity,Dtxpower !Enter the returned values into variables.
120 IF Integrity=0 THEN !See if the integrity value = 0 (valid measurement).
130 ELSE
140 PRINT "Measurement problem; check for sync not found or over/under range."
150 END IF
160 END

```

### Returned Values

The measurements returned by this program are:

- `Integrity` returns the measurement integrity indicator (see "Integrity Indicator" on page 206); 0 means a successful measurement with no errors.
- `DtxPower` returns the Average Digital Transmit Power measurement value in dBm.

### Related Topics

“Digital Transmit Power Measurement Description” on page 41

“Digital Transmit Power Troubleshooting” on page 612

“INITiate” on page 389

“SETup:DTXPower” on page 434

“Description” on page 63

“FETCh:DTXPower” on page 347

“Control Program Example” on page 1

“Receiver Control” on page 169

## Programming a Frequency Modulation (FM) Measurement

This section provides an example of how to make analog FM deviation and distortion measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on an analog voice channel (AVC). For information on configuring the test set to get the mobile on an active call, see "Establishing an Active Link with the Mobile Station" on page 90.

The test set uses the AVC Channel (CALL:SET:AVC) and MS TX Level (CALL:SET:MS:ANALog:TXLevel) settings of the base station emulator for the expected frequency and power level. To manually set the expected frequency and power, see "Receiver Control" on page 169.

The basic procedure to test Frequency Stability is as follows:

1. Enter the expected frequency and power.
2. Define the Frequency Modulation SETup parameters as desired to enable the distortion measurement and set its fundamental frequency, and to define other settings such as measurement timeout and multi-measurements.
3. Use the INITiate:FM command to start the measurement.
4. Use the FETCh? command to obtain the measurement results.

### Programming Example

```

10 !Set the expected frequency and power.
20 OUTPUT 714;"SETup:FM:COUNT 5" !Set multi-measurements to 5.
30 OUTPUT 714;"SETup:FM:DISTortion:STATE ON" !Enable the distortion measurement.
40 OUTPUT 714;"SETup:FM:DISTortion:FREQuency 1004 HZ" !Set the distortion measurement
50                                     !Fundamental Frequency (1004 HZ).
60 OUTPUT 714;"SETup:FM:FREQ:STATE ON" !Turn on the modulation frequency measurement.
70 OUTPUT 714;"SETup:FM:FILTer CMESsage" !Select the C-Message filter.
80 OUTPUT 714;"SETup:FM:DETEctor PPEak" !Select the Peak + detector.
90 OUTPUT 714;"SETup:FM:DEMPHasis:STATE OFF" !Make sure de-emphasis is off.
100 OUTPUT 714;"SETup:FM:EXPandor:STATE OFF" !Make sure the expander is off.
110 OUTPUT 714;"SETup:FM:CONTinuous OFF" !Set the FM measurement to single trigger mode.
120 OUTPUT 714;"SETup:FM:TIMEout 1 S" !Set a timeout value of 1 second
130                                     !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:FM" !Start the measurement.
150 OUTPUT 714;"FETCh:FM?" !Query the returned integrity indicator and the
160                                     !average FM deviation and average FM distortion results.
170 ENTER 714;Integrity,Fm_dev,Fm_dist,Fm_freq !Enter the returned values into variables.
180 IF Integrity=0 THEN !See if the integrity value = 0 (valid measurement).
190 ELSE
200 PRINT "Measurement problem; check for signal level over/under range condition."
210 END IF
220 END

```



### Returned Values

The measurements returned by this program are:

- Integrity returns the measurement integrity indicator (see “Integrity Indicator” on page 206); 0 means a successful measurement with no errors.
- FM\_dev returns the average FM deviation in kHz. FM\_dist returns the average FM distortion in percent (%). FM\_freq returns the average modulation frequency in Hz.

### Related Topics

“Frequency Modulation (FM) Measurement Description” on page 44

“Frequency Modulation (FM) Troubleshooting” on page 613

“INITiate” on page 389

“SETup:FM” on page 438

“FETCh:FM” on page 350

“Control Program Example” on page 1

“Receiver Control” on page 169

## Programming a Frequency Stability Measurement

This section provides an example of how to make analog Frequency Stability measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on an analog voice channel (AVC). For information on configuring the test set to get the mobile on an active call, see "Establishing an Active Link with the Mobile Station" on page 90.

The test set uses the AVC Channel (CALL:SET:AVC) and MS TX Level (CALL:SET:MS:ANALog:TXLevel) settings of the base station emulator for the expected frequency and power level. To manually set the expected frequency and power, see "Receiver Control" on page 169.

The basic procedure to test Frequency Stability is as follows:

1. Enter the expected frequency and power.
2. Define the Frequency Stability Setup parameters as desired for measurement timeout and multi-measurements.
3. Use the INITiate:FSTability command to start the measurement.
4. Use the FETCh? command to obtain the measurement results.

### Programming Example

```

10 !Set the expected frequency and power.
20 OUTPUT 714;"SETup:FSTability:CONTinuous OFF" !Set the frequency stability
30                                     !measurement to single trigger mode.
40 OUTPUT 714;"SETup:FSTability:TIMEout 1 S" !Set a timeout value of 1 second
50                                     !in case the measurement cannot be made.
60 OUTPUT 714;"SETup:FSTability:COUNT 5" !Set multi-measurements to 5.
70 OUTPUT 714;"INITiate:FSTability" !Start the measurement.
80 OUTPUT 714;"FETCh:FSTability?" !Query the returned integrity indicator and the
90                                     !Worst Case Frequency Error and average Frequency measurements.
100 ENTER 714;Integrity,Freq_error,Frequency !Enter the returned values into variables.
110 IF Integrity=0 THEN !See if the integrity value = 0 (valid measurement).
120 ELSE
130 PRINT "Measurement problem; check for signal level over/under range condition."
140 END IF
150 END

```

### Returned Values

The measurements returned by this program are:

- Integrity returns the measurement integrity indicator (see "Integrity Indicator" on page 206); 0 means a successful measurement with no errors.
- Freq\_error returns the worst case frequency error in parts per million (PPM). Frequency returns the average frequency.

### Related Topics

“Frequency Stability Measurement Description” on page 46

“Frequency Stability Troubleshooting” on page 615

“INITiate” on page 389

“SETup:FSTability” on page 444

“FETCh:FSTability” on page 356

“Control Program Example” on page 1

“Receiver Control” on page 169

## Programming an IQ Tuning Measurement

This section provides an example of how to make an I/Q Tuning measurement via the GPIB.

1. Ensure that the mobile is in test mode and is transmitting all 00s or 01s.
2. Ensure that the expected frequency, expected power level and trigger are appropriately set.
3. Configure the I/Q Tuning measurement parameters using the SETup subsystem.
4. Start the I/Q Tuning measurement using the INITiate subsystem.
5. Use the FETCh? command to obtain I/Q Tuning measurement results.

### Program Example

The following program shows how to make an I/Q Tuning measurement on a normal DTC burst. If you want to test a CW signal all you need to change in this program is the trigger type, which should be set to Immediate, rather than RF Rise.

```

10  OUTPUT 714;"SETup:IQTuning:COUNT 5" !Enable multi-measurements to use 5
20      !samples for each returned IQ offset and spur measurement.
30  OUTPUT 714;"SETup:IQTuning:CONTinuous OFF" !Select single trigger mode.
40  OUTPUT 714;"SETup:IQTuning:TRIGger:SOURce RISE" !Select RF Rise trigger. If
50      !you are not measuring a bursted signal, set this to IMMEDIATE instead.
60  OUTPUT 714;"SETup:IQTuning:REFerence:FREquency 3.0375 KHZ" ! Set the Reference
70      !Offset Frequency to +3.0375 kHz.
80  OUTPUT 714;"SETup:IQTuning:SPUR:STATe ON" !Enable the Spur power measurement.
90  OUTPUT 714;"SETup:IQTuning:SPUR:FREquency 10 MHz" !Specify the frequency
100      !for the spur power measurement.
110 OUTPUT 714;"SETup:IQTuning:OFFset 0Hz,-3.0375KHZ, 9.113KHZ,-9.113KHZ" !Set the
120 !IQ tuning offset frequencies using a comma-separated list for offsets 1 to 4.
130 OUTPUT 714;"INITiate:IQTuning" !Start IQ offset and spur power measurement.
140 OUTPUT 714;"FETCh:IQTuning?" !Query the IQ Tuning measurement.
150 ENTER 714;Iq_integ,Offset_1,Offset_2,Offset_3,Offset_4 !Enter the returned
160 !measurement integrity indicator value and offset levels measurments into variables.
170 OUTPUT 714;"FETCh:IQTuning:SPUR:POWer?" !Query the spur power measurement.
180 ENTER 714;Spur_power !Enter the Spur Power measurement result into a variable.
190 IF Iq_integ<>0 THEN !Check to verify a valid measurement was made.
200 PRINT "Measurement Error" !Integrity is not zero (0) = measurement error.
210 END IF
220 END

```

### Returned Values

The measurements returned by this program are:

- Iq\_integ returns the measurement “Integrity Indicator” on page 206 (0 means a successful measurement with no errors).
- The signal level of the following offsets are measured relative to the signal level at the reference offset (either  $F_c + 3.0375$  kHz for all 00s or  $F_c - 3.0375$  kHz for all 01s). Note, if the TX I/Q Tuning measurement multi-measurements are set to ON the average of all the individual results at the following offsets are returned:
  - -3.0375 kHz
  - -9.113 kHz
  - 0 Hz (Carrier Frequency)
  - +9.113 kHz

### Related Topics

“IQ Tuning Measurement Description” on page 47

“IQ Tuning Troubleshooting” on page 616

“SETup:IQTuning” on page 448

“INITiate” on page 389

“FETCh:IQTuning” on page 361

## Programming a Loopback Bit Error Ratio (BER) Measurement

This section provides an example of how to make Loopback BER measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on a Digital Traffic Channel (DTC) in loopback mode and synchronized to the test set. When correctly configured, the mobile's DTC Channel number and output power level match the test set's DTC Channel and MS TX Level settings for DTC test mode.

For information on configuring the test set to get the mobile on an DTC in test mode, see "DTC Test Operating Mode" on page 78.

The basic procedure to test Loopback BER is as follows:

1. Put the mobile in digital loopback mode, synchronizing it to the test set in DTC Test mode.
2. Configure the Loopback BER Setup parameters using the SETup subsystem.
3. Start the Loopback BER measurement using the INITiate subsystem.
4. Use the FETCh? command to obtain the measurement results. The measurement integrity value, number of bits to test, bit error ratio, and the number of bit errors are all available results. The following program example queries the measurement integrity value and bit error ratio result.

### Programming Example

```

10 !Select DTC Test Operating Mode and put the mobile on a DTC in digital loopback mode.
20 OUTPUT 714;"SETup:LBError:COUNT 2600" !Set number of bits to test to 2600.
30 OUTPUT 714;"SETup:LBError:CONTinuous OFF" !Select single trigger mode for
40                                     !the loopback BER measurement.
50 OUTPUT 714;"SETup:LBError:TIMEout 5 S" !Turn on measurement timeout
60                                     !and set a value of 5 seconds in case the measurement cannot be made.
70 OUTPUT 714;"INITiate:LBError" !Start the measurement.
80 OUTPUT 714;"FETCh:LBError:INTegrity?;RATio?" !Query the integrity indicator
90                                     !and bit error ratio.
100 ENTER 714;Integrity,Ber_ratio !Enter the returned integrity and bit error
110                                     !ratio results into variables.
120 IF Integrity=0 THEN !Measurement results are valid.
130 ELSE
140 PRINT "Measurement problem; the mobile must be in TDMA loopback test mode, and"
150 PRINT "the test set must be in DTC Test Operating Mode, to make this measurement."
160 END IF
170 END

```

### Returned Values

The results returned by this program are:

- **Integrity** returns the measurement integrity indicator (see "Integrity Indicator" on page 206); 0 means a successful measurement with no errors.
- **Ber\_Ratio** is the bit error ratio, expressed as a percent.

## **Related Topics**

“Loopback Bit Error Ratio Measurement Description” on page 50

“Loopback Bit Error Ratio (BER) Troubleshooting” on page 617

“INITiate” on page 389

“FETCh:LBError” on page 364

“SETup:LBError” on page 461

“Control Program Example” on page 1

## Programming a MAHO BER/RSSI Measurement

This section provides an example of how to make Mobile Assisted HandOff (MAHO) Bit Error Ratio (BER) and Received Signal Strength Indicator (RSSI) measurements.

The following program assumes the mobile's antenna port is connected to the test set's RF IN/OUT connector, and the mobile is on a Digital Traffic Channel (DTC) with the test set in Active Cell operating mode. For information on getting the mobile on a DTC, see "Establishing an Active Link with the Mobile Station" on page 90.

The basic procedure to test MAHO BER is as follows:

1. Get the mobile on a DTC in Active Cell operating mode.
2. Enable MAHO measurements.
3. Specify the percentage of induced errors on the DTC.
4. Set up the neighbor list for making neighbor RSSI measurements.
5. Query the BER and RSSI results. If you have just changed the signal level into the mobile before querying the results, you should query the results twice; discarding the first result and re-querying the results to make sure the returned measurements are stable. (See the program example below.)

### Programming Example

```

10  !Get the mobile on a DTC in Active Cell operating mode.
20  OUTPUT 714;"CALL:MS:REPorted:MAHO:STATe ON" !Enable MAHO reporting.
30  OUTPUT 714;"CALL:DTC:IBERror 7" !Enable DTC Induced Errors and
40  !set the value to create an induced BER of 7%.
50  OUTPUT 714;"CALL:POWer -60 DBM" !Set the power into the mobile to -60 dBm.
60  OUTPUT 714;"CALL:MS:REPorted:MAHO:NEIGHbor:COUNT 6" !Enable neighbor
70  !RSSI measurements for six neighbor cell channels.
80  OUTPUT 714;"CALL:MS:REPorted:MAHO:NEIGHbor:BAND 1,1,1,1,1,1" !Specify
90  !the Cellular band for each of the neighbor cell measurements.
100 OUTPUT 714;"CALL:MS:REPorted:MAHO:NEIGHbor:CHANnel 298,299,301,302,331,300"
110 !Specify the neighbor cell channel numbers for making the
120 !neighbor RSSI measurements.
130 OUTPUT 714;"CALL:MS:REPorted:MAHO:BERRor:NEW?" !Start a new BER
140 !and RSSI measurement and query the BER result.
150 ENTER 714;Discard !Throw away the first BER (and RSSI) measurements.
160 OUTPUT 714;"CALL:MS:REPorted:MAHO:BERRor:NEW?" !Start the second BER and
170 !RSSI measurements to make sure the mobile returns settled values.
180 ENTER 714;Maho_ber$ !Enter the new returned BER value into a variable.
190 OUTPUT 714;"CALL:MS:REPorted:MAHO:RSSI?" !Query the RSSI result.
200 ENTER 714;Maho_rssi !Enter the returned RSSI value into a variable.
210 OPTION BASE 1 !Set the index for the following array to one (instead of zero).
220 DIM Neighbors(18) !Create an array to contain neighbor RSSI results (18 values).
230 OUTPUT 714;"CALL:MS:REPorted:MAHO:NEIGHbor:LIST:ALL:NEW?" !Start and
240 !query a new set of neighbor RSSI measurements.
250 ENTER 714;Neighbors(*) !Enter all neighbor RSSI results into the variable.
260 PRINT "Reported MAHO interval is ";Maho_ber$
270 PRINT "Cell #1 Band ";Neighbors(1) !Returned 1=Cellular, 2=PCS

```



```
280 PRINT "Cell #1 Channel ";Neighbors(7)
290 PRINT "Cell #1 RSSI ";Neighbors(13)
300 END
```

### Returned Values

Maho\_ber\$ is the returned string value representing the BER interval. In this case, the program deliberately set the induced error rate to 7%, so the returned value should be BERI6 (because it is between 4% and 8%). See “MAHO BER Reported Values” on page 52 for more information.

Maho\_RSSI is the numeric value for the RSSI measurement. Neighbors is an 18 element numeric array for storing the returned neighbor band, channel number, and RSSI values.

In the example program, six neighbor channels are enabled by specifying the number of neighbor cells to measure (6), specifying the band (1=Cellular, 2=PCS) for each neighbor, and then specifying the channel number for each neighbor. The PRINT “Cell #1...” commands illustrate how to access the returned band, channel number, and RSSI values for neighbor cell 1 in the array.

### Related Topics

“MAHO BER/RSSI Measurement Description” on page 51

“MAHO BER/RSSI Troubleshooting” on page 618

## Programming Digital Modulation Accuracy Measurements

This section provides an example of how to make Digital Modulation Accuracy measurements via GPIB.

The following program example assumes that the mobile's antenna output is connected to the RF IN/OUT connector, and the mobile is on a Digital Traffic Channel (DTC). For information on configuring the test set to get the mobile on an DTC, see "Establishing an Active Link with the Mobile Station" on page 90.

The basic procedure to test Digital Modulation Accuracy is as follows:

1. Configure the Digital Modulation Accuracy setup parameters using the SETup subsystem.
2. Start the Digital Modulation Accuracy measurement using the INITiate subsystem.
3. Use the FETCh? command to obtain the measurement results. Measurements can be queried one at a time, in groups (such as all EVM measurements at one time), or as the full set of all Digital Modulation Accuracy measurements at one time. The programming example queries the Frequency Error measurement by itself, and then queries the group of EVM1 measurements.

### Programming Example

```

10  OUTPUT 714;"SETup:MACCuracy:COUNT:NUMBER 5" !Set multi-measurements to 5.
20  OUTPUT 714;"SETup:MACCuracy:CONTinuous OFF" !Set the Dig. Mod. Accuracy
30                                     !measurement to single trigger mode.
40  OUTPUT 714;"SETup:MACCuracy:TRIGger:SOURce AUTO" !Select Auto trigger.
50  OUTPUT 714;"SETup:MACCuracy:TImeout 5 S" !Set a timeout value of 5 seconds
60                                     !in case the measurement cannot be made.
70  OUTPUT 714;"INITiate:MACCuracy" !Start the measurement.
80  OUTPUT 714;"FETCh:MACCuracy:INTEgrity?" !Query the integrity indicator to
90      ! see if valid measurements were made (0 returned = valid measurement).
100 ENTER 714;Integrity !Enter the integrity result into a variable.
110 IF Integrity=0 THEN !Measurement results are valid.
120     OUTPUT 714;"FETCh:MACCuracy:FERRor:MINimum?" !Query freq error measurement
130     ENTER 714;Freq_error !and enter the result into a variable.
140     OUTPUT 714;"FETCh:MACCuracy:EVM1:ALL?" !Query all EVM1 results.
150     ENTER 714;Min_evm1,Max_evm1,Avg_evm1,Std_dev_evm1 !Enter the 4 EVM1
160         !measurements (including multi-measurement values) into variables.
170 ELSE
180 PRINT "Measurement problem; check for sync not found or other trigger problems."
190 END IF
200 END

```

### Returned Values

The measurements returned by this program are:

- Integrity returns the measurement integrity indicator (see "Integrity Indicator" on page 206); 0 means a successful measurement with no errors.
- Freq\_error returns the Frequency Error result in Hz.
- Min\_evm1 (minimum EVM1), Max\_evm1 (maximum EVM1), Avg\_evm1 (average EVM1), and Std\_dev\_evm1 (standard deviation for the multi-measurements).

## **Related Topics**

“Digital Modulation Accuracy Measurements Description” on page 42

“Digital Modulation Accuracy Troubleshooting” on page 619

“INITiate” on page 389

“SETup:MACCuracy” on page 464

“FETCh:MACCuracy” on page 367

“Control Program Example” on page 1

## 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 34.

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:SDISortion:STATE ON" !Turn on the SINAD and
60                                     !distortion measurements.
70  OUTPUT 714;"SETup:AFANalyzer:SDISortion: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 206.
- `SINAD` returns the SINAD value in dB.

### Related Topics

“Audio Analyzer Measurement Description” on page 34

“AFANalyzer Troubleshooting” on page 611

“INITiate” on page 389

“SETup:AFANalyzer” on page 417

“FETCh:AFANalyzer” on page 332

“Control Program Example” on page 1

## 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

```

```
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 206 (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 55

“SETup:SMONitor” on page 477

“INITiate” on page 389

“FETCh:SMONitor” on page 386

“CALCulate:SMONitor” on page 249

## 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

```



### Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator (see “Integrity Indicator” on page 206); 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 Measurements Description” on page 57

“Swept Audio Measurement Troubleshooting” on page 620

“INITiate” on page 389

“SETup:SAUDio” on page 468

“FETCh:SAUDio” on page 380

“Control Program Example” on page 1

## 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 17. 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

**Table 17. Partial Preset Behavior**

Function	Partial Preset Result
Maskable Message Display State	no change
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 18. Full Preset Behavior**

Function	Full Preset Result
Trigger Arm	Continuous (manual operation full preset or SYSTEM:PRESET2 command)

## Preset Descriptions

**Table 18. Full Preset Behavior**

Function	Full Preset Result
Trigger Arm	Single (remote operation full preset, *RST command)
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" !Preset the STATus subsystem.
```

### Related Topics

“SYSTEM:PRESet” on page 552

“\*RST” on page 561

---

## Receiver Control

The test set normally sets all receiver parameters automatically using call control settings. You may want to control the test set's receiver parameters manually rather than allowing the test set to control them. This ability is referred to as manual receiver control.

### Selecting Manual or Automatic Receiver Control

- Auto mode is the default for all operating modes except CW (which defaults to manual mode). The receiver's expected power and measurement frequency settings are set automatically according to the call control settings you specify (AVC/DTC Channel number, DTC Band, and MS TX Level).
- Manual mode allows you to override some or all of the automatic settings by first selecting the manual mode for the setting and then specifying the desired value. You can view the affected settings by selecting F12 (Receiver Control) from the Call Setup screen. A full or partial preset of the test set, including cycling power, returns the test set back to auto mode.

### GPIB Examples

The following program examples use simple commands to perform a single function. Complex commands that enable manual receiver control and set a specified parameter at the same time are also available. See "RFANalyzer" on page 403 for a listing of all receiver control syntax.

```
OUTPUT 714;"RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO OFF" !Enables manual control of the
measurement receiver's frequency.
```

```
OUTPUT 714;"RFANalyzer:MANual:MEASurement:FREQuency 825.030 MHZ" !Tunes the measurement
receiver to 825.030 MHz through manual receiver control.
```

```
OUTPUT 714;"RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO ON" !Returns measurement receiver
frequency tuning control to auto.
```

Manual control parameter values are stored internally (as long as the test set is powered on). Enabling manual control of a parameter without providing a new value causes a previously stored value to immediately take effect. This allows you to pre-define manual control parameter values in your program before enabling manual control.

## Operating Mode and Receiver Control

### Manual Receiver Control Parameters

The following parameters can be individually set to manual control:

- Expected Power Control
- Measurement Frequency
- Link Frequency

## Receiver Control

**Expected Power Control** The expected power from the mobile is set manually using the following settings (see “Expected Power” on page 171):

- Analog Power Cellular Band - expected power for cellular band AMPS (analog) measurements when operating in the AVC Test or Active Cell operating modes:

```
OUTPUT 714;"RFANalyzer:MANual:ANALog:POWer:CELLular 24 DBM"
```

- Digital Power Cellular Band - expected power for TDMA (digital) signals in the cellular band when operating in the DTC Test or Active Cell operating modes:

```
OUTPUT 714;"RFANalyzer:MANual:DIGital:POWer:CELLular 24 DBM"
```

- Digital Power PCS Band - expected power for TDMA (digital) signals in the PCS band when operating in the DTC Test or Active Cell operating modes:

```
OUTPUT 714;"RFANalyzer:MANual:DIGital:POWer:PCS 24 DBM"
```

- CW Power- expected power for analog carriers when operating in the CW mode. This value is used with manual and auto receiver control:

```
OUTPUT 714;"RFANalyzer:CW:EXPEcted:POWer 24 DBM"
```

---

**NOTE** During manual receiver control, make sure you are using the correct operating mode for the type of measurement you are making. Trying to make a digital measurement while operating in AVC Test mode, or making an analog measurement while operating in DTC Test mode, will likely result in an error. The error occurs because the test set uses the expected power setting for the operating mode you are using, and uses different methods to measure analog and digital signals. Using the analog method to measure a digital signal, or vice versa, results in the error.

Also, it is recommended that you specify the expected power each time you perform a handoff to a new band or traffic channel type during manual receiver control. This ensures that the correct expected power is set for the new channel settings.

---

**Measurement Frequency** Measurement frequency is used to tune the test set’s measuring receiver for all mobile carriers: analog (including CW) or digital systems, cellular or PCS band.

```
OUTPUT 714;"RFANalyzer:MANual:MEASurement 942.6 MHZ" !Enables manual measurement  
!receiver control and sets the test set’s receiver frequency to 942.6 MHz.
```

**Link Frequency** Link Frequency sets the test set’s demodulation receiver frequency, used to demodulate information from the mobile’s reverse channel transmission.

```
OUTPUT 714;"RFANalyzer:MANual:UPLink 942.6 MHZ" !Enables manual demodulation  
!receiver control and sets the test set’s receiver frequency to 942.6 MHz.
```

---

**NOTE** Manual control of the demodulation receiver frequency is rarely needed. Use the measurement receiver when manual receiver frequency control is required.

---

## Auto Receiver Control

The receiver settings are derived from the following parameters when using automated control:

- Expected Power - derived from the MS TX Level setting for the specified system type, queried/set using the

following mnemonics: CALL:SETup:MS:ANALog:TXLevel, CALL:SETup:MS:DIGital:TXLevel, CALL:SETup:MS:DIGital:TXLevel:CELL, CALL:SETup:MS:DIGital:TXLevel:PCS

- Measurement Frequency and Link Frequency - derived from the DTC Band and DTC Channel or AVC Channel settings, queried/set using the following mnemonics: CALL:SETup:DTC:BAND, CALL:SETup:DTC, CALL:SETup:DTC:CELLular, CALL:SETup:DTC:PCS, CALL:SETup:AVC

See “CALL:SETup” on page 305 for a description of the CALL:SETup commands.

## Expected Power

To make accurate measurements, the test set needs to know how much power to expect at the test set's RF IN/OUT port; referred to as the Expected Power. It gets this value from the call control MS TX Level setting during automatic receiver control, or by the user specifying the expected power with the receiver power control set to manual. See “Expected Power Control” on page 170 for more information.

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 DUT. This range of RF power is meant to accommodate the use of a gain or loss network between the DUT and the test set. See “Description” on page 63 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.

## Cellular Band (800 MHz) Mobile Power Class Considerations for Expected Input Level

The nominal power output for power settings 0, 1, 8, 9, and 10 are different for power class 1 and power class 4 mobiles *when operating in the cellular (800 MHz) band*, and affect the expected input level. (Power levels 0 to 7 are used for analog and digital signals, but power levels 8, 9, and 10 are only used for digital signals. See IS-137, section 3.2.1.)

When the MS TX Level is set to power level 0 or power level 1, the test set *assumes you are testing a power class 1 mobile* and sets the expected input level accordingly. If you are testing a power class 4 mobile and have the MS TX Level set to 0 or 1, the test set will likely display an under range condition when making a measurement, indicating that the signal being measured is well below the expected input level. This is because power levels 0 and 1 = 4W (36 dBm) for a power class 1 mobile, but only 0.6W (about 28 dBm) for a class 4 mobile.

When the MS TX Level is set to power level 8, 9, or 10, the test set *assumes you are testing a power class 4 mobile* and sets the expected input level accordingly. If you are testing a power class 1 mobile, the test set may display an over range condition when making a measurement, indicating that the signal being measured is well above the expected level. This is because power levels 8, 9, and 10 are about 5 dB higher for a power class 1 mobile than for a class 4 mobile.

If an under range or over range condition occurs during a measurement due to a power class difference, use manual receiver control to set the correct expected level. See “Expected Power Control” on page 170.

## Receiver Control

### Effects on Receiver Control When Changing Operating Mode

After selecting the operating mode to use 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 causes some or all receiver parameters to return to automatic control. The table below lists the effects on receiver control parameters for a change in operating mode.

**Table 19.**

Operating Mode Where You Set the Receiver Control Parameters	Operating Mode You Changed To	Effects on the Receiver Control Settings
Active Cell, AVC Test, DTC Test, CW	AVC Test, DTC Test	Expected power control is set to auto. Measurement frequency is set to auto. Uplink frequency is set to auto.
AVC Test, DTC Test	Active Cell	Expected power control is set to auto. Measurement frequency is set to auto.
Active Cell, AVC Test, DTC Test	CW	Measurement and uplink frequencies are set to the previous CW operating mode settings.

### Related Topics

“AVC Test Operating Mode” on page 75

“DTC Test Operating Mode” on page 78

“Active Cell Operating Mode” on page 71

“RFAnalyzer” on page 403



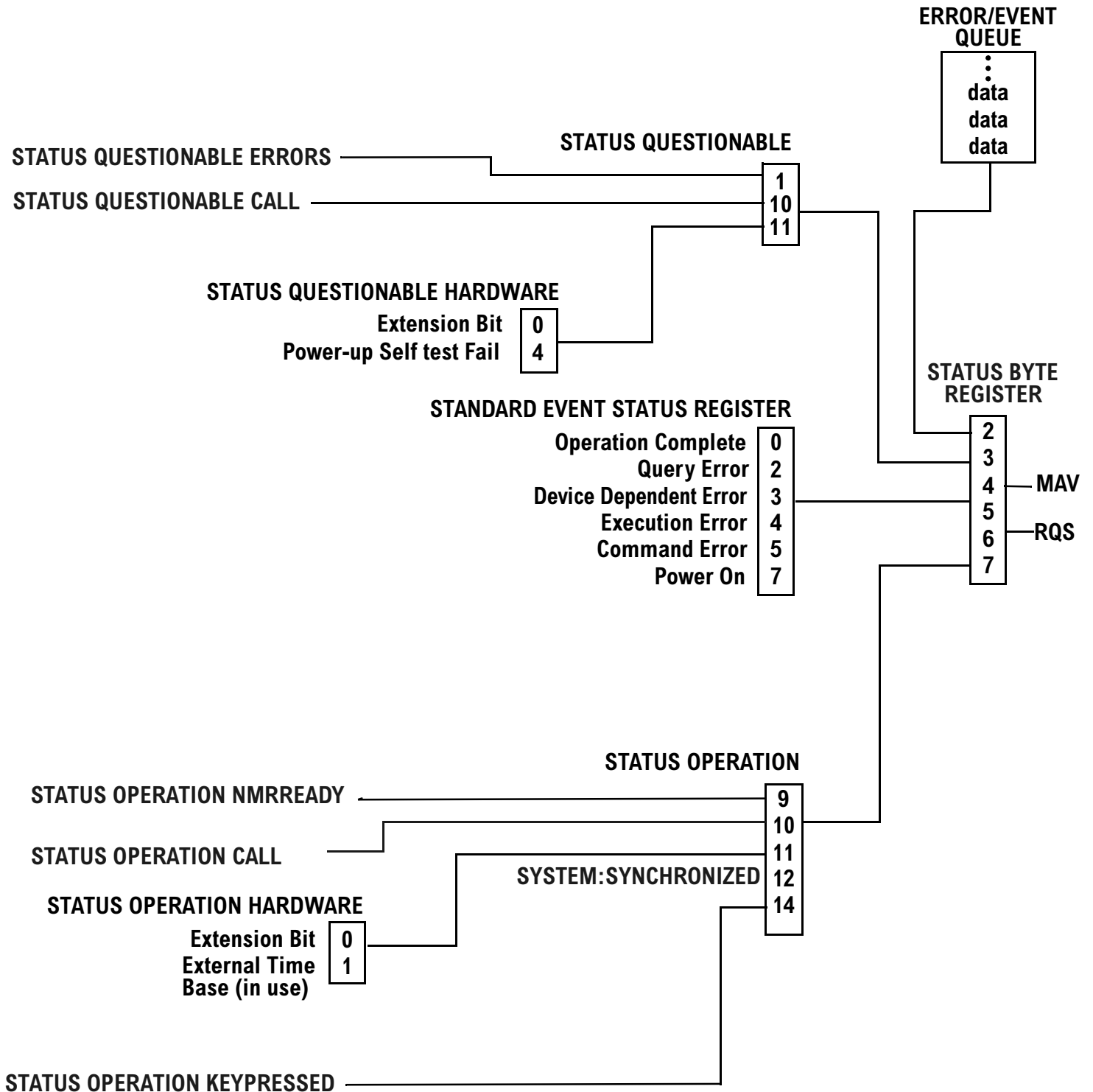
---

## 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 Reporting Structure For STATUS QUESTIONABLE and STATUS OPERATION

STATUS QUESTIONABLE CALL

Extension Bit	0
COMMO Summary	1
GSM Summary	2
AMPS Summary	3
DIGital 136 Summary	4
TA136 Summary	5
DIGital 95 Summary	6
DIGital 2000 Summary	7
CDMA Summary	8
TA 2000 Summary	9
GPRS Summary	12

Bit 10  
STATUS  
QUESTIONABLE

STATUS QUESTIONABLE ERRORS

Extension Bit	0
COMMO Summary	1
GSM Summary	2
AMPS Summary	3
DIGital 136 Summary	4
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

Bit 1  
STATUS  
QUESTIONABLE

Some status registers are not functional at this time.

STATUS OPERATION CALL

Extension Bit	0
COMMO Summary	1
GSM Summary	2
AMPS Summary	3
DIGital 136 Summary	4
TA136 Summary	5
DIGital 95 Summary	6
DIGital 2000 Summary	7
CDMA Summary	8
TA 2000 Summary	9

Bit 10  
STATUS  
OPERATION

STATUS OPERATION NMRREADY

Extension Bit	0
COMMO Summary	1
GSM Summary	2
AMPS Summary	3
DIGital 136 Summary	4
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

Bit 9  
STATUS  
OPERATION

## Status Subsystem Overview

### 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 sofkey	6	
F8 softkey	7	
F9 softkey	8	
F10 softkey	9	
F11 softkey	10	
F12 softkey	11	

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 Subsystem Overview

### Status Reporting Structure for the GSM Registers

#### STATUS QUESTIONABLE CALL GSM

Extension Bit	0	Bit 2 STATUS QUESTIONABLE
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	

#### STATUS QUESTIONABLE ERRORS GSM

Extension Bit	0	Bit 2 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 GSM

Extension Bit	0	Bit 2 STATUS OPERATION NMRREADY
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	

#### STATUS OPERATION CALL GSM

Extension Bit	0	Bit 2 STATUS OPERATION CALL
Idle	1	
Connected	2	
Alerting	3	
BCH Changing	4	
TCH Changing	5	
Control Status Changing	6	
BS Originating	7	
BS Disconnecting	8	

Status Reporting Structure For the GPRS Registers

STATUS QUESTIONABLE CALL GPRS

Extension Bit	0
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

Bit 12  
STATUS  
QUESTIONABLE  
CALL

STATUS QUESTIONABLE ERRORS GPRS

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 12  
STATUS  
QUESTIONABLE  
ERRORS

STATUS OPERATION NMRREADY GPRS

Extension Bit	0
Tx Power	1
Power vs. Time	2
Phase/Freq 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
GBER	11
BLER	12

Bit 12  
STATUS  
OPERATION  
NMRREADY

## Status Subsystem Overview

### Status Reporting Structure for the AMPS Registers

#### STATUS QUESTIONABLE ERRORS AMPS

Extension Bit	0	Bit 3 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 NMRREADY AMPS

Extension Bit	0	Bit 3 STATUS OPERATION NMRREADY
Analog Transmit Power	1	
Frequency Stability	2	
Frequency Modulation	3	



Status Reporting Structure for the DIGital136 Registers

**STATUS QUESTIONABLE ERRORS DIGITAL 136**

Extension Bit	0	Bit 4 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 DIGITAL 136**

Extension Bit	0	Bit 4 STATUS OPERATION NMRREADY
Digital Transmit Power	1	
Modulation Accuracy	2	
Adjacent Channel Power	3	
Loopback BER	4	
Digital IQ Adjust	5	
Digital Dynamic Power	6	

Status Reporting Structures for the TA136 Registers

STATUS QUESTIONABLE ERRORS TA136

Extension Bit	0	Bit 5 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 Reporting Structure for the DIGital95 Registers

STATUS QUESTIONABLE ERRORS DIGITAL 95

Extension Bit	0	Bit 6 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 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	Bit 8 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 CDMA

Extension Bit	0	
Traffic channel preamble not received	1	
Service Option or Radio Configuration rejected by MS	2	Bit 8 STATUS QUESTIONABLE CALL
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	

**STATUS OPERATION NMRREADY CDMA**

Extension Bit	0	Bit 8 STATUS OPERATION NMRREADY
DA Power	1	
WQuality	2	
C Power	3	
CFError	4	
CAPower	5	
TROPower	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 OPERATION NMRREADY TA 2000**

Reserved for future use	0	Bit 9 STATUS OPERATION NMRREADY
Reserved for future use	1	
Reserved for future use	2	
Reserved for future use	3	

## Status Subsystem Overview

### 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
+600 Messages	6	STATUS
+700 Messages	7	QUESTIONABLE
+800 Messages	8	ERRORS
+900 Messages	9	
MUI Maskable Error	14	

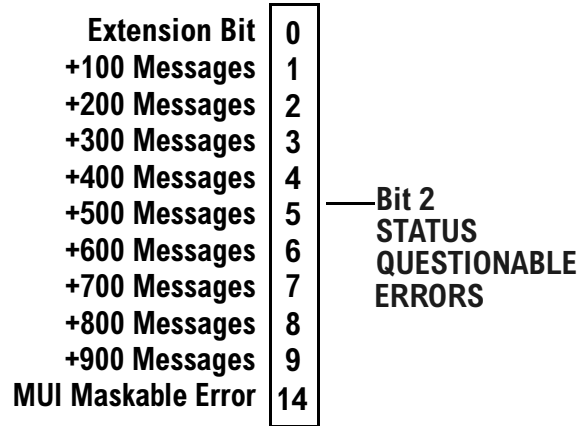
#### STATUS OPERATION NMRREADY FDD

Extension Bit	0	
Thermal Power	1	Bit 2
Adjacent Channel Leakage	2	STATUS
Waveform Quality	3	OPERATION
Channel Power	4	NMRREADY
Bit Error	5	
Spectrum Emissions Mask	6	
Occupied Bandwidth	7	
Code Domain Power	8	

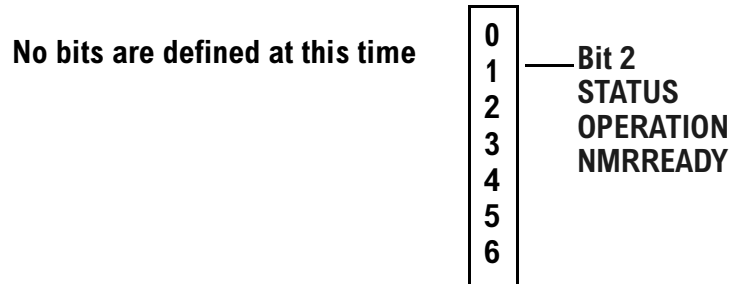


Status Reporting Structure for the WCDMA Registers

STATUS QUESTIONABLE ERRORS FDD



STATUS OPERATION NMRREADY WCDMA

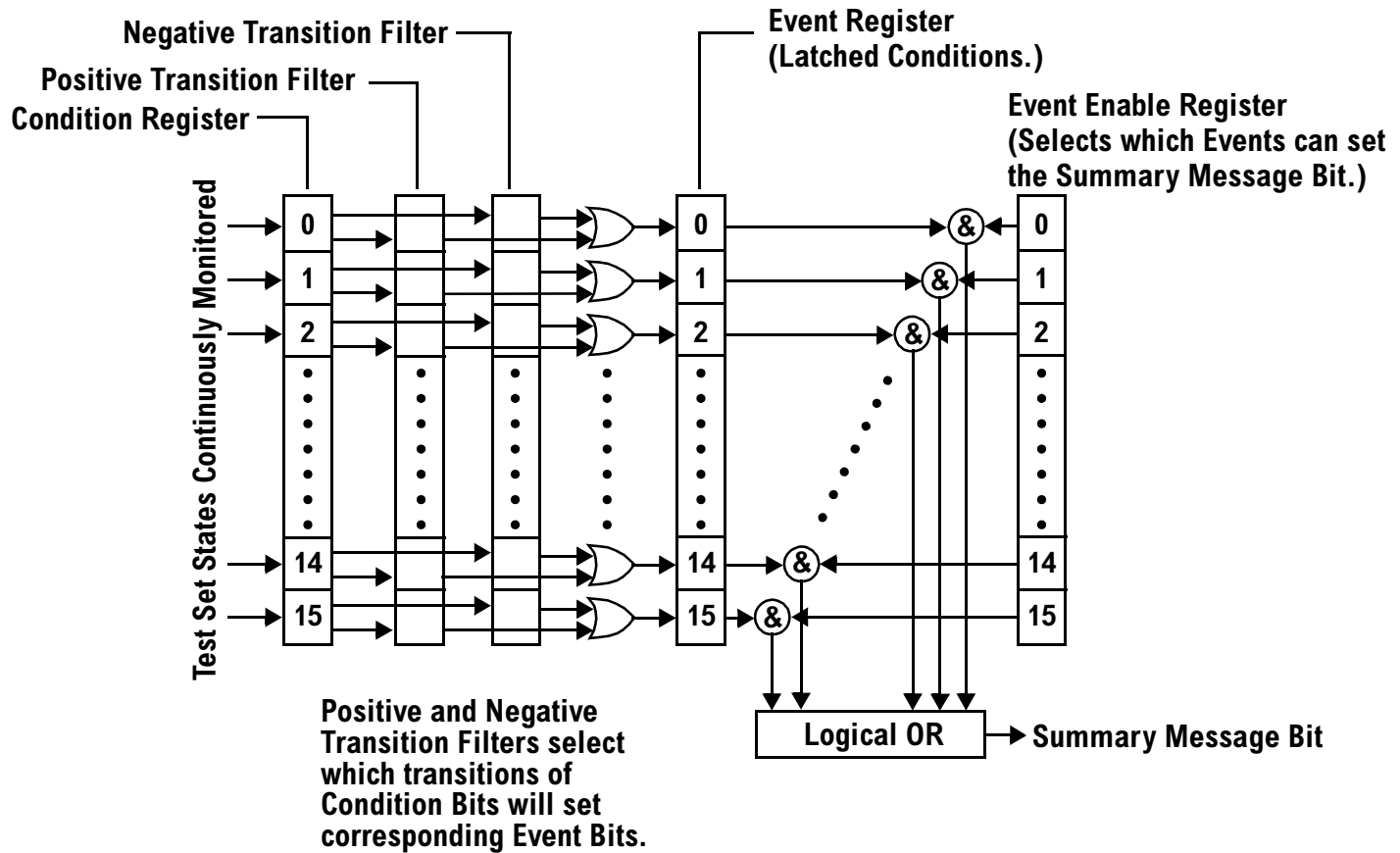


Status Data Structure - Register Model

The generalized status register model consists of a Condition Register, Transition Filters, an Event Register,

## Status Subsystem Overview

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 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.

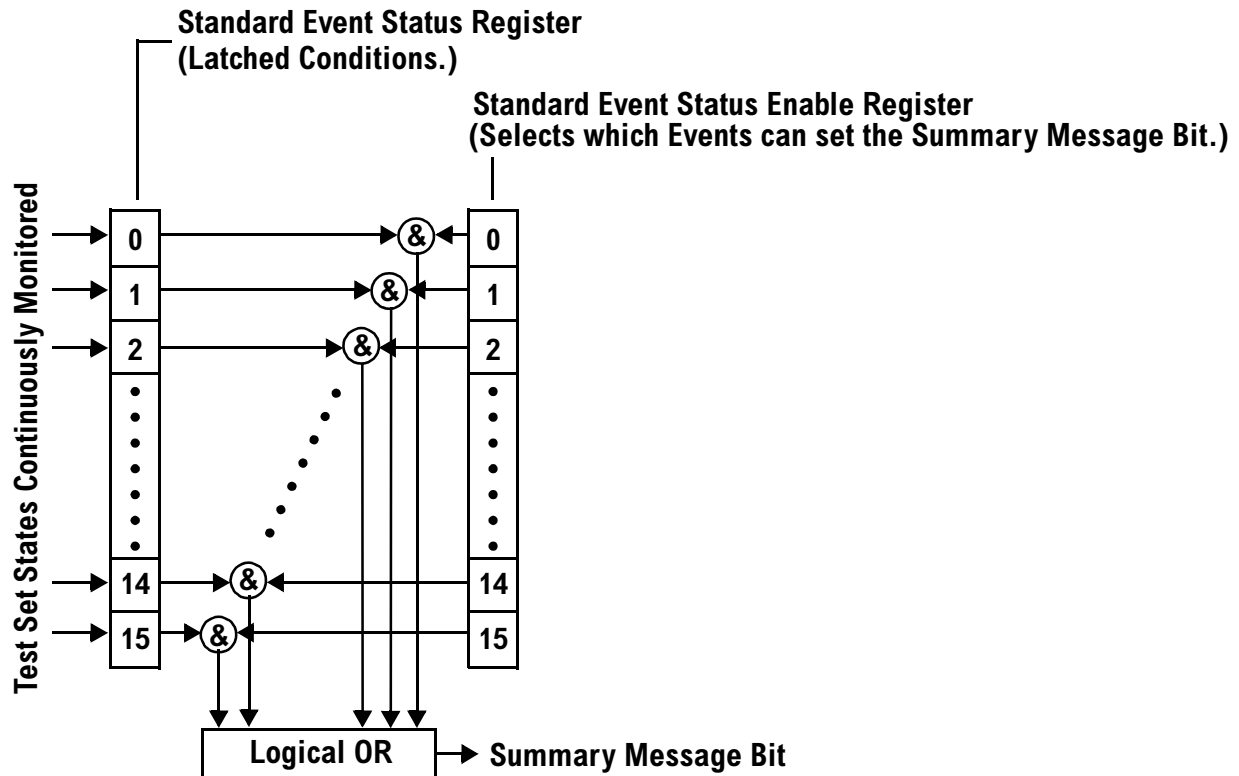
Transitions Filters are set to pass positive transitions (all 16 bits of the PTR register are set to 1 and all 16 bits of the NTR register are set to 0) at power on or after receiving the \*RST (reset) command.

**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.

## Status Subsystem Overview

### Standard Event Status Register Model

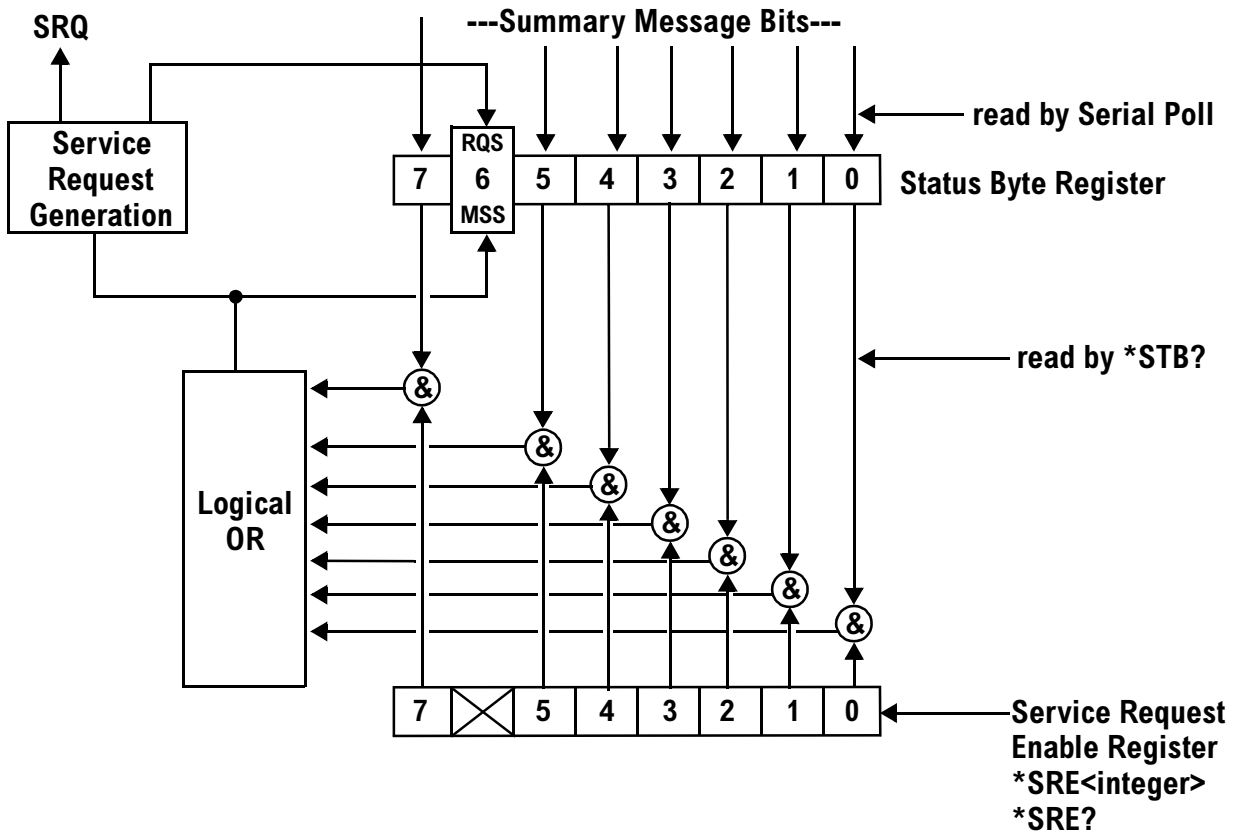


**Summary Message Bit** The Summary Message is a single-bit message which indicates whether or not one or more of the enabled events have occurred since the last reading or clearing of the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs 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.

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 Bute 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 is in the output

## Status Subsystem Overview

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 486

## 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.

### Concurrent Measurements For The E1961A Test Application

This table shows the concurrency considerations for the E1961A AMPS/136 Mobile Test Application .

**Table 20.**

Measurement	IQ Tuning	Audio Analyzer	FM Deviation (FDEV)	Frequency Stability (FST)	Adjacent Chan Power (ACP)	Loopback BER (LBER)	Modulation Accuracy (MAcc)	Analog TX Power
Digital TX Power (DTXP)	Partial	Partial	Partial	Partial	Partial	Yes	Partial	Partial
Analog TX Power (ATXP)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Modulation Accuracy (MAcc)	Partial	Partial	Partial	Partial	Partial	Yes		
Loopback BER (LBER)	Yes	Yes	Yes	Yes	Yes			
Adjacent Channel Power (ACP)	Partial	Partial	Partial	Partial				

## Concurrent Measurements

**Table 20.**

Measurement	IQ Tuning	Audio Analyzer	FM Deviation (FDEV)	Frequency Stability (FST)	Adjacent Chan Power (ACP)	Loopback BER (LBER)	Modulation Accuracy (MACC)	Analog TX Power
Digital TX Power (DTXP)	Partial	Partial	Partial	Partial	Partial	Yes	Partial	Partial
Analog TX Power (ATXP)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Frequency Stability (FST)	Partial	Partial	Partial					
FM Deviation (FDEV)	Partial	Partial						
Audio Analyzer	Partial							

Table Key:

YES - The pair of measurements can be initiated simultaneously and the measurements will be performed concurrently, resulting in decreased test times.

Partial - The pair of measurements can be initiated simultaneously, but the measurements will be performed sequentially, resulting in no decrease in test times over performing the tests sequentially.

## Related Topics

“Measurement Event Synchronization” on page 217

“Block Diagram” on page 655



## Measurement 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 Default Values

**Table 21. List of Timeouts and Default Values**

Measurement Function	Default Timeout Time	Default Timeout State	Integrity Indicator Value
Adjacent Channel Power (ACP)	10 seconds	OFF	2
Analog Frequency Stability (FST)	10 seconds	OFF	2
Analog Transmit Power (ATXP)	10 seconds	OFF	2
Digital Transmit Power (DTXP)	10 seconds	OFF	2
Digital Modulation Accuracy (MACC)	10 seconds	OFF	2
Dynamic Power (DPOW)	10 seconds	OFF	2
Frequency Modulation (FM)	10 seconds	OFF	2
IQ Tuning (IQT)	10 seconds	OFF	2
Loopback Bit Error Rate (LBER)	10 seconds	OFF	2
Call Control Status Change Arm	10 seconds	OFF	Not included

## Measurement Timeouts

### Program Example

With the mobile transmitting on an ANALOG voice channel (AVC), the following program will force a timeout to occur when attempting to make a DIGITAL transmit power measurement (since the test set will not see the burst rise needed to trigger the digital measurement). The integrity indicator should return a 2 (the measurement timeout indicator).

```
10 OUTPUT 714;"SETup:DTXPower:TIMEout 5S" !Set a timeout value of 5 seconds.
20 OUTPUT 714;"SETup:DTXPower:TRIGger:SOURce RISE" !Select rise triggering.
30 OUTPUT 714;"INITiate:DTXPower" !Start the measurement.
40 OUTPUT 714;"FETCh:DTXPower?" !Query the returned integrity indicator and the
50                                     !Average digital transmit power measurement.
60 ENTER 714;Integrity,Dtxpower !Enter the returned values into variables.
70 IF Integrity=2 THEN !Integrity value of 2 means digital TX power timed out.
80 PRINT "Measurement timed out."
90 ELSE
100 PRINT "Measurement successful; Digital TX Power result was ";Dtxpower
110 END IF
120 END
```

In this example, if the digital TX power measurement takes longer than 5 seconds to complete (since the trigger never happens), the FETCh command will obtain an integrity value of 2. The test set's GPIB will then be available to accept more commands.

### Related Topics

"Integrity Indicator" on page 206

"SETup Subsystem" on page 411

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## 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:ATXPOWER:ICOUNT?" !Returns the approximate number of
                                         !multi-measurement cycles completed during a
                                         !multi-measurement count cycle
```

### Related Topics

“Statistical Measurement Results” on page 205

## Triggering of Measurements

### Measurement Triggering

#### 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. The following table shows the trigger source selections available to the user.

**Table 22. Trigger Source choices**

Trigger Source	Function
RF Rise	Generates trigger from amplitude of signal being measured.
Protocol	Generates trigger from protocol timing.
External	Generates trigger from an external signal.
Immediate	Generates trigger from measurement initiation.
Auto	The test set selects the trigger source optimized for a given measurement.

**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 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. When the operating mode = active cell mode, Auto triggering sets the trigger source to Protocol. When the operating mode = test mode, auto triggering sets the trigger source to RF Rise. See "AVC Test Operating Mode" on page 75, "DTC Test Operating Mode" on page 78, or "Active Cell Operating Mode" on page 71.

### GPIB Example

```
OUTPUT 714;"SETUP:DTXPower:TRIGGER:SOURCE AUTO" !Sets Trigger Source to Auto.
```

### 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. Refer to Figure 13. on page 202 for a summary of the measurement states.

Manually, a measurement is activated by selecting it from the Measurement Selection menu. A measurement is inactivated by pressing the Measurement Selection key, scrolling to measurement in the Measurement Selection menu, and then pressing F4 (Close Measurement).

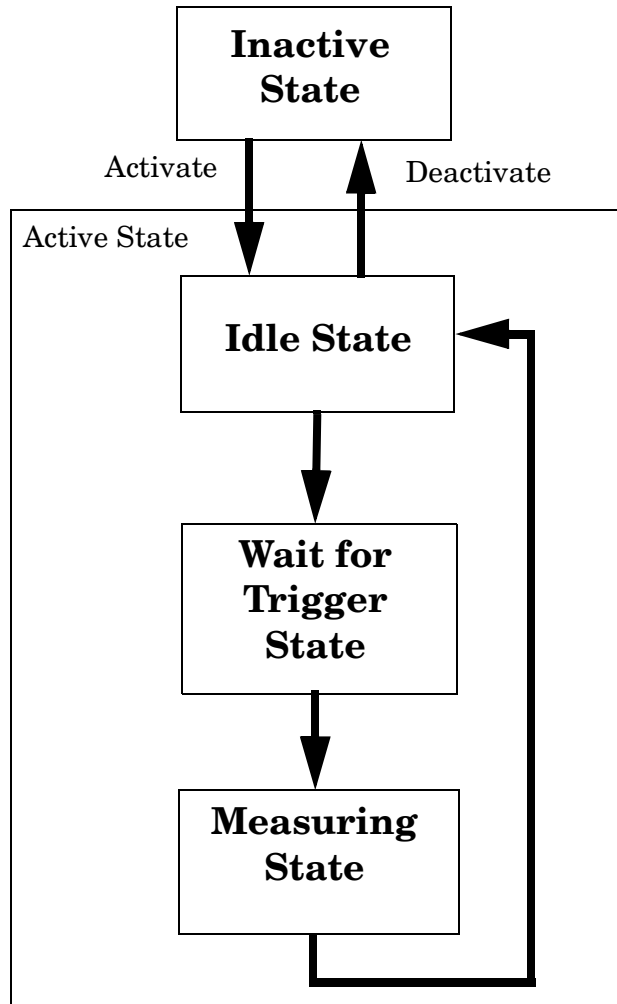
### GPIB Examples

```
OUTPUT 714;"INITIATE:DTXPower:OFF" !Turns off a Digital Transmit Power measurement.
```

```
OUTPUT 714;"INITIATE:DTXPower" !Turns on a Digital Transmit Power measurement.
```

## Triggering of Measurements

**Figure 13. The Test Set's Measurement States**



### Measurement States

The following examples describe states of the test set under various conditions. Refer to Figure 13. on page 202.

#### Example 17. 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 18. 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. See “INITiate” on page 389.

#### Example 19. Measuring and Idle States (Trigger Arm Single)

If the trigger arm is set to single, and the trigger source is available, the measurement state transitions to

measuring and measurement results are now available to the user. After results are available, the state transitions to idle (awaiting another INITiate). (See “Trigger Source Description” on page 200 and “Trigger Arm (Single or Continuous) Description” on page 203)

**Example 20. Measuring State (Trigger Arm Continuous)**

If the trigger arm is set to continuous, and the trigger source is available, 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. When the measurement is deactivated (INITiate:<MEAS>:OFF. or Close Measurement), it becomes inactive. (See “Trigger Source Description” on page 200 and “Trigger Arm (Single or Continuous) Description” on page 203).

**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, trigger arm must be set to single. This causes the measurement cycle to transition to the idle state but remain active.

---

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.

It is unnecessary to start a measurement if trigger arm is set to continuous because it will continue to cycle in the measuring state.

**Table 23. 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

**GPIB Example**

```
OUTPUT 714;"SETUP:MACCuracy:CONTINUOUS OFF" !Set Digital Modulation Accuracy measurement to single trigger mode.
```

**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.

## Triggering of Measurements

### GPIB Example

```
OUTPUT 714;"SETUP:MACCuracy:TRIGGER:DELAY .0012 S" !Sets a trigger delay of
!1.2 milliseconds. The units
!(seconds) are an optional
!part of the command.
```

## Triggering Considerations When Making Manual 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

"Integrity Indicator" on page 206

"Measurement Event Synchronization" on page 217

"SETup Subsystem" on page 411



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## 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:ATXPOWER:COUNT 10" !Enters an Analog TX Power count
                                     !value of 10, and turns the Analog TX Power
                                     !multi-measurement state on.
```

### Related Topics

“Measurement Progress Report” on page 199

## 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 and GPRS measurements return integrity indicators (8, 9, 11) when the measurement synchronization is set to midamble.

---

**Table 24.**

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.

Table 24.

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.

## Integrity Indicator

**Table 24.**

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	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.
19	Uncalibrated Due To Temperature: Indicates that the current temperature of the test set is different than the calibration data temperature by more than $\pm 10$ degrees C, when attempting a Channel Power Measurement.
20	Potential Receiver Saturation: Indicates that an input signal immediately prior to the measured input was high enough to potentially saturate the receiver hardware.
21	Parameter Error: Indicates that a measurement setup parameter has been set in a way that gives invalid measurement results.
22	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.
23	Call Processing Operation Failed: Indicates that a call processing operation, (base station emulator) needed in the course of making the measurement could not complete.

**Example Program**

```
10 OUTPUT 714;"INITiate:ATXPower" !Start ATXP measurement
20 OUTPUT 714;"FETCH:ATXPower?" !Request measurement results.
30 ENTER 714;Integrity,Tx_power !Read measurement results.
40 IF Integrity = 0 THEN !Permits measurement to be printed if integrity indicator
50             !indicates a successful measurement
60 PRINT "Analog TX Power =";Tx_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.
140 END IF
150 END
```

**Related Topics**

"Error Messages" on page 622

---

## 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.

- $9.9E+37 = \text{INFINITY}$  (Infinity)
- $-9.9E+37 = \text{NINFINITY}$  (Negative Infinity)
- $9.91E+37 = \text{NAN}$  (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.

## Setting Frame Trigger Parameters

### Frame Trigger Parameters

The frame trigger is a positive-going TTL compatible pulse at the rear-panel TRIG OUT connector that is approximately 0.5 symbols (20 $\mu$ s) wide, and is aligned to the forward channel TDMA frame timing. The frame trigger is provided to synchronize other test equipment to a measurement.

The frame trigger has 3 parameters that the user must set. See “SYSTEM:FTRigger” on page 548.

- “External Trigger State (on or off)” on page 211
- “External Trigger Timeslot (1 to 6)” on page 211
- “External Trigger Symbol (0 to 972)” on page 211

### Programming Examples

#### External Trigger State (on or off)

```
OUTPUT 714;"SYSTEM:FTRIGGER:STATE ON"
```

would set the external frame trigger ON.

#### External Trigger Timeslot (1 to 6)

```
OUTPUT 714;"SYSTEM:FTRIGGER:TSLOT 3"
```

would cause external frame trigger pulses to align with timeslot three.

#### External Trigger Symbol (0 to 972)

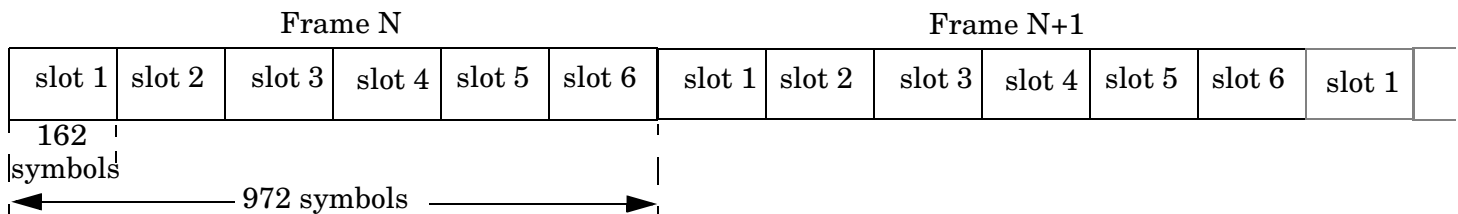
```
OUTPUT 714;"SYSTEM:FTRIGGER:SYMBOL 100"
```

would cause external frame trigger pulses to occur 100 symbols after symbol 0 of the selected timeslot.

### Operating Considerations

Each AMPS/136 frame is made up of 6 time slots. Each time slot is 162 symbols in length. Therefore the total number of symbols in a frame is 972 (162 x 6) (see figure below).

If you set the trigger timeslot to 3, and set the trigger symbol to 100, the external trigger signal appears at the TRIG OUT connector 100 symbols after the start of timeslot 3. Setting the trigger symbol to its maximum value (972) causes the trigger signal to appear one full frame after the specified timeslot.



## Setting Frame Trigger Parameters

When using the AVC Test or CW operating modes, the frame trigger settings are unaltered but the output is disabled (set to 0 volts) since there is no reference forward channel TDMA frame structure available. The frame trigger output signal will be restored whenever the Active Cell or DTC Test operating modes are used and the external trigger state is set to ON.

The frame trigger can be set manually from the Call Control screen by pressing the External Trigger Setup soft key (shown on menu 2 of 2 on the left side of the screen).

## Related Topics

“SYSTem:FTRigger” on page 548



## 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.

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:

## Dealing With Semicolon Separated Response Data Lists

```
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
```

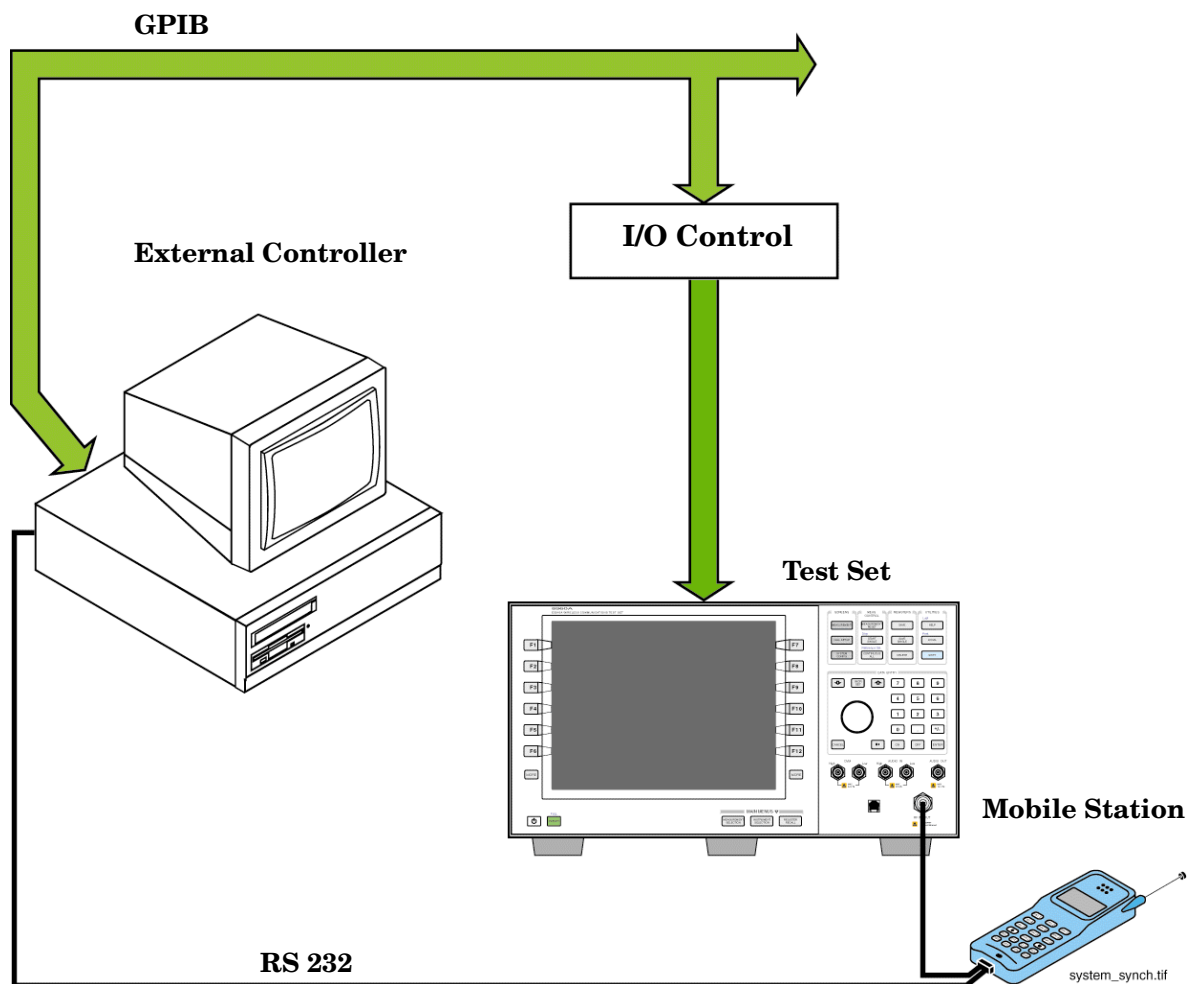
## Test System Synchronization Overview

### 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 14. Test System**



## Test System Synchronization Overview

### 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.

### Related Topics

“Call Processing State Synchronization” on page 225

“Call Processing Event Synchronization” on page 221

“Measurement Event Synchronization” on page 217

“SYSTem:SYNChronized” on page 555

---

## 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 what, if any, measurements are ready to be fetched. This query should be used inside a loop, checking each measurement that was initiated. See "INITiate:DONE?" on page 392 for more details about this query.

The INITiate:DONE? query returns at least one of the following indicators for each pass through the loop:

- "ACP" - The adjacent channel power measurement results are available.
- "AFAN" - The audio analyzer measurement results (SINAD, Distortion, AF Level) are available.
- "ATXP" - The analog transmit power measurement results are available
- "DPOW" - The dynamic power measurement results are available.
- "DTXP" - The digital transmit power measurement results are available
- "FM" - The frequency modulation measurement results are available.
- "FST" - The analog frequency stability measurement results are available.
- "IQT" - The IQ Tuning measurement results are available.
- "LBER" - The loopback bit error measurement results are available.
- "MACC" - The digital modulation accuracy measurement results are available.
- "SMON" - The spectrum monitor measurement results are available.
- "WAIT" - There are one or more measurements which are in the measuring state which are not excluded from the query. See "INITiate:DONE:FLAG:<measurement mnemonic>" on page 393. When WAIT is returned at least one measurement is not ready to be fetched yet.
- "NONE" - There are no measurements currently in the measuring state. This assumes no measurements have been excluded. See "INITiate:DONE:FLAG:<measurement mnemonic>" on page 393. This would indicate that all measurements results are available or none have been initiated.

## Measurement Event Synchronization

### Programming Example

The following example assumes that the mobile is transmitting on a digital traffic channel and no measurements other than digital TX power (DTXP) and digital modulation accuracy (MACC) are being triggered. See “Triggering Process Description” on page 201.

```
10 OUTPUT 714;"SETup:DTXPower:CONTinuous OFF" !Sets digital TX power
20                                     !trigger mode to single.
30 OUTPUT 714;"SETUP:MACCuracy:CONTinuous OFF" !Sets digital modulation
40                                     !accuracy trigger mode to single.
50 OUTPUT 714;"INITiate:DTXPower;MACCuracy" !Begin digital TX power and
60                                     !modulation accuracy measurements.
70 REPEAT
80 OUTPUT 714;"INITiate:DONE?" !Queries the test set for measurements
90                                     !that are done
100 ENTER 714;Meas_done$ !String value representing DONE measurements,
110                                     ! NONE if no measurements are done.
120 SELECT Meas_done$ !This variable will be set to WAIT until measurements
130                                     !are DONE.
140 CASE "DTXP" !Characters must be upper case.
150 OUTPUT 714;"FETCh:DTXPower:POWer:AVERAge?" !If this case is selected,
160                                     !average digital TX Power (no integrity indicator) is FETChed.
170 ENTER 714;Dtxpower_meas
180 PRINT "DTX_Power is ";Dtxpower_meas
190 CASE "MACC" !Characters must be uppercase.
200 OUTPUT 714;"FETCh:MACC:EVM1:AVERAge?" !If this case is selected,
210                                     !the average EVM1 modulation accuracy measurement is FETChed.
220 ENTER 714;Evm1_meas
230 PRINT "Average EVM1 is ";Evm1_meas
240 END SELECT
250 UNTIL Meas_done$="NONE" !When all triggered measurements have completed,
260                                     !the INITiate:DONE? query returns NONE.
270 END
```

### 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 Assignment” on page 497 for more details about this command.

The user 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 190.
- STATus:OPERation:NMRReady bit for the measurement desired
- STATus:OPERation bit (512 for NMRReady). See “Status Subsystem Overview” on page 173.
- Service Request Enabling (\*SRE 128 for NMRReady). See “Status Subsystem Overview” on page 173.

The “STATus:OPERation:NMRReady Condition Register Bit Assignment” on page 497 status register provides status reporting on the following measurement completions:

- Analog TX Power
- Digital TX Power
- Adjacent Channel Power
- Loopback BER
- Frequency Stability
- Frequency Modulation
- MAHO Bit Error
- AF Analyzer (SINAD, Distortion, AC Level)

---

**NOTE** The following program example uses the E1960A GSM Mobile Test Application Bit Error Rate measurement for the example. Refer to “STATUS:OPERATION:NMRReady Condition Register Bit Assignment” on page 497 for bit assignments for other Test Applications.

---

### Example 21. Generating a Service Request (SRQ) Interrupt - Bit Error Rate NMRR

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

```

## Measurement Event Synchronization

### Operating Considerations

Only one indicator is returned per query.

To ensure that when a measurement completes it will remain in a state that qualifies it as DONE, use the SETup subsystem to set all active measurements to single (CONTinuous:OFF) trigger mode.

### Related Topics

“INITiate” on page 389

“What Happens When a Measurement is INITiated?” on page 387

“Concurrent Measurements” on page 195



## Call 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.

---

## Call Processing Event Synchronization

### Call Processing Subsystem Overlapped Command Synchronization Commands

**Table 25. 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 25. 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 Event Synchronization

### Call Processing Subsystem Overlapped Commands

#### Overlapped Commands

Call Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
CALL:END	Performs a base station call termination.	The call processing state reaches the Idle state (when the operating mode is active cell), or The test set has noted this parameter change (when the operating mode is test mode).
CALL:CONNEcted:ARM[:IMMediate]	Arms the call control status change detector.	The call control status change detector has been disarmed.

### Related Topics

“Call Processing State Synchronization” on page 225

“Test System Synchronization Overview” on page 215

“Measurement Event Synchronization” on page 217

---

## Call Processing State Synchronization

### Call Processing State Query

The CALL:STATUS:STATE query returns the current call processing state.

This is a list of all possible values for this test application.

- “ALER”  
Alerting is returned when an alert message is sent to the MS during a call setup due to a page.
- “CONN”  
Connected is returned when the test set and the MS are connected on a call.
- “HAND”  
Handoff is returned when the test set is in the process of handing off the MS.
- “IDLE”  
Idle is returned when the test set is not on a call, involved with any termination, page, origination, or registration call processing procedures with the MS.
- “PAG”  
Paging is returned when the test set is in the process of paging the MS.
- “REG”  
Registering is returned when the test set is in the process of performing a registration with the MS.
- “REL”  
Releasing is returned when the test set is in the process of releasing the MS from a call using over the air signalling as part of a MS or BS originated release procedure.
- “SREQ”  
Set Up Request is returned when the test set is in the process of assigning a channel to an MS as part of a Page or an MS originated call setup.

The following command returns the current state of a call:

```
OUTPUT 714;"CALL:STATUS:STATE?"
```

See the “Instrument Status Area” on page 604 for call processing state information.

## Call Processing State Synchronization

# Description

### Connected/Idle Query

This query will determine if a call is connected or disconnected by returning an integer value. The value indicates if the call state is idle or connected, not if any call state change has occurred.

Query returns one of the following:

- 0 = idle
- 1 = connected

If the call is in the setup request, proceeding, alerting, or disconnecting state, this command will not return a value until the call status proceeds to either connected or idle.

```
OUTPUT 714;"CALL:CONNECTED:STATE?"
```

### Example 22. Base Station Originated Call - Using the Connected/Idle Query

The following example illustrates the use of the connected/idle query for a base station originated call. This code originates a call, then waits for the connected/idle query to return a result.

Note that this code does not include the CALL:CONNECTED:TIME (timeout timer) or the CALL:CONNECTED:ARM (change detector arm) commands. These commands are unnecessary since the change detector is armed automatically by the CALL:ORIGINATE command, and the timeout timer value is never applicable since a base station originated call guarantees a state change.

```
10 OUTPUT 714;"CALL:ORIGINATE" ! Begin the BS originated call.
20 OUTPUT 714;"CALL:CONNECTED:STATE?" ! The connect/idle query.
30 ENTER 714;Call_connected ! Program will hang here until state
40                               ! change or protocol timer expires.
50 !*****
60 ! If mobile is not set to auto-answer, answer the call.
70 !*****
80 IF NOT Call_connected THEN
90   DISP "CALL NOT CONNECTED."
100 ELSE
110   DISP "CALL IS CONNECTED."
120 END IF
130 END
```

### Call State Change Detector

This feature provides a method for holding off the "Connected/Idle Query" results until a change in call processing states is detected. Arming the call state change detector is useful only for mobile station originated calls or disconnects only. It is armed automatically when call processing functions originating from the test set are requested.

The call state change detector becomes *disarmed* when any of the following conditions have been met:

- the call processing state has changed to either connected or idle  
or...
- the attempt to connect or disconnect a call has failed, and one of the test set's Fixed Timers has timed out  
or...

- no call processing state changes occurred within the time period specified by the “Call State Change Detector Timeout” .

The following command arms the call state change detector:

```
OUTPUT 714;"CALL:CONNECTED:ARM[:IMMEDIATE]"
```

### Example 23. Mobile Station Originated Call - Arming the Change Detector

The following example illustrates the use of the call state change detector along with the connected/idle query to synchronize a controlling application with a call processing state change during a mobile station originated call.

When the CALL:CONNECTED:ARM command is received by the test set, the detector becomes armed and configures the test set to hold off on returning a result for the CALL:CONNECTED:STATE? query until the detector is disarmed by one of the three events described above.

```
10  OUTPUT 714;"CALL:CONNECTED:TIMEOUT 10S" ! Sets the time out
20                                     ! time to 10 seconds.
30  OUTPUT 714;"CALL:CONNECTED:ARM" ! Arm the change detector.
40  DISP "Make a mobile station orginated call. Continue when done."
50  PAUSE
60  OUTPUT 714;"CALL:CONNECTED:STATE?" ! The connected/idle query.
70  ENTER 714;Call_connected
80  IF Call_connected=1 THEN
90      DISP "Call is connected."
100     WAIT 2
110    ELSE
120     DISP "Call is not connected."
130     WAIT 2
140    END IF
150    END
```

**Call State Change Detector Timeout** If a state change does not occur, the user needs a way to control how long to wait for the change detector. The change detector is disarmed by the timeout timer. After a timeout, the connected/idle query will return a 1 for connected or a 0 for idle. The timeout timer is user settable, but the user setting is only applied during mobile station originated call processing operations. For base station originated call processing operations, the timeout timer is automatically set to 60 seconds by the test set.

## STATUS:OPERation:CALL Status Register

The STATUS subsystem provides a status register group that allows the user to query call processing states. Call processing state synchronization can be performed using the bit transitions of STATUS:OPERATION:CALL to generate interrupts to the external controller. Refer to “STATUS:OPERation:CALL Condition Register Bit Assignment” on page 492 for status bit definitions and GPIB command syntax.

## Call State STATUS:OPERation:CALL Program Example

### Example 24. Generating a Service Request (SRQ) Interrupt - Dropped Call

The following example illustrates the use of the status subsystem to generate a service request when a call has been dropped.

## Call Processing State Synchronization

```
10 CLEAR SCREEN
20 OUTPUT 714;"*CLS"
30 OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:PTR 0;NTR 4"!Enable the
40 !negative
50 !transition
60 !filter for the
70 !connected bit.
80 OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:ENABLE 4" !Enable the
90 !connected bit
100 ! to generate a
110 !summary message.
120 OUTPUT 714;"STATUS:OPERATION:CALL:PTR 2;NTR 0" !Enable the
130 !positive
140 !transition
150 !filter for the
160 !summary bit.
170 OUTPUT 714;"STATUS:OPERATION:CALL:ENABLE 2" !Enable the
180 !connected bit
190 !to generate a
200 !summary message.
210 OUTPUT 714;"STATUS:OPERATION:PTR 1024;NTR 0" !Enable the positive
220 !transition filter for the
230 !call summary bit.
240 OUTPUT 714;"STATUS:OPERATION:ENABLE 1024" !Enable the call sumary
250 !bit to generate a summary
260 !message.
270 OUTPUT 714;"*SRE 128" !Enable the service request enable register to
280 !generate an SRQ.
290 ON INTR 7,15 CALL Err !Define the interrupt-initiated branch with a
300 !priority of 15, the highest.
310 ENABLE INTR 7;2 !Enable interrupt on interface card 7 with a bit mask
320 !(for the interface's interrupt-enable register) of 2.
330 PRINT "Step 1. Make a call, and type CONT when connected." !Make a Mobile Station
340 !originated call.
350 PAUSE
360 PRINT "Step 2. End the call from the mobile station."
370 LOOP !Put the program into a loop until the interrupt is detected.
380 DISP "CALL STATUS: The call is still connected."
390 END LOOP
400 END
410 SUB Err
420 DISP "CALL STATUS: The call has ended."
430 Clear_interrupt=SPOLL(714)
440 OUTPUT 714;"*CLS"
450 DISABLE INTR 7
460 STOP
470 SUBEND
```



## Related Topics

“Call Processing Event Synchronization” on page 221

“Instrument Status Area” on page 604

“CALL:CONNEcted:TIMEout” on page 261

“CALL:STATus[:STATe]?” on page 319

“CALL:CONNEcted:ARM[:IMMEDIATE]” on page 260

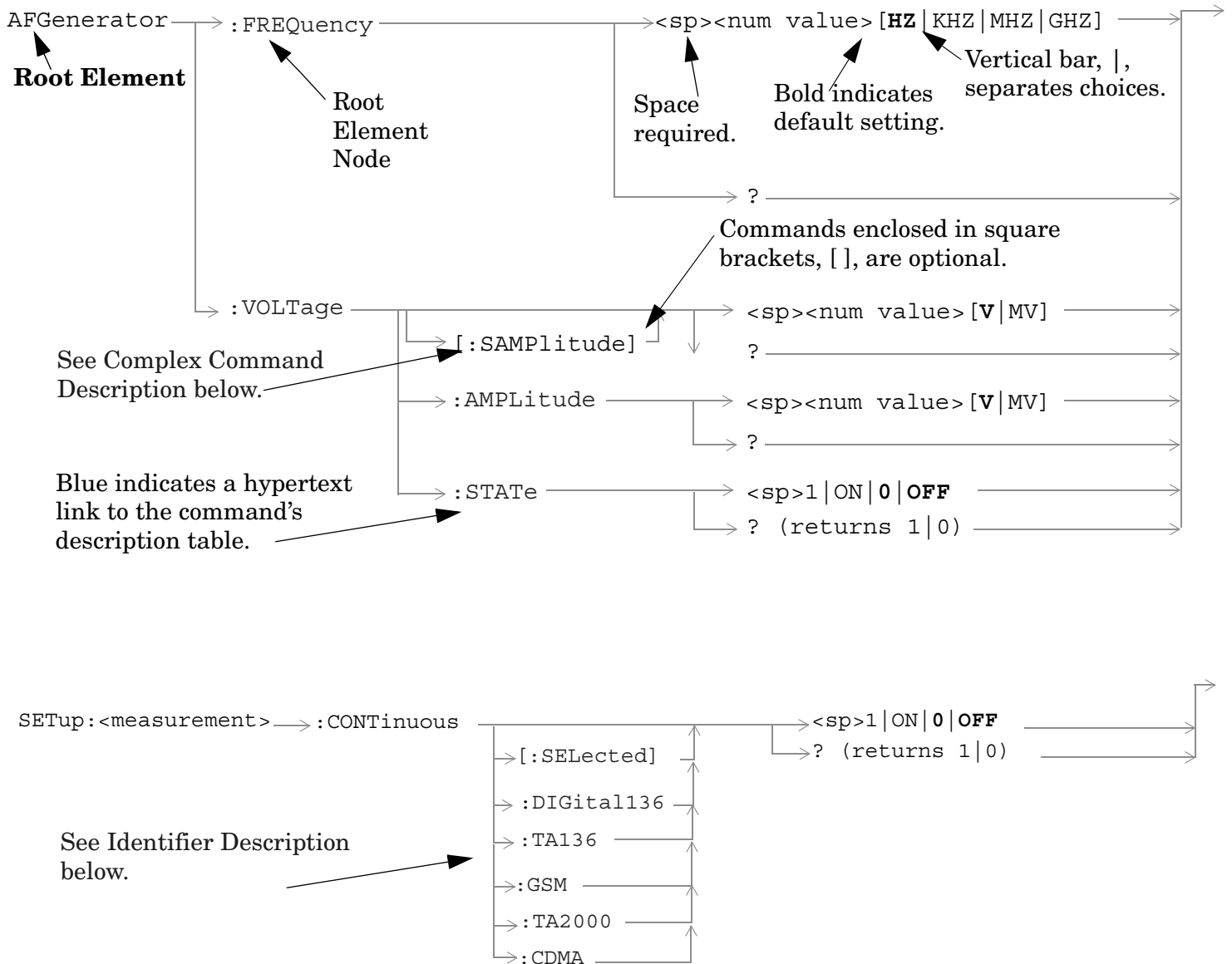
## Call Processing State Synchronization

# 4 GPIB Commands



# 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.

## Diagram Conventions

### 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.

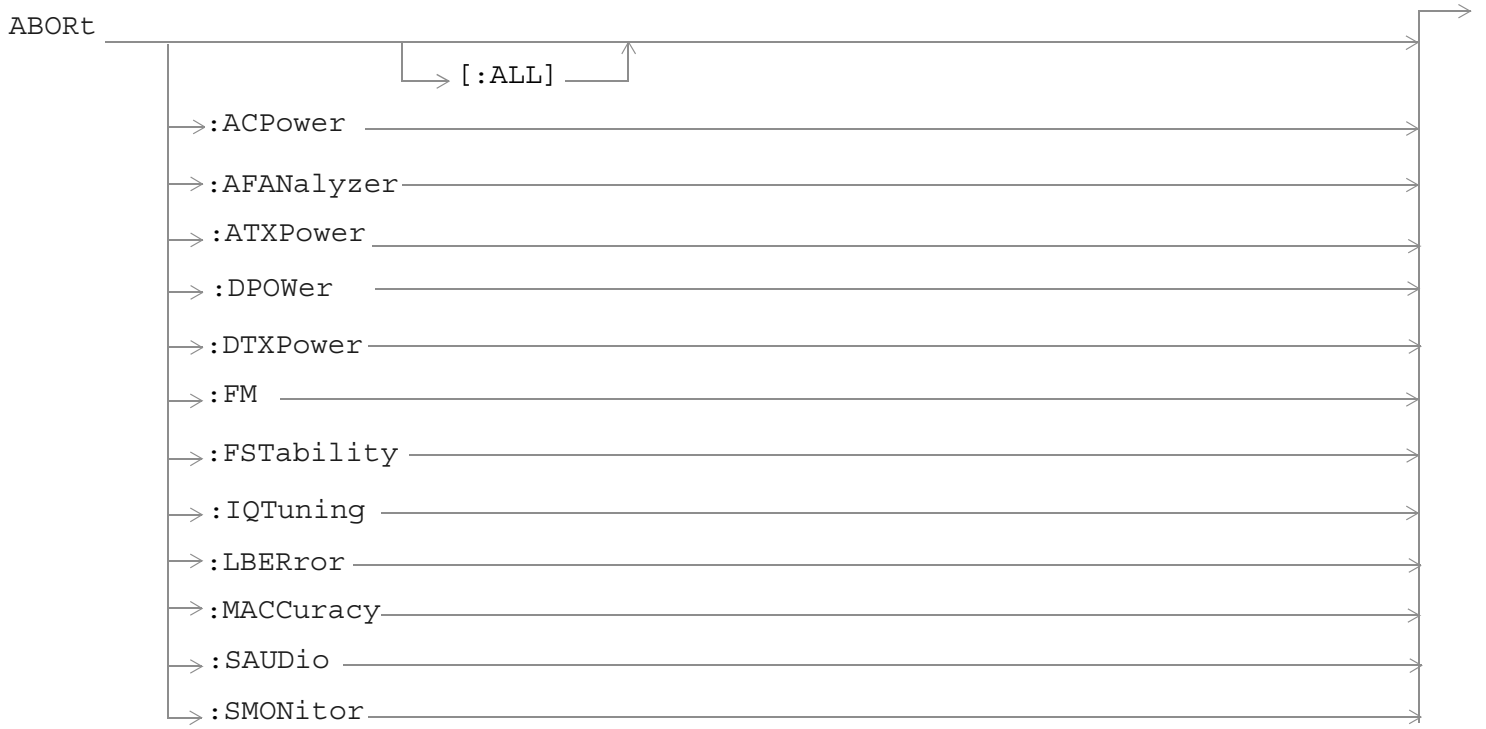
READ:<meas>? will execute an ABORt:<meas> action that aborts just one trigger sequence and then combines the INITiate and FETCh? commands.

### Syntax Diagram and Command Descriptions

“ABORt”

---

# ABORt



“Diagram Conventions” on page 233



**ABORt[:ALL]**

Function	<p>Stops all measurements that are active. See “Measurement States” on page 202.</p> <p>If the trigger arm is set to single the measurements will go to the idle state. See “Trigger Arm (Single or Continuous) Description” on page 203.</p> <p>If the trigger arm is set to continuous the measurements will re-arm and initiate again.</p>
Setting	<p>Range:</p> <p>ACPower   AFANalyzer   ATXPower   DPOwer   DTXPower   FM   FSTability   IQTuning   LBERror   MACCuracy   SAUDio   SMONitor</p>
<p><b>Programming Example</b></p> <p>OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.</p>	

**ABORt:<meas-mnemonic>**

Function	<p>Stops the selected measurement if it is active. See “Measurement States” on page 202.</p> <p>If the trigger arm is set to single the measurements will go to the idle state. See “Trigger Arm (Single or Continuous) Description” on page 203.</p> <p>If the trigger arm is set to continuous the measurements will re-arm and initiate again.</p>
Setting	<p>Range:</p> <p>ACPower   AFANalyzer   ATXPower   DPOwer   DTXPower   FM   FSTability   IQTuning   LBERror   MACCuracy   SAUDio   SMONitor</p>
<p><b>Programming Example</b></p> <p>OUTPUT 714;"ABORT:ATXP" !Aborts the analog transmitter power measurement.</p>	

## **AFGenerator Subsystem**

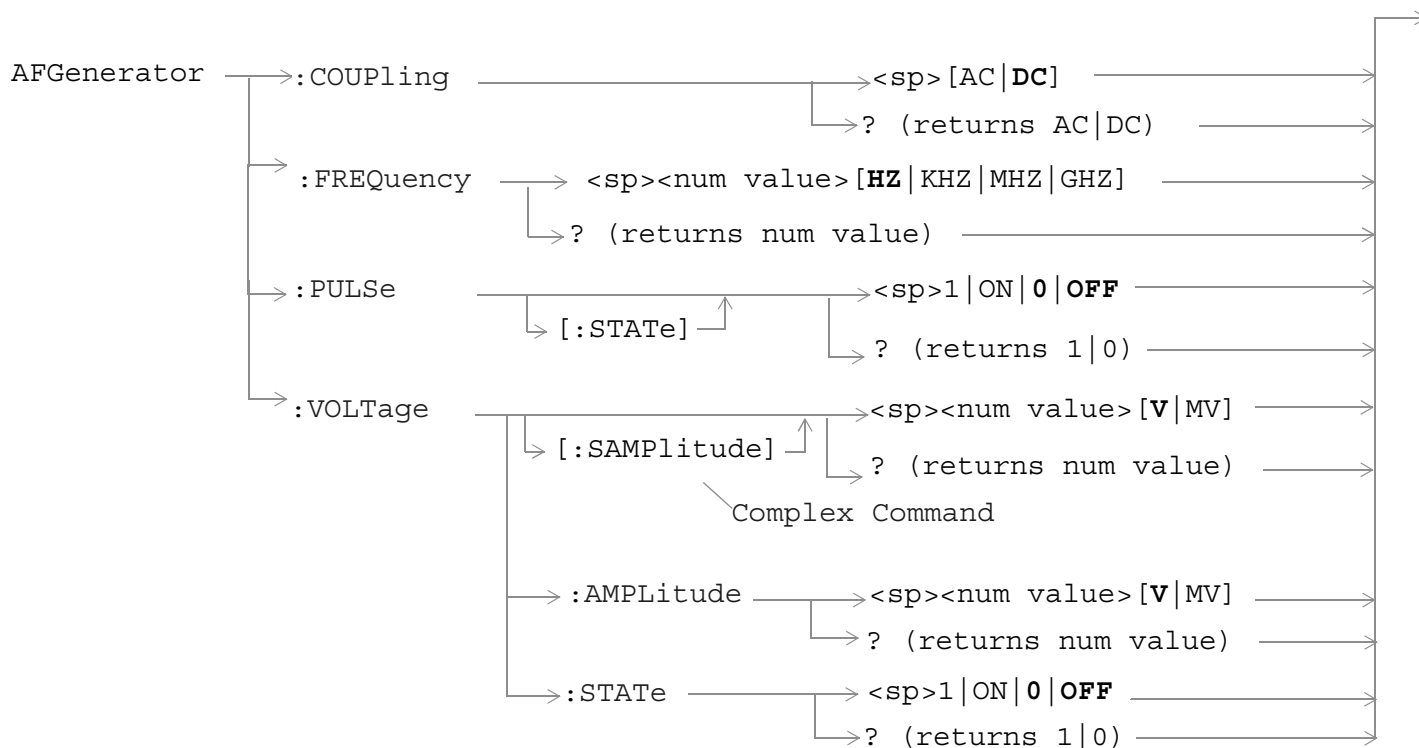
### **Description**

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 239

# AFGenerator



“Diagram Conventions” on page 233

## AFGenerator

### 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
Programming Example	
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
Programming Example	
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.  The amplitude and frequency of the pulse is set with afgenerator commands. See "AFGenerator" on page 239.
Setting	Range: 0   OFF   1   ON
Query	Range: 0   1
*RST setting	0 (off)
Programming Example	
OUTPUT 714;"AFGENERATOR:PULSE ON" !Sets the audio generator pulse to ON.	

**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> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output !voltage to 2.1 volts.</pre>	

**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> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output !voltage to 1.414 volts peak.</pre>	

## AFGenerator

### 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

### Description

The only user calibration that can be performed is for the IQ modulator. 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.

### Syntax Diagram and Command Descriptions

“CALibration”





**CALibration:IQ2?**

Function	<p>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.</p> <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	<p>Range</p> <ul style="list-style-type: none"> <li>• 0 = Pass</li> <li>• -340 = Fail</li> </ul>
<p>Programming Example</p> <pre>OUTPUT 714;"CALIBRATION:IQ2?" !Performs a calibration of the IQ modulator !for RF generator 2 and returns 0 or -340</pre>	

---

**NOTE**        When the the calibration is done the test set display will display:  
                   IQ Calibration completed successfully for modulator 2.

---

## CALibration

### 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.
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>
Programming Example <pre>OUTPUT 714;"CALIBRATION:DATE 1999,01,04" !Sets the date of the last system !calibration year, month and day.</pre>	

### CALibration:SMONitor

Function	Starts the spectrum monitor calibration routine. It is important that no power is applied to the RF IN/OUT connector during calibration.
Query	Range: 0 through 10, and -340 <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>

**Programming Example**

```
OUTPUT 714;"CALIBRATION:SMONitor?" !Queries the spectrum monitor calibration.
```

## CALCulate Subsystem

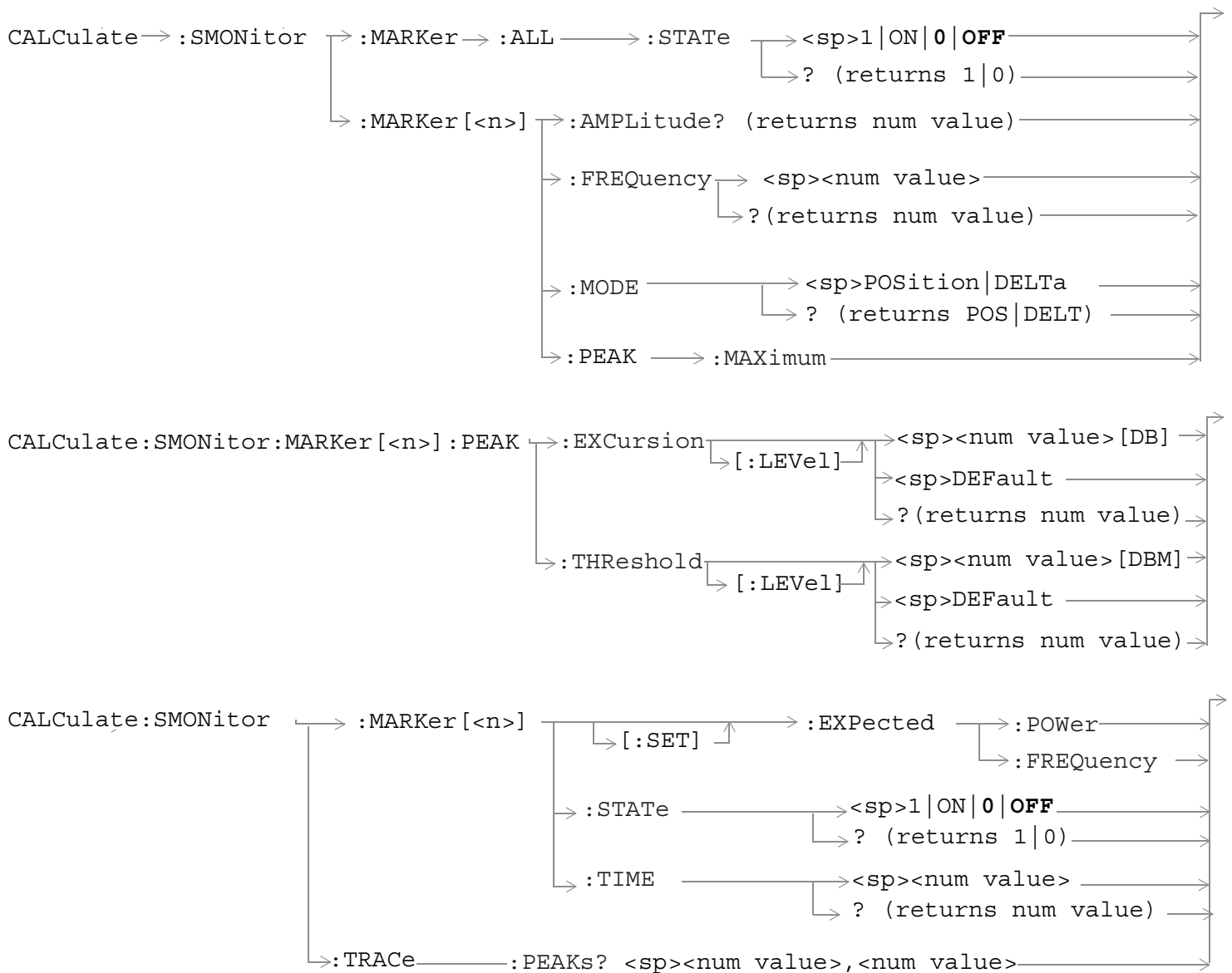
### Description

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 233

## 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
Programming Example	
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 "CALCulate:SMONitor:MARKer[<n>]:MODE" .)
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
Programming Example	
OUTPUT 714;"CALCulate:SMONitor:MARKer2:AMPLitude?" !Returns the amplitude of marker 2.	

**CALCulate:SMONitor:MARKer[<n>]: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[<n>]: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
Programming Example	
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.
Programming Example	
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
Programming Example	
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 "CALCulate:SMONitor:MARKer[<n>]:MODE" .)
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> <pre>OUTPUT 714;"CALCulate:SMONitor:TRACe:PEAKs?"</pre>	

---

## CALL Subsystem

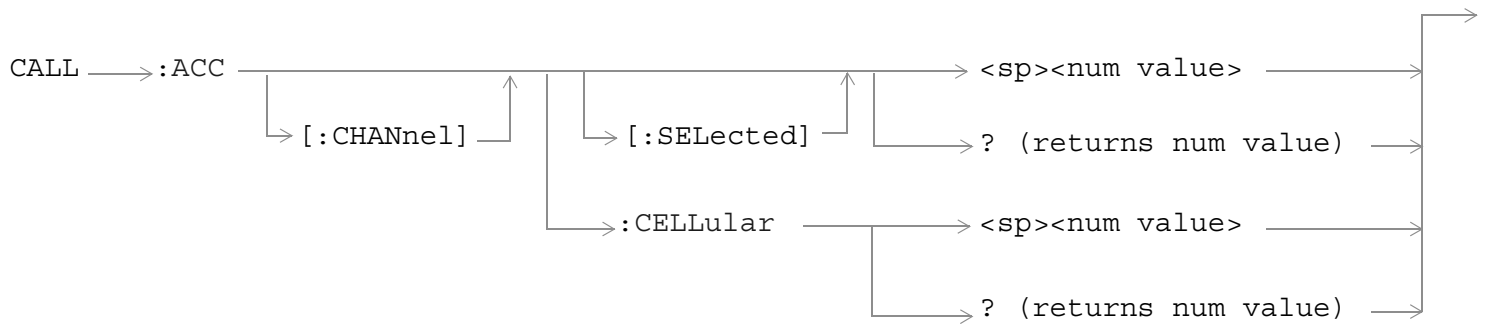
### Description

The CALL subsystem handles all setup, control, and query functions for call processing. This includes mobile station (MS) and Base Station (cell) functions.

### Syntax Diagrams and Command Descriptions

“CALL:ACC” on page 256	“CALL:OPERating” on page 290
“CALL:AVCTest” on page 257	“CALL:ORIGinate” on page 291
“CALL:CCHannel” on page 258	“CALL:PAGing:PNUMBER” on page 292
“CALL:CONNected” on page 259	“CALL:PAGing:REPeat” on page 293
“CALL:CONTRol:DOWNlink:FREQUency:AUTO” on page 262	“CALL:POWer” on page 294
“CALL:DCCH” on page 263	“CALL:REGister” on page 302
“CALL:DTC:BURSt” on page 266	“CALL:RFGenerator” on page 304
“CALL:DTC:IBERror” on page 267	“CALL:SETup” on page 305
“CALL:END” on page 269	“CALL:SID” on page 316
“CALL:FM” on page 270	“CALL:SOCode” on page 317
“CALL:HANDoff” on page 274	“CALL:STATus” on page 318
“CALL:MCCode” on page 275	“CALL:TCHannel” on page 323
“CALL:MS” on page 276	

## CALL:ACC



“Diagram Conventions” on page 233

### CALL:ACC[:CHANnel][:SElected]

Function	Specifies the RF channel number of the analog control channel (cellular band is inferred).
Setting	range: 1 to 799, 991 to 1023
Query	range: 1 to 799, 991 to 1023
*RST Setting	333
Programming Example	
OUTPUT 714;"CALL:ACC:CHANNEL:SELECTED 799" !Sets the analog control channel to 799.	

### CALL:ACC[:CHANnel]:CELLular

Function	Specifies the RF channel number of the analog control channel (cellular band is specified).
Setting	range: 1 to 799, 991 to 1023
Query	range: 1 to 799, 991 to 1023
*RST Setting	333
Programming Example	
OUTPUT 714;"CALL:ACC:CHANNEL:CELLULAR 991" !Set cell band analog control channel to 991.	

## CALL:AVCTest

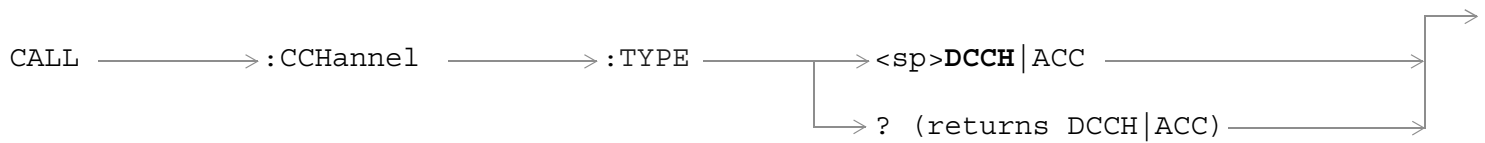
CALL → :AVCTest → :AVC → :SATone → :STATE → <sp>1|ON|0|OFF →  
 ? (returns 1|0) →

“Diagram Conventions” on page 233

### CALL:AVCTest:AVC:SATone:STATE

Function	Turns SAT on or off. Applies only in AVC test mode. In active cell mode SAT state is not controlled by the user.
Setting	Range: 1 ON 0 OFF
Query	Range: 1 0
*RST Setting	1 (on)
Programming Example	
OUTPUT 714;"CALL:AVCTEST:AVC:SATONE:STATE 0" !Turns the supervisory audio tone off.	

## CALL:CCHannel

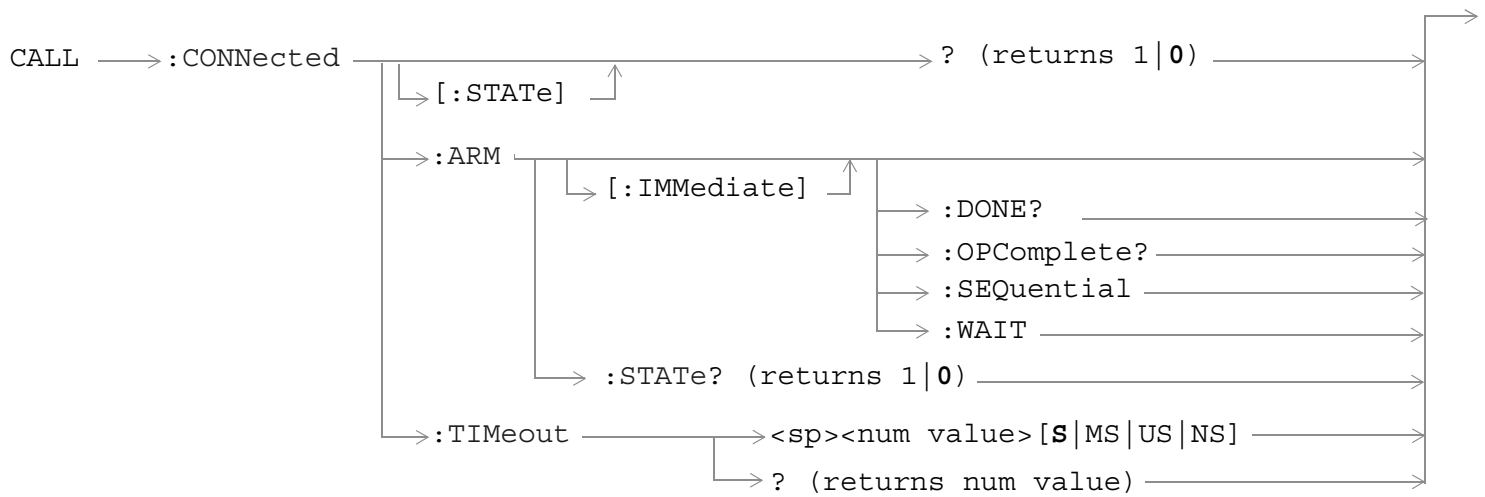


“Diagram Conventions” on page 233

### CALL:CCHannel:TYPE

Function	Specifies which type of control channel is to be generated.
Setting	range: DCCH ACC
Query	range: DCCH ACC
*RST Setting	DCCH
Programming Example	
OUTPUT 714;"CALL:CCH:TYPE DCCH" !Sets control channel type to digital control channel.	

## CALL:CONNEcted



“Diagram Conventions” on page 233

## CALL:CONNeCted

### CALL:CONNeCted[:STATe]

Function	Queries the connected/disconnected state of the call. A one is returned if the call is in the connected state. A zero is returned if the call is in the idle (disconnected) state. If the call is in any state other than connected or idle, the query will hang until the call state transitions to the connected or idle state. When used in conjunction with the CALL:CONNeCted:ARM and CALL:CONNeCted:TIMEout commands, the CALL:CONNeCted:STATe? command allows the control program to synchronize to call connection/disconnection. See “Call Processing State Synchronization” on page 225.
Query	Range: 0 1
*RST Setting	0
Programming Example	
OUTPUT 714;"CALL:CONNECTED:STATE?" !returns 1 if call is connected, 0 if call is idle.	

### CALL:CONNeCted:ARM[:IMMeDiate]

Function	Sets (arms) the call-state-change detector. Arming this detector allows the control program to tell the test set that it is expecting a change in the state of a call, prior to initiating the state change.  Once armed, the detector remains armed until there is a call state change to Idle or Connected from one of the transitory states, nor is it disarmed by any transitions from Idle to Idle or Connected to Connected.  When used in conjunction with the CALL CONNeCted:STATe? and the CALL:CONNeCted:TIMEout commands, the CALL:CONNeCted:ARM command allows the control program to synchronize to call connection/disconnection. See “Call Processing State Synchronization” on page 225.
Programming Example	
OUTPUT 714;"CALL:CONNECTED:ARM:IMMEDIATE" !Arms the call-state-change detector.	

### CALL:CONNeCted:ARM:STATe?

Function	Queries the arm state of the call-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 “Call Processing State Synchronization” on page 225.
Query	Range: 1 0
*RST Setting	0
Programming Example	
OUTPUT 714;"CALL:CONN:ARM:STATE?" !Returns arm state of the call-state-change detector.	



## CALL:CONNEcted:TIMEout

Function	<p>Sets/queries the maximum time the test set will wait for a hanging CALL:CONNEcted:STATe? query to complete. Default setting units are seconds. To set timeout time in units other than seconds, include an optional unit specifier in the command string.</p> <p>A timeout timer is started whenever the call-state-change detector becomes armed or gets rearmed when already armed. The duration of this timeout is set using the CALL:CONNEcted:TIMEout command and should be greater than the maximum amount of time the control program needs to wait between arming the call-state-change detector and the connect/disconnect operation starting. Once the process starts and the call state has moved to one of the transitory states, the IS136 defined protocol timers take over and prevent the call state from staying in a transitory state forever. See "Call Processing State Synchronization" on page 225.</p>
Setting	<p>Range: 0 to 100 seconds Resolution: 0.1 seconds</p>
Query	<p>Range: 0 to 100 seconds Resolution: 0.1 seconds</p>
*RST Setting	10 seconds
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:CONNECTED:TIMEOUT 3" !Sets the CALL:CONNEcted:STATe? query timeout time to 3 seconds.  OUTPUT 714;"CALL:CONNECTED:TIMEOUT 500 MS" !Sets the Sets the CALL:CONNEcted:STATe? query timeout time to 500 milliseconds.</pre>	

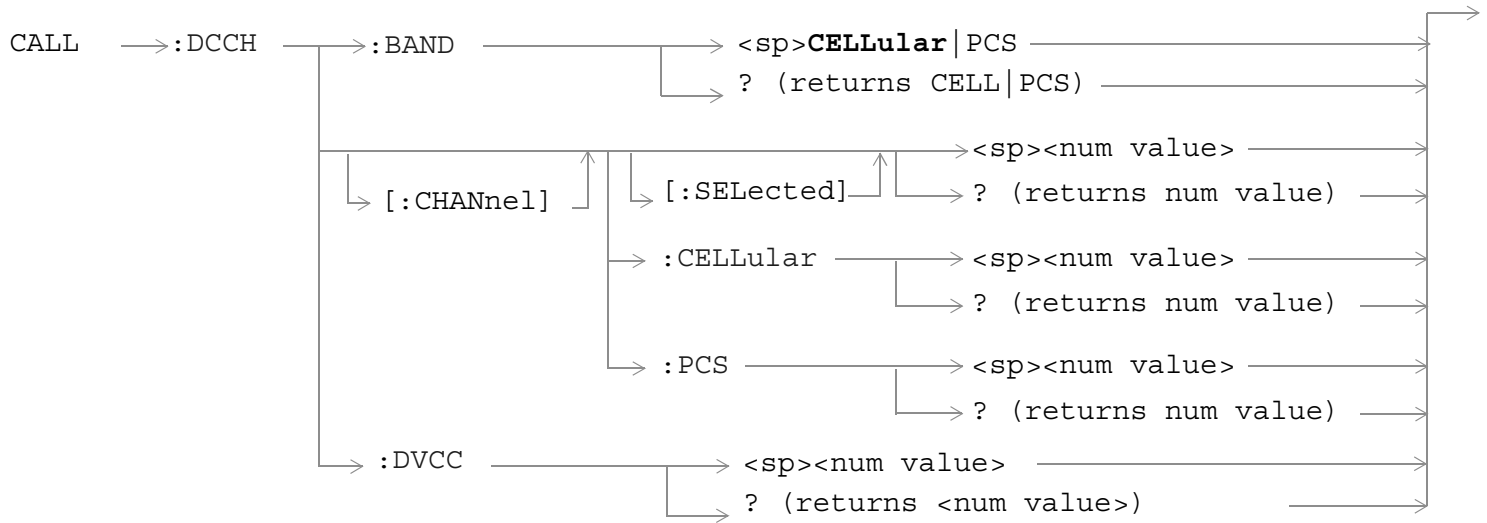
**CALL:CONTRol:DOWNlink:FREQuency:AUTO**

CALL →:CONTRol →:DOWNlink → :FREQuency → :AUTO → <sp>1 | ON | 0 | OFF →  
 → ? (returns 1 | 0) →

“Diagram Conventions” on page 233

**CALL:CONTRol:DOWNlink:FREQuency:AUTO**

Function	Sets/queries whether the user or the base station emulator is in control of the RF generator's frequency setting while in either AVC or DTC test mode. If set to auto (1), the appropriate band and channel parameters are used to set the frequency of the downlink. If set to manual (0), the RF Generator Frequency parameter value is used.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	1 (automatic)
Programming Example	
OUTPUT 714; "CALL:CONTROL:DOWNLINK:FREQUENCY:AUTO OFF" !Enables manual frequency setting.	

**CALL:DCCH**

“Diagram Conventions” on page 233

## CALL:DCCH

### CALL:DCCH:BAND

Function	Sets/queries the band for the digital control channel during active cell operating mode.
Setting	Range: CELLular   PCS
Query	Range: CELL   PCS
*RST Setting	CELL
Programming Example OUTPUT 714;"CALL:DCCH:BAND PCS" !Selects the PCS band for the DCCH.	

### CALL:DCCH[:CHANnel][:SELEcted]

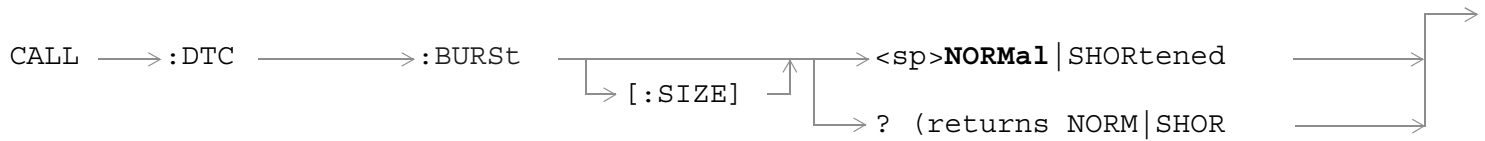
Function	Sets/queries the RF channel number of the digital control channel for the selected band during active cell operating mode.
Setting	Depends upon the selected band: CELLular: 1 to 799, 991 to 1023 PCS: 1 to 1999
Query	Range:CELLular: 1 to 799, 991 to 1023 PCS: 1 to 1999
*RST Setting	CELLular: 991 PCS: 251
Programming Example OUTPUT 714;"CALL:DCCH:CHANNEL:SELECTED 777" !Sets the DCCH for the selected band to 777.	

### CALL:DCCH[:CHANnel]:CELLular

Function	Sets/queries the RF channel number of the digital control channel in the cellular band (applies to active cell operating mode).
Setting	Range: 1 to 799, 991 to 1023
Query	Range: 1 to 799, 991 to 1023
*RST Setting	991
Programming Example OUTPUT 714;"CALL:DCCH:CHANNEL:CELLULAR 799" !Sets the DCCH channel number in the cellular !band to 799.	



## CALL:DTC:BURSt

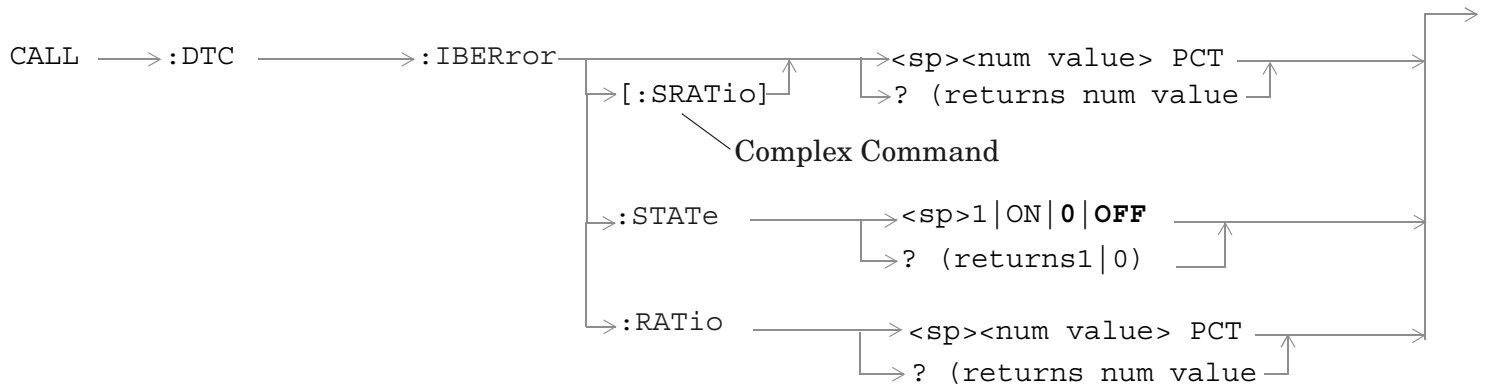


“Diagram Conventions” on page 233

### CALL:DTC:BURSt

Function	Specifies the digital traffic channel (DTC) burst size to be used during assignments and handoffs to DTCs (applies in active cell mode).  Note: This setting is ignored when a mobile that is camped on an ACC is commanded to go to a DTC. In this case, the mobile is <u>always</u> commanded to use shortened bursts on the DTC. However, when originating a call from a DCCH to a DTC, or anytime a handoff to a DTC is performed, the DTC Burst Size you specify is used.
Setting	Range: NORMAl   SHORtened
Query	Range: NORM   SHOR
*RST Setting	NORM
Programming Example	
OUTPUT 714;"CALL:DTC:BURST SHORTENED" !Sets the DTC burst size to shortened burst.	

## CALL:DTC:IBERror



“Diagram Conventions” on page 233

### CALL:DTC:IBERror[:SRATio]

Function	Sets/queries the level (in percent) of induced bit errors sent to the mobile on a DTC. When setting a value, the CALL:DTC:IBERror:STATe is automatically set to ON. When querying the value, the state is not affected.
Setting	Range: 0 PCT to 20 PCT
Query	Range: 0 to 20
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"CALL:DTC:IBERror 7 PCT" !Enables induced bit errors and sets the induced Bit Error Ratio to 7 percent.	

### CALL:DTC:IBERror:STATe

Function	Sets/queries the state of the DTC induced errors function.
Setting	Range: 1 ON 0 OFF
Query	Range: 1 0
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"CALL:DTC:IBERror:STATe ON" !Turns on the DTC induced bit error function.	

**CALL:DTC:IBERror****CALL:DTC:IBERror:RATio**

Function	Sets/queries the level (in percent) of induced bit errors sent to the mobile on a DTC when the STATE is set to ON.
Setting	Range: 0 PCT to 20 PCT
Query	Range: 0 to 20
*RST Setting	Off
Programming Example	
OUTPUT 714;"CALL:DTC:IBERror:RATio 5 PCT" !Sets the induced Bit Error Ratio to 5 percent.	



---

## CALL:END

CALL → :END →

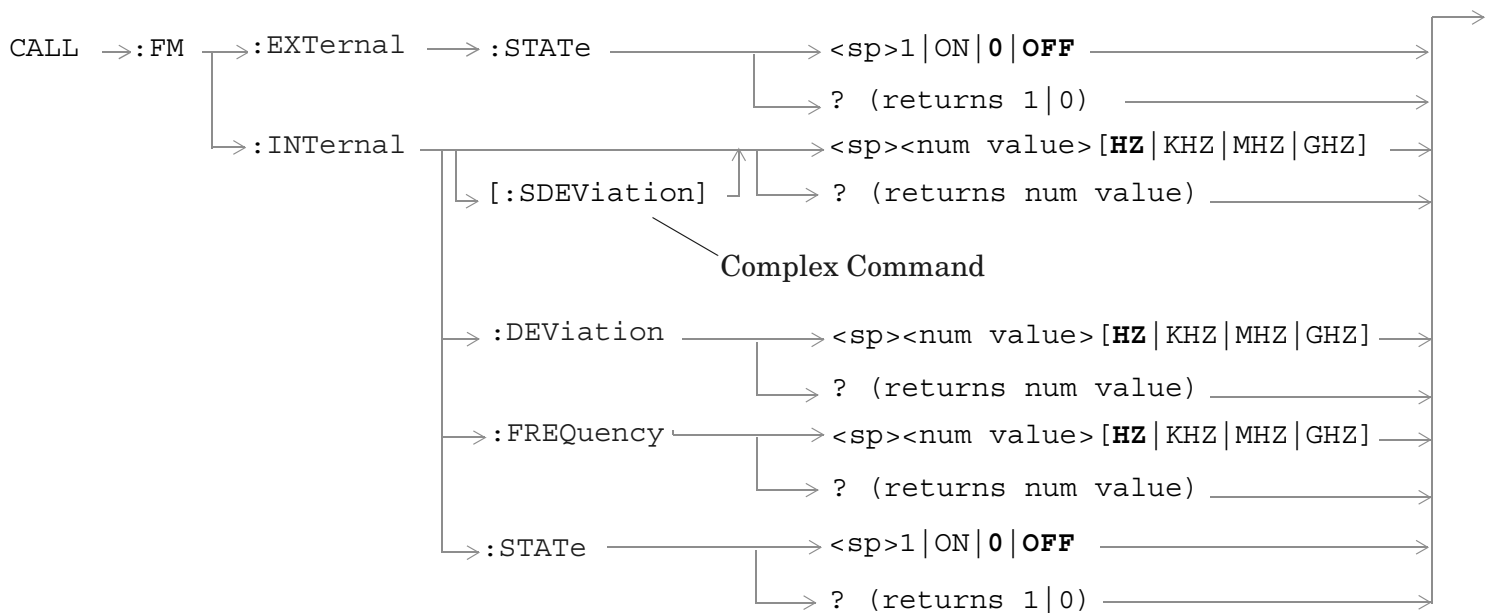


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### CALL:END

Function	<p>Terminates the active call.</p> <p>Note: Immediately following this command with the CALL:ORIGinate command may result in an error. This is often caused by the mobile not being able to respond to the page quickly enough after terminating a call. If the error “Call Operation Rejected; Protocol request ignored” is displayed, wait until the mobile has camped on the control channel before issuing the CALL:ORIGinate command.</p>
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:END" !Terminates the active call.</pre>	

## CALL:FM



“Diagram Conventions” on page 233

### CALL:FM:EXTERNAL:STATE

Function	Sets/queries the external FM input (on or off). The FM deviation is fixed at 20 kHz/volt with a 1 volt maximum input voltage. You must make sure that the sum of the three FM sources (internal FM, external FM, and SAT) do not exceed 20 kHz deviation. The performance of the signal is not specified beyond 20 kHz deviation.  While in active cell mode, the internal and external FM states parameters will be overridden and FM turned off temporarily by the call processing state machine during wideband signaling with the mobile station. Querying during this temporary state will return user defined values. This command applies in active cell mode while on an AVC, and in AVC test mode.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"CALL:FM:EXTERNAL:STATE ON" !Turns on the external FM input.	

### CALL:FM:INTERNAL[:SDEVIATION]

Function	Sets/queries the internal FM source's deviation and automatically sets the internal FM state to ON. This is “complex” command.
----------	--

Setting	Range: 0 to 20 kHz Resolution: 0.1 Hz
Query	Range: 0 to 20 kHz Resolution: 0.1 Hz
*RST Setting	Internal FM: OFF Internal FM: OFF
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:FM:INTERNAL:SDEVIATION 10 kHz" !Sets internal FM deviation to 10 kHz and !automatically turns on the internal FM !source.</pre>	

## CALL:FM

### CALL:FM:INTERNAL:DEVIATION

Function	<p>Sets/queries the internal FM source's deviation. When querying the internal FM deviation, the current setting of this parameter will always be returned regardless of the setting for the internal FM state.</p> <p>You must make sure that the sum of the three FM sources (internal FM, external FM, and SAT) do not exceed 20 kHz deviation. The performance of the signal is not specified beyond 20 kHz deviation.</p> <p>This command applies in active cell mode while on an AVC, and in AVC test mode.</p>
Setting	<p>Range: 0 to 20 kHz</p> <p>Resolution: 0.1 Hz</p>
Query	<p>Range: 0 to 20 kHz</p> <p>Resolution: 0.1 Hz</p>
*RST Setting	8 kHz
Programming Example	
OUTPUT 714;"CALL:FM:INTERNAL:DEVIATION 10 KHZ" !Sets internal FM deviation to 10 kHz.	

### CALL:FM:INTERNAL:FREQUENCY

Function	Sets/queries the frequency of the internal FM source. Applies in active cell mode while on an AVC, and in AVC test mode.
Setting	<p>Range: 20 Hz to 20 kHz</p> <p>Resolution: 0.1 Hz</p>
Query	<p>Range: 20 Hz to 20 kHz</p> <p>Resolution: 0.1 Hz</p>
*RST Setting	1004 Hz
Programming Example	
OUTPUT 714;"CALL:FM:INTERNAL:FREQUENCY 60 HZ" !Sets the internal FM source's frequency to !60 Hz.	

**CALL:FM:INTernal:STATe**

Function	Sets/queries the internal FM source (on or off).  While in active cell mode, the internal and external FM states parameters will be overridden and FM turned off temporarily by the call processing state machine during wideband signaling with the mobile station. Querying during this temporary state will return user defined values. This command applies in active cell mode while on an AVC, and in AVC test mode.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b>  OUTPUT 714;"CALL:FM:INTERNAL:STATE ON" !Turns on the internal FM source.	

## CALL:HANDoff

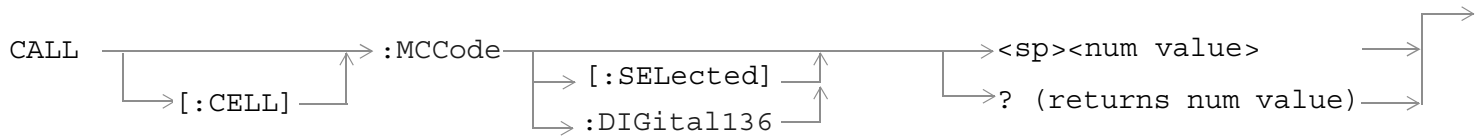


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### CALL:HANDoff[:IMMEDIATE]

Function	<p>Causes the test set to handoff the call to a new set of traffic channel parameters. The parameters involved are as follows: Traffic Channel Type, and Control Channel Type.</p> <ul style="list-style-type: none"> <li>• If Traffic Channel Type is AVC: <ul style="list-style-type: none"> <li>— AVC Channel Number</li> <li>— Analog MS Power Level</li> <li>— FVC SAT Color Code</li> </ul> </li> <li>• If Traffic Channel Type is DTC: <ul style="list-style-type: none"> <li>— DTC Band</li> <li>— DTC Channel Number</li> <li>— Digital MS Power Level</li> <li>— DTC DVCC</li> <li>— Slot Number</li> <li>— Vocoder Type</li> </ul> </li> </ul> <p>Once the handoff is complete the "Current" channel parameters will be updated to reflect the values of the channel parameter settings. This command only applies in active cell mode while on a traffic channel.</p>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:HANDOFF:IMMEDIATE" !Hands the call off to a new traffic channel.</pre>	

## CALL:MCCode



“Diagram Conventions” on page 233

### CALL[:CELL]:MCCode[:SElected]

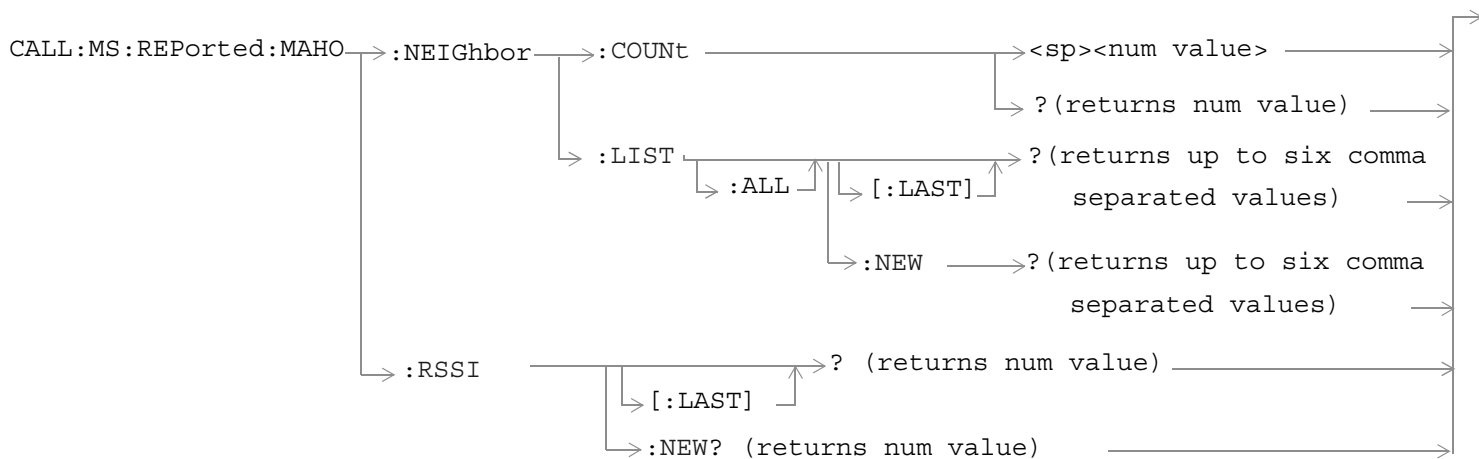
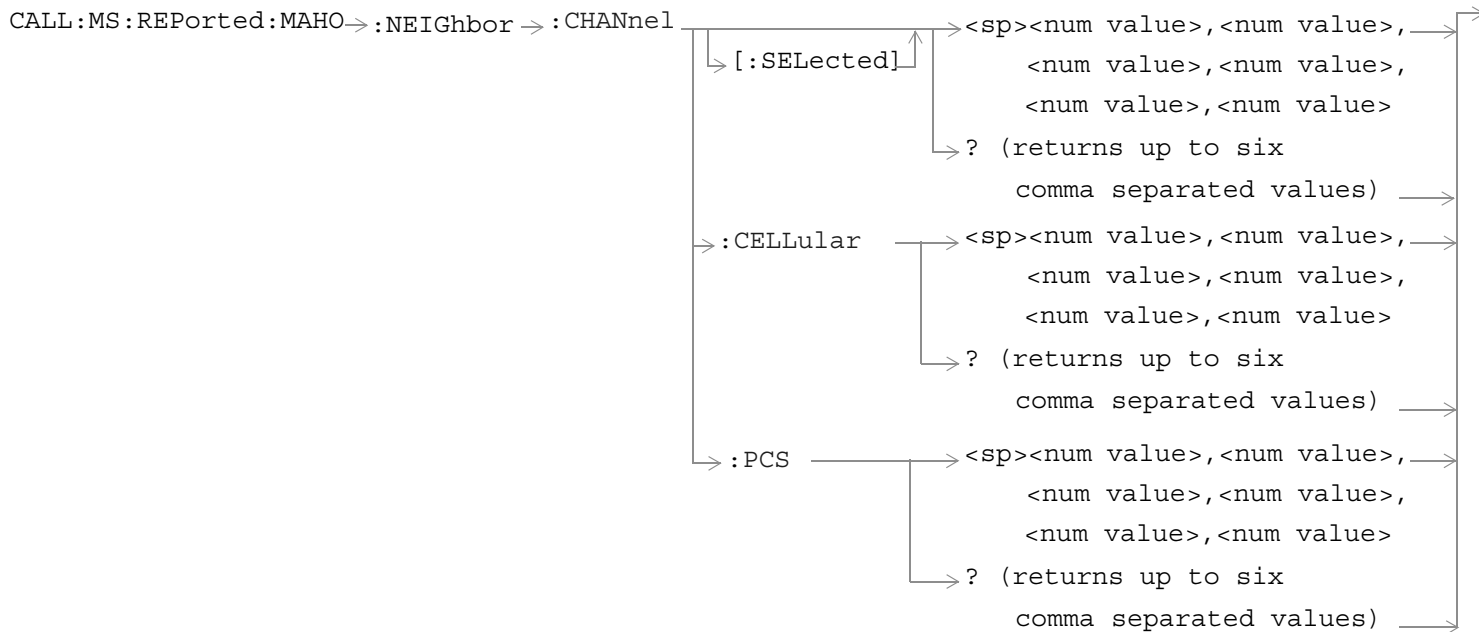
Function	Sets/queries the mobile country code for the active (that is the selected) radio format.
Setting	Range: 0 to 999
Query	Range: 0 to 999
*RST Setting	310
Programming Example	
OUTPUT 714;"CALL:CELL:MCCODE:SELECTED 314" !Sets a value for the mobile country code.	

### CALL[:CELL]:MCCode:DIGital136

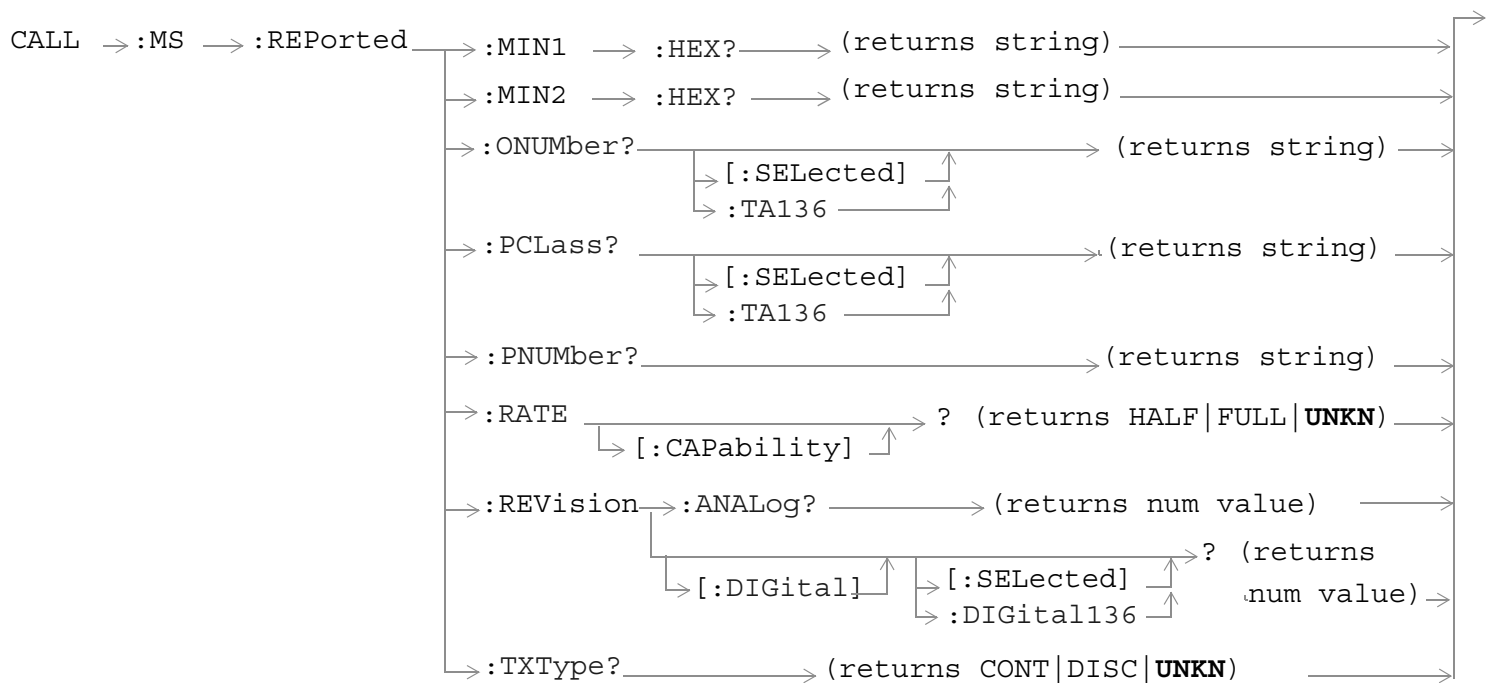
Function	Sets/queries the mobile country code for the DIGital136 radio format whether or not that format is active.
Setting	Range: 0 to 999
Query	Range: 0 to 999
*RST Setting	310
Programming Example	
OUTPUT 714;"CALL:CELL:MCCODE:DIGITAL136 314" !Sets a value for the mobile country code.	







## CALL:MS



“Diagram Conventions” on page 233

### CALL:MS:ANALog:TXLevel[:IMMediate]

Function	Sets/queries the mobile station transmit level while on an analog voice channel. This command is used in active cell operating mode to immediately change the mobile level while on an AVC.
Setting	Range: 0 to 7 MS TX Level 0: expected power, 36 dBm* MS TX Level 1: expected power, 32 dBm MS TX Level 2: expected power, 28 dBm MS TX Level 3: expected power, 24 dBm MS TX Level 4: expected power, 20 dBm MS TX Level 5: expected power, 16 dBm MS TX Level 6: expected power, 12 dBm MS TX Level 7: expected power, 8 dBm *all values for MS TX level assume 0 dB antenna gain
Query	Range: 0 to 7
*RST Setting	2
Programming Example	
OUTPUT 714; "CALL:MS:ANALOG:TXLEVEL 5" !Sets mobile station AVC transmit power level to 5 (expected power 16 dBm).	

**CALL:MS:DIGital:TXLevel[:IMMediate]**

Function	<p>Sets/queries the mobile station transmit level for a digital traffic channel on the selected band.</p> <p>This command is used in active cell operating mode to immediately change the mobile level while on a DTC.</p> <p>Note: This setting is NOT used when the mobile station is camped on a Digital Control Channel (DCCH) and the test set is in the idle state. If a forward control channel message is sent to the mobile while camped on a DCCH, the mobile is always commanded to respond on the reverse channel at Dig MS TX Level 2, regardless of this setting.</p>
Setting	<p>Range: 0 to 10</p> <p>MS TX Level 0: expected power, 36 dBm (cellular or PCS)*  MS TX Level 1: expected power, 32 dBm (cellular or PCS)  MS TX Level 2: expected power, 28 dBm (cellular or PCS)  MS TX Level 3: expected power, 24 dBm (cellular or PCS)  MS TX Level 4: expected power, 20 dBm (cellular or PCS)  MS TX Level 5: expected power, 16 dBm (cellular or PCS)  MS TX Level 6: expected power, 12 dBm (cellular or PCS)  MS TX Level 7: expected power, 8 dBm (cellular or PCS)  MS TX Level 8: expected power, 3 dBm (cellular), 2 dBm (PCS)  MS TX Level 9: expected power, -2 dBm (cellular), -3 dBm (PCS)  MS TX Level 10: expected power, -7 dBm (cellular), -8 dBm (PCS)</p> <p>*all values for MS TX level assume 0 dB antenna gain</p>
Query	Range: 0 to 10
*RST Setting	<p>Cellular: 2  PCS: 2</p>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:MS:DIGITAL:TXLEVEL 5" !Sets mobile station transmit power level to 5 (expected power 16 dBm).</pre>	

## CALL:MS

### CALL:MS:REPorted:BWType?

Function	Queries the mobile reported bandwidth support as part of the station class mark (SCM). Bandwidths supported are 20 MHz, 25 MHz, or unknown. Used only in active cell operating mode.
Query	Range: BWT20   BWT25   UNKN
*RST Setting	UNKN
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:BWTYPE?" !Queries the reported SCM bandwidth support.	

### CALL:MS:REPorted:ESN[:DECimal]?

Function	Queries the decimal formatted version of the electronic serial number. Returns a string of decimal characters. Used only in active cell operating mode.
Query	Range: 0000000000 to 4294967295, or null
*RST Setting	null
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:ESNUMBER:DECIMAL?" !Queries the decimal value of the ESN.	

### CALL:MS:REPorted:ESNumber:HEX?

Function	Queries the hexadecimal formatted version of the electronic serial number. Returns a string of hexadecimal characters. Used only in active cell operating mode.
Query	Range: 0x00000000 to 0xFFFFFFFF, or null
*RST Setting	null
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:ESNUMBER:HEX?" !Queries the Hexadecimal value of the ESN.	

### CALL:MS:REPorted:MAHO[:STATe]

Function	Sets MAHO reporting on or off. When on, the mobile reports MAHO BER, MAHO RSSI, and Neighbor List RSSI information back to the base station while it is on a DTC. Used only in active cell operating mode.
Setting	Range: 1   ON   0   OFF
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:MAHO:STATE ON" !Turns MAHO reporting on.	

**CALL:MS:REPorted:MAHO:BERRor[:LAST]?**

Function	Queries the MAHO BER (Bit Error Ratio) measurement results. Used only in active cell operating mode.
Query	Range: BERI0   BERI1   BERI2   BERI3   BERI4   BERI5   BERI6   BERI7   UNKN BER Interval 0 (<0.01%) BER Interval 1 (0.01 to <0.1%) BER Interval 2 (0.1 to <0.5%) BER Interval 3 (0.5 to <1.0%) BER Interval 4 (1.0 to <2.0%) BER Interval 5 (2.0 to <4.0%) , BER Interval 6 (4.0 to <8.0%) BER Interval 7 (>= 8.0%) UNKNown
*RST Setting	UNKN
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPORTED:MAHO:BERROR:LAST?" !Returns results for MAHO BER measurement.	

**CALL:MS:REPorted:MAHO:BERRor:NEW?**

Function	Clears the last MAHO BER result and requests a new MAHO BER measurement from the mobile.
Query	Range: BERI0   BERI1   BERI2   BERI3   BERI4   BERI5   BERI6   BERI7   UNKN BER Interval 0 (<0.01%) BER Interval 1 (0.01 to <0.1%) BER Interval 2 (0.1 to <0.5%) BER Interval 3 (0.5 to <1.0%) BER Interval 4 (1.0 to <2.0%) BER Interval 5 (2.0 to <4.0%) , BER Interval 6 (4.0 to <8.0%) BER Interval 7 (>= 8.0%) UNKNown
*RST Setting	UNKN
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPORTED:MAHO:BERROR:NEW?" !Clears the last measurement and returns results for a new MAHO BER measurement.	

## CALL:MS

### CALL:MS:REPorted:MAHO:NEIGhbor:BAND

Function	Sets/queries the band type of the neighbor channels. Bands can be set for up to six neighbor channels. The CALL:MS:REP:MAHO:NEIG:COUN command selects the number of channels in the neighbor list.
Setting	Range: 1 = Cellular band 2 = PCS band
Query	Range: 1 2
*RST Setting	1 (cellular band)
Programming Example OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR 1,2,1,2,1,1" !Sets up the RSSI measurement to return results in the cellular band for neighbor 1, the !PCS band for neighbor 2, cellular band for neighbor 3, PCS band for neighbor 4, and !cellular band for neighbors 5 and 6.	

### CALL:MS:REPorted:MAHO:NEIGhbor:CHANnel[:SElected]

Function	Sets/queries the channels for the neighbor cells (up to six) that the mobile station is instructed to report RSSI for in the band selected with the CALL:MS:REP:MAHO:NEIG:BAND command.
Setting	Range: Cell band: 1 to 799, 991 to 1023 PCS band: 2 to 1998
Query	Range: Cell band: 1 to 799, 991 to 1023 PCS band: 2 to 1998
*RST Setting	1 (cellular band) 2 (PCS band)
Programming Example OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR:CHANNEL:SELECTED 112,223,334,445,556,667" !Sets the channel number for neighbor 1 to 112, neighbor 2 to 223, and so forth.	

**CALL:MS:REPorted:MAHO:NEIGHbor:CHANnel:CELLular**

Function	Sets/queries the channels for the neighbor cells (up to 6) that are set to the cellular band using the CALL:MS:REP:MAHO:NEIG:BAND command.
Query	Range: 1 to 799, 991 to 1023
*RST Setting	1
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR:CHANNEL:CELLULAR 112,223,334,445,556,667" !Sets the cellular band channel number for neighbor 1 to 112, neighbor 2 to 223, !and so forth.	

**CALL:MS:REPorted:MAHO:NEIGHbor:CHANnel:PCS**

Function	Sets/queries the channels for the neighbor cells (up to 6) that are set to the PCS band using the CALL:MS:REP:MAHO:NEIG:BAND command.
Query	Range: 2 to 1998
*RST Setting	2
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR:PCS 112,223,334,445,556,667" !Sets the PCS band channel number for neighbor 1 to 112, neighbor 2 to 223, and so forth.	

**CALL:MS:REPorted:MAHO:NEIGHbor:COUNt**

Function	Sets/queries the number of cells in the neighbor list.
Setting	Range: 1 to 6
Query	Range: 1 to 6
*RST Setting	1
<b>Programming Example</b> OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR:COUNT 5" !Sets the number of cells in the neighbor list to 5.	

## CALL:MS

### CALL:MS:REPorted:MAHO:NEIGhbor:LIST[:ALL][:LAST]?

Function	Queries the last RSSI measurement in the neighbor cells specified by the CALL:MS:REP:MAHO:NEIG:COUN command . This query returns a comma separated list <band>,<band>,<band>,<band>,<band>,<band>,<channel>,<channel>,<channel>,<channel>,<channel>,<channel>,<RSSI>,<RSSI>,<RSSI>,<RSSI>,<RSSI>,<RSSI>.  Results for band, channel, and RSSI will be 9.91E+37 for any neighbor cells that are not specified by the CALL:MS:REP:MAHO:NEIG:COUN command.
Query	Range: -113 to -30 dBm, 9.91E+37
Programming Example  OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR:LIST:ALL:LAST?" !Returns the last RSSI measurement results for the specified neighbor cells.	

### CALL:MS:REPorted:MAHO:NEIGhbor:LIST[:ALL]:NEW?

Function	Triggers and queries a new set of RSSI measurements in the neighbor cells specified by the CALL:MS:REP:MAHO:NEIG:COUN command . This query returns a comma separated list <band>,<band>,<band>,<band>,<band>,<band>,<channel>,<channel>,<channel>,<channel>,<channel>,<channel>,<RSSI>,<RSSI>,<RSSI>,<RSSI>,<RSSI>,<RSSI>.  Results for band, channel, and RSSI will be 9.91E+37 for any neighbor cells that are not specified by the CALL:MS:REP:MAHO:NEIG:COUN command.
Query	Range: -113 to -30 dBm, 9.91E+37
Programming Example  OUTPUT 714;"CALL:MS:REPORTED:MAHO:NEIGHBOR:LIST:ALL:NEW?" !Clears the last RSSI measurement and returns a new set of results for the neighbor list .	

### CALL:MS:REPorted:MAHO:RSSI[:LAST]?

Function	Clears the last MAHO RSSI result and requests a new MAHO RSSI measurement from the mobile.
Query	Range: -113 dBm to -30 dBm, 9.91 E+37
*RST Setting	9.91 E+37
Programming Example  OUTPUT 714;"CALL:MS:REPORTED:MAHO:RSSI:NEW?" !Clears the last measurement and returns a new received signal strength result.	



**CALL:MS:REPorted:MAHO:RSSI:NEW?**

Function	Queries the MAHO RSSI (Received Signal Strength Indicator) measurement. Used only in active cell operating mode.
Query	Range: -113 dBm to -30 dBm, 9.91 E+37
*RST Setting	9.91 E+37
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:MAHO:RSSI?" !Returns received signal strength result.	

**CALL:MS:REPorted:MIN1:HEX?**

Function	<p>Queries the 24 bits of the mobile identification number that represent the mobile station's 7 digit phone number. Returns a string of hexadecimal characters.</p> <p>When the MS registers, the MS sends a 34 bit Mobile Identification Number that is divided into MIN1 (24 bits) representing the MS's 7 digit phone number and MIN2 (10 bits) representing the 3 digit area code. When the 34 bit Mobile Identification Number value is received by the test set, Paging Phone Number, MIN1 and MIN2 will be updated.</p> <p>Used only in active cell operating mode.</p>
Query	Range: 0x000000 to 0xFFFFFFFF, or null
*RST Setting	null
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:MIN1:HEX?" !Returns the MIN1 value.	

**CALL:MS:REPorted:MIN2:HEX?**

Function	<p>Queries the 10 bits of the mobile identification number that represent the mobile station's 3 digit area. Returns a string of hexadecimal characters. Used only in active cell operating mode.</p> <p>When the MS registers, the MS sends a 34 bit Mobile Identification Number that is divided into MIN1 (24 bits) representing the MS's 7 digit phone number and MIN2 (10 bits) representing the 3 digit area code. When the 34 bit Mobile Identification Number value is received by the test set, Paging Phone Number, MIN1 and MIN2 will be updated.</p>
Query	Range: 0x000 to 0x3FF, or null
*RST Setting	null
Programming Example	
OUTPUT 714;"CALL:MS:REPORTED:MIN2:HEX?"	

## CALL:MS

### CALL:MS:REPorted:ONUMber[:SElected]?

Function	Queries the phone number the mobile station dialed in a mobile originated call for the active (that is the selected) radio format. Used only in active cell mode. Returns a string of up to 16 digits.
Query	Range: up to 16 digits: 0 through 9, *,#, or null
*RST Setting	null
Programming Example OUTPUT 714;"CALL:MS:REPORTED:ONUMBER:SELECTED?" !Returns the phone number of the last !MS that called the test set.	

### CALL:MS:REPorted:ONUMber:TA136?

Function	Queries the phone number the mobile station dialed in a mobile originated call for the TA136 radio format whether or not that format is active. Used only in active cell mode. Returns a string of up to 16 digits.
Query	Range: up to 16 digits: 0 through 9, *,#, or null
*RST Setting	null
Programming Example OUTPUT 714;"CALL:MS:REPORTED:ONUMBER:TA136?" !Returns the phone number of the last !MS that called the test set.	

### CALL:MS:REPorted:PClass[:SElected]?

Function	Queries the mobile reported power class as part of the station class mark (SCM) for the active (that is the selected) radio format. Used only in active cell operating mode.
Query	Range: 1 through 8, 9.91 E+37
*RST Setting	9.91 E+37
Programming Example OUTPUT 714;"CALL:MS:REPORTED:PCLASS:SELECTED?" !Returns the MS reported power class.	

**CALL:MS:REPorted:PClass:TA136?**

Function	Queries the mobile reported power class as part of the station class mark (SCM) for the TA136 radio format whether or not that format is active.  Used only in active cell operating mode.
Query	Range: 1 through 8, 9.91 E+37
*RST Setting	9.91 E+37
Programming Example  OUTPUT 714;"CALL:MS:REPORTED:PCLASS:TA136?" !Returns the MS reported power class.	

**CALL:MS:REPorted:PNUMber?**

Function	Queries the mobile station reported phone number. When the mobile station registers, the 34 bit mobile identification number (MIN) is used to set the MS reported phone number and paging phone number. If the MIN does not translate into a valid phone number, set the ms reported phone number nad paging phone number to 0000000000. Used only in active cell operating mode.
Query	Range: Up to 10 characters 0 through 9, or null
*RST Setting	null
Programming Example  OUTPUT 714;"CALL:MS:REPORTED:PNUMBER?" !Returns the phone number of the mobile.	

**CALL:MS:REPorted:RATE[:CAPability]?**

Function	Queries the mobile station reported half rate or full rate capabilitiy. Used only in active cell operating mode.
Query	Range: HALF   FULL   UNKN
*RST Setting	UNKN
Programming Example  OUTPUT 714;"CALL:MS:REPORTED:RATE:CAPABILITY?" !Returns the reported rate capability.	

**CALL:MS****CALL:MS:REPorted:REVision[:DIGital][:SElected]?**

Function	Queries the digital mobile reported protocol version that the mobile station supports for the active (that is the selected) radio format.  Used only in active cell operating mode.
Query	Range: 0 to 15, 9.91 E+37  Protocol Version: 0 (TIA/EIA-553/IS-54-A) 1 (TIA/EIA 627) 2 (IS-136 Rev 0) 3 (Permanently Reserved) 4 (EIA/TIA-136-0 pv0) 5 (EIA/TIA-136-A pv1) 6 (EEIA/TIA-136-A p2) 7 (EIA/TIA-136-A pv3) 8 through 15 (9.91 e+37)
*RST Setting	9.91 E+37
<b>Programming Example</b>  OUTPUT 714;"CALL:MS:REPORTED:REVISION:DIGITAL:SELECTED?" !Returns the MS reported !protocol version.	

**CALL:MS:REPorted:REVision[:DIGital]:DIGital136?**

Function	Queries the digital mobile reported protocol version that the mobile station supports for the DIGital136 radio format whether or not that format is active.  Used only in active cell operating mode.
Query	Range: 0 to 15, 9.91 E+37  Protocol Version: 0 (TIA/EIA-553/IS-54-A) 1 (TIA/EIA 627) 2 (IS-136 Rev 0) 3 (Permanently Reserved) 4 (EIA/TIA-136-0 pv0) 5 (EIA/TIA-136-A pv1) 6 (EEIA/TIA-136-A p2) 7 (EIA/TIA-136-A pv3) 8 through 15 (9.91 e+37)
*RST Setting	9.91 E+37
<b>Programming Example</b>  OUTPUT 714;"CALL:MS:REPORTED:REVISION:DIGITAL:DIGITAL136?" !Returns the MS reported !protocol version.	

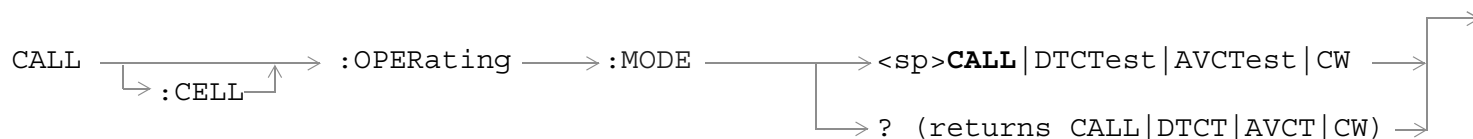
**CALL:MS:REPorted:REVisIon:ANALog?**

Function	Queries the analog mobile reported protocol version that the mobile station supports. Used only in active cell operating mode.
Query	Range: 0 to 3, 9.91E+37  Protocol Version: 0 (TIA/EIA-553/IS-54-A MS) 1 (TIA/EIA 627 dual-mode MS) 2 (IS-95 dual mode MS) 3 (TIA/EIA-136 dual-mode MS) 9.91E+37
*RST Setting	9.91 E+37
Programming Example OUTPUT 714;"CALL:MS:REPORTED:REVISION:ANALOG?"	

**CALL:MS:REPorted:TXType?**

Function	Queries the mobile reported discontinuous transmission support as part of the station class mark (SCM).
Query	Range: CONT   DISC   UNKN
*RST Setting	UNKN
Programming Example OUTPUT 714;"CALL:MS:REPORTED:TXTYPE?"	

## CALL:OPERating

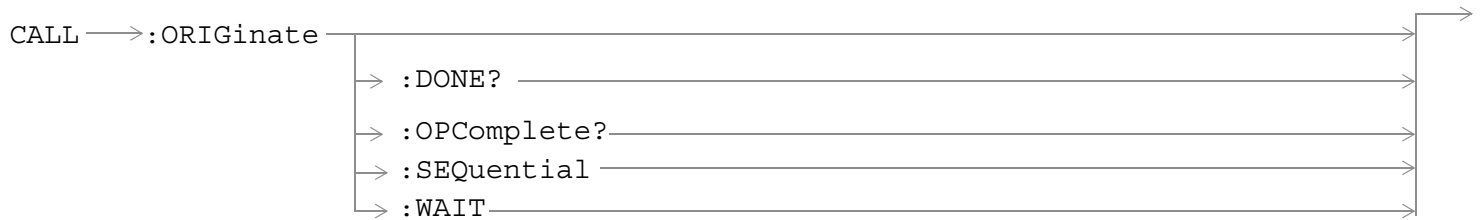


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### CALL[:CELL]:OPERating:MODE

Function	<p>Sets/queries the mode of the base station emulator.</p> <p>CALL is the default operating mode. In CALL mode (also called active cell mode), signaling between the mobile station and the base station emulator is used for call origination, handoffs, MS power level changes, and other operations that simulate in-service mobile interaction.</p> <p>DTCTest generates a forward digital traffic channel to make measurements on mobiles in digital test mode. There is no over-the-air signaling available.</p> <p>AVCTest generates a forward analog voice channel to make measurements on mobiles in analog test mode. The SAT can be turned on or off in this mode. Internal and external FM are available. There is no over-the-air signaling available.</p> <p>CW generates a continuous wave forward signal. This turns the base station emulator’s forward link into a basic signal generator with level (cell power) and frequency (RF generator frequency) control. No reverse demodulation or decoding is available. There is no over-the-air signaling available.</p>
Setting	Range: CALL   DTCTest   AVCTest   CW
Query	Range: CALL   DTCT   AVCT   CW
*RST Setting	CALL
<b>Programming Example</b> OUTPUT 714; "CALL:CELL:OPERATING:MODE DTCTEST" !Selects DTC Test mode.	

## CALL:ORIGinate

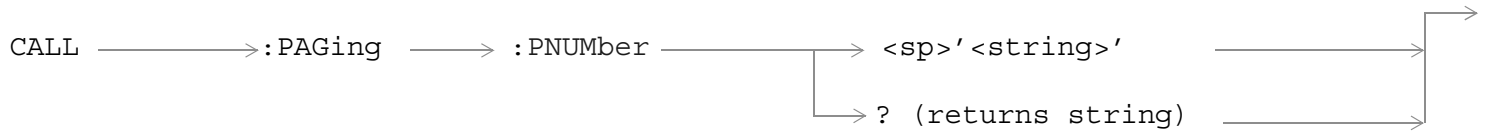


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### CALL:ORIGinate

Function	<p>Performs a base station originated call. See “Call Processing Event Synchronization” on page 221.</p> <p>Additional commands can be appended to aid in controller or mobile station synchronization.</p> <p>Note: Immediately preceding this command with the CALL:END command may result in an error. This is often caused by the mobile not being able to respond to the page quickly enough after terminating a call. If the error “Call Operation Rejected; Protocol request ignored” is displayed, wait until the mobile has camped on the control channel before issuing the CALL:ORIGinate command.</p>
<p>Programming Example</p> <pre> OUTPUT 714;"CALL:ORIGINATE:SEQUENTIAL" !Orignates a base station call.  !Appending SEQUENTIAL to this command  !causes the command to be  !performed sequentially.           </pre>	

## CALL:PAGing:PNUMber



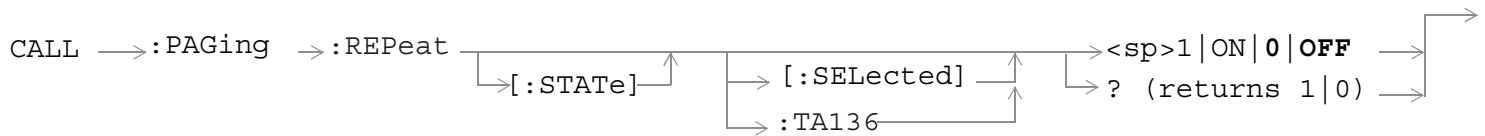
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### CALL:PAGing:PNUMber

Function	Sets/queries the paging phone number. When the mobile station registers, the 34 bit mobile identification number (MIN) is used to set the MS reported phone number and paging phone number. If the MIN does not translate into a valid phone number, the ms reported phone number and paging phone number are set to 0000000000. This setting is overwritten when the phone number is updated.  When setting the paging number, the value is entered as a string (not as a numeric entry). Be sure to enclose the paging number in single quotes.
Setting	Range: up to 10 characters: 0 through 9, or null
Query	Range: up to 10 characters: 0 through 9, or null
*RST Setting	null
Programming Example	
OUTPUT 714;"CALL:PAGING:PNUMBER '8005551212'" !Set the paging number to 8005551212.	



## CALL:PAGing:REPeat



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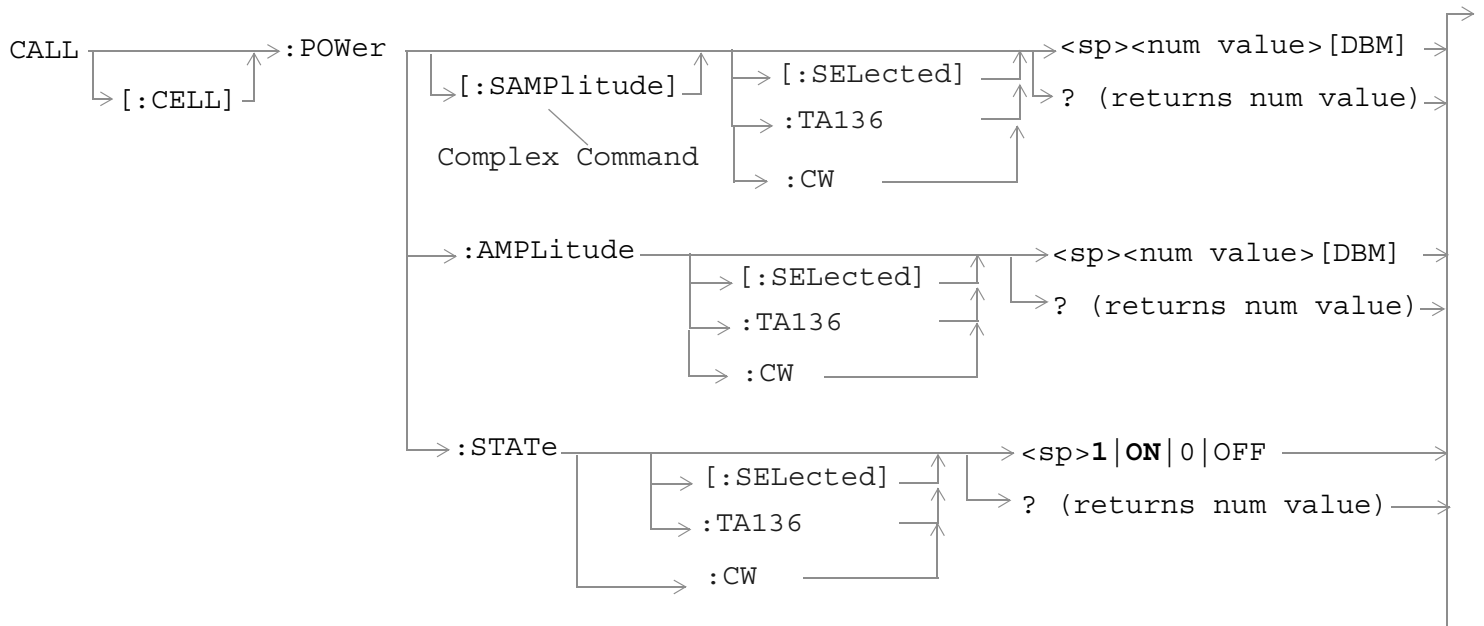
### CALL:PAGing:REPeat[:STATe][:SELeCted]

Function	Sets/queries whether the test set sends a single page command to the mobile when originating a call (repeat=off) or continues to send page commands to the mobile until the mobile responds (repeat=on). This command/query is for the active (that is the selected) radio format.  When repeat paging is on, the test set will appear to be “frozen” until the mobile responds to the paging command or until repeat paging is turned off (if the mobile does not respond).  Repeat paging is only controlled using the Remote User Interface (RUI); no front panel control is provided at this time.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"CALL:PAGING:REPeat:STATE:SELECTED ON" !Enables repeat paging.	

### CALL:PAGing:REPeat[:STATe]:TA136

Function	Sets/queries whether the test set sends a single page command to the mobile when originating a call (repeat=off) or continues to send page commands to the mobile until the mobile responds (repeat=on). This command /query is for the TA136 radio format whether or not that format is active.  When repeat paging is on, the test set will appear to be “frozen” until the mobile responds to the paging command or until repeat paging is turned off (if the mobile does not respond).  Repeat paging is only controlled using the Remote User Interface (RUI); no front panel control is provided at this time.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"CALL:PAGING:REPeat:STATE:TA136 ON" !Enables repeat paging.	

## CALL:POWer



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**CALL[:CELL]:POWer[:SAMPlitude][:SElected]**

Function	<p>Sets/queries the test set's RF output power (Cell Power) for the active (that is the selected) radio format when using the Active Cell, DTC Test, or AVC Test operating mode. This command does not affect the Cell Power setting for the CW operating mode.</p> <p>This is the RF output power at the test set's front panel RF IN/OUT connector (including compensation for amplitude offset).</p> <p>This is a complex command combining the cell power state and amplitude commands. The cell power state is automatically set to ON when this command is used.</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
*RST Setting	-50 dBm
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:CELL:POWER:SAMPLITUDE:SELECTED -30" !Set the Cell Power state to ON and !sets the output power to -30dBm for !the active radio format.</pre>	

## CALL:POWer

### CALL[:CELL]:POWer[:SAMPlitude]:TA136

Function	<p>Sets/queries the test set's RF output power (Cell Power) for the TA136 radio format whether or not that format is active. This setting is only used with the Active Cell, DTC Test, and AVC Test operating modes. This command does not affect the Cell Power setting for the CW operating mode.</p> <p>This is the RF output power at the test set's front panel RF IN/OUT connector (including compensation for amplitude offset).</p> <p>This is a complex command combining the cell power state and amplitude commands. The cell power state is automatically set to ON when this command is used.</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
*RST Setting	-50 dBm
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:CELL:POWER:SAMPLITUDE:TA136 -32" !Set the Cell Power state to ON and !sets the output power to -30dBm for !the TA136 radio format.</pre>	

**CALL[:CELL]:POWer[:SAMPlitude]:CW**

Function	<p>Sets/queries the test set's RF output power (Cell Power) for the active (that is the selected) radio format when Operating Mode is CW. This command does not affect the Cell Power setting for the Active Cell, DTC Test, and AVC Test operating modes.</p> <p>This is the RF output power at the test set's front panel RF IN/OUT connector (including compensation for amplitude offset).</p> <p>This is a complex command combining the cell power state and amplitude commands. The cell power state is automatically set to ON when this command is used.</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
*RST Setting	-50 dBm
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:CELL:POWER:SAMPLITUDE:CW -51DBM" !Sets the Cell Power for the active !radio format in CW mode.</pre>	

## CALL:POWer

### CALL[:CELL]:POWer:AMPLitude[:SElected]

Function	<p>Sets/queries the test set's RF output power (Cell Power) for the active (that is the selected) radio format when using the Active Cell, DTC Test, or AVC Test operating mode. This command does not affect the Cell Power setting for the CW operating mode..</p> <p>This is the RF output power at the test set's front panel RF IN/OUT connector (including compensation for amplitude offset).</p> <p>This command does not affect the cell power state (on/off).</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
*RST Setting	-50 dBm
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE:SELECTED -52" !Sets the Cell Power to -52 dBm for !the active radio format.</pre>	

**CALL[:CELL]:POWer:AMPLitude:TA136**

Function	<p>Sets/queries the test set's RF output power (Cell Power) for the TA136 radio format when using the Active Cell, DTC Test, or AVC Test operating mode. This command does not affect the Cell Power setting for the CW operating mode.. The output power for TA136 radio format is set whether or not that format is active.</p> <p>This is the RF output power at the test set's front panel RF IN/OUT connector (including compensation for amplitude offset).</p> <p>This command does not affect the cell power state (on/off).</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
*RST Setting	-50 dBm
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE:TA136 -53DBM" !Sets the Cell Power to -53 dBm for !the TA136 format.</pre>	

## CALL:POWer

### CALL[:CELL]:POWer:AMPLitude:CW

Function	<p>Sets/queries the test set's RF output power (Cell Power) for the active (that is the selected) radio format when the CW Operating Mode.</p> <p>This command does not affect the Cell Power setting for the Active Cell, DTC Test, and AVC Test operating modes.</p> <p>This is the RF output power at the test set's front panel RF IN/OUT connector (including compensation for amplitude offset).</p> <p>This command does not affect the cell power state (on/off).</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution 0.01 dBm</p> <p>The actual cell power range is defined by adding the value of the associated amplitude offset. For example, if amplitude offset is -3.5 dB, then the Cell Power range will be -13.5 to -130.5 dBm.</p>
*RST Setting	-50 dBm
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE:CW:SELECTED -49" !Sets the Cell Power for the !active format in CW mode.</pre>	

### CALL[:CELL]:POWer:STATe[:SELEcted]

Function	<p>Sets/queries the test set RF output power (Cell Power) on/off state at the test set's front panel RF IN/OUT connector for the active (that is the selected) radio format when using the Active Cell, DTC Test, or AVC Test operating mode. This command does not affect the Cell Power setting for the CW operating mode..</p>
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	1 (on)
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:CELL:POWER:STATE:SELECTED OFF" !Sets the Cell Power state to off !for the active radio format.</pre>	



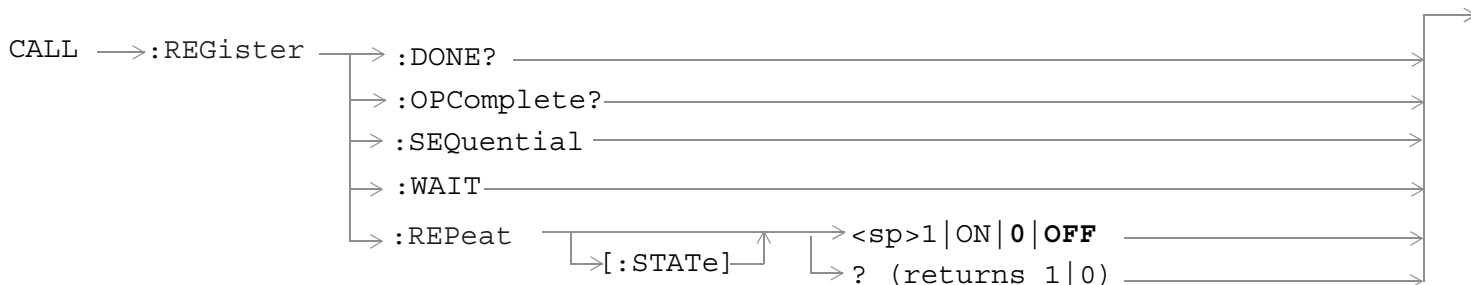
**CALL[:CELL]:POWer:STATe:TA136**

Function	Sets/queries the test set's RF output power (Cell Power) on/off state at the test set's front panel RF IN/OUT connector. The value for the TA136 radio format is set whether or not that format is active.  This command is only used with the Active Cell, DTC Test, or AVC Test operating mode. This command does not affect the Cell Power state for the CW operating mode.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	1 (on)
<b>Programming Example</b>  <pre>OUTPUT 714;"CALL:CELL:POWER:STATE:TA136 ON" !Sets the Cell Power state to on !for the TA136 format.</pre>	

**CALL[:CELL]:POWer:STATe:CW**

Function	Sets/queries the test set's RF output power (Cell Power) on/off state for the active (that is the selected) radio format when the Operating Mode is set to CW. This setting is not used with the Active Cell, DTC Test, and AVC Test operating modes.  Sets/queries the test set RF output power on/off state at the test set's front panel RF IN/OUT connector.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	1 (on)
<b>Programming Example</b>  <pre>OUTPUT 714;"CALL:CELL:POWER:STATE:CW:SELECTED OFF" !Sets the Cell Power state for !the active format in CW mode.</pre>	

## CALL:REGister



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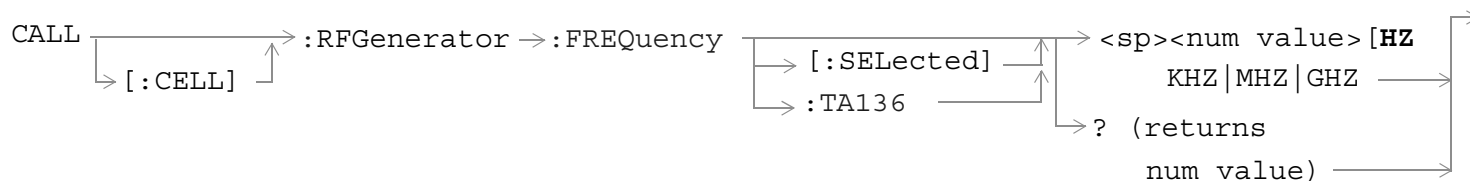
### CALL:REGister

<p><b>Function</b></p>	<p>Performs a base station registration. See “Call Processing Event Synchronization” on page 221. Additional commands can be appended to aid in controller or mobile station synchronization.</p> <p>Note: Immediately preceding this command with the CALL:END command may result in an error. This is often caused by the mobile not being able to respond to the registration quickly enough after terminating a call. If the error “Call Disconnected; No response to registration request” is displayed, wait until the mobile has camped on the control channel before issuing the CALL:REGister command, or turn on repeat registration (CALL:REG:REP ON).</p>
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"CALL:REGISTER:SEQUENTIAL" !Originates a base station registration.  !Appending SEQUENTIAL to this command  !causes the command to be  !performed sequentially.                 </pre>	

**CALL:REGister:REPeat[:STATe]**

Function	<p>Sets/queries whether the test set sends a single registration command to the mobile when registering a mobile (repeat=off) or continues to send the registration command to the mobile until the mobile responds (repeat=on).</p> <p>When repeat registration is on, the test set will appear to be “frozen” until the mobile responds to the registration command or until repeat registration is turned off (if the mobile does not respond).</p> <p>Repeat registration is only controlled using the Remote User Interface (RUI); no front panel control is provided at this time.</p>
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"CALL:REGister:REPeat ON" !Enables repeat registration.	

## CALL:RFGenerator



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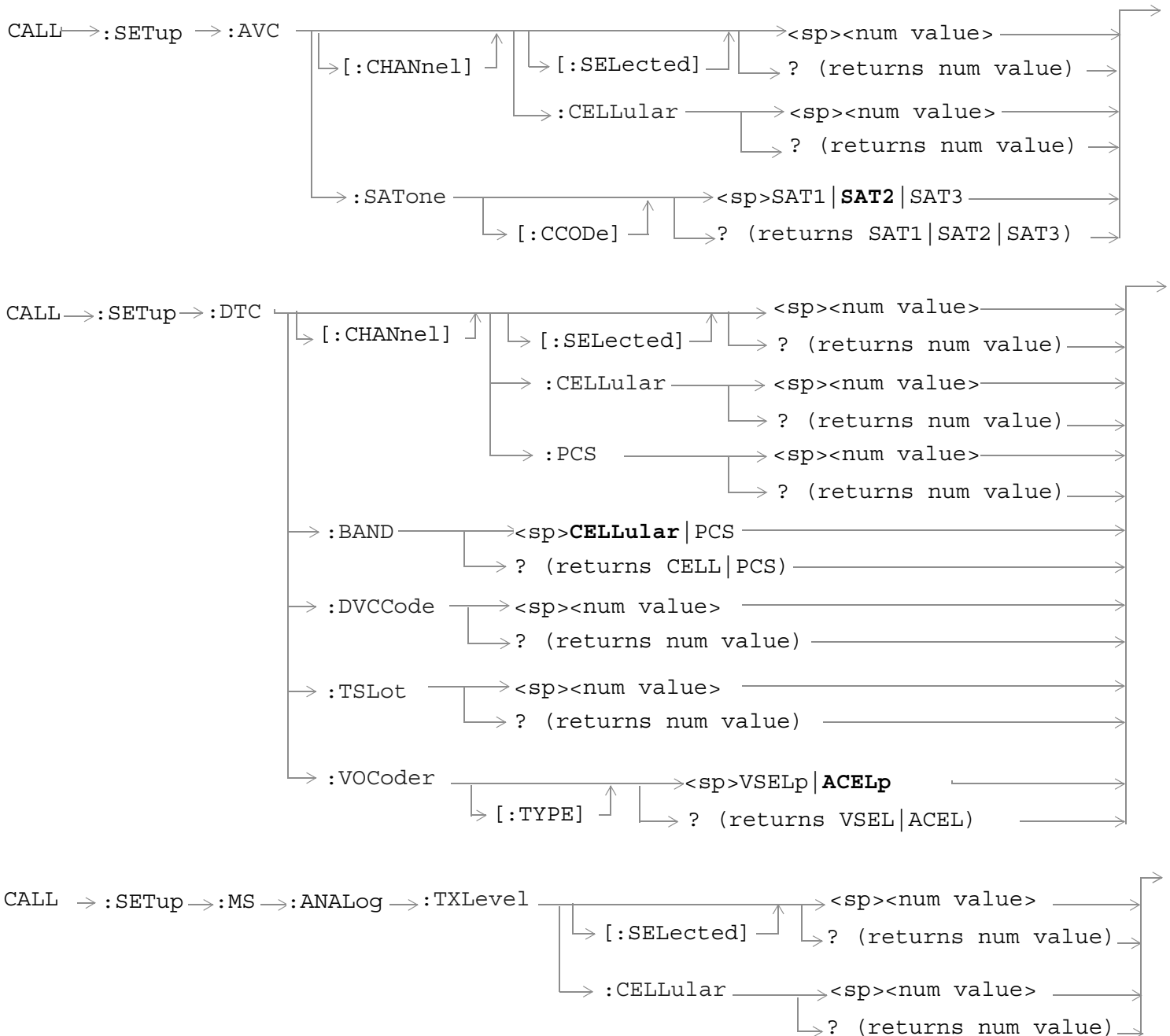
### CALL[:CELL]:RFGenerator:FREQUENCY[:SElected]

Function	Sets/queries RF generator frequency for the active (that is the selected) radio format. If no units are specified the setting defaults to Hz. This setting is only used with AVC Test, DTC Test, and CW operating modes.
Setting	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
Query	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
*RST Setting	851 MHz
Programming Example	
OUTPUT 714;"CALL:CELL:RFGENERATOR:FREQUENCY:SELECTED 896.2MHZ" !Sets RF Gen frequency.	

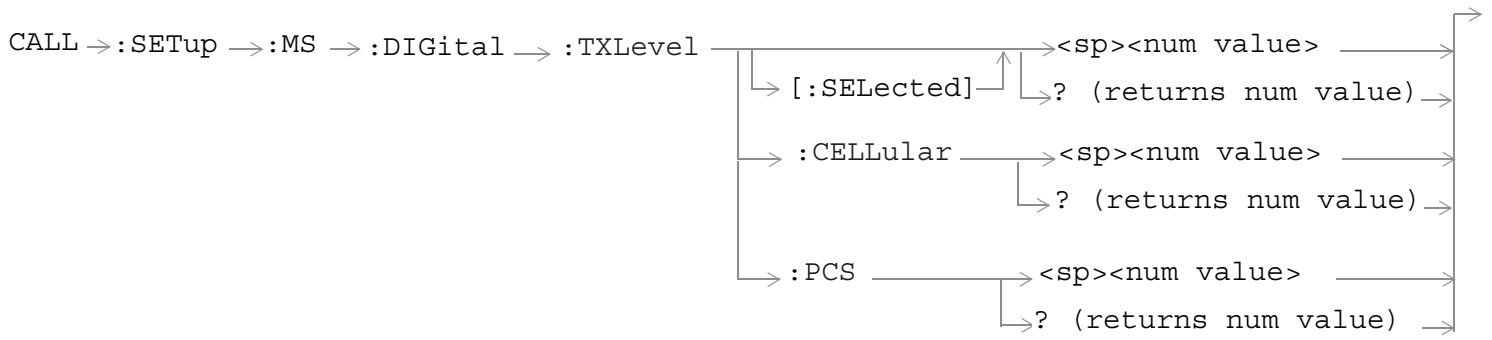
### CALL[:CELL]:RFGenerator:FREQUENCY:TA136

Function	Sets/queries RF generator frequency for the TA136 radio format whether or not that format is active. If no units are specified the setting defaults to Hz. This setting is only used with AVC Test, DTC Test, and CW operating modes.
Setting	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
Query	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
*RST Setting	851 MHz
Programming Example	
OUTPUT 714;"CALL:CELL:RFGENERATOR:FREQUENCY:TA136 896.2MHZ" !Sets RF Gen frequency.	

## CALL:SETup



## CALL:SETup



“Diagram Conventions” on page 233

**CALL:SETup:AVC[:CHANnel][:SELEcted]**

Function	Sets/queries the RF channel number of the analog voice channel.  During active cell operating mode, this setting does not take affect until a call is originated on the AVC or a handoff occurs to a new AVC. This setting takes effect immediately during AVC Test operating mode.
Setting	Range: 1 through 799, 991 through 1023, 9.91 E+37
Query	Range: 1 through 799, 991 through 1023, 9.91 E+37
*RST Setting	300
Programming Example	
OUTPUT 714;"CALL:SETUP:AVC:CHANNEL:SELECTED 799" !Set the AVC to channel 799.	

**CALL:SETup:AVC[:CHANnel]:CELLular**

Function	Sets/queries the RF channel number of the analog voice channel, specifying the cellular band (800 MHz).  During active cell operating mode, this setting does not take affect until a call is originated on the AVC or a handoff occurs to a a new AVC. This setting takes effect immediately during AVC Test operating mode. PCS band analog operation is currently not supported.
Setting	Range: 1 through 799, 991 through 1023, 9.91 E+37
Query	Range: 1 through 799, 991 through 1023, 9.91 E+37
*RST Setting	300
Programming Example	
OUTPUT 714;"CALL:SETUP:AVC:CHANNEL:CELLULAR 799" !Set the AVC to cell band channel 799.	

**CALL:SETup:AVC:SATone[:CCODE]**

Function	Sets/queries the supervisory audio tone's color code (frequency).  In active cell mode, this command sets/queries the SAT color code (frequency) to be used on the next handoff.  In test mode, this command sets/queries the current SAT color code (frequency).
Setting	Range: SAT1   SAT2   SAT3  SAT1 = 5970 Hz SAT2 = 6000 Hz SAT3 = 6030 Hz
Query	Range: SAT1   SAT2   SAT3
*RST Setting	SAT2
Programming Example	
OUTPUT 714;"CALL:SETUP:AVC:SATONE:CCODE SAT1" !Sets the SAT frequency to 5970 Hz.	

## CALL:SETup

### CALL:SETup:DTC[:CHANnel][:SElected]

Function	<p>Specifies the RF channel number of the digital traffic channel in the selected band. Used only in active cell and DTC test mode.</p> <p>In active cell mode, this command sets/queries the RF channel number to be used when originating a call or when a handoff takes place.</p> <p>In DTC test mode this command sets/queries the current RF channel number.</p>
Setting	<p>Range:</p> <ul style="list-style-type: none"><li>• Cellular: 1 through 799, 991 through 1023</li><li>• PCS: 1 through 1999</li></ul>
Query	<p>Range:</p> <ul style="list-style-type: none"><li>• Cellular: 1 through 799, 991 through 1023</li><li>• PCS: 1 through 1999</li></ul>
*RST Setting	<p>Cellular: 300</p> <p>PCS: 300</p>
<p>Programming Example</p> <p>OUTPUT 714 ; "CALL : SETUP : DTC : CHANNEL : SELECTED"</p>	

### CALL:SETup:DTC[:CHANnel]:CELLular

Function	<p>Sets/queries the RF channel number of the digital traffic channel in the cellular band. Used only in active cell and DTC test modes.</p> <p>In active cell mode, this command sets/queries the RF channel number to be used when originating a call or when a handoff takes place.</p> <p>In DTC test mode this command sets/queries the current RF channel number.</p>
Setting	<p>Range: 1 through 799, 991 through 1023</p>
Query	<p>Range: 1 through 799, 991 through 1023</p>
*RST Setting	<p>300</p>
<p>Programming Example</p> <p>OUTPUT 714 ; "CALL : SETUP : DTC : CHANNEL : CELLULAR 799"</p>	



**CALL:SETup:DTC[:CHANnel]:PCS**

Function	Sets/queries the RF channel number of the digital traffic channel in the PCS band. Used only in active cell and DTC test modes.  In active cell mode, this command sets/queries the RF channel number to be used when originating a call or when a handoff takes place.  In DTC test mode this command sets/queries the current RF channel number.
Setting	Range: 1 through 1999
Query	Range: 1 through 1999
*RST Setting	300
Programming Example OUTPUT 714;"CALL:SETUP:DTC:CHANNEL:PCS 777"	

**CALL:SETup:DTC:BAND**

Function	Sets/queries the digital traffic channel band.  In active cell mode, this command sets/queries the DTC band to be used when originating a call or when a handoff takes place.  In DTC test mode this command sets/queries the current DTC band.
Setting	Range: CELLular   PCS
Query	Range: CELL   PCS
*RST Setting	CELL
Programming Example OUTPUT 714;"CALL:SETUP:DTC:BAND PCS"	

**CALL:SETup:DTC:DVCCode**

Function	Sets/queries the digital verification color code (DVCC) that is carried on the digital traffic channel (DTC).  In active cell mode, this command sets/queries the DTC's DVCC to be used when originating a call or when a handoff takes place.  In DTC test mode this command sets/queries the current DTC DVCC.
Setting	Range: 0 to 255
Query	Range: 0 to 255, 9.91 E+37
*RST Setting	1
Programming Example OUTPUT 714;"CALL:SETUP:DTC:DVCC 210"	

## CALL:SETup

### CALL:SETup:DTC:TSLot

Function	<p>Sets/queries the digital traffic channel timeslot. Since the test set only supports full rate vocoders, 2 slots are used to make up a DTC. For example if the user selects 1 the DTC will actually use slots 1 and 4, if 2 is selected, slots 2 and 5 will be used, if 6 is selected, slots 3 and 6 will be used.</p> <p>In active cell mode, this command sets/queries the DTC timeslot to be used when originating a call or when a handoff takes place.</p> <p>In DTC test mode this command sets/queries the current DTC timeslot.</p>
Setting	Range: 1 to 6
Query	Range: 1 to 6
*RST Setting	1
Programming Example	
OUTPUT 714;"CALL:SETUP:DTC:TSLOT 3"	

### CALL:SETup:DTC:VOCoder

Function	Sets/queries the vocoder type for the DTC when in active cell operating mode.
Setting	Range: VSELP ACELP1
Query	Range: VSEL ACEL1
*RST Setting	ACEL1
Programming Example	
OUTPUT 714;"CALL:SETUP:DTC:VOCODER VSELP"	

**CALL:SETup:MS:ANALog:TXLevel[:SElected]**

Function	Sets/queries the mobile power level to be used when originating a call on an AVC, or when performing a handoff to an AVC in the selected band, when in active cell operating mode.  In AVC Test operating mode, this command immediately changes the expected analog MS TX level.
Setting	Range: 0 to 7  MS TX Level 0: expected power, 36 dBm* MS TX Level 1: expected power, 32 dBm MS TX Level 2: expected power, 28 dBm MS TX Level 3: expected power, 24 dBm MS TX Level 4: expected power, 20 dBm MS TX Level 5: expected power, 16 dBm MS TX Level 6: expected power, 12 dBm MS TX Level 7: expected power, 8 dBm  *all values for MS TX level assume 0 dB antenna gain
Query	Range: 0 to 7
*RST Setting	2
<b>Programming Example</b>  OUTPUT 714;"CALL:SETUP:MS:ANALOG:TXLEVEL:SELECTED 5" !Sets the handoff transmit power level to 5.	

## CALL:SETup

### CALL:SETup:MS:ANALog:TXLevel:CELLular

Function	Sets/queries the mobile power level to be used when originating a call on an AVC, or when performing a handoff to an AVC in the cellular (800 MHz) band, when in active cell operating mode.  In AVC Test operating mode, this command immediately changes the expected analog MS TX level.
Setting	Range: 0 to 7  MS TX Level 0: expected power, 36 dBm* MS TX Level 1: expected power, 32 dBm MS TX Level 2: expected power, 28 dBm MS TX Level 3: expected power, 24 dBm MS TX Level 4: expected power, 20 dBm MS TX Level 5: expected power, 16 dBm MS TX Level 6: expected power, 12 dBm MS TX Level 7: expected power, 8 dBm  *all values for MS TX level assume 0 dB antenna gain
Query	Range: 0 to 7
*RST Setting	2
<b>Programming Example</b>  OUTPUT 714;"CALL:SETUP:MS:ANALOG:TXLEVEL:CELLULAR 5" !Sets the handoff transmit power level to 5 in the cellular band.	

**CALL:SETup:MS:DIGital:TXLevel[:SElected]**

Function	Sets/queries the mobile power level to be used when originating a call on a DTC, or when performing a handoff to a DTC in the selected band, when in active cell operating mode.  In DTC Test operating mode, this command immediately changes the expected digital MS TX level.
Setting	Range: 0 to 10  MS TX Level 0: expected power, 36 dBm (cellular or PCS)* MS TX Level 1: expected power, 32 dBm (cellular or PCS) MS TX Level 2: expected power, 28 dBm (cellular or PCS) MS TX Level 3: expected power, 24 dBm (cellular or PCS) MS TX Level 4: expected power, 20 dBm (cellular or PCS) MS TX Level 5: expected power, 16 dBm (cellular or PCS) MS TX Level 6: expected power, 12 dBm (cellular or PCS) MS TX Level 7: expected power, 8 dBm (cellular or PCS) MS TX Level 8: expected power, 3 dBm (cellular), 2 dBm (PCS) MS TX Level 9: expected power, -2 dBm (cellular), -3 dBm (PCS) MS TX Level 10: expected power, -7 dBm (cellular), -8 dBm (PCS)  *all values for MS TX level assume 0 dB antenna gain
Query	Range: 0 to 10
*RST Setting	Cellular: 2 PCS: 2
<b>Programming Example</b>  OUTPUT 714;"CALL:SETUP:MS:DIGITAL:TXLEVEL:SELECTED 5" !Sets mobile station transmit power level to 5 (expected power 16 dBm).	

## CALL:SETup

### CALL:SETup:MS:DIGital:TXLevel:CELLular

Function	Sets/queries the mobile power level to be used when originating a call on a DTC, or when performing a handoff to a DTC in the cellular (800 MHz) band, when in active cell operating mode.  In DTC Test operating mode, this command immediately changes the expected digital MS TX level.
Setting	Range: 0 to 10  MS TX Level 0: expected power, 36 dBm* MS TX Level 1: expected power, 32 dBm MS TX Level 2: expected power, 28 dBm MS TX Level 3: expected power, 24 dBm MS TX Level 4: expected power, 20 dBm MS TX Level 5: expected power, 16 dBm MS TX Level 6: expected power, 12 dBm MS TX Level 7: expected power, 8 dBm MS TX Level 8: expected power, 3 dBm MS TX Level 9: expected power, -2 dBm MS TX Level 10: expected power, -7 dBm  *all values for MS TX level assume 0 dB antenna gain
Query	Range: 0 to 10
*RST Setting	2
Programming Example  OUTPUT 714;"CALL:SETUP:MS:DIGITAL:TXLEVEL:CELLULAR 5" !Sets the handoff transmit power level to 5 (expected power 16 dBm).	

## CALL:SETup:MS:DIGital:TXLevel:PCS

Function	Sets/queries the mobile power level to be used when originating a call on a DTC, or when performing a handoff to a DTC in the PCS (1900 MHz) band, when in active cell operating mode. In DTC Test operating mode, this command immediately changes the expected digital MS TX level
Setting	<p>Range: 0 to 10</p> <p>MS TX Level 0: expected power, 36 dBm*</p> <p>MS TX Level 1: expected power, 32 dBm</p> <p>MS TX Level 2: expected power, 28 dBm</p> <p>MS TX Level 3: expected power, 24 dBm</p> <p>MS TX Level 4: expected power, 20 dBm</p> <p>MS TX Level 5: expected power, 16 dBm</p> <p>MS TX Level 6: expected power, 12 dBm</p> <p>MS TX Level 7: expected power, 8 dBm</p> <p>MS TX Level 8: expected power, 2 dBm</p> <p>MS TX Level 9: expected power, -3 dBm</p> <p>MS TX Level 10: expected power, -8 dBm</p> <p>*all values for MS TX level assume 0 dB antenna gain</p>
Query	Range: 0 through 10
*RST Setting	2
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:SETUP:MS:DIGITAL:TXLEVEL:PCS 5" !Sets the handoff transmit power level to 5 (expected power 16 dBm).</pre>	

## CALL:SID



“Diagram Conventions” on page 233

### CALL[:CELL]:SID

Function	Sets/queries the system identification number.
Setting	Range: 0 to 32767
Query	Range: 0 to 32767
*RST Setting	231
Programming Example	
OUTPUT 714;"CALL:CELL:SID 30" !Set the system identification number to 30.	



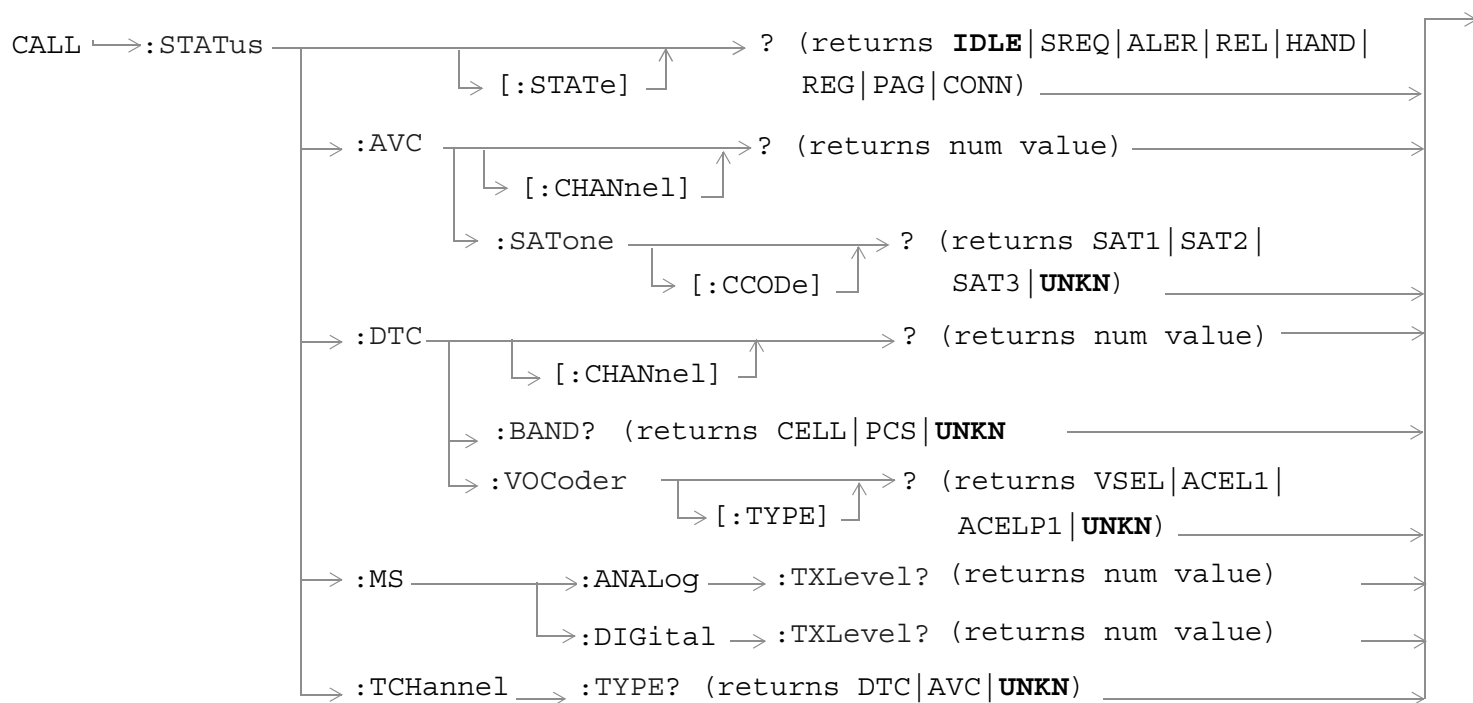
## CALL:SOCode



“Diagram Conventions” on page 233

### CALL[:CELL]:SOCode

Function	Sets/queries the system operator code.
Setting	Range: 0 to 4095
Query	Range: 0 to 4095
*RST Setting	0
Programming Example	
OUTPUT 714;"CALL:CELL:SOCODE 314" !Sets the system operator code to 314.	

**CALL:STATUS**

“Diagram Conventions” on page 233

**CALL:STATUS[:STATE]?**

Function	Queries the status of the call. Only used in active cell operating mode.
Setting	Range: IDLE   SREQ   ALER   REL   HAND   REG   PAG   CONN (Idle, requesting service, alerting, releasing, handing off, registering, paging, connected)
Query	Range: IDLE   SREQ   ALER   REL   HAND   REG   PAG   CONN
*RST Setting	IDLE
Programming Example	
OUTPUT 714;"CALL:STATUS:STATE?" !Query the current call status.	

**CALL:STATUS:AVC[:CHANNEL]?**

Function	Queries the active channel number when connected on an analog voice channel. Only used in active cell operating mode.
Query	Range: 1 through 799, 991 through 1023, 9.91 E+37
*RST Setting	9.91E37 (*RST disconnects the call, so the mobile is no longer on an AVC.)
Programming Example	
OUTPUT 714;"CALL:STATUS:AVC:CHANNEL?"	

**CALL:STATUS:AVC:SATone[:CCODE]?**

Function	Queries the active supervisory audio tone frequency when connected on an analog voice channel. Only used in active cell operating mode.
Query	Range: SAT1   SAT2   SAT3   UNKN SAT1 = 5970 Hz SAT2 = 6000 Hz SAT3 = 6030 Hz
*RST Setting	UNKN (*RST disconnects the call, so the mobile is no longer on an AVC.)
Programming Example	
OUTPUT 714;"CALL:STATUS:AVC:SATONE:CCODE?"	

## CALL:STATUS

### CALL:STATUS:DTC[:CHANNEL]?

Function	Queries the active channel number when connected on a digital traffic channel. Only used in active cell operating mode.
Query	Range: <ul style="list-style-type: none"><li>• Cellular: 1 through 799, 990 through 1023, 9.91E37</li><li>• PCS: 1 through 1999, 9.91E37</li></ul>
*RST Setting	9.91E37 (*RST disconnects the call, so the mobile is no longer on a DTC.)
Programming Example OUTPUT 714;"CALL:STATUS:DTC:CHANNEL?"	

### CALL:STATUS:DTC:BAND?

Function	Queries the band of the active digital traffic channel. Only used in active cell operating mode.
Query	Range: CELL   PCS   UNKN
*RST Setting	UNKN (*RST disconnects the call, so the mobile is no longer on a DTC.)
Programming Example OUTPUT 714;"CALL:STATUS:DTC:BAND?"	

### CALL:STATUS:DTC:VOCoder[:TYPE]?

Function	Queries the vocoder type for the active digital traffic channel. Only used in active cell operating mode.
Query	Range: VSEL   ACEL1   UNKN
*RST Setting	UNKN (*RST disconnects the call, so the mobile is no longer on a DTC.)
Programming Example OUTPUT 714;"CALL:STATUS:DTC:VOCODER:TYPE?"	

**CALL:STATus:MS:ANALog:TXLevel?**

Function	Queries the power level setting of the mobile on an active analog voice channel. Only used in active cell operating mode.
Query	<p>Range: 0 to 7, 9.91E37</p> <p>MS TX Level 0: expected power, 36 dBm*</p> <p>MS TX Level 1: expected power, 32 dBm</p> <p>MS TX Level 2: expected power, 28 dBm</p> <p>MS TX Level 3: expected power, 24 dBm</p> <p>MS TX Level 4: expected power, 20 dBm</p> <p>MS TX Level 5: expected power, 16 dBm</p> <p>MS TX Level 6: expected power, 12 dBm</p> <p>MS TX Level 7: expected power, 8 dBm</p> <p>*all values for MS TX level assume 0 dB antenna gain</p>
*RST Setting	9.91E37 (*RST disconnects the call, so the mobile is no longer on an AVC.)
<b>Programming Example</b> OUTPUT 714 ; "CALL:STATUS:MS:ANALOG:TXLEVEL?"	

**CALL:STATus:MS:DIGital:TXLevel?**

Function	Queries the uplink power control level. Only used in active cell operating mode.
Query	<p>Range: 0 to 10, 9.91E37</p> <p>MS TX Level 0: expected power, 36 dBm (cellular or PCS)*</p> <p>MS TX Level 1: expected power, 32 dBm (cellular or PCS)</p> <p>MS TX Level 2: expected power, 28 dBm (cellular or PCS)</p> <p>MS TX Level 3: expected power, 24 dBm (cellular or PCS)</p> <p>MS TX Level 4: expected power, 20 dBm (cellular or PCS)</p> <p>MS TX Level 5: expected power, 16 dBm (cellular or PCS)</p> <p>MS TX Level 6: expected power, 12 dBm (cellular or PCS)</p> <p>MS TX Level 7: expected power, 8 dBm (cellular or PCS)</p> <p>MS TX Level 8: expected power, 3 dBm (cellular), 2 dBm (PCS)</p> <p>MS TX Level 9: expected power, -2 dBm (cellular), -3 dBm (PCS)</p> <p>MS TX Level 10: expected power, -7 dBm (cellular), -8 dBm (PCS)</p> <p>*all values for MS TX level assume 0 dB antenna gain</p>
*RST Setting	9.91E37 (*RST disconnects the call, so the mobile is no longer on a DTC.)
<b>Programming Example</b> OUTPUT 714 ; "CALL:STATUS:MS:DIGITAL:TXLEVEL?"	

## CALL:STATUS

### CALL:STATUS:TCHannel:TYPE?

Function	Queries the active traffic channel type. Only used in active cell operating mode.
Query	Range: DTC   AVC   UNKN
*RST Setting	UNKN (*RST disconnects the call, so the mobile is no longer on an active traffic channel.)
<b>Programming Example</b> OUTPUT 714;"CALL:STATUS:TCHANNEL:TYPE?"	



---

## 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

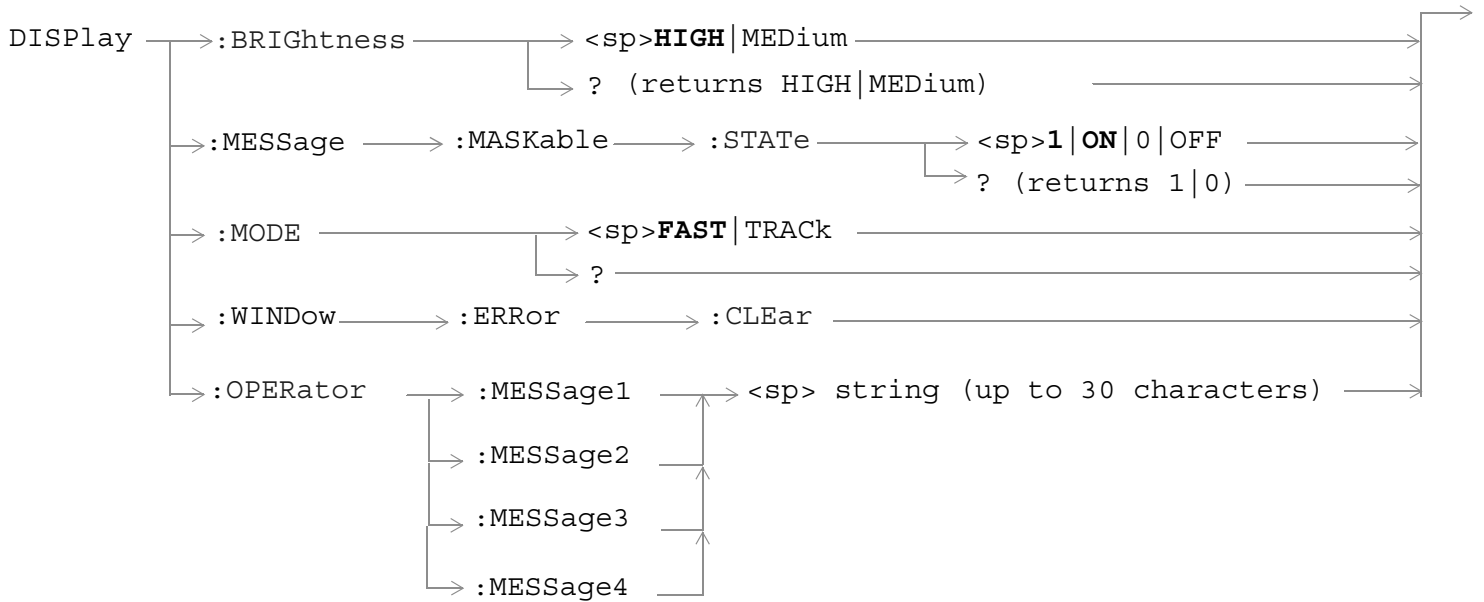
The test set's display brightness parameter has two settings at this time, high and medium. The life of the display's backlight will be maximized when brightness is set to medium. The test set has an auto dimming feature that will lower the display brightness automatically if approximately 10 minutes 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”



# DISPlay



“Diagram Conventions” on page 233

## 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 “Display Backlight Dimming” on page 324.
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)
Programming Example	
OUTPUT 714;“DISPLAY:BRIGHTNESS MEDIUM” !Sets display brightness to medium.	

## DISPlay

### 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 “Error Message Descriptions” on page 622.
Setting	Range: 1   On   0   Off
Query	Range: 1   On   0   Off
Factory setting	1 (on)
Programming Example	
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 “Display Mode (Track/Fast)” on page 670.
Setting	Range: FAST   TRACK
Query	Range: FAST   TRAC
*RST setting	TRACK
Programming Example	
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.
<b>Programming Example</b> <pre>OUTPUT 714;"DISP:OPER:MESS1`Press F6 to stop test`"!Writes the message "Press F6 to stop test" to the uppermost display field.</pre>	

---

## 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:ACPower” on page 329

“FETCh:AFANalyzer” on page 332

“FETCh:ATXPower” on page 341

“FETCh:DPOWer” on page 344

“FETCh:DTXPower” on page 347

“FETCh:FM” on page 350

“FETCh:FSTability” on page 356

“FETCh:IQTuning” on page 361

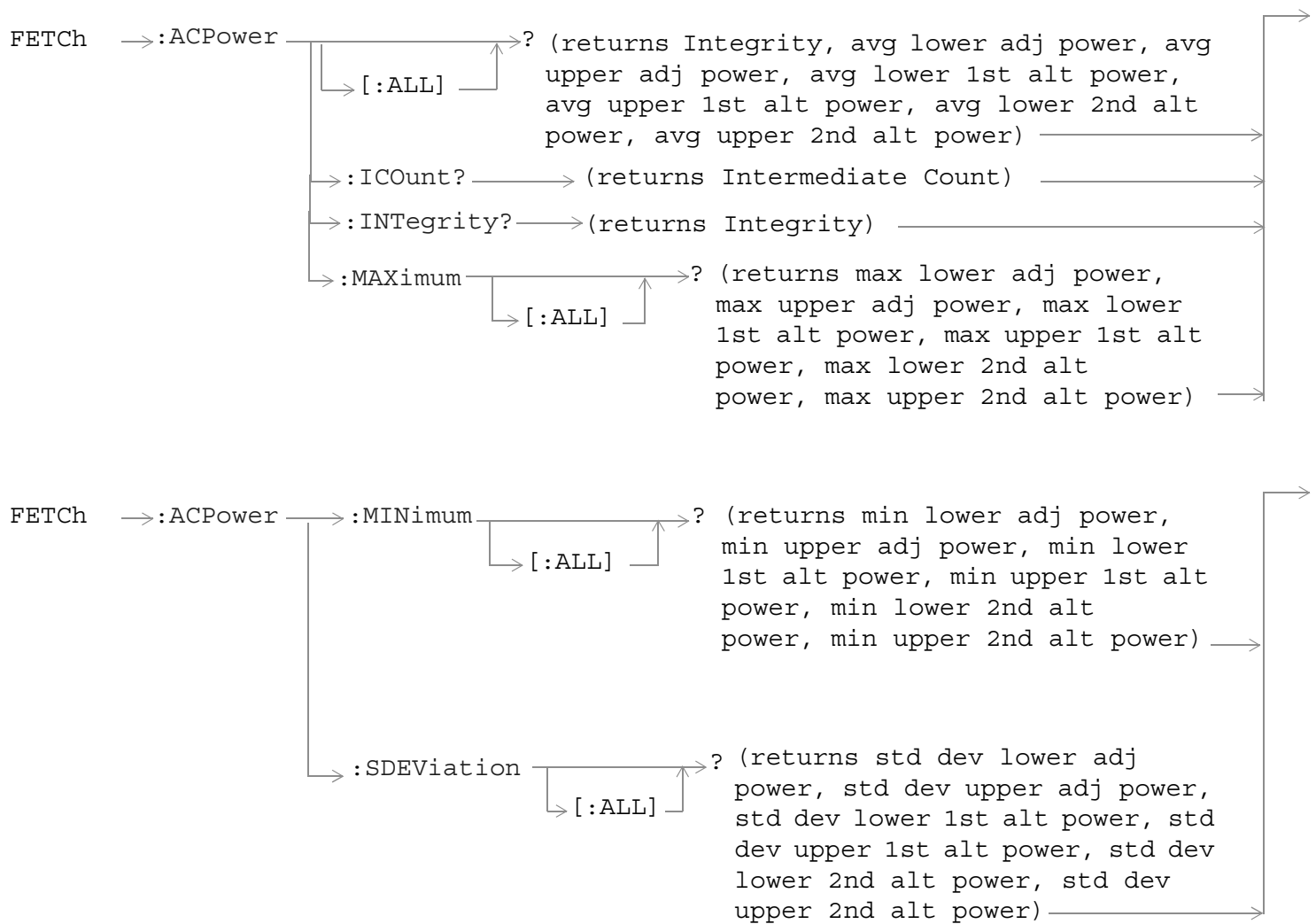
“FETCh:MACCuracy” on page 367

“FETCh:LBERror” on page 364

“FETCh:SAUDio” on page 380

“FETCh:SMONitor” on page 386

## FETCh:ACPower



“Diagram Conventions” on page 233

## FETCH:ACPower

### FETCH:ACPower[:ALL]?

Function	Queries the adjacent channel power measurement results. Returns measurement results in the following order: integrity, average lower adjacent channel power, average upper adjacent channel power, average lower first alternate power, average upper first alternate power, average lower second alternate power, average upper second alternate power.
Query	<ul style="list-style-type: none"><li>• Range: -999 to 999 dBc</li><li>• Resolution: 0.1</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:ACPOWER:ALL?"
```

```
! Returns the measurement integrity value and average adjacent channel power measurement results.
```

### FETCH:ACPower:MAXimum[:ALL]?

Function	Queries the maximum adjacent channel power measurement results. Returns measurement results in the following order: maximum lower adjacent channel power, maximum upper adjacent channel power, maximum lower first alternate power, maximum upper first alternate power, maximum lower second alternate power, maximum upper second alternate power.
Query	<ul style="list-style-type: none"><li>• Range: -999 to 999 dBc</li><li>• Resolution: 0.1</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:ACPOWER:MAXIMUM:ALL?" !Returns maximum adjacent channel power measurment results.
```

### FETCH:ACPower:MINinum[:ALL]?

Function	Queries the minimum adjacent channel power measurement results. Returns measurement results in the following order: integrity, minimum lower adjacent channel power, minimum upper adjacent channel power, minimum lower first alternate power, minimum upper first alternate power, minimum lower second alternate power, minimum upper second alternate power.
Query	<ul style="list-style-type: none"><li>• Range: -999 to 999 dBc</li><li>• Resolution: 0.1</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:ACPOWER:MINIMUM:ALL?" !Returns minimum adjacent channel power measurment results.
```

**FETCh:ACPower:SDEviation[:ALL]?**

Function	Queries the standard deviation adjacent channel power measurement results.  Returns measurement results in the following order: standard deviation lower adjacent channel power, standard deviation upper adjacent channel power, standard deviation lower first alternate power, standard deviation upper first alternate power, standard deviation lower second alternate power, standard deviation upper second alternate power.
Query	<ul style="list-style-type: none"> <li>• Range: 0 to 999 dB</li> <li>• Resolution: 0.1</li> </ul>

**Programming Example**

```
OUTPUT 714;"FETCH:ACPOWER:SDEVIATION:ALL?"
!Returns standard deviation adjacent channel power measurment results.
```

**FETCh:ACPower:ICount?**

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

**Programming Example**

```
OUTPUT 714;"FETCH:ACPOWER:ICOUNT?"
```

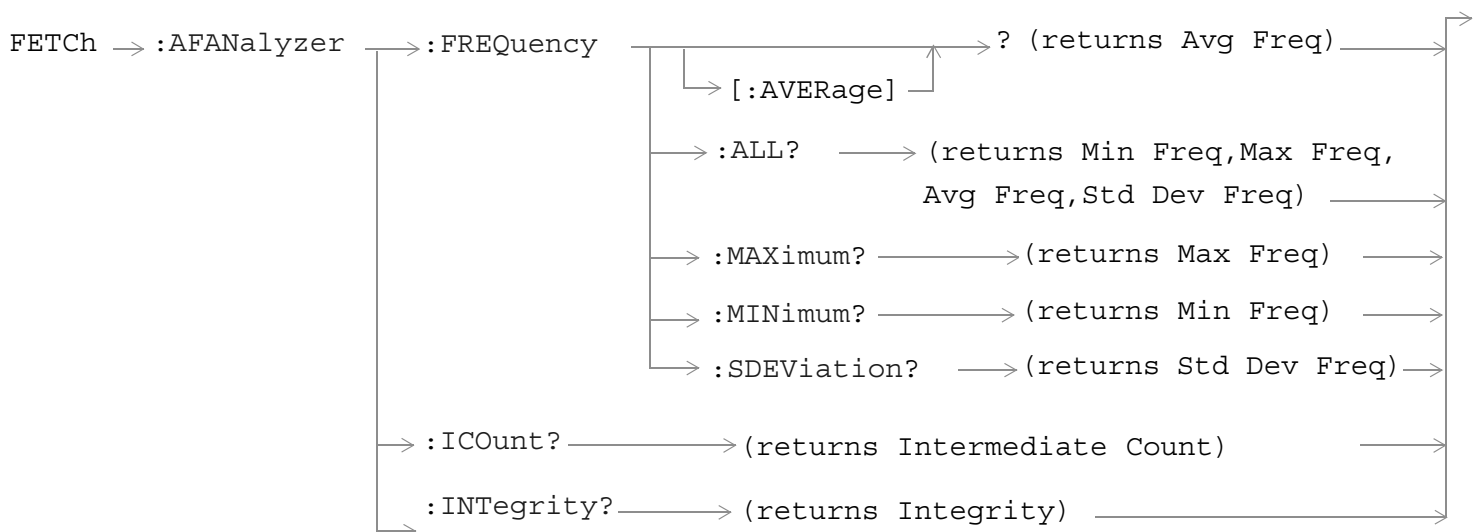
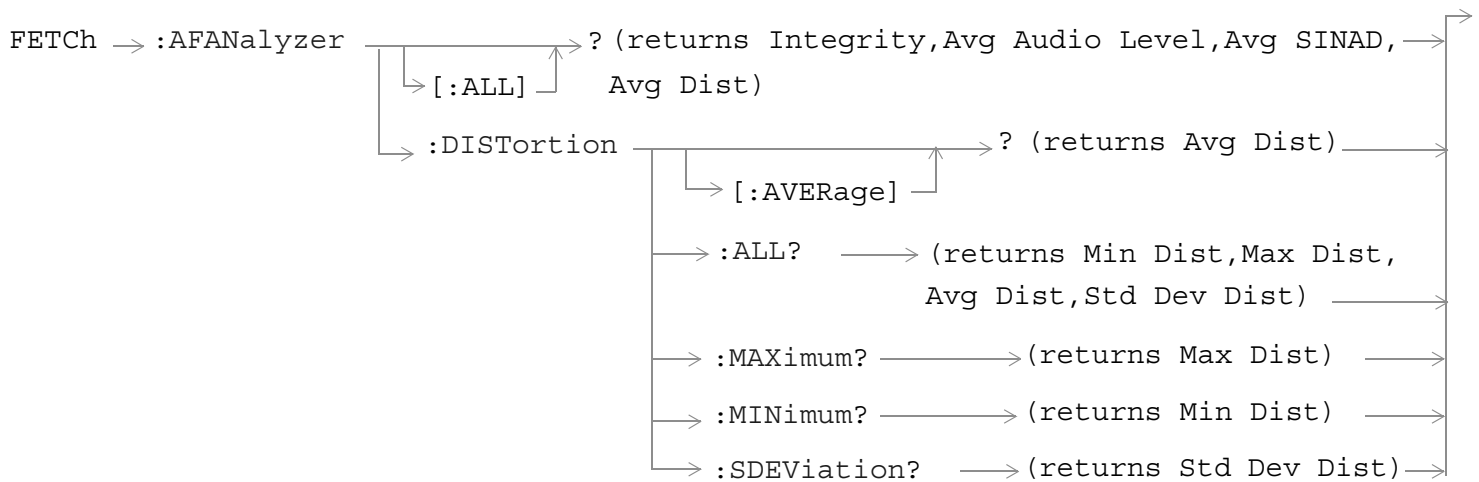
**FETCh:ACPower:INTEgrity?**

Function	Queries the measurement integrity indicator for the last adjacent channel power measurement completed.  Zero indicates a normal measurement. See "Integrity Indicator" on page 206 for information about non-zero integrity results.
Query	Range: 1 to 16

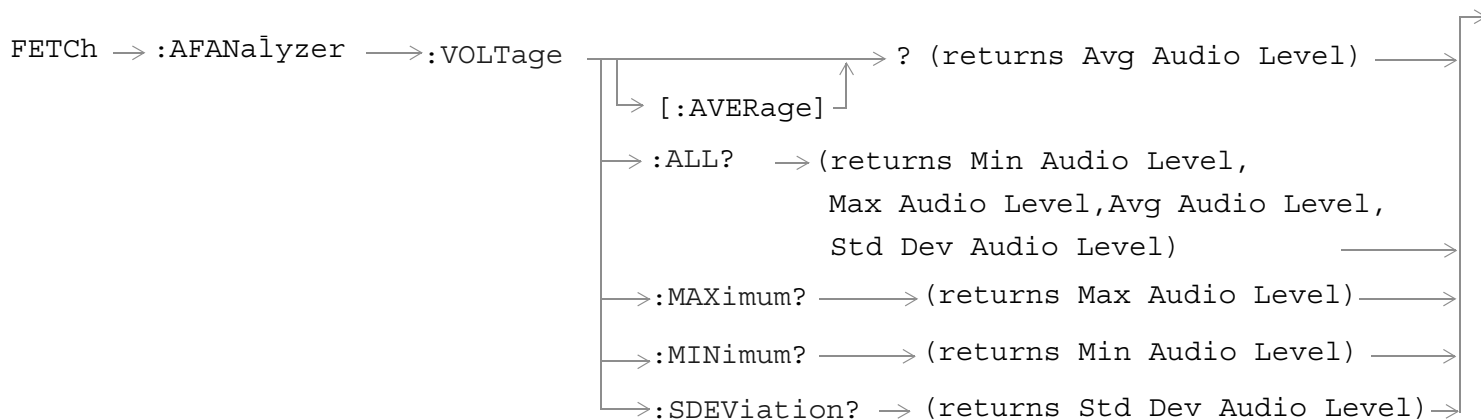
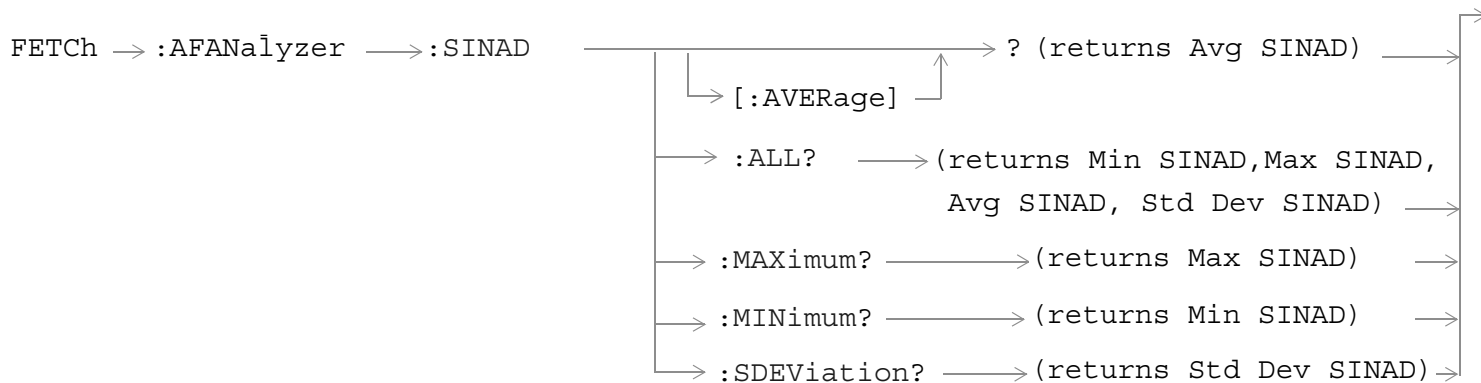
**Programming Example**

```
OUTPUT 714;"FETCH:ACPower:INTEgrity?"
!Query the integrity value for the last adjacent channel power measurement.
```

## FETCh:AFANalyzer







“Diagram Conventions” on page 233

## FETCh:AFANalyzer

### FETCh:AFANalyzer[:ALL]?

Function	Queries the AF analyzer measurements. Measurement results are returned in the following order: integrity, average audio level, average SINAD, average distortion.
Query	Average analog 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 to 99 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 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:DIS TORTion[:AVERAge]?

Function	Queries the average audio distortion measurement.
Query	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>

#### Programming Example

```
OUTPUT 714;"FETCh:AFANALYZER:DIS TORTION:AVERAGE?"
```

**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	Miniumum, 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:DIS TORTION: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:DIS TORTION: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:DIS TORTION: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:DIS TORTION:SDEVIATION?"
```

## FETCh:AFANalyzer

### 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: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 "Integrity Indicator" on page 206 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

### FETCH:AFANalyzer:SINAD:ALL?

Function	Queries the SINAD measurements. Measurement results are returned in the following order: minimum 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: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:MINIMUM?"
```

## **FETCh:AFANalyzer**

### **FETCh:AFANalyzer:VOLTage:SDEVIation?**

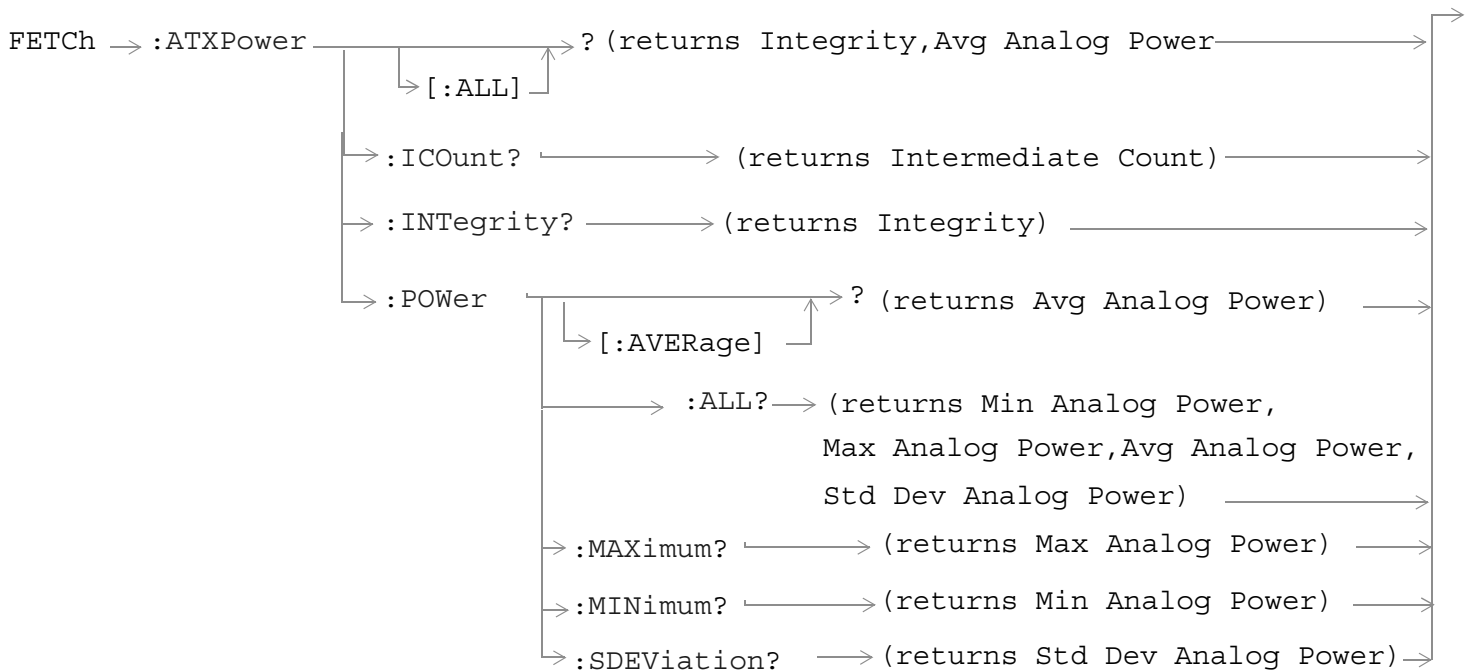
Function	Queries the standard deviation audio level measurement.
Query	Range: 0 to 20 V, 9.91 E+37 Resolution: 4 significant digits

#### Programming Example

OUTPUT 714 ; "FETCh:AFANALYZER:VOLTAGE:SDEVIATION?"



## FETCh:ATXPower



“Diagram Conventions” on page 233

### FETCh:ATXPower[:ALL]?

Function	Queries the average analog transmitter power measurement. The query returns integrity, and average analog power.
Query	Range: -100 dBm to +100 dBm Resolution: 0.01 dB

#### Programming Example

OUTPUT 714; "FETCh:ATXPOWER:ALL?" !Returns integrity and average analog power.

## FETCH:ATXPower

### FETCH:ATXPower:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714;"FETCH:ATXPOWER:ICOUNT?"
```

### FETCH:ATXPower:INTegrity?

Function	Queries the measurement integrity indicator for the last analog transmitter power measurement completed.  Zero indicates a normal measurement. See "Integrity Indicator" on page 206 for information about non-zero integrity results.
Query	Range: 1 through 16

#### Programming Example

```
OUTPUT 714;"FETCH:ATXPower:INTegrity?"  
!Query the integrity indicator for the analog TX power measurement.
```

### FETCH:ATXPower:POWER[:AVERage]?

Function	Queries the average analog transmitter power.
Query	Range: -100 to 100 dBm Resolution: 0.01 dB

#### Programming Example

```
OUTPUT 714;"FETCH:ATXPOWER:POWER:AVERAGE?"
```

### FETCH:ATXPower:POWER:ALL?

Function	Queries the analog transmitter power measurements.  Measurement results are returned in the following order: minimum analog power, maximum analog power, average analog power, standard deviation analog power.
Query	Minimum, maximum, and average analog power: <ul style="list-style-type: none"><li>• Range: -100 to 100 dBm</li><li>• Resolution: 0.01 dB</li></ul> Standard deviation analog power: <ul style="list-style-type: none"><li>• Range: 0 to 100 dB</li><li>• Resolution: 0.001 dB</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:ATXPOWER:POWER:ALL?"  
!Returns minimum, maximum, average, and standard deviation analog power.
```

**FETCh:ATXPower:POWer:MAXimum?**

Function	Queries the maximum analog transmitter power.
Query	Range: -100 to 100 dBm Resolution: 0.01 dB

## Programming Example

```
OUTPUT 714;" FETCh:ATXPOWER:POWER:MAXIMUM?"
```

**FETCh:ATXPower:POWer:MINimum?**

Function	Queries the minimum analog transmitter power.
Query	Range: -100 to 100 dBm Resolution: 0.01 dB

## Programming Example

```
OUTPUT 714;" FETCh:ATXPOWER:POWER:MINIMUM?"
```

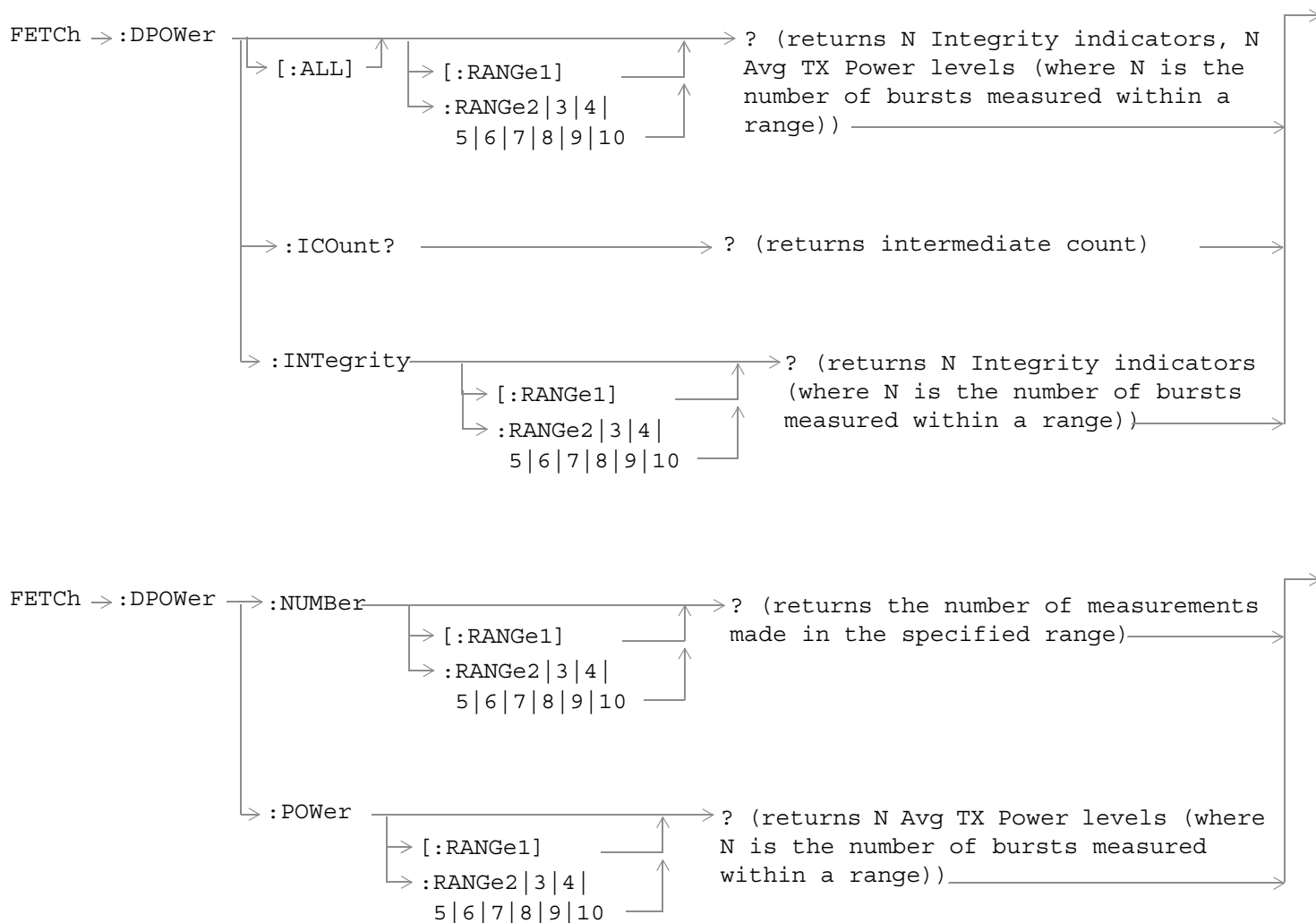
**FETCh:ATXPower:POWer:SDEVIation?**

Function	Queries the standard deviation analog transmitter power.
Query	Range: 0 to 100 dB Resolution: 0.001 dB

## Programming Example

```
OUTPUT 714;" FETCh:ATXPOWER:POWER:SDEVIATION?"
```

## FETCh:DPOWer



“Diagram Conventions” on page 233

**FETCh:DPOWer[:ALL][:RANGe1]?**

**FETCh:DPOWer[:ALL]:RANGe2|3|4|5|6|7|8|9|10?**

Function	<p>Queries the Dynamic Power measurement results. Query returns N integrity indicators and N average TX power levels (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWer:COUNT:NUMBer[:SElected]” on page 429.</p> <p>Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 250 bursts you must use range 1, range 2 and range 3 to obtain all your results.</p>
Query	<p>Integrity indicators for each individual burst</p> <ul style="list-style-type: none"> <li>• Range: See “Integrity Indicator” on page 206.</li> <li>• Resolution: 1</li> </ul> <p>Average TX power levels for each individual burst</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dBm</li> </ul>
<p>Programming Example</p> <pre>OUTPUT 714;"FETCh:DPOWer?" !Queries the Dynamic Power measurement results for the first 100 bursts.</pre>	

**FETCh:DPOWer:ICount?**

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

Programming Example

```
OUTPUT 714;"FETCh:DPOWer:ICOUNT?"
```

**FETCh:DPOWer:INTEgrity[:RANGe1?  
FETCh:DPOWer:INTEgrity:RANGe2|3|4|5|6|7|8|9|10]?**

Function	<p>Returns N integrity indicators (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWer:COUNT:NUMBer[:SElected]” on page 429.</p> <p>Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 160 bursts you must use range 1 and range 2 to obtain all the integrity indicators.</p>
Query	<p>Range: See “Integrity Indicator” on page 206.</p> <p>Resolution: 1</p>
<p>Programming Example</p> <pre>OUTPUT 714;"FETCh:DPOWer:INTEgrity:RANGe3?" !Queries the integrity results for bursts 201 through 300.</pre>	

**FETCh:DPOWer:NUMBer[:RANGe1]?**

## FETCh:DPOWer

### FETCh:DPOWer:POWer:NUMBer:RANGe2|3|4|5|6|7|8|9|10?

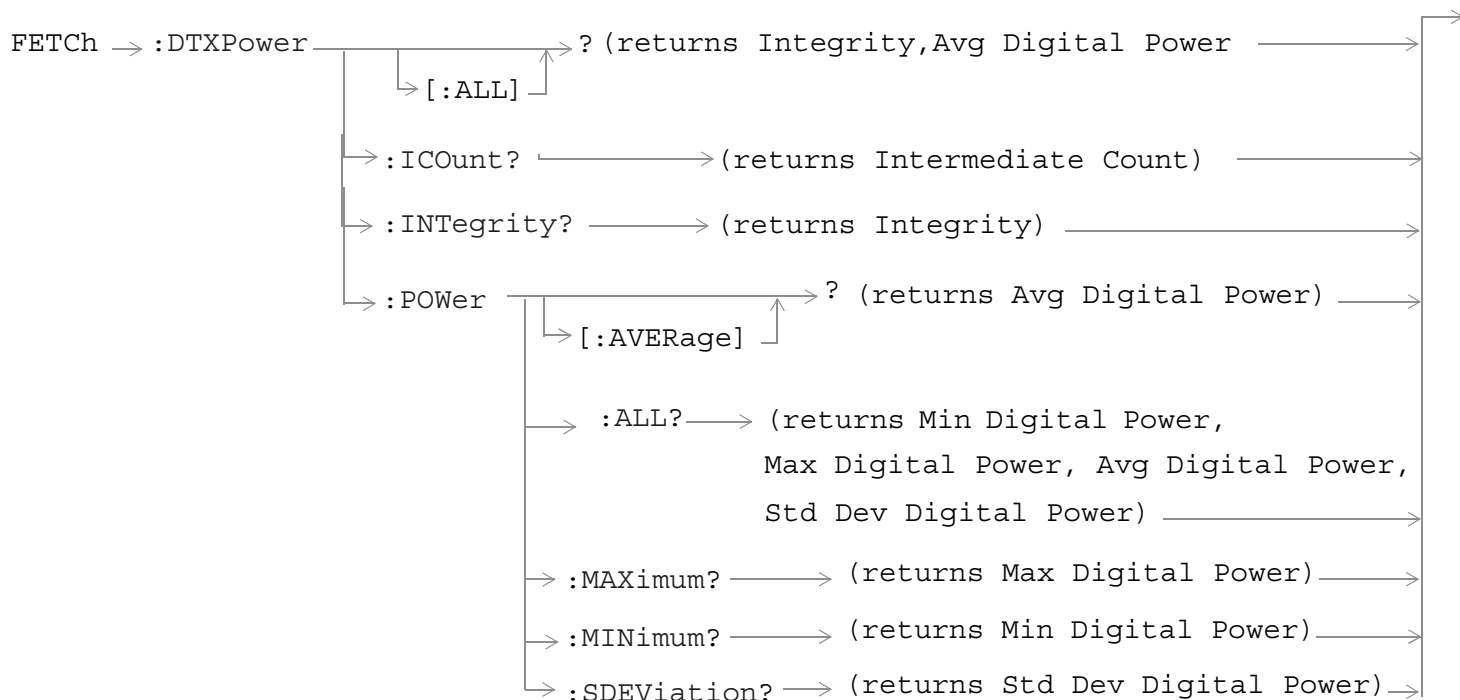
Function	Queries the number of measurements made in the specified range. Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 400 bursts you must use range 1, range 2, range 3 and range 4 to obtain all your TX power level results.
Query	Range: 1 to 100 (per range)
Programming Example	
OUTPUT 714;"FETCh:DPOWer:NUMBer:RANGe2?" !Queries the number of measurements made in range 2.	

### FETCh:DPOWer:POWer[:RANGe1]?

### FETCh:DPOWer:POWer:RANGe2|3|4|5|6|7|8|9|10?

Function	Queries the average TX power levels for the Dynamic Power measurement. Returns N average power levels (where N is the number of bursts measured. To set the number of bursts you want to measure, see "SETup:DPOWer:COUNT:NUMBer[:SElected]" on page 429. Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 400 bursts you must use range 1, range 2, range 3 and range 4 to obtain all your TX power level results.
Query	Range: -100 to +100 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB
Programming Example	
OUTPUT 714;"FETCh:DPOWer:POWer:RANGe2?" !Queries the average TX power for bursts 101 through 200.	

## FETCh:DTXPower



“Diagram Conventions” on page 233

### FETCh:DTXPower[:ALL]?

Function	Queries the average digital transmitter power measurement. Returns integrity and average digital transmitter power.
Query	Range: <ul style="list-style-type: none"> <li>• Integrity = 1 through 16</li> <li>• Power = -100 dBm to 100 dBm</li> </ul> Power Resolution: 0.01 dB

#### Programming Example

```
OUTPUT 714;"FETCh DTXPOWER:ALL?" !Returns integrity and average digital transmitter power.
```

## FETCH:DTXPower

### FETCH:DTXPower:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714;"FETCH:DTXPOWER:ICOUNT?"
```

### FETCH:DTXPower:INTegrity?

Function	Queries the measurement integrity indicator for the last digital transmitter power measurement completed.  Zero indicates a normal measurement. See "Integrity Indicator" on page 206 for information about non-zero integrity results.
Query	Range: 1 through 16

#### Programming Example

```
OUTPUT 714;"FETCH:DTXPower:INTegrity?"  
!Request the integrity indicator value for the digital TX power measurement.
```

### FETCH:DTXPower:POWER[:AVERage]?

Function	Queries the average digital transmitter power.
Query	Range: -100 to 100 dBm Resolution: 0.01 dB

#### Programming Example

```
OUTPUT 714;"FETCH:DTXPOWER:POWER:AVERAGE?"
```

### FETCH:DTXPower:POWER:ALL?

Function	Queries the digital transmitter power measurements.  Measurement results are returned in the following order: minimum digital power, maximum digital power, average digital power, standard deviation digital power.
Query	Minimum, maximum, and average digital power: <ul style="list-style-type: none"><li>• Range: -100 to 100 dBm</li><li>• Resolution: 0.01 dB</li></ul> Standard deviation transmitter power: <ul style="list-style-type: none"><li>• Range: 0 to 100 dB</li><li>• Resolution: 0.001 dB</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:DTXPOWER:POWER:ALL?"  
!Returns minimum, maximum, average, and standard deviation digital power.
```



**FETCh:DTXPower:POWer:MAXimum?**

Function	Replace
Query	Range: -100 to 100 dBm Resolution: 0.01 dB

## Programming Example

```
OUTPUT 714;" FETCh:DTXPOWER:POWER:MAXIMUM?"
```

**FETCh:DTXPower:POWer:MINimum?**

Function	Replace
Query	Range: -100 to 100 dBm Resolution: 0.01 dB

## Programming Example

```
OUTPUT 714;" FETCh:DTXPOWER:POWER:MINIMUM?"
```

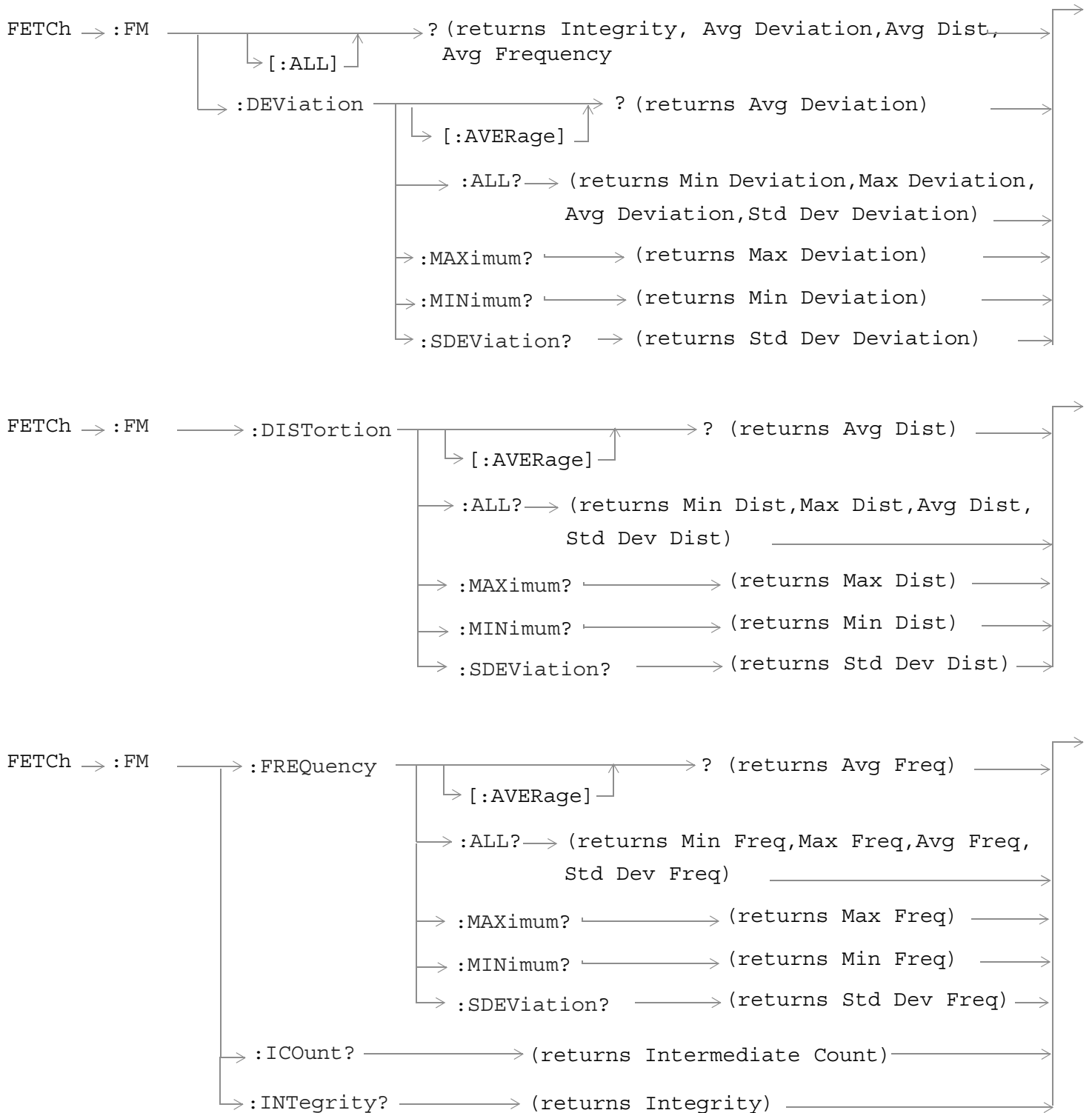
**FETCh:DTXPower:POWer:SDEVIation?**

Function	Replace
Query	Range: 0 to 100 dB Resolution: 0.001 dB

## Programming Example

```
OUTPUT 714;" FETCh:DTXPOWER:POWER:SDEVIATION?"
```

# FETCh:FM



“Diagram Conventions” on page 233

**FETCh:FM[:ALL]?**

Function	Queries the FM measurement. Returns integrity, average FM deviation, and average FM distortion.
Query	<p>FM deviation</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99 kHz, 9.91 E+37</li> <li>• Resolution: 0.001 kHz</li> </ul> <p>FM distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%, 9.91 E+37</li> <li>• Resolution: 0.1%</li> </ul>

**Programming Example**

OUTPUT 714;"FETCh:FM:ALL?" !Returns integrity, average FM deviation and average FM distortion.

**FETCh:FM:DEVIation[:AVERage]?**

Function	Queries the average FM deviation.
Query	<p>Range: 0 to 99 kHz, 9.91 E+37</p> <p>Resolution: 0.001 kHz</p>

**Programming Example**

OUTPUT 714;" FETCh:FM:DEVIATION:AVERAGE?"

**FETCh:FM:DEVIation:ALL?**

Function	<p>Queries the FM deviation measurements.</p> <p>Measurement results are returned in the following order: minimum deviation, maximum deviation, average deviation, standard deviation deviation.</p>
Query	<p>Minimum, maximum, average FM deviation</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99 kHz, 9.91 E+37</li> <li>• Resolution: 0.001 kHz</li> </ul> <p>Standard deviation FM deviation</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99 kHz, 9.91 E+37</li> <li>• Resolution: 0.0001 kHz</li> </ul>

**Programming Example**

OUTPUT 714;" FETCh:FM:DEVIATION:ALL?"  
!Returns minimum, maximum, average, and standard deviation FM deviation.

## **FETCh:FM**

### **FETCh:FM:DEVIation:MAXimum?**

Function	Queries the maximum FM deviation measurement.
Query	Range: 0 to 99 kHz, 9.91 E+37 Resolution: 0.001 kHz

#### Programming Example

```
OUTPUT 714;"FETCh:FM:DEVIation:MAXimum?"
```

### **FETCh:FM:DEVIation:MINimum?**

Function	Queries the minimum FM deviation measurement.
Query	Range: 0 to 99 kHz, 9.91 E+37 Resolution: 0.001 kHz

#### Programming Example

```
OUTPUT 714;"FETCh:FM:DEVIation:MINimum?"
```

### **FETCh:FM:DEVIation:SDEVIation?**

Function	Queries the standard deviation FM deviation measurement.
Query	Range: 0 to 99 kHz, 9.91 E+37 Resolution: 0.0001

#### Programming Example

```
OUTPUT 714;"FETCh:FM:DEVIation:SDEVIation?"
```

### **FETCh:FM:DISTortion[:AVERage]?**

Function	Queries the average FM distortion measurement.
Query	Range: 0 to 100%, 9.91 E+37 Resolution: 0.1%

#### Programming Example

```
OUTPUT 714;"FETCh:FM:DISTortion:AVERage?"
```

**FETCh:FM:DISToRTion:ALL?**

Function	Queries the FM distortion measurements. Measurement results are returned in the following order: minimum distortion, maximum distortion, average distortion, standard deviation distortion.
Query	Minimum, maximum, average FM distortion <ul style="list-style-type: none"> <li>• Range: 0 to 100%, 9.91 E+37</li> <li>• Resolution: 0.1%</li> </ul> Standard deviation FM distortion <ul style="list-style-type: none"> <li>• Range: 0 to 100%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

Programming Example

```
OUTPUT 714;"FETCh:FM:DISToRTion:ALL?"
!Returns minimum, maximum, average, and standard deviation FM distortion.
```

**FETCh:FM:DISToRTion:MAXimum?**

Function	Queries the maximum FM distortion measurement.
Query	Range: 0 to 100%, 9.91 E+37 Resolution: 0.1%

Programming Example

```
OUTPUT 714;"FETCh:FM:DISToRTion:MAXimum?"
```

**FETCh:FM:DISToRTion:MINimum?**

Function	Queries the minimum FM distortion measurement.
Query	Range: 0 to 100%, 9.91 E+37 Resolution: 0.1%

Programming Example

```
OUTPUT 714;"FETCh:FM:DISToRTion:MINimum?"
```

**FETCh:FM:DISToRTion:SDEVIation?**

Function	Queries the standard deviation FM distortion measurement.
Query	Range: 0 to 100%, 9.91 E+37 Resolution: 0.01%

Programming Example

```
OUTPUT 714;"FETCh:FM:DISToRTion:SDEVIation?"
```

## FETCh:FM

### FETCh:FM: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:FM:FREQUency:AVERAge?"
```

### FETCh:FM: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	Miniumum, 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:FM:FREQUency:ALL?"  
!Returns minimum, maximum, average, and standard deviation audio frequency.
```

### FETCh:FM: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:FM:FREQUency:MAXimum?"
```

### FETCh:FM:FREQUency:MINinum?

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:FM:FREQUency:MINinum?"
```

**FETCh:FM: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:FM:FREQUENCY:SDEVIATION?"
```

**FETCh:FM:ICOunt?**

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 99

Programming Example

```
OUTPUT 714;"FETCh:FM:ICOUNT?"
```

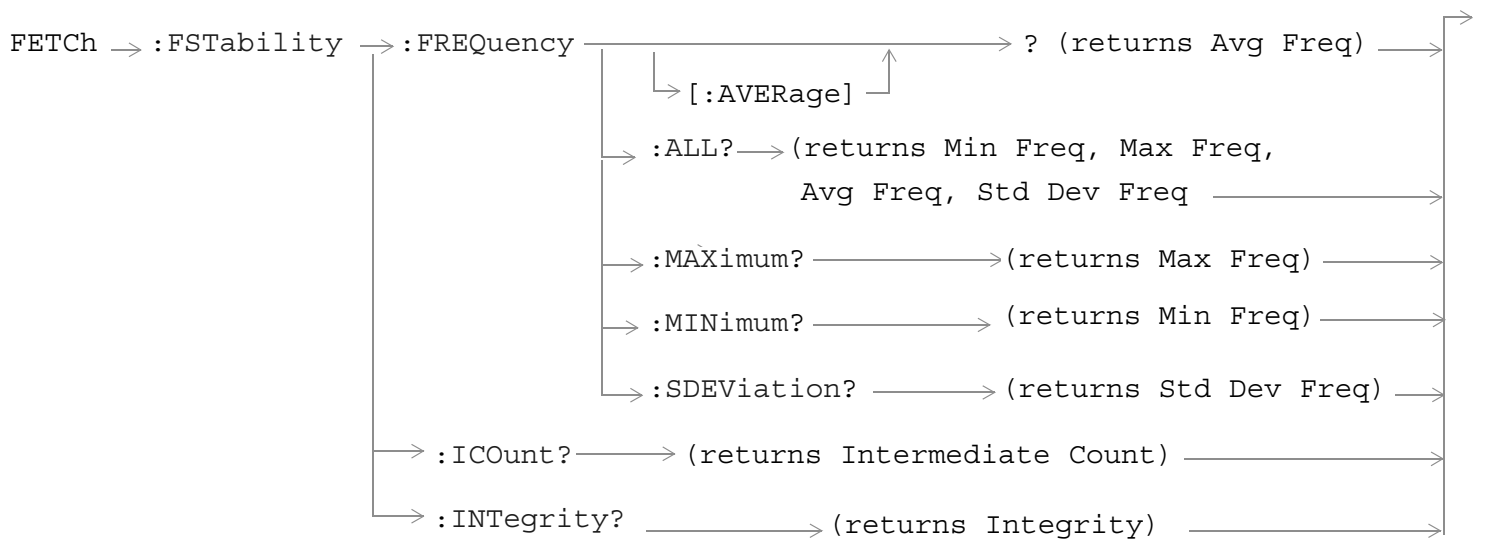
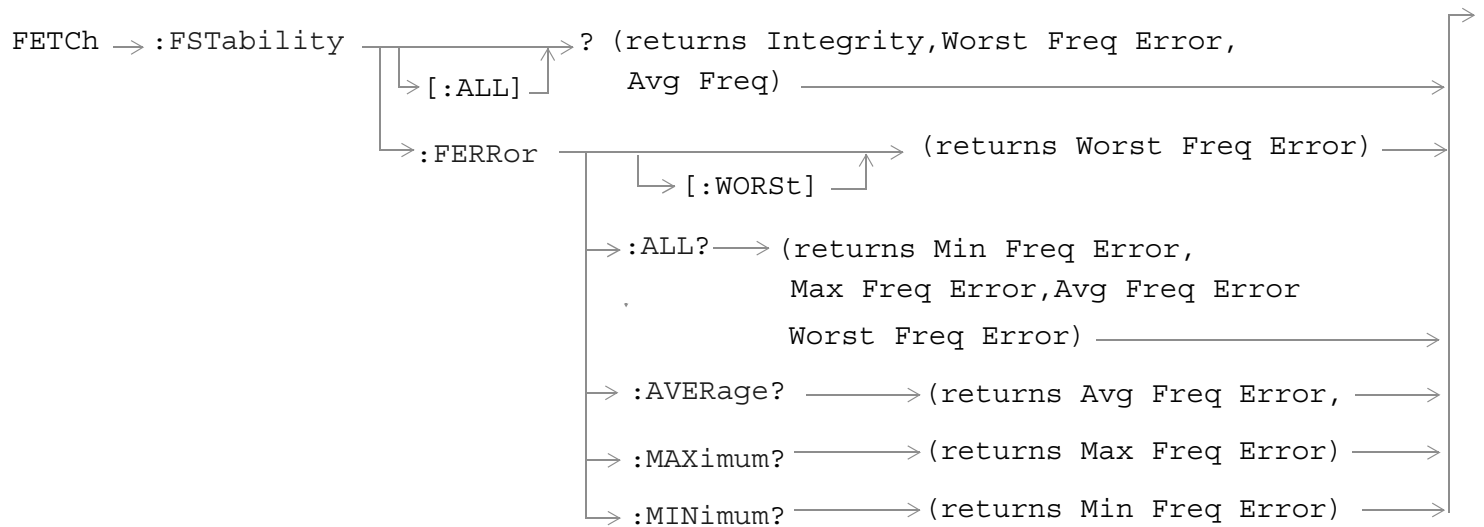
**FETCh:FM:INTegrity?**

Function	Queries the measurement integrity indicator for the last FM measurement completed. Zero indicates a normal measurement. See "Integrity Indicator" on page 206 for information about non-zero integrity results.
Query	Range: 1 through 16

Programming Example

```
OUTPUT 714;"INITiate:FM" !Start FM measurement.
OUTPUT 714;"FETCh:FM?" !Request measurement results.
ENTER 714;Integrity,Fm_dev_dist !Read measurement results.
IF Integrity = 0 THEN !If 0 then measurement was successful.
PRINT "FM =" ;Fm_dev_dist !Measurement results printed if measurement is successful.
ELSE
PRINT "Measurement integrity questionable, integrity value = ";Integrity
END IF
END
```

## FETCh:FSTability



“Diagram Conventions” on page 233



**FETCh:FSTability[:ALL]?**

Function	Queries the frequency stability measurement. Returns integrity, worst-case frequency error, and average frequency.
Query	<p>Worst-case frequency error:</p> <ul style="list-style-type: none"> <li>• Range: -500 to 500 parts per million (ppm)</li> <li>• Resolution: 0.01 ppm</li> </ul> <p>Average frequency:</p> <ul style="list-style-type: none"> <li>• Range: 100 E+6 to 3 E+9 Hz</li> <li>• Resolution: 0.01 ppm</li> </ul>

**Programming Example**

```
OUTPUT 714;"FETCh:FSTABILITY:ALL?"
!Returns integrity, worst-case frequency error, and average frequency.
```

**FETCh:FSTability:FERRor[:WORSt]?**

Function	Queries the frequency stability frequency error measurement.
Query	<p>Range: -500 to 500 parts per million (ppm)</p> <p>Resolution: 0.01 ppm</p>

**Programming Example**

```
OUTPUT 714;"FETCh:FSTABILITY:FERRor:WORSt?"
```

## FETCH:FSTability

### FETCH:FSTability:FERRor:ALL?

Function	Queries the frequency stability frequency error measurements. Measurement results are returned in the following order: minimum frequency error, maximum frequency error, average frequency error, worst-case frequency error.
Query	Maximum, minimum frequency error: <ul style="list-style-type: none"><li>• Range: -500 E+3 to 500 E+3 Hz</li><li>• Resolution: 1 Hz</li></ul> Average frequency error: <ul style="list-style-type: none"><li>• Range: -500 E+3 to 500 E+3 Hz</li><li>• Resolution: 1 Hz</li></ul> Worst-case frequency error: <ul style="list-style-type: none"><li>• Range: -500 to 500 parts per million (ppm)</li><li>• Resolution: 0.01</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:FERROR:ALL?"  
!Returns minimum, maximum, average, and worst-case frequency error.
```

### FETCH:FSTability:FERRor:AVERage?

Function	Queries the average frequency error measurement.
Query	Range: -500 E+3 to 500 E+3 Hz Resolution: 1 Hz

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:FERROR:AVERAGE?"
```

### FETCH:FSTability:FERRor:MAXimum?

Function	Queries the maximum frequency error measurement.
Query	Range: -500 E+3 to 500 E+3 Hz Resolution: 1 Hz

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:FERROR:MAXIMUM?"
```

**FETCh:FSTability:FERRor:MINimum?**

Function	Queries the minimum frequency error measurement.
Query	Range: -500 E+3 to 500 E+3 Hz Resolution: 1 Hz

Programming Example

OUTPUT 714;" " !.

**FETCh:FSTability:FREQuency[:AVERage]?**

Function	Queries the frequency stability average frequency measurement.
Query	Range: 100 E+6 to 3 E+9 Hz Resolution: 1 Hz

Programming Example

OUTPUT 714;" FETCh:FSTABILITY:FREQUency:AVERage?"

**FETCh:FSTability:FREQuency:ALL?**

Function	Queries the frequency stability frequency measurement. Measurement results are returned in the following order: minimum frequency, maximum frequency, average frequency, and standard deviation frequency.
Query	Minimum, maximum, average frequency: <ul style="list-style-type: none"> <li>• Range: 100 E+6 to 3 E+9</li> <li>• Resolution: 1 Hz</li> </ul> Standard deviation frequency: <ul style="list-style-type: none"> <li>• Range: 0 to 500 E+3 Hz</li> <li>• Resolution: 0.1 Hz</li> </ul>

Programming Example

OUTPUT 714;" FETCh:FSTABILITY:FREQUency:ALL?"  
!Returns minimum, maximum, average, and standard deviation frequency.

**FETCh:FSTability:FREQuency:MAXimum?**

Function	Queries the maximum frequency stability frequency.
Query	Range: 100 E+6 to 3 E+9 Resolution: 1 Hz

Programming Example

OUTPUT 714;" FETCh:FSTABILITY:FREQUency:MAXIMUM?"

## FETCh:FSTability

### FETCh:FSTability:FREQUENCY:MINimum?

Function	Queries the minimum frequency stability frequency.
Query	Range: 100 E+6 to 3 E+9 Resolution: 1 Hz

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:FREQUENCY:MINIMUM?"
```

### FETCh:FSTability:FREQUENCY:SDEVIation?

Function	Queries the standard deviation frequency stability frequency.
Query	Range: 0 to 500 E+3 Hz Resolution: 0.1 Hz

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:FREQUENCY:SDEVIATION?"
```

### FETCh:FSTability:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:ICOUNT?"
```

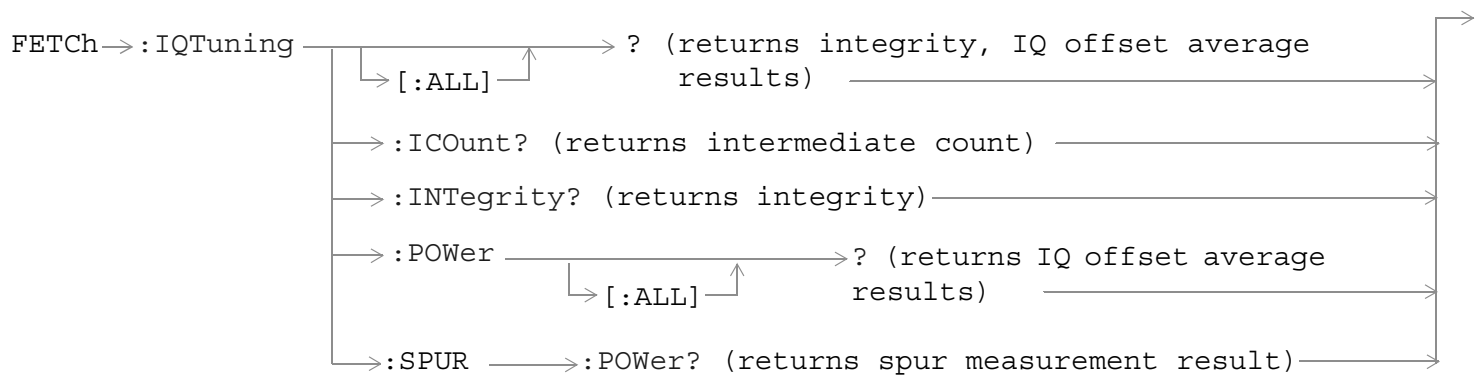
### FETCh:FSTability:INTEGRity?

Function	Queries the measurement integrity indicator for the last frequency stability measurement completed.  Zero indicates a normal measurement. See "Integrity Indicator" on page 206 for information about non-zero integrity results.
Query	Range: 1 through 16

#### Programming Example

```
OUTPUT 714;"FETCH:FSTABILITY:INTEGRITY"  
!Returns the integrity indicator for the frequency stability measurement.
```

## FETCh:IQTuning



“Diagram Conventions” on page 233

## FETCh:IQTuning

### FETCh:IQTuning[:ALL]?

Function	Queries the IQ tuning measurement results. Query returns integrity indicator and any IQ tuning offset average results. One result is returned for each of the enabled entries in the TX digital IQ tuning offset frequency list. Up to four entries can be made in the list. If no offsets are specified, 9.91E+37 is returned for the measurement result.  See “SETup:IQTuning:OFFSet[:FREQuency][:SElected]” on page 453.  The number of IQ tuning offsets that are enabled can be queried using the “SETup:IQTuning:OFFSet:POINts[:SElected]?” query.
Query	Range: <ul style="list-style-type: none"><li>• Integrity: 0 to 16</li><li>• IQ Offset results: -100 to +100 dB, 9.91 E+37; Resolution: 0.1 dB</li></ul>

#### Programming Example

```
OUTPUT 714; "FETCh:IQTuning:ALL?"
```

### FETCh:IQTuning:ICount?

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 999

#### Programming Example

```
OUTPUT 714; "FETCh:IQTuning:ICount?"
```

### FETCh:IQTuning:INTEGRITY?

Function	Returns the integrity indicator value for the last IQ tuning measurement performed. Zero indicates a normal result.  See “Integrity Indicator” on page 206 for descriptions of non-zero integrity indicators.
Query	Range: 0 to 16

#### Programming Example

```
OUTPUT 714; "FETCh:IQTuning:INTEGRITY?"
```

**FETCh:IQTuning:POWer[:ALL]?**

Function	<p>Queries the IQ tuning measurement results. Query returns IQ tuning offset average results for all enabled IQ tuning offsets. One result is returned for each of the enabled entries in the TX digital IQ tuning offset frequency list. Up to four entries can be made in the list. If no offsets are specified, 9.91E+37 is returned for the measurement result.</p> <p>See “SETup:IQTuning:OFFSet[:FREQuency][:SElected]” on page 453.</p> <p>The number of IQ tuning offsets that are enabled can be queried using the “SETup:IQTuning:OFFSet:POINts[:SElected]?” query.</p>
Query	<p>Range: -100 to +100 dB, 9.91 E+37</p> <p>Resolution: 0.1 dB</p>

**Programming Example**

```
OUTPUT 714;"FETCh:IQTuning:POWer:ALL?"
```

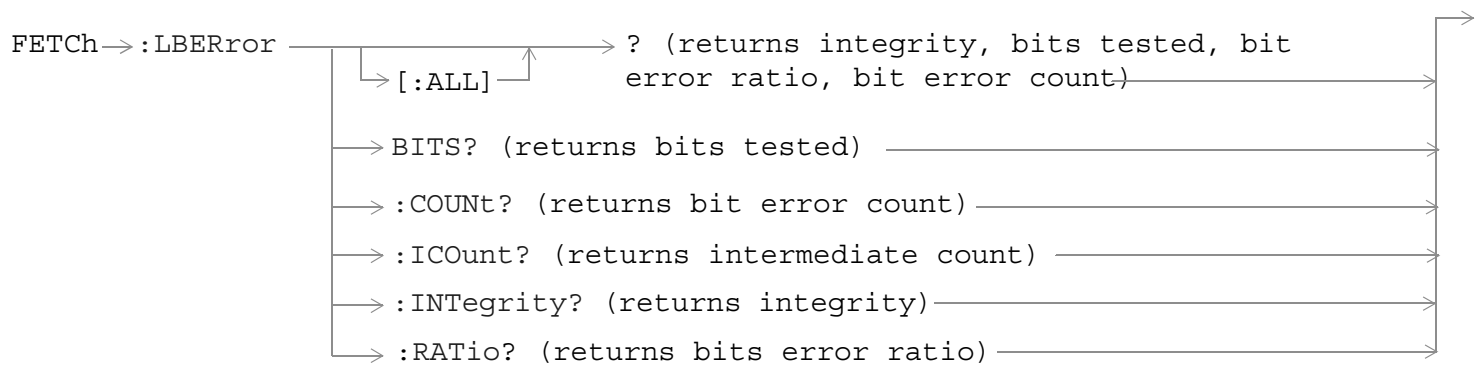
**FETCh:IQTuning:SPUR:POWer?**

Function	<p>Queries the TX digital IQ tuning spur measurement. The measurement value is referenced to the power level at the TX digital IQ tuning reference offset frequency.</p>
Query	<p>Range: -100 to +100 dB, 9.91 E+37</p> <p>Resolution: 0.1 dB</p>

**Programming Example**

```
OUTPUT 714;"FETCh:IQTuning:SPUR:POWer?"
```

## FETCh:LBError



“Diagram Conventions” on page 233



**FETCh:LBERRor[:ALL]?**

Function	<p>Queries the loopback bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count. See “Loopback Bit Error Ratio Measurement Description” on page 50.</p> <p>Bits to test is determined by the SETup:LBERRor:COUNt command.</p>
Query	<p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to “bits to test” +259, 9.91 E+37</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%, 9.91 E+37</li> <li>• Resolution: 0.01</li> </ul> <p>Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to “bits tested”</li> </ul>

**Programming Example**

OUTPUT 714; "FETCh:LBERRor:ALL?"

**FETCh:LBERRor:BITS?**

Function	<p>Queries the number of bits actually tested.</p> <p>The number of bits tested will always be a multiple of 260. See “Loopback Bit Error Ratio Measurement Description” on page 50.</p> <p>Bits to test is determined by the SETup:LBERRor:COUNt command.</p>
Query	<p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to “bits to test” +259, 9.91 E+37</li> </ul>
*RST Setting	10000

**Programming Example**

OUTPUT 714; "FETCh:LBERRor:BITS?"

**FETCh:LBERRor:COUNT?**

Function	<p>Queries the number of bits that were in error during the last bit error test. See “Loopback Bit Error Ratio Measurement Description” on page 50</p>
Query	<p>Range: 0 to “bits tested”</p>

**Programming Example**

OUTPUT 714; "FETCh:LBERRor:COUNT?"

## FETCh:LBError

### FETCh:LBError:ICount?

Function	Queries the intermediate count of bits tested in a mult-measurement.
Query	Range: 0 to “bits tested”, 9.91 E+37

#### Programming Example

```
OUTPUT 714;"FETCh:LBError:ICount?"
```

### FETCh:LBError:INTEGRity?

Function	Returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result. See “Integrity Indicator” on page 206 for descriptions of non-zero integrity indicators.
Query	Range: 0 to 16

#### Programming Example

```
OUTPUT 714;"FETCh:LBError:INTEGRity?"
```

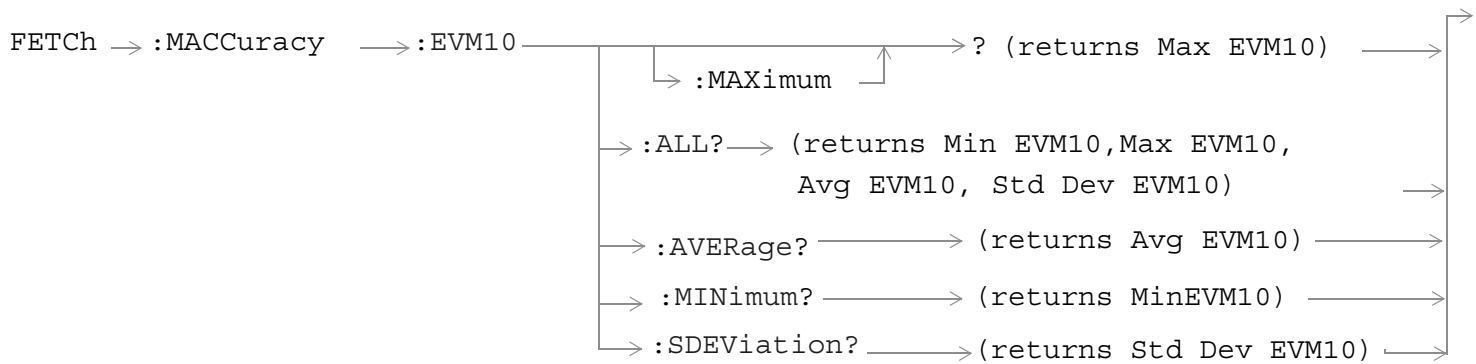
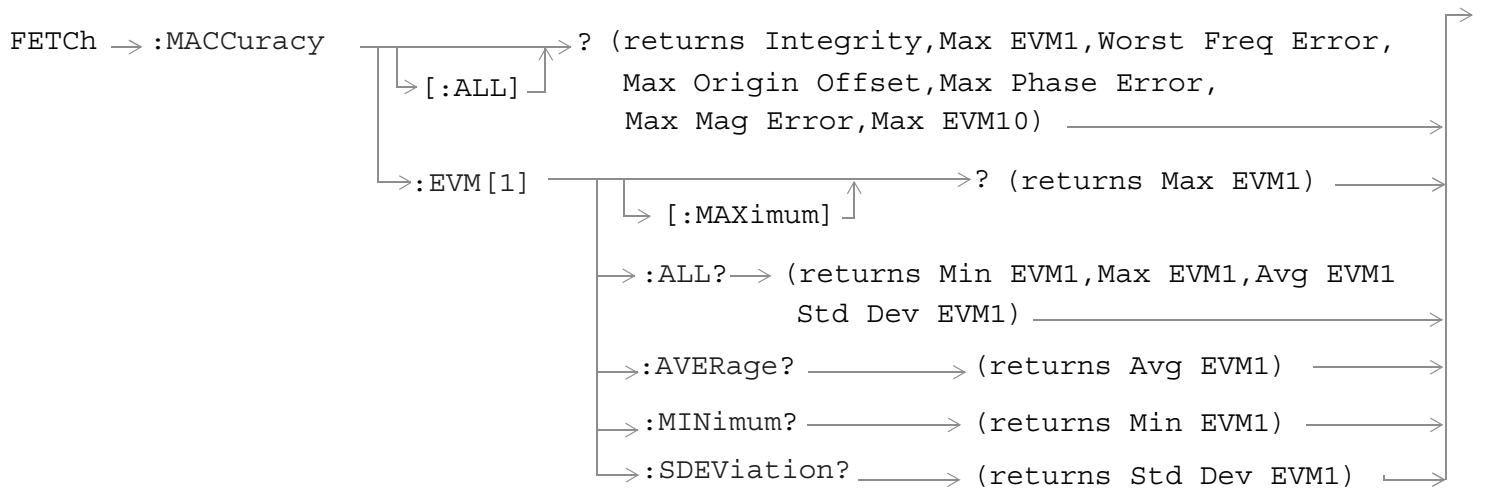
### FETCh:LBError:RATio?

Function	Queries the ratio of bits in error to the number of bits tested during the last bit error test and returns it as a percentage. See “Loopback Bit Error Ratio Measurement Description” on page 50
Query	Range: 0 to 100%, 9.91 E+37 Resolution: 0.01

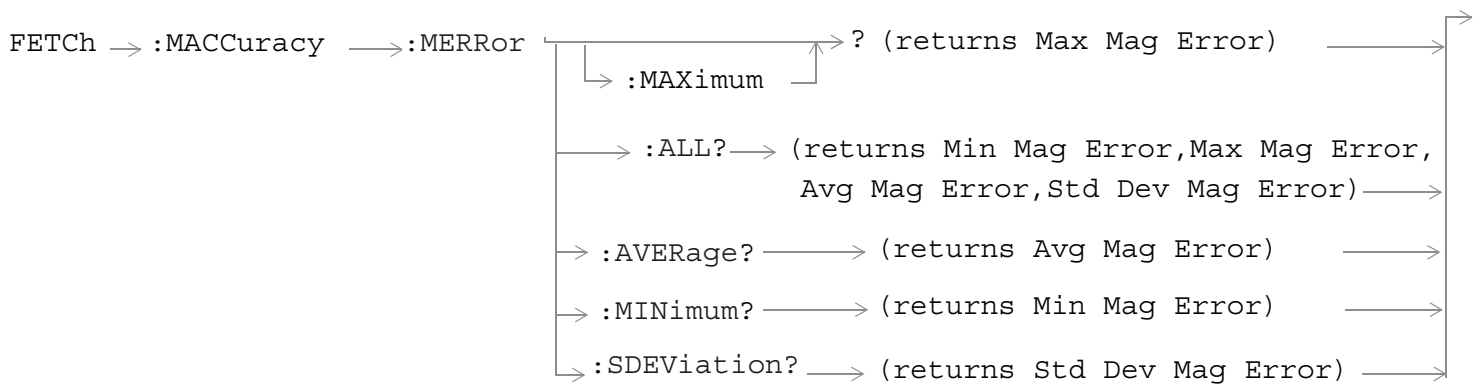
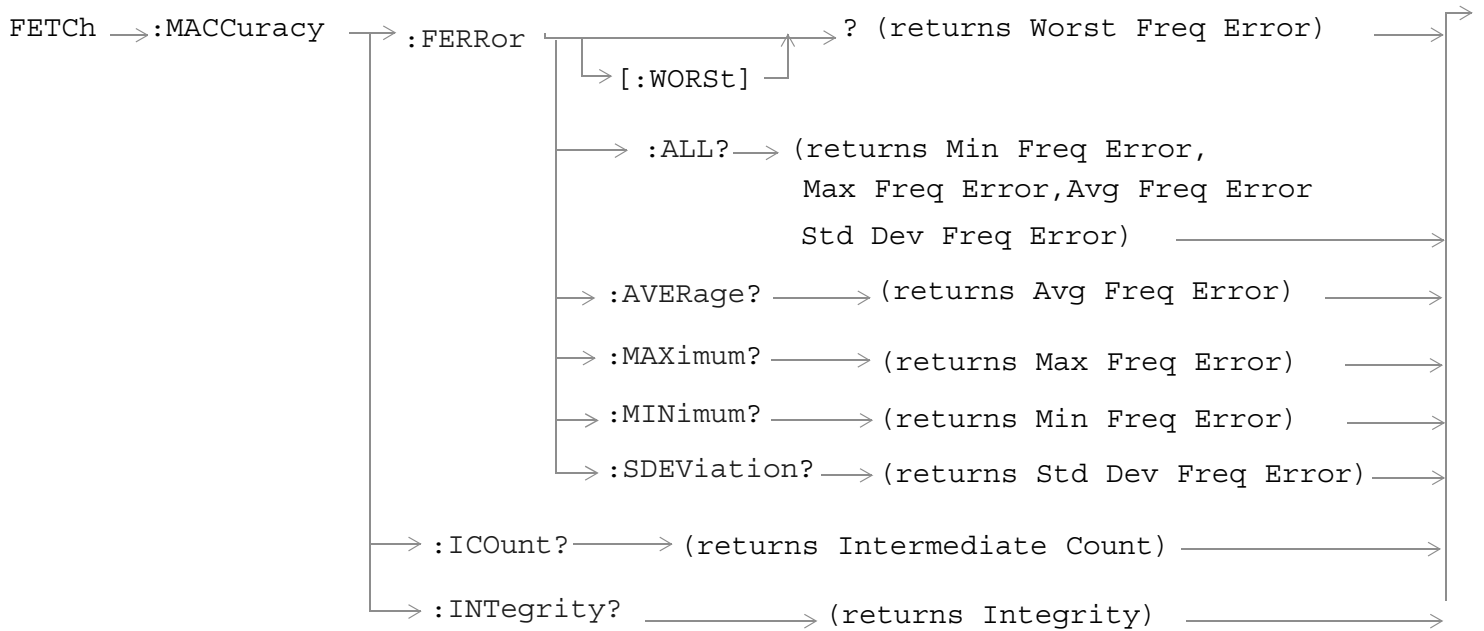
#### Programming Example

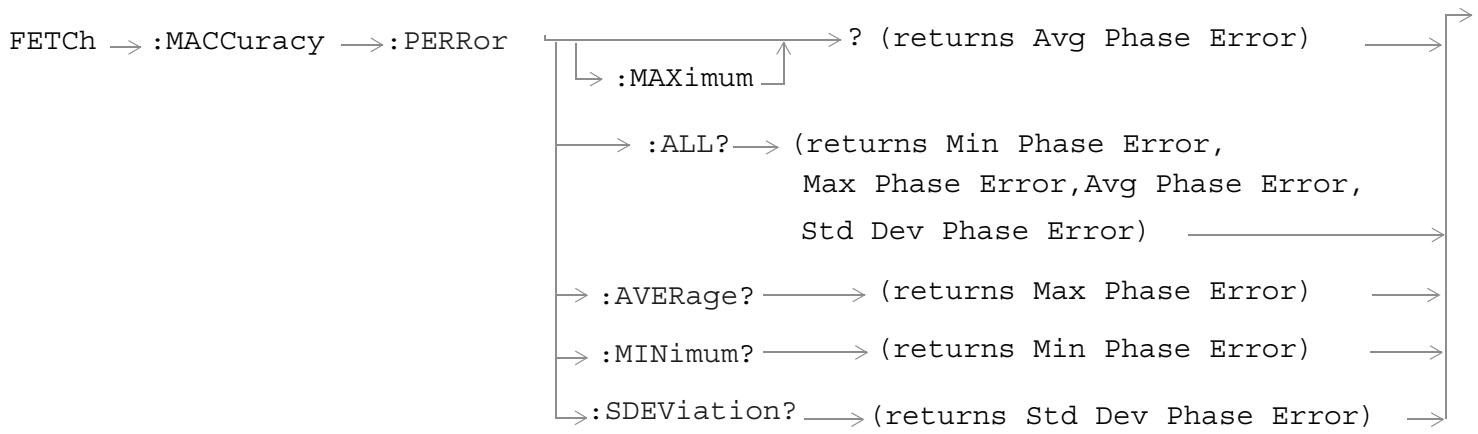
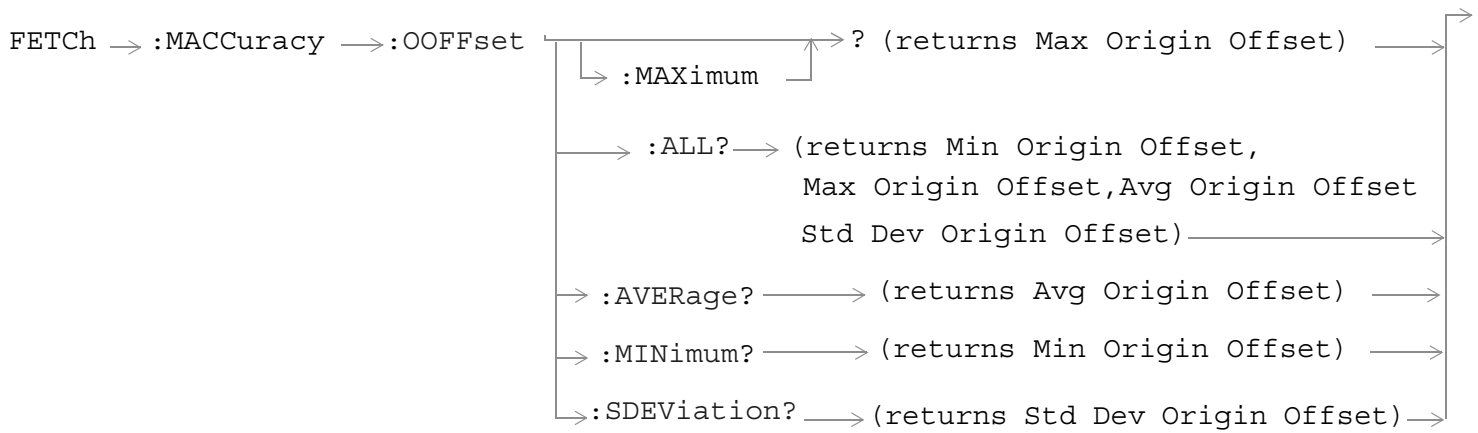
```
OUTPUT 714;"FETCh:LBError:RATio?"
```

## FETCh:MACCuracy



## FETCH:MACCuracy





“Diagram Conventions” on page 233

## FETCH:MACCuracy

### FETCH:MACCuracy[:ALL]?

Function	Queries the modulation accuracy measurements. Measurement results are returned in the following order: integrity, maximum EVM1, worst-case frequency error, maximum origin offset, maximum phase error, maximum magnitude error, and maximum EVM 10.
Query	Maximum EVM: <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> Worst-case frequency error: <ul style="list-style-type: none"><li>• Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37</li><li>• Resolution: 1 Hz</li></ul> Maximum origin offset: <ul style="list-style-type: none"><li>• Range: -100 to 0 dBc, 9.91 E+37</li><li>• Resolution: -1 dB</li></ul> Maximum phase error: <ul style="list-style-type: none"><li>• Range: 0 to 22.0 degrees rms, 9.91 E+37</li><li>• Resolution: 0.01 degrees</li></ul> Maximum magnitude error: <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> Maximum EVM 10: <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:ALL"  
!Returns integrity, maximum EVM, worst-case frequency error, maximum origin offset, maximum phase error,  
!maximum magnitude error, and maximum EVM 10.
```

### FETCH:MACCuracy:EVM[1][:MAXimum]?

Function	Queries the modulation accuracy measurement's maximum error vector magnitude for a single burst.
Query	Range: 0 to 100.0% rms, 9.91 E+37 Resolution: 0.01%

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:EVM1:MAXIMUM"
```

**FETCh:MACCuracy:EVM[1]:ALL?**

Function	Queries the modulation accuracy measurement's error vector magnitude for a single burst. Measurement results are returned in the following order minimum EVM1, maximum EVM1, average EVM1, standard deviation EVM1.
Query	Minimum, maximum, average EVM1: <ul style="list-style-type: none"> <li>• Range: 0 to 100% rms, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul> Standard deviation EVM1: <ul style="list-style-type: none"> <li>• Range: 0 to 100% rms, 9.91 E+37</li> <li>• Resolution: 0.001%</li> </ul>

Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:EVM1:ALL?"
!Returns EVM1, maximum EVM1, average EVM1, standard deviation EVM1.
```

**FETCh:MACCuracy:EVM[1]:AVERAge?**

Function	Queries the modulation accuracy measurement's average error vector magnitude the for a single burst.
Query	Range: 0 to 100% rms, 9.91 E+37 Resolution: 0.01%

Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:EVM1:AVERAGE?"
```

**FETCh:MACCuracy:EVM[1]:MINimum?**

Function	Queries the modulation accuracy measurement's minimum error vector magnitude the for a single burst.
Query	Range: 0 to 100% rms, 9.91 E+37 Resolution: 0.01%

Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:EVM1:MINIMUM?"
```

**FETCh:MACCuracy:EVM[1]:SDEVIation?**

Function	Queries the modulation accuracy measurement's standard deviation error vector magnitude the for a single burst.
Query	Range: 0 to 100%, 9.91 E+37 Resolution: 0.001%

Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:EVM1:SDEVIATION"
```

## FETCH:MACCuracy

### FETCH:MACCuracy:EVM10[:MAXimum]?

Function	Queries the modulation accuracy measurement's average maximum error vector magnitude over 10 bursts.
Query	Range: 0 to 100.0% rms, 9.91 E+37 Resolution: 0.01%

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:EVM10:MAXIMUM?"
```

### FETCH:MACCuracy:EVM10:ALL?

Function	Queries the modulation accuracy measurement's error vector magnitude (EVM) over 10 bursts. Measurement results are returned in the following order: minimum EVM10, maximum EVM10, average EVM10, standard deviation EVM10.
Query	Minimum, maximum, average EVM10: <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> Standard deviation EVM10: <ul style="list-style-type: none"><li>• Range: 0 to 100.0%, 9.91 E+37</li><li>• Resolution: 0.001%</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:EVM10:ALL?"  
!Returns minimum EVM10, maximum EVM10, average EVM10, standard deviation EVM10.
```

### FETCH:MACCuracy:EVM10:AVERage?

Function	Queries the modulation accuracy measurement's average error vector magnitude over 10 bursts.
Query	Range: 0 to 100.0% rms, 9.91 E+37 Resolution: 0.01%

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:EVM10:AVERAGE?"
```

### FETCH:MACCuracy:EVM10:MINimum?

Function	Queries the modulation accuracy measurement's minimum error vector magnitude over 10 bursts.
Query	Range: 0 to 100.0% rms, 9.91 E+37 Resolution: 0.01%

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:EVM10:MINIMUM?"
```



**FETCh:MACCuracy:EVM10:SDEVIation?**

Function	Queries the modulation accuracy measurement's standard deviation error vector magnitude over 10 bursts.
Query	Range: 0 to 100.0%, 9.91 E+37 Resolution: 0.001%

Programming Example

OUTPUT 714;" FETCh:MACCuracy:EVM10:SDEVIation?"

**FETCh:MACCuracy:FERRor[:WORSt]?**

Function	Queries the modulation accuracy measurement's worst-case frequency error.
Query	Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37 Resolution: 1 Hz

Programming Example

OUTPUT 714;" FETCh:MACCuracy:FERRor:WORSt?"

**FETCh:MACCuracy:FERRor:ALL?**

Function	Queries the modulation accuracy measurement's frequency error. Measurement results are returned in the following order: minimum frequency error, maximum frequency error, average frequency error, standard deviation frequency error.
Query	Minimum, maximim, average frequency error: <ul style="list-style-type: none"> <li>• Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37</li> <li>• Resolution: 1 Hz</li> </ul> Standard deviation frequency error: <ul style="list-style-type: none"> <li>• Range: 0 to 1 E+4 Hz, 9.91 E+37</li> <li>• Resolution: 0.1 Hz</li> </ul>

Programming Example

OUTPUT 714;" FETCh:MACCuracy:FERRor:ALL?"  
!Returns minimum, maximum, average, and standard deviation frequency error.

**FETCh:MACCuracy:FERRor:AVERAge?**

Function	Queries the modulation accuracy measurement's average frequency error.
Query	Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37 Resolution: 1 Hz

Programming Example

OUTPUT 714;" FETCh:MACCuracy:FERRor:AVERAge?"

## **FETCh:MACCuracy**

### **FETCh:MACCuracy:FERRor:MAXimum?**

Function	Queries the modulation accuracy measurement's maximum frequency error.
Query	Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37 Resolution: 1 Hz

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:FERRor:MAXimum?"
```

### **FETCh:MACCuracy:FERRor:MINimum?**

Function	Queries the modulation accuracy measurement's minimum frequency error.
Query	Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37 Resolution: 1 Hz

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:FERRor:MINimum?"
```

### **FETCh:MACCuracy:FERRor:SDEVIation?**

Function	Queries the modulation accuracy measurement's standard deviation frequency error.
Query	Range: 0 to 1 E+4 Hz, 9.91 E+37 Resolution: 0.1 Hz

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:FERRor:SDEVIation?"
```

### **FETCh:MACCuracy:ICount?**

Function	Queries the intermediate count of measurements completed in a multi-measurement.
Query	Range: 0 to 99

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:ICount?"
```

### FETCh:MACCuracy:INTEgrity?

Function	Queries the measurement integrity indicator for the last modulation accuracy measurement completed.  Zero indicates a normal measurement. See “Integrity Indicator” on page 206 for information about non-zero integrity results.
Query	Range: 1 through 16

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:INTEGRITY"  
!Query the integrity indicator for the modulation accuracy measurement.
```

### FETCh:MACCuracy:MERRor[:MAXimum]?

Function	Queries the modulation accuracy measurement’s maximum magnitude error.
Query	Range: 0 to 100.0% rms, 9.91 E+37  Resolution: 0.01%

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:MERROR:MAXIMUM?"
```

### FETCh:MACCuracy:MERRor:ALL?

Function	Queries the modulation accuracy measurement’s magnitude error.  Measurement results are returned in the following order: minimum magnitude error, maximum magnitude error, average magnitude error, standard deviation magnitude error.
Query	Minimum, maximum, standard deviation magnitude error: <ul style="list-style-type: none"> <li>• Range: 0 to 100.0% rms, 9.91 E+37</li> <li>• Resolution: 0.01 %</li> </ul> Standard deviation magnitude error: <ul style="list-style-type: none"> <li>• Range: 0 to 100%, 9.91 E+37</li> <li>• Resolution: 0.001 %</li> </ul>

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:MERROR:ALL?"  
!Returns minimum, maximum, average, standard deviation magnitude error.
```

## **FETCh:MACCuracy**

### **FETCh:MACCuracy:MERRor:AVERage?**

Function	Queries the modulation accuracy measurement's average magnitude error.
Query	Range :0 to 100.0% rms, 9.91 E+37 Resolution: 0.01 %

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:MERRor:AVERage?"
```

### **FETCh:MACCuracy:MERRor:MINimum?**

Function	Queries the modulation accuracy measurement's minimum magnitude error.
Query	Range : 0 to 100.0% rms, 9.91 E+37 Resolution: 0.01 %

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:MERRor:MINimum?"
```

### **FETCh:MACCuracy:MERRor:SDEVIation?**

Function	Queries the modulation accuracy measurement's standard deviation magnitude error.
Query	Range : 0 to 100.0%, 9.91 E+37 Resolution: 0.001 %

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:MERRor:SDEVIation?"
```

### **FETCh:MACCuracy:OOffset[:MAXimum]?**

Function	Queries the modulation accuracy measurement's maximum origin offset.
Query	Range: -100 to 0 dBc, 9.91 E+37 Resolution: 0.1 dB

#### Programming Example

```
OUTPUT 714;"FETCh:MACCuracy:OOffset:MAXimum?"
```

**FETCh:MACCuracy:OOffset:ALL?**

Function	Queries the modulation accuracy measurement's origin offset. Measurement results are returned in the following order: minimum origin offset, maximum origin offset, average origin offset, standard deviation origin offset.
Query	Minimum, maximum, average origin offset: <ul style="list-style-type: none"> <li>• Range: -100 to 0 dBc, 9.91 E+37</li> <li>• Resolution: 0.1 dB</li> </ul> Standard deviation origin offset: <ul style="list-style-type: none"> <li>• Range: 0 to 100 dB, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:OOFFSET:ALL?"
!Returns minimum, maximum, average, standard deviation origin offset.
```

**FETCh:MACCuracy:OOffset:AVERage?**

Function	Queries the modulation accuracy measurement's average origin offset.
Query	Range: -100 to 0 dBc, 9.91 E+37 Resolution: 0.1 dB

Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:OOFFSET:AVERAGE"
```

**FETCh:MACCuracy:OOffset:MINimum?**

Function	Queries the modulation accuracy measurement's minimum origin offset.
Query	Range: -100 to 0 dBc, 9.91 E+37 Resolution: 0.1 dB

Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:OOFFSET:MINIMUM"
```

**FETCh:MACCuracy:OOffset:SDEviation?**

Function	Queries the modulation accuracy measurement's standard deviation origin offset.
Query	Range: 0 to 100 dB, 9.91 E+37 Resolution: 0.01 dB

Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:OOFFSET:SDEVIATION?"
```

## FETCH:MACCuracy

### FETCH:MACCuracy:PERRor[:MAXimum]?

Function	Queries the modulation accuracy measurement's maximum phase error.
Query	Range: 0 to 22.0 degrees rms, 9.91 E+37 Resolution: 0.01 degrees

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:PERROR:MAXIMUM?"
```

### FETCH:MACCuracy:PERRor:ALL?

Function	Queries the modulation accuracy measurement's phase error. Measurement results are returned in the following order: minimum phase error, maximum phase error, average phase error, standard deviation phase error.
Query	Mininim, maximum, average phase error: <ul style="list-style-type: none"><li>• Range: 0 to 22.0 degrees rms, 9.91 E+37</li><li>• Resolution: 0.01 degrees</li></ul> Standard deviation phase error: <ul style="list-style-type: none"><li>• Range: 0 to 22.0 degrees, 9.91 E+37</li><li>• Resolution: 0.001 degrees</li></ul>

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:PERROR:ALL?"  
!Returns minimum, maximum, average, and standard deviation phase error.
```

### FETCH:MACCuracy:PERRor:AVERAge?

Function	Queries the modulation accuracy measurement's average phase error.
Query	Range: 0 to 22.0 degrees rms, 9.91 E+37 Resolution: 0.01 degrees

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:PERROR:AVERAGE?"
```

### FETCH:MACCuracy:PERRor:MINimum?

Function	Queries the modulation accuracy measurement's minimum phase error.
Query	Range: 0 to 22.0 degrees rms, 9.91 E+37 Resolution: 0.01 degrees

#### Programming Example

```
OUTPUT 714;"FETCH:MACCURITY:PERROR:MINIMUM?"
```

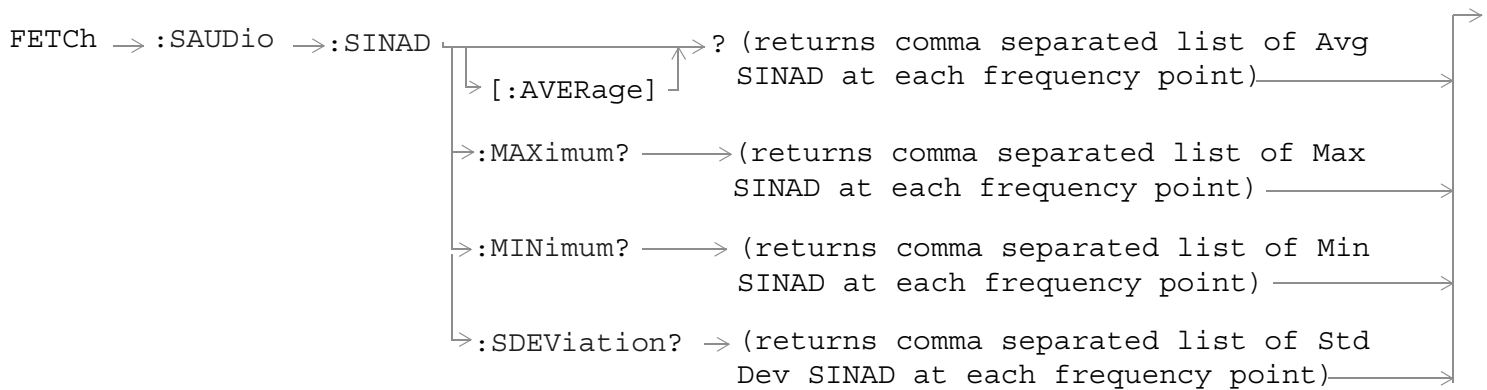
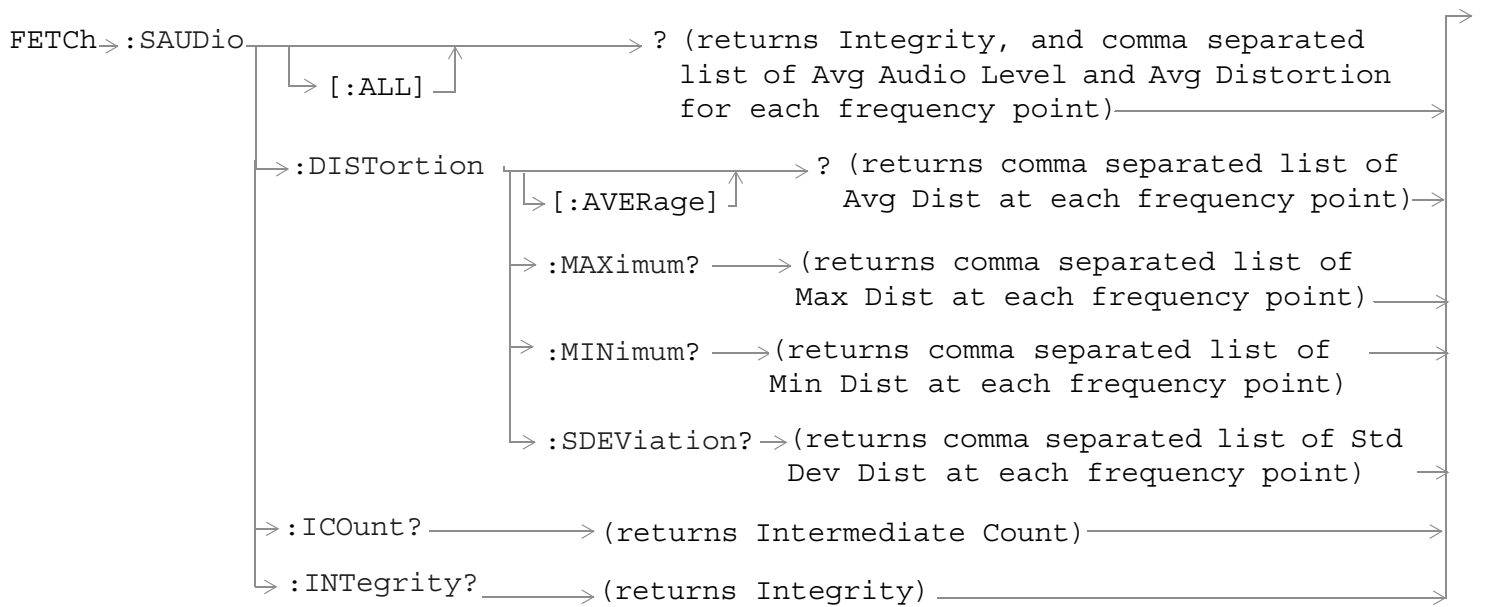
**FEtCh:MACCuracy:PErRor:SDEVIation?**

Function	Queries the modulation accuracy measurement's standard deviation phase error.
Query	Range: 0 to 22.0 degrees, 9.91 E+37 Resolution: 0.001 degrees

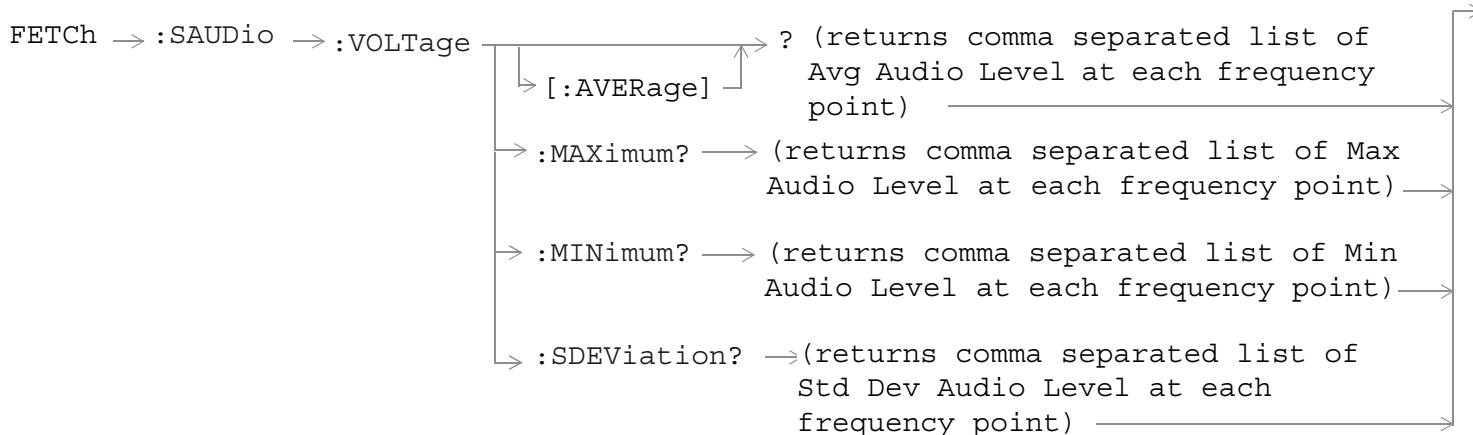
**Programming Example**

OUTPUT 714;"FEtCh:MACCuracy:PErRor:SDEVIation?"

## FETCh:SAUDio







“Diagram Conventions” on page 233

**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 <code>*****SETup:SAUDio:FREQuency:POINts*****</code> 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 “Integrity Indicator” on page 206.</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

### FETCh:SAUDio:DISTortion[:AVERage]?

Function	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 <code>*****SETup:SAUDio:FREQuency:POINts*****</code> command. For frequencies above 10 kHz, this measurement returns 9.91 E+37.
Query	Average audio distortion <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	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 <code>*****SETup:SAUDio:FREQuency:POINts*****</code> command. For frequencies above 10 kHz, this measurement returns 9.91 E+37.
Query	Range: 0 to 99.9%, 9.91 E+37 Resolution: 0.01%

### 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 <code>*****SETup:SAUDio:FREQuency:POINts*****</code> 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, <code>*****SETup:SAUDio:FREQuency:POINts*****</code> , times the number of frequency points specified with the <code>*****SETup:SAUDio:FREQuency:POINts*****</code> . Therefore, when completing a 5 point sweep with multi-measurements turned off, the measurement will return 5 not 1.  See also “FETCh:SAUDio:DISTortion:MAXimum?”
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 “Integrity Indicator” on page 206 for descriptions of non-zero integrity indicators.
Query	Range: See “Integrity Indicator” on page 206. 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 <code>*****SETup:SAUDio:FREQuency:POINts*****</code> 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 <code>*****SETup:SAUDio:FREQuency:POINts*****</code> command.
Query	Range: -99.99 to 99.99 dB, 9.91 E+37 Resolution: 0.01 dB

## FETCh:SAUDio

### 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 <code>SETup:SAUDio:FREQuency:POINts</code> 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 <code>SETup:SAUDio:FREQuency:POINts</code> 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 <code>SETup:SAUDio:FREQuency:POINts</code> 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 <code>SETup:SAUDio:FREQuency:POINts</code> command.
Query	Range: 1 mV to 20 V, 9.91 E+37 Resolution: 4 significant digits

### FETCh:SAUDio:VOLTage:MINimum?

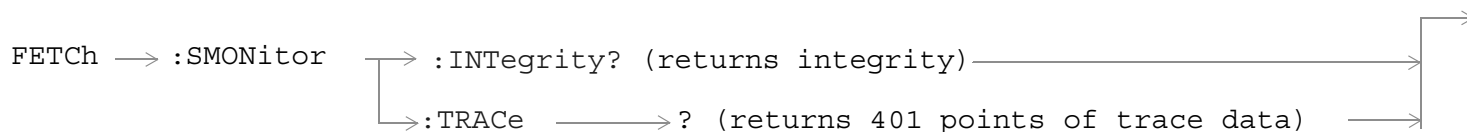
Function	This query returns a comma separated list of minimum audio voltage measured at each frequency point in the sweep. The number of frequency points is determined with the <code>SETup:SAUDio:FREQuency:POINts</code> command.
Query	Range: 1 mV to 20 V, 9.91 E+37 Resolution: 4 significant digits

### 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 <code>SETup:SAUDio:FREQuency:POINts</code> command.
----------	---

Query	Range: 1 mV to 20 V, 9.91 E+37 Resolution: 4 significant digits
-------	--

## FETCh:SMONitor



“Diagram Conventions” on page 233

### FETCh:SMONitor:INTEgrity?

Function	GSM	Returns the integrity indicator value for the last spectrum monitor measurement performed. Zero indicates a normal result.
	GPRS	See “Integrity Indicator” on page 206 for descriptions of non-zero integrity indicators.
Query		Range: See “Integrity Indicator” on page 206. Resolution: 1

### FETCh:SMONitor:TRACe?

Function	GSM	Queries the spectrum monitor and returns 401 points representing the amplitude results (in dBm) of the trace data.
	GPRS	
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>

---

# INITiate Subsystem

## Syntax Diagrams and Command Descriptions

“INITiate” on page 389

### 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 code starts the Digital Transmit Power and Modulation Accuracy measurements, and then uses the INITiate:DONE? command in a loop to query the status of these measurements, see “Measurement Event Synchronization” on page 217.

When the measurements are done, the FETCh command is used to acquire the results, and the results are entered into variables in the controlling application. The 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 202.

## INITiate Subsystem

---

**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.

---

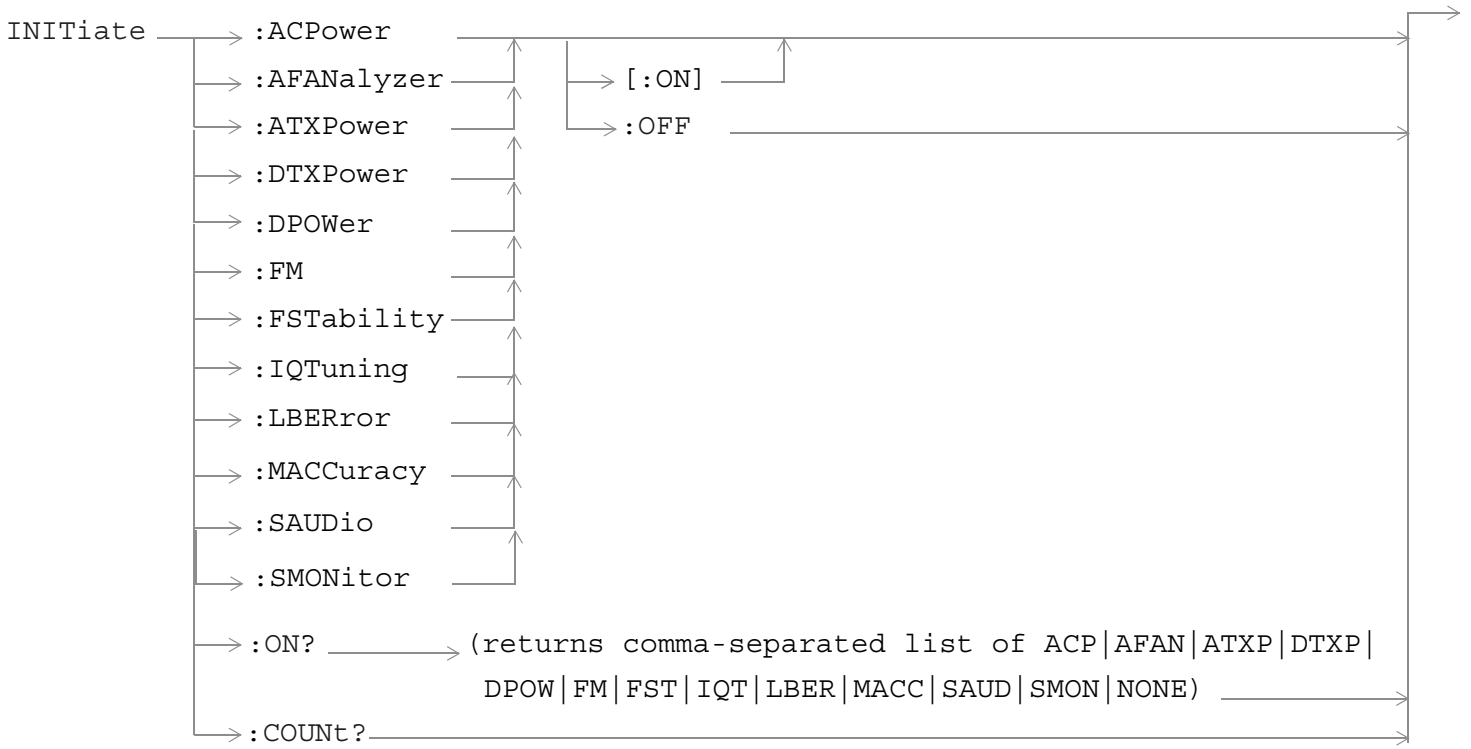
```
10 OUTPUT 714;"SETup:ALL:CONTinuous:OFF" ! selects single trigger mode.
20 OUTPUT 714;"INITiate:DTXPower;MACCuracy" ! starts digital TX power and
30                                     !modulation accuracy measurements.
40 LOOP
50 OUTPUT 714;"INITiate:DONE?" !query to find out if any measurements are done.
60 ENTER 714;Meas_complete$
70 SELECT Meas_complete$
80 CASE "DTXP" !tests for the string "DTXP", indicating digital TX power measurement is done.
90 OUTPUT 714;"FETCh:DTXPower:POWer?" !Queries average digital TX power measurement.
100 ENTER 714;Dtxpower
110 CASE "MACC" !tests for the string "MACC", indicating that the modulation accuracy
120                                     !measurement is done.
130 OUTPUT 714;"FETCh:MACCuracy:EVM?" !Queries maximum error vector magnitude over 1 burst.
140 ENTER 714;Max_evml
150 END SELECT
160 EXIT IF Meas_complete$="NONE"
170 END LOOP
180 END
```

INITiate commands should be sent only when the test set has finished performing any operations, such as handoffs, that require settling. For example, the following code performs a handoff from a digital traffic channel to an analog voice channel (AVC), verifies that the mobile is on an AVC, then initiates an analog TX power measurement.

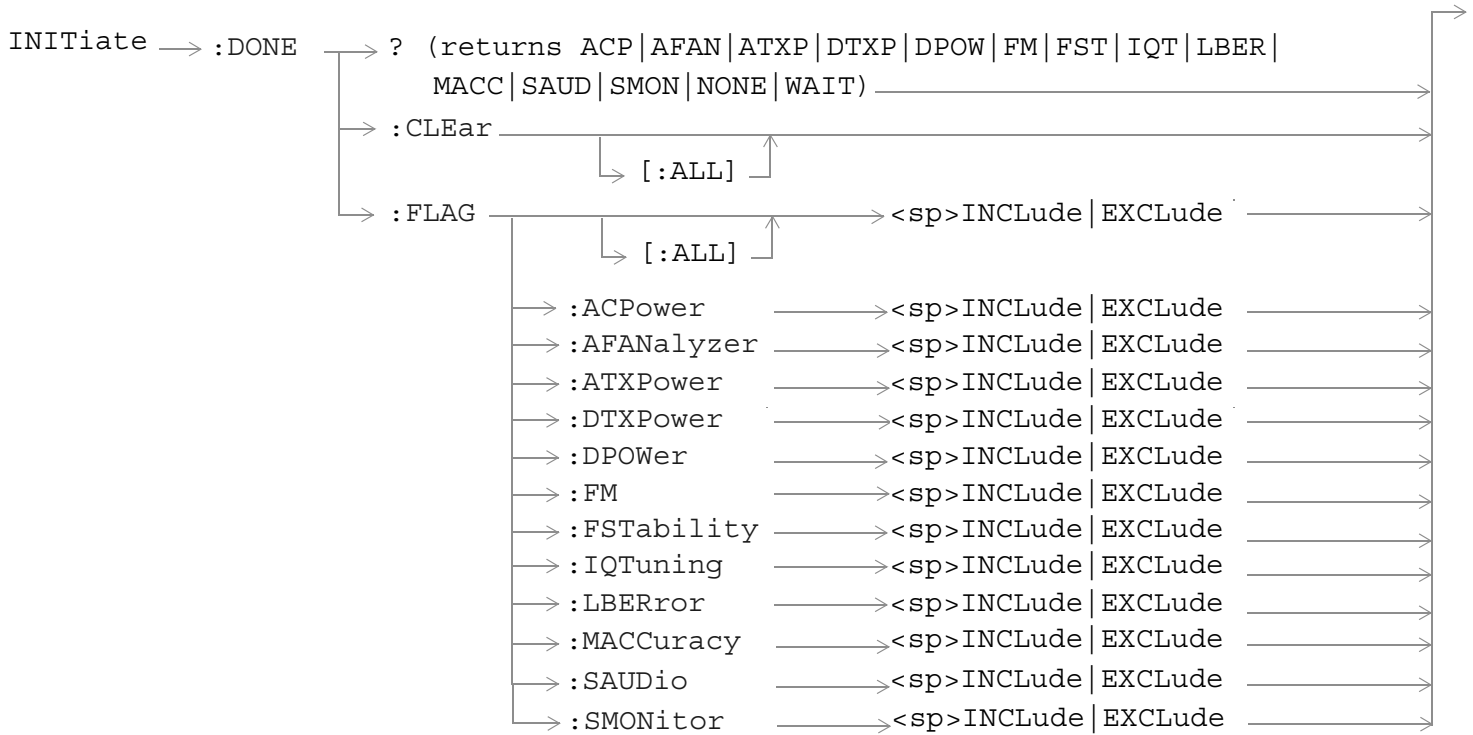
```
10 !The mobile is on a digital traffic channel up to this point.
20 !Call setup parameters have been configured for handoff to an AVC.
30 OUTPUT 714;"CALL:HANDOFF"
40 LOOP
50 OUTPUT 714;"CALL:STATus:TCHannel:TYPE?" !See if the mobile is on an AVC yet.
60 ENTER 714;Tch_type$
70 SELECT Tch_type$
80 CASE "AVC" !If the mobile is on an AVC, go ahead and measure analog TX power.
90 OUTPUT 714;"INIT:ATXPOWER" !Start the analog TX power measurement.
100 OUTPUT 714;"FETCh:ATXPOWER:POWER?" !Query the analog TX power result.
110 ENTER 714;Atx_power !Enter the returned measurement value into a variable.
120 CASE "DTC" !The mobile is not on an AVC yet, so don't start ATX power yet.
130 END SELECT
140 EXIT IF Tch_type$="AVC" !The measurement was made; continue to next routine.
150 END LOOP
160 End
```



# INITiate



## INITiate



“Diagram Conventions” on page 233

**INITiate:<measurement mnemonic>[:ON]**

Function	<p>Starts measurements.</p> <p>The INITiate command is associated with the SETup “SETup Subsystem” on page 411 and the “FETCh? Subsystem” on page 328.</p> <p>One or more measurements can be initiated with the same program line (see “Concurrent Measurements” on page 195).</p> <p>This command is also used to activate a measurement. See “INITiate Programming Examples (how INIT commands are used)” on page 387.</p>
<b>Programming Example</b> <pre>OUTPUT 714;"INITIATE:ACPOWER;LBERROR:ON" !Initiates an adjacent channel power and a loopback BER measurment.</pre>	

**INITiate:ON?**

Function	Queries the names of the measurements that are on. Returns a comma separated list of measurement mnemonics.
Query	Range: ACP   AFAN   ATXP   DTXP   DPOW   FM   FST   IQT   LBER   MACC   SAUD   SMON   NONE
<b>Programming Example</b> <pre>OUTPUT 714;"INITIATE:ON?"</pre>	

**INITiate:<measurement mnemonic>:OFF**

Function	<p>Deactivates the selected measurement. See “Measurement States” on page 202.</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 236.</p>
<b>Programming Example</b> <pre>OUTPUT 714;"INITIATE:ACPOWER:OFF" !Deactivates the adjacent channel power measurement.</pre>	

**INITiate:COUNt?**

Function	Queries the number of measurements that have been initiated (are active). See “Measurement States” on page 202.
Query	Range: 0 to 10
<b>Programming Example</b> <pre>OUTPUT 714;"INITIATE:COUNt?"</pre>	

## INITiate

### INITiate:DONE?

Function	Queries (one at a time) which measurements, if any, are finished or have timed-out. See “Measurement Event Synchronization” on page 217 for how to use this command. See “Measurement States” on page 202 to understand the test set’s measurment states. See “INITiate:DONE:FLAG:<measurement mnemonic>” on page 393 for include or exclude commands.
Query	Range: ACP   AFAN   ATXP   DTXP   DPOW   FM   FST   IQT   LBER   MACC   SAUD   SMON   NONE   WAIT

### INITiate:DONE:CLEar

Function	Clears the done flag from all measurements.
Programming Example	<pre>OUTPUT 714;"INITIATE:DONE:CLEAR" !Clears the done flag.</pre>

### INITiate:DONE:FLAG[:ALL]

Function	Specifies that all measurements are considered (included or excluded) when the INITiate:DONE? query is sent.  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. Use INITiate:DONE:FLAG:ALL EXCLude to exclude all measurements. Use INITiate:DONE:FLAG:<measurement mnemonic> to exclude specific measurements.  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.
Setting	Range: INCLude   EXCLude
Programming Example	<pre>OUTPUT 714;"INITIATE:DONE:FLAG:ALL EXCLUDE" !Excludes all measurements from responding to the INITIATE:DONE? query.</pre>

**INITiate:DONE:FLAG:<measurement mnemonic>**

Function	<p>Specifies if a specific measurement is considered (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. Use INITiate:DONE:FLAG:ALL EXCLude to exclude all measurements. Use INITiate:DONE:FLAG:&lt;measurement mnemonic&gt; to exclude specific 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>
Setting	Range: INCLude   EXCLude
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"INITIATE:DONE:FLAG:ACP EXCLUDE"</pre> <p>!Excludes the adjacent channel power measurement from responding to the INITIATE:DONE? query.</p>	

---

## READ? Subsystem

### Syntax Diagram and Command Descriptions

“READ” on page 396

### 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.

---

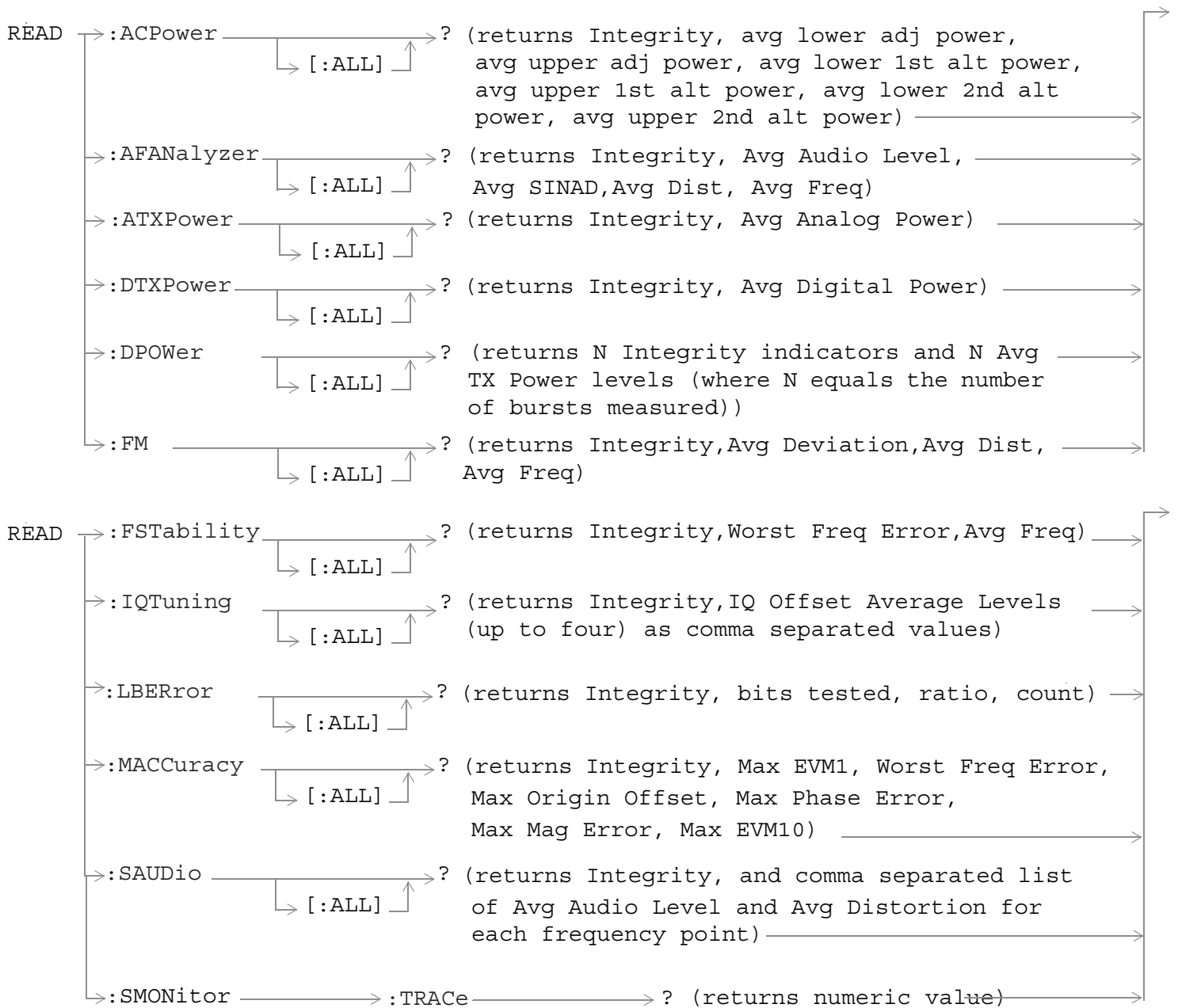
**NOTE** Trigger arming for each measurement is controlled in the SETUp subsystem. Best practice during remote operation is to set trigger arm to single (Continuous Off).

---

**Program Example - READ:DTXPower?**

```
OUTPUT 714;"READ:DTXPower?" !Starts digital TX power measurement. As soon as the
!measurement cycle has completed, the test set
!provides the digital TX power measurement results to the
!controlling application.
ENTER 714;Integrity, Digital_power !Enters the integrity indicator and
!digital TX power measurement values into
!controlling application.
```

**READ**



“Diagram Conventions” on page 233



**READ:ACPower[:ALL]?**

Function	Initiates and fetches an adjacent channel power measurement as a sequential operation. Measurement results are returned in the following order: integrity, average lower adjacent channel power, average upper adjacent channel power, average lower first alternate channel power, average upper 1st alternate channel power, average lower second alternate channel power, upper second alternate channel power.
Query	Range: -999 to 999 dBc Resolution: 0.1 dB

**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	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 to 99 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 to 99%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

**READ:ATXPower[:ALL]?**

Function	Initiates and fetches an analog transmitter power measurement as a sequential operation. Measurement results are returned in the following order: integrity, average analog power.
Query	Average analog transmitter power <ul style="list-style-type: none"> <li>• Range: -100 to 100 dBm</li> <li>• Resolution: 0.01 dB</li> </ul>

## READ

### READ:DPOwer[:ALL]?

Function	Initiates and fetches a dynamic power measurement as a sequential operation. Measurement results are returned in the following order: returns $N$ integrity indicators and $N$ Avg TX Power levels (where $N$ equals the number of bursts measured).
Query	Dynamic power <ul style="list-style-type: none"><li>• Range: -100 to 100 dBm, 9.91 E+37</li><li>• Resolution: 0.01 dB</li></ul>

### READ:DTXPower[:ALL]?

Function	Initiates and fetches a digital transmitter power measurement as a sequential operation. Measurement results are returned in the following order: integrity, average digital power.
Query	Average digital transmitter power <ul style="list-style-type: none"><li>• Range: -100 to 100 dBm</li><li>• Resolution: 0.01 dB</li></ul>

### READ:FM[:ALL]?

Function	Initiates and fetches an FM measurement as a sequential operation. Measurement results are returned in the following order: integrity, average frequency deviation, average distortion. The distortion measurement must be enabled before a measurement result (other than 9.91E+37) is reported. See “SETup:AFANalyzer:SDISortion:STAtE” on page 422.
Query	Average FM frequency deviation <ul style="list-style-type: none"><li>• Range: 0 to 99 kHz, 9.91 E+37</li><li>• Resolution: 0.001 Hz</li></ul> Average FM distortion <ul style="list-style-type: none"><li>• Range :0 to 100%, 9.91 E+37</li><li>• Resolution: 0.1%</li></ul> Average FM 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>

**READ:FSTability[:ALL]?**

Function	<p>Initiates and fetches a frequency stability measurement as a sequential operation.</p> <p>Measurement results are returned in the following order: integrity, worst-case frequency error, average frequency.</p>
Query	<p>Worst-case frequency error</p> <ul style="list-style-type: none"> <li>• Range: -500 to 500 parts per million (ppm)</li> <li>• Resolution: 0.01</li> </ul> <p>Average frequency</p> <ul style="list-style-type: none"> <li>• Range: 100 E+6 to 3 E+9 Hz</li> <li>• Resolution: 1 Hz</li> </ul>

**READ:IQTuning[:ALL]?**

Function	<p>Initiates and fetches an IQ tuning measurement as a sequential operation.</p> <p>One result is returned for each of the enabled entries in the TX digital IQ tuning offset frequency list. Up to four entries can be made in the list. If no offsets are specified, the measurement will return a single NAN value.</p> <p>See “SETup:IQTuning:OFFSet[:FREQuency][:SElected]” on page 453.</p> <p>The number of results returned are the same as those returned with the “SETup:IQTuning:OFFSet:POINts[:SElected]?” query.</p>
Query	<p>Range: -100 to +100 dB, 9.91 E+37</p> <p>Resolution: 0.1 dB</p>

**READ:LBError[:ALL]?**

Function	<p>Initiates and fetches a loopback bit error measurement as a sequential operation.</p> <p>Measurement results are returned in the following order: integrity, bits tested, bit error ratio, bits counted.</p> <p>Bits to test is determined by the SETup:LBError:COUNt command.</p>
Query	<p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to “bits to test” + 259, 9.91 E+37</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 100%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul> <p>Bits counted</p> <ul style="list-style-type: none"> <li>• Range: 0 to “bits tested”, 9.91 E+37</li> </ul>

## READ

### READ:MACCuracy[:ALL]?

Function	<p>Initiates and fetches a modulation accuracy measurement as a sequential operation.</p> <p>Measurement results are returned in the following order: integrity, maximum EVM1, worst-case frequency error, maximum origin offset, maximum phase error, maximum magnitude error, maximum EVM10.</p>
Query	<p>Maximum EVM1</p> <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> <p>Worst-case frequency error</p> <ul style="list-style-type: none"><li>• Range: -1 E+4 to 1 E+4 Hz, 9.91 E+37</li><li>• Resolution: 1 Hz</li></ul> <p>Maximum origin offset</p> <ul style="list-style-type: none"><li>• Range: -100.0 to 0 dBc, 9.91E+37</li><li>• Resolution: 0.1 dB</li></ul> <p>Maximum phase error</p> <ul style="list-style-type: none"><li>• Range: 0 to 22.0 degrees rms, 9.91 E+37</li><li>• Resolution: 0.01 degrees</li></ul> <p>Maximum magnitude error</p> <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 9.91 E+37</li><li>• Resolution: 0.01%</li></ul> <p>Maximum EVM10</p> <ul style="list-style-type: none"><li>• Range: 0 to 100.0% rms, 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>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>Queries (initiates and fetches) one 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>

## RFANalyzer Subsystem

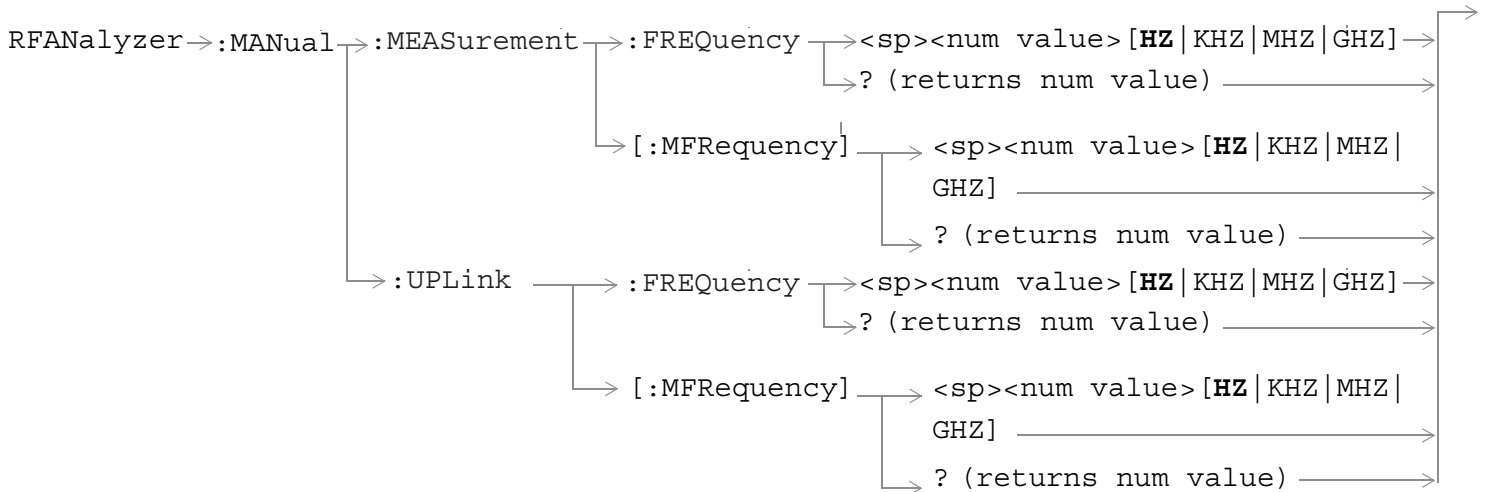
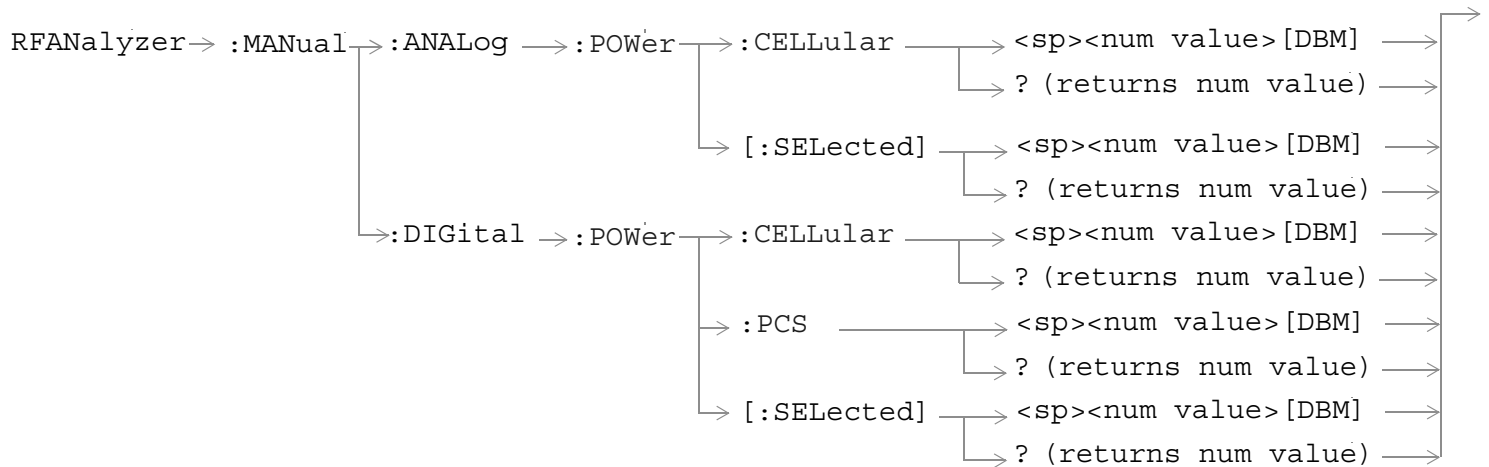
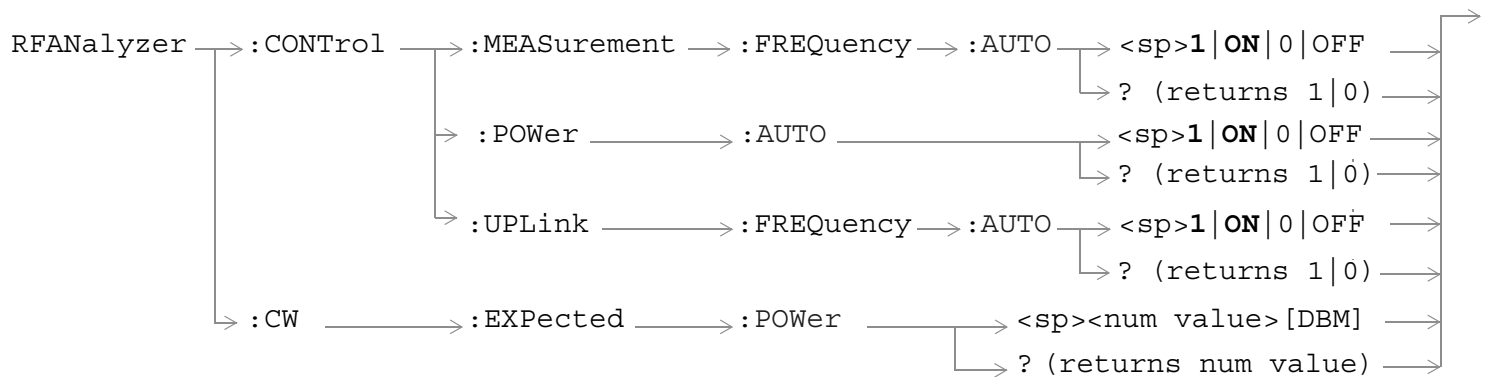
### Description

The RFANalyzer command subsystem performs “lower-level” functions that control the Test Set's measuring receiver and demodulation receiver. Most of these functions are normally controlled indirectly by commands in other subsystems, such as CALL subsystem commands to change the current traffic or control channel frequency or MS TX level.

### Syntax Diagrams and Command Descriptions

“RFANalyzer” on page 403

## RFAnalyzer



“Diagram Conventions” on page 233

## RFANalyzer

### RFANalyzer:CONTROL:MEASUREMENT:FREQUENCY:AUTO

Function	Sets/queries the whether the test set's receiver is set to automatic (AUTO ON) or manual (AUTO OFF) measurement frequency control. See "Receiver Control" on page 169.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	1 (on)
Programming Example	
OUTPUT 714;"RFANalyzer:CONTROL:MEASUREMENT:FREQUENCY:AUTO OFF" !Enables manual control of the measurement receiver's frequency.	

### RFANalyzer:CONTROL:POWER:AUTO

Function	Sets/queries the whether the test set receiver's expected power setting is set to automatic (AUTO ON) or manual (AUTO OFF) power control. See "Receiver Control" on page 169.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	1 (on)
Programming Example	
OUTPUT 714;"RFANALYZER:CONTROL:POWER:AUTO OFF"	

### RFANalyzer:CONTROL:UPLINK:FREQUENCY:AUTO

Function	Sets/queries the whether the test set's demodulation receiver is set to automatic (AUTO ON) or manual (AUTO OFF) uplink frequency control. See "Receiver Control" on page 169.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	1 (on)
Programming Example	
OUTPUT 714;"RFANALYZER:CONTROL:UPLINK:FREQUENCY:AUTO OFF"	



**RFANalyzer:CW:EXPeCted:POWer**

Function	Sets/queries the expected power for analog carriers when operating in the CW mode. This value is used with manual and auto receiver control.
Setting	Range: -25 to +43 dBm (interacts with the Amplitude Offset setting to determine the available range) Resolution: 0.01 dBm
Query	Range: Same as setting.
*RST setting	13 dBm
Programming Example OUTPUT 714;"RFANalyzer:CW:EXPeCted:POWer 24 DBM"	

**RFANalyzer:MANual:ANALog:POWer[:SELeCted]**

Function	Sets/queries the expected power when the mobile is on an analog voice channel. The selected band is currently limited to the cellular band (800 MHz).
Setting	Range: -60 dBm to +53 dBm (interacts with the Amplitude Offset setting to determine the available range) Resolution: 0.01 dB
Query	Range: -60 dBm to +53 dBm Resolution: 0.01 dBm
*RST setting	13 dBm
Programming Example OUTPUT 714;"RFANalyzer:MANual:ANALog:POWer:SELeCTED 24 DBM"	

**RFANalyzer:MANual:ANALog:POWer:CELLular**

Function	Sets/queries the expected power when the mobile is on a cellular band (800 MHz) analog voice channel.
Setting	Range: -60 dBm to +53 dBm (interacts with the Amplitude Offset setting to determine the available range) Resolution: 0.01 dBm
Query	Range: -60 dBm to +53 dBm
*RST setting	13 dBm
Programming Example OUTPUT 714;"RFANalyzer:MANual:ANALog:POWer:CELLular 24 DBM"	

## RFANalyzer

### RFANalyzer:MANual:DIGital:POWer[:SELected]

Function	Sets/queries the expected power from the mobile station while on a digital traffic channel operating in the selected band.
Setting	Range: -60 dBm to +53 dBm (interacts with the Amplitude Offset setting to determine the available range) Resolution: 0.01 dBm
Query	Range: -60 dBm to +53 dBm
*RST setting	13 dBm
Programming Example OUTPUT 714;"RFANALYZER:MANUAL:DIGITAL:POWER:SELECTED 24 DBM"	

### RFANalyzer:MANual:DIGital:POWer:CELLular

Function	Sets/queries the expected power from the mobile station while on a digital traffic channel operating in the cellular (800 MHz) band.
Setting	Range: -60 dBm to +53 dBm (interacts with the Amplitude Offset setting to determine the available range) Resolution: 0.01 dBm
Query	Range: -60 dBm to +53 dBm
*RST setting	13 dBm
Programming Example OUTPUT 714;"RFANalyzer:MANual:DIGital:POWer:CELLular 24 DBM"	

### RFANalyzer:MANual:DIGital:POWer:PCS

Function	Sets/queries the expected power from the mobile station while on a digital traffic channel operating in the PCS (1900 MHz) band.
Setting	Range:-60 dBm to +53 dBm (interacts with the Amplitude Offset setting to determine the available range) Resolution: 0.01 dB
Query	Range: -60 dBm to +53 dBm
*RST setting	13 dBm
Programming Example OUTPUT 714;"RFANalyzer:MANual:DIGital:POWer:PCS 24 DBM"	

**RFANalyzer:MANual:MEASurement[:MFRequency]**

Function	Sets/queries the frequency used to tune the test set's measuring receiver for all mobile carriers: analog (including CW) or digital systems (cellular or PCS band).  This command automatically sets the receiver to manual mode and changes the measurement frequency.
Setting	Range: 292.5 MHz to 2700 MHz  Resolution: 1 Hz
Query	Range: 292.5 MHz to 2700 MHz
*RST setting	896.000 MHz
<b>Programming Example</b>  <pre>OUTPUT 714;"RFANalyzer:MANual:MEASurement:MFRequency 942.6 MHz" !Enables manual receiver control and sets the test set's receiver frequency to 942.6 MHz.</pre>	

**RFANalyzer:MANual:MEASurement:FREQuency**

Function	Sets/queries the frequency used to tune the test set's measuring receiver for all mobile carriers: analog (including CW) or digital systems (cellular or PCS band), when manual mode is selected (RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO OFF).
Setting	Range: 292.5 MHz to 2700 MHz  Resolution: 1 Hz
Query	Range: 292.5 MHz to 2700 MHz
*RST setting	896.000 MHz
<b>Programming Example</b>  <pre>OUTPUT 714;"RFANalyzer:MANual:MEASurement:FREQuency 942.6 MHz" !Sets the test set's receiver frequency to 942.6 MHz when manual control is used.</pre>	

**RFANalyzer:MANual:UPLink[:MFRequency]**

Function	Sets/queries the test set's demodulation receiver frequency, used to demodulate information from the mobile's reverse channel transmission.  This command automatically sets the test set to manual mode and changes the uplink frequency.
Setting	Range: 292.5 MHz to 2700 MHz  Resolution: 1 Hz
Query	Range: 292.5 MHz to 2700 MHz
*RST setting	896.000 MHz
<b>Programming Example</b>  <pre>OUTPUT 714;"RFANalyzer:MANual:UPLink:MFRequency 1955.030 MHz" !Enables manual demodulation receiver control and sets the test set's demodulation receiver !frequency to 1955.030 MHz.</pre>	

## RFANalyzer

### RFANalyzer:MANual:UPLink:FREQuency

Function	Sets/queries the test set's demodulation receiver frequency used to demodulate information from the mobile's reverse channel transmission when manual mode is selected (RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO:OFF).
Setting	Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query	Range: 292.5 MHz to 2700 MHz
*RST setting	896.000 MHz
<b>Programming Example</b> OUTPUT 714;"RFANalyzer:MANual:UPLink:FREQuency 942.6 MHz" !Sets the test set's demodulation receiver frequency to 942.6 MHz.	

## **RFGenerator Subsystem**

### **Description**

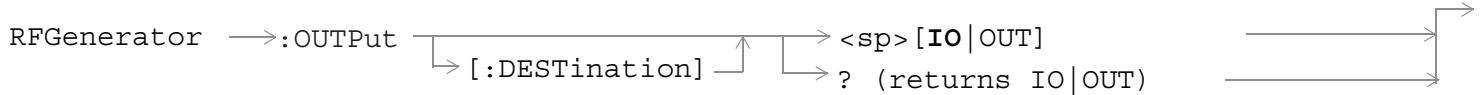
The RFGenerator subsystem selects the RF generator output port on test sets equipped with both the RF IN/OUT port and the RF OUT ONLY port. If the test set does not have the RF OUT ONLY port, an error message is generated when attempting to switch output ports.

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 410

## RFGenerator:OUTPUT



“Diagram Conventions” on page 233

### 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.
Setting	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
Query	Range: 292 MHz to 2700 MHz Resolution: 0.1 Hz
*RST Setting	851 MHz
Requirements	Test Application Revision: A.05.05 Hardware: RF Input/Output module with second RF output connector, modified front panel.
<b>Programming Example</b> OUTPUT 714; "RFGENERATOR:OUTPUT:DESTINATION OUT" !Sets the RF generator's output destination to the RF Out Only port.	

---

## 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[:ALL]:CONTInuous” on page 412

“SETup:ACPower” on page 413

“SETup:AFANalyzer” on page 417

“SETup:ATXPower” on page 424

“SETup:DPOWER” on page 428

“SETup:DTXPower” on page 434

“SETup:FM” on page 438

“SETup:FSTability” on page 444

“SETup:IQTuning” on page 448

“SETup:LBError” on page 461

“SETup:MACCuracy” on page 464

“SETup:SAUDio” on page 468

“SETup:SMONitor” on page 477

## SETup[:ALL]:CONTInuous



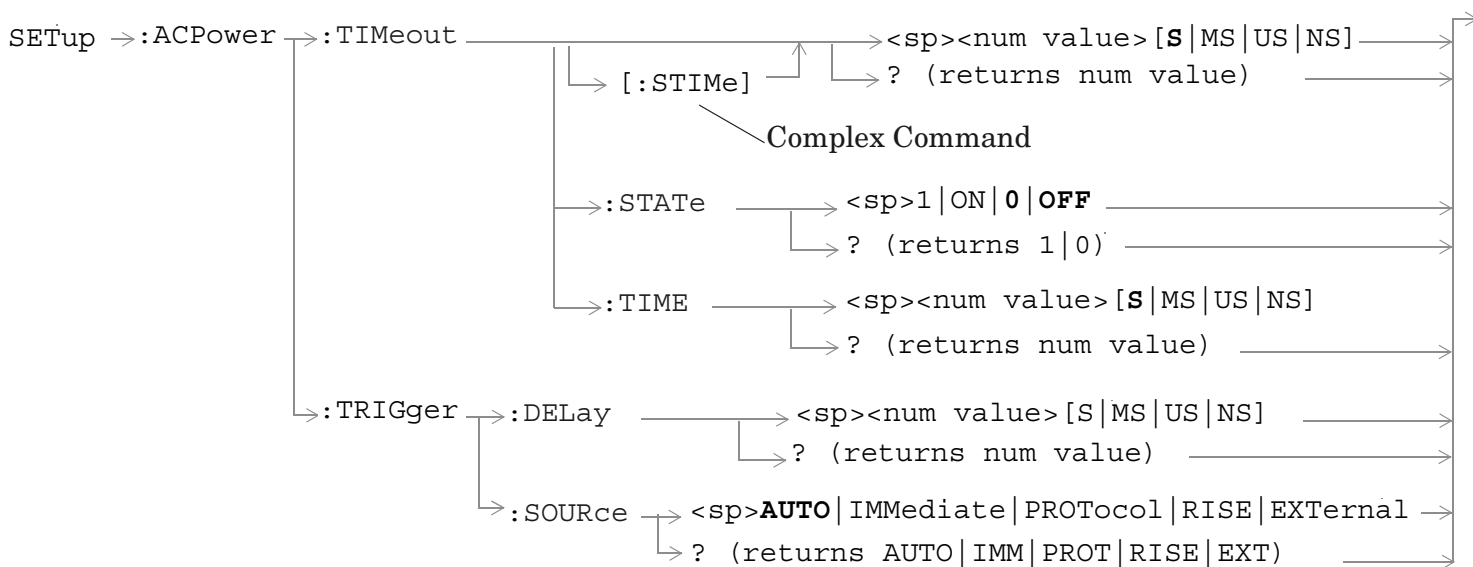
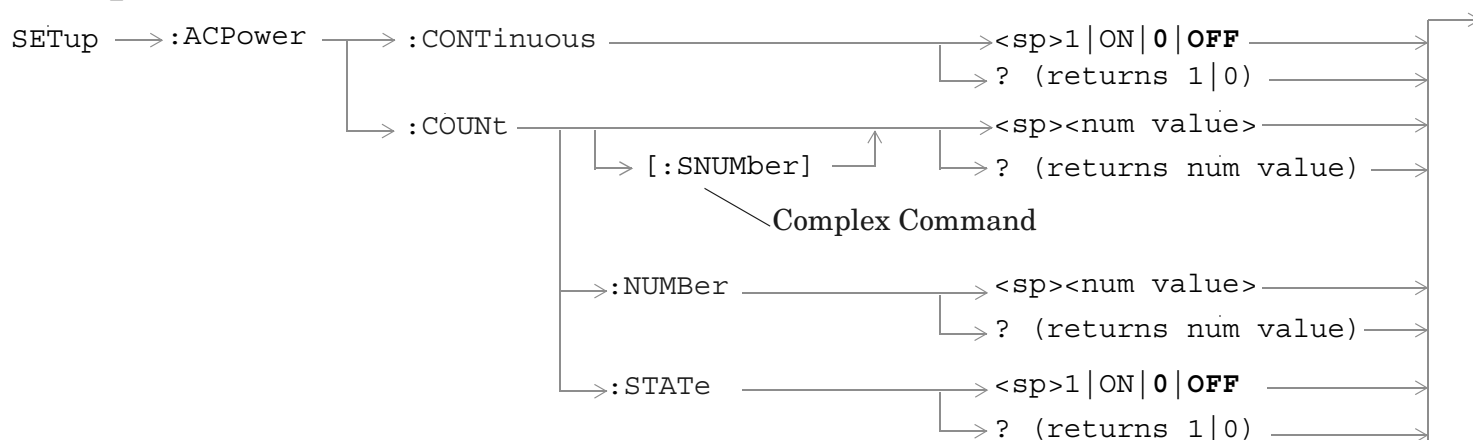
“Diagram Conventions” on page 233

### SETup[:ALL]:CONTInuous

Function	Sets/queries 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)).  This setting overrides previously set trigger arm settings for individual measurements.
Setting	Range: ON, OFF
Programming Example	
OUTPUT 714;"SETup:ALL:CONTInuous:OFF" !Sets all measurements to single trigger mode.	



## SETup:ACPower



“Diagram Conventions” on page 233

## SETup:ACPower

### SETup:ACPower:CONTInuous

Function	Sets/queries the trigger arm state for the adjacent channel power 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)
Programming Example	
OUTPUT 714;"SETUP:ACPOWER:CONTINUOUS ON" !Sets measurement to continuous trigger mode.	

### SETup:ACPower:COUNT[:SNUMber]

Function	Sets/queries the number of adjacent channel power 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)
Programming Example	
OUTPUT 714;"SETUP:ACPOWER:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.	

### SETup:ACPower:COUNT:NUMBer

Function	Sets/queries the number of adjacent channel power measurements to be made when multi-measurement state is ON.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	Off, (10 when STATE = On)
Programming Example	
OUTPUT 714;"SETUP:ACPOWER:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

**SETup:ACPower:COUNT:STATE**

Function	Sets/queries the multi-measurement state of the adjacent channel power measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:ACPOWER:COUNT:STATE ON" !Turns on multi-measurements.	

**SETup:ACPower:TIMEout[:STIME]**

Function	Sets/queries the adjacent channel power measurement's timeout setting and automatically sets the timeout state to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	Off (10 seconds when STATE = On)
Programming Example	
OUTPUT 714;"SETUP:ACPOWER:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

**SETup:ACPower:TIMEout:STATE**

Function	Sets/queries the adjacent channel power measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:ACPOWER:TIMEOUT:STATE ON" !Enables measurement timeouts.	

## SETup:ACPower

### SETup:ACPower:TIMEout:TIME

Function	Sets/queries the adjacent channel power measurement's timeout setting to be used when the timeout state is set to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	Off, (10 when STATE = On)
Programming Example OUTPUT 714;"SETUP:ACPOWER:TIMEOUT:TIME 5S" !Enables a measurement timeout of 5 seconds when the timeout state is set to ON.	

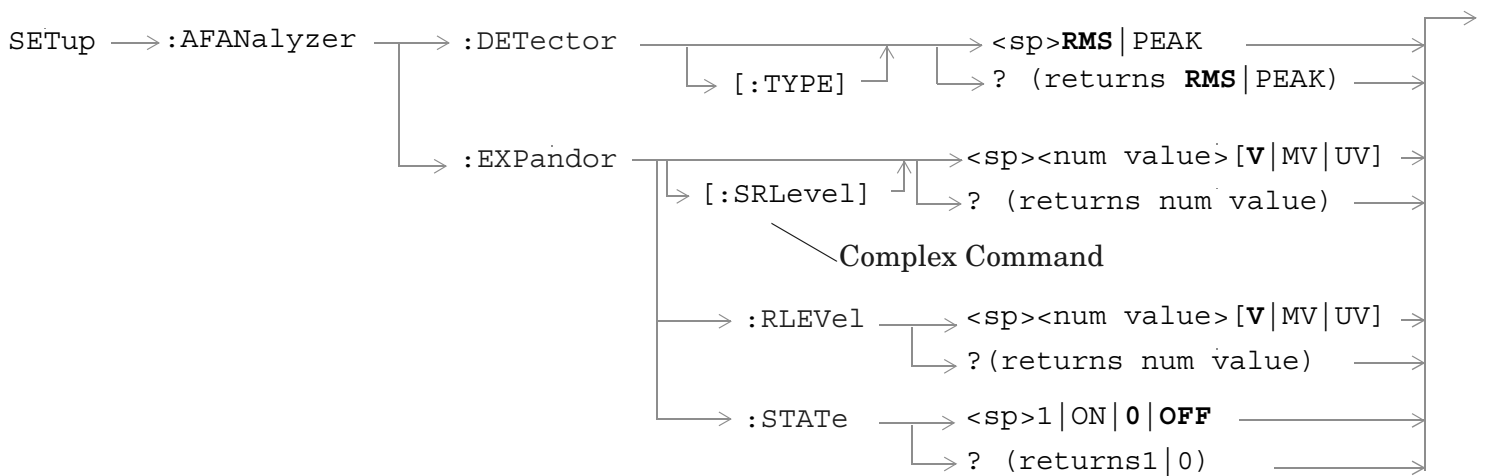
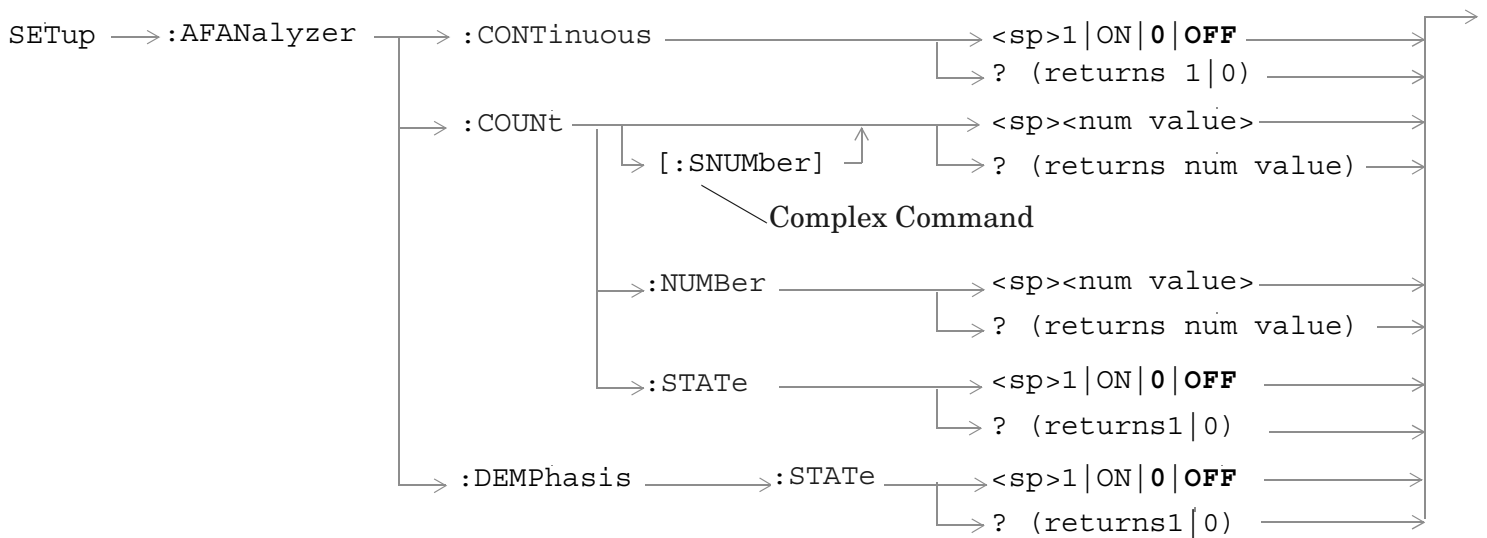
### SETup:ACPower:TRIGger:DELay

Function	Sets/queries the trigger delay for the adjacent channel power measurement.
Setting	Range: -20 to 20 ms Resolution: 10 us
Query	Range: -20 to 20 ms
*RST Setting	0 seconds
Programming Example OUTPUT 714;"SETUP:ACPOWER:TRIGGER:DELAY 1S"	

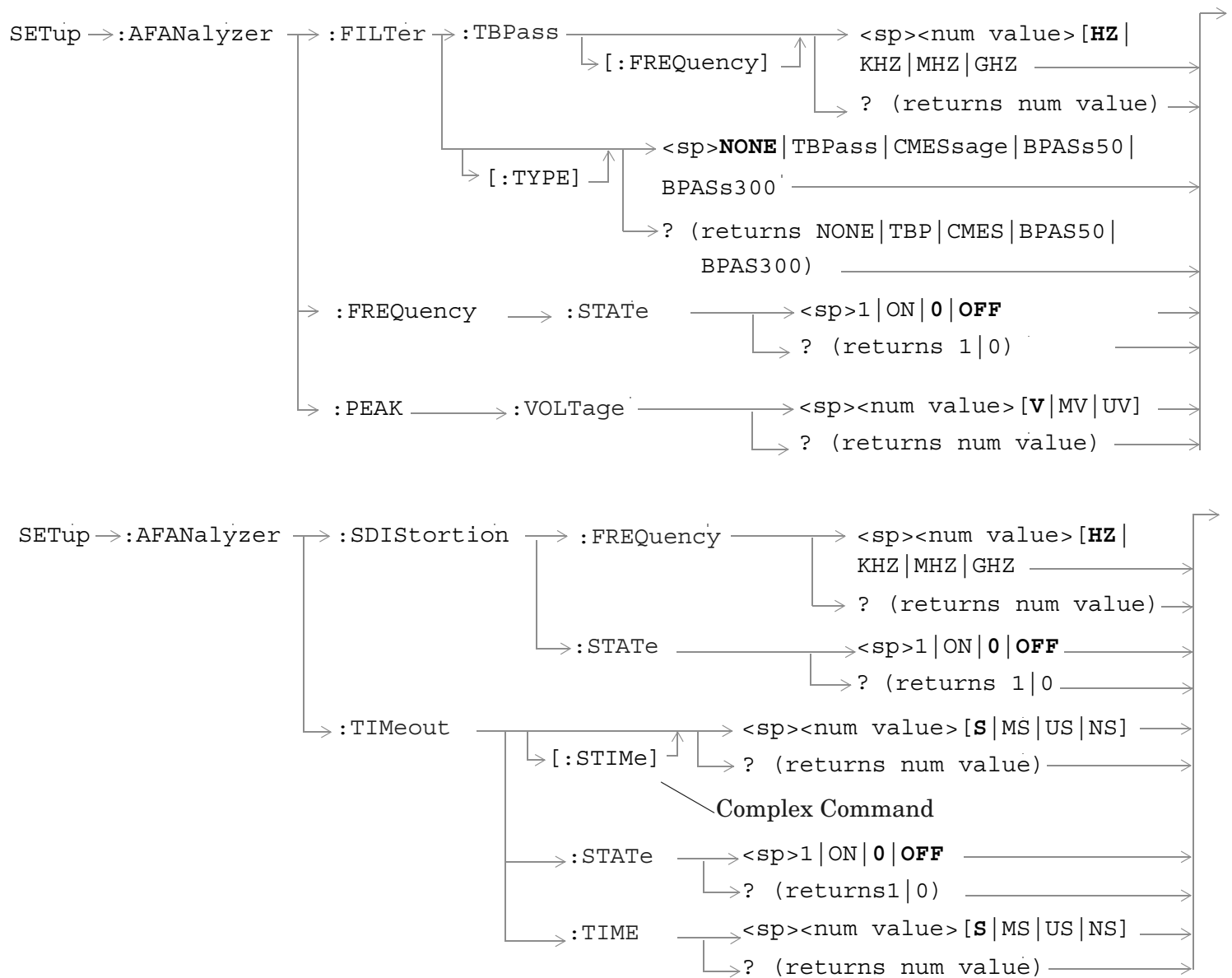
### SETup:ACPower:TRIGger:SOURce

Function	Sets/queries the trigger source for the adjacent channel power measurement.
Setting	Range: AUTO   IMMEDIATE   PROTOCOL   RISE   EXTERNAL
Query	Range: AUTO   IMM   PROT   RISE   EXT
*RST Setting	AUTO
Programming Example OUTPUT 714;"SETUP:ACPOWER:TRIGGER:SOURCE RISE"	

## SETup:AFANalyzer



## SETup:AFANalyzer



“Diagram Conventions” on page 233

**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> <pre>OUTPUT 714;"SETUP:AFANALYZER:CONTINUOUS OFF" !Sets measurement to single trigger mode.</pre>	

**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> <pre>OUTPUT 714;"SETUP:AFANALYZER:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.</pre>	

**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> <pre>OUTPUT 714;"SETUP:AFANALYZER:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.</pre>	

## SETup:AFANalyzer

### 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:DEMPHISIS: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 expandor's reference level and automatically sets the expandor'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 expandor state to on and level to 5 V.	



**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
Programming Example	
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)
Programming Example	
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
Programming Example	
OUTPUT 714;"SETUP:AFANALYZER:FILTER:TYPE BPASS50" !Selects the 50 Hz to 15 kHz bandpass filter.	

**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
Programming Example	
10 OUTPUT 714;"SETUP:AFANALYZER:FILTER:TBPASS:FREQUENCY 300HZ"	

## SETup:AFANalyzer

### 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   ON   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
Programming Example 10 OUTPUT 714 ; SETUP : AFANALYZER : SDISTORTION : STATE ON "	

**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
<b>Programming Example</b> OUTPUT 714;"SETUP:AFANALYZER:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

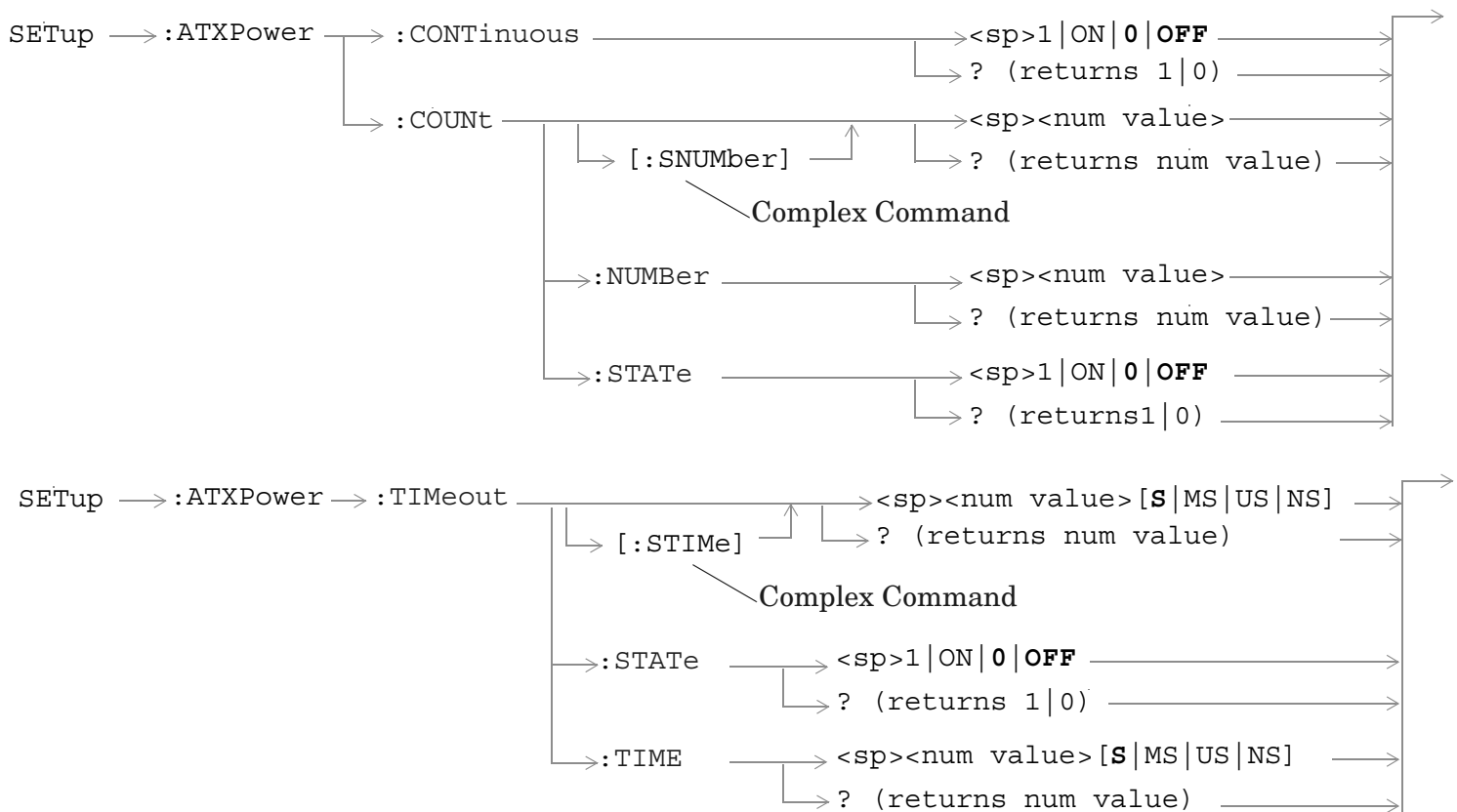
**SETup:AFANalyzer:TIMEout:STATE**

Function	Sets/queries the AF analyzer measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> 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
<b>Programming Example</b> OUTPUT 714;"SETUP:AFANALYZER:TIMEOUT:TIME 5S"	

## SETup:ATXPower



“Diagram Conventions” on page 233

**SETup:ATXPower:CONTInuous**

Function	Sets/queries the trigger arm state for the analog transmitter power 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)
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:CONTINUOUS ON" !Sets measurement to continuous trigger mode.	

**SETup:ATXPower:COUNT[:SNUMBER]**

Function	Sets/queries the number of analog transmitter power 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	10, on
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.	

**SETup:ATXPower:COUNT:NUMBER**

Function	Sets/queries the number of analog transmitter power measurements to be made when multi-measurement state is ON.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

## SETup:ATXPower

### SETup:ATXPower:COUNT:STATe

Function	Sets/queries the multi-measurement state of the analog transmitter power measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:COUNT:STATE ON" !Turns on multi-measurements.	

### SETup:ATXPower:TIMEout[:STIME]

Function	Sets/queries the analog transmitter power measurement's timeout setting and automatically sets the timeout state to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds, on
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

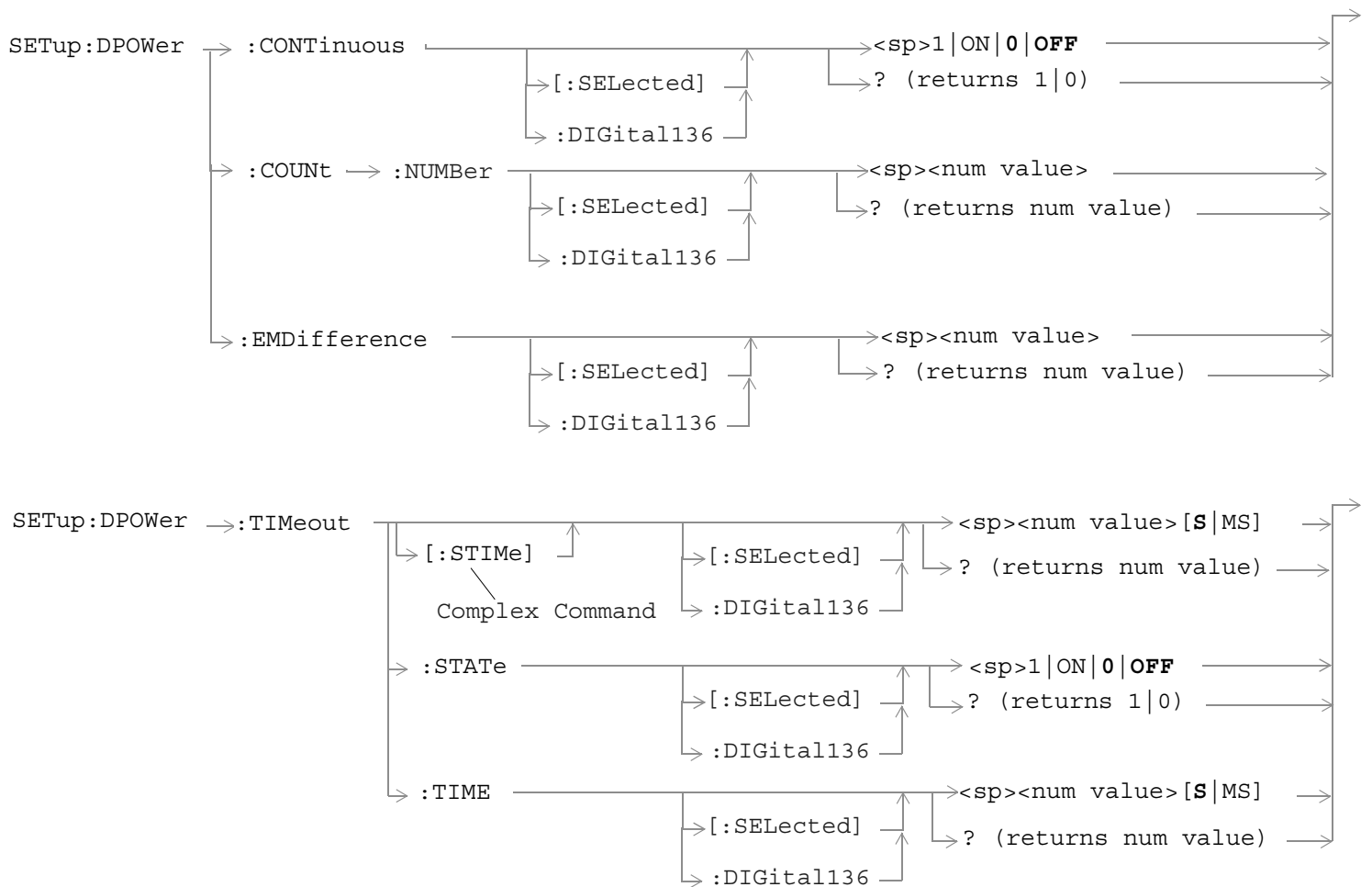
### SETup:ATXPower:TIMEout:STATe

Function	Sets/queries the analog transmitter power measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:TIMEOUT:STATE ON"	

**SETup:ATXPower:TIMEout:TIME**

Function	Sets/queries the analog transmitter power measurement's timeout setting to be used when the timeout state is set to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds
Programming Example	
OUTPUT 714;"SETUP:ATXPOWER:TIMEOUT:TIME 5S"	

## SETup:DPOWER



“Diagram Conventions” on page 233



**SETup:DPOWer:CONTInuous[:SELEcted]**

Function	Selects/queries the trigger state of the Dynamic Power measurement for the active (that is the selected) radio format.
Setting	Continuous trigger mode: 1   ON Single trigger mode: 0   OFF
Query	1   0
*RST	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:CONTINUOUS:SELECTED ON" !Sets trigger mode to Continuous.	

**SETup:DPOWer:CONTInuous:DIGItal136**

Function	Selects/queries the trigger state of the Dynamic Power measurement in the DIG136 radio format whether or not that format is active.
Setting	Continuous trigger mode: 1   ON Single trigger mode: 0   OFF
Query	1   0
*RST	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:CONTINUOUS:DIGITAL136 ON" !Sets trigger mode to Continuous.	

**SETup:DPOWer:COUNT:NUMBer[:SELEcted]**

Function	Sets/queries the number of bursts for the Dynamic Power measurement for the active (that is the selected) radio format.
Setting	Range: 1 to 999 Resolution: 1
Query	Range: 1 to 999 Resolution: 1
*RST	25
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER:SELECTED 25" !Sets the number of measurement bursts.	

## SETup:DPOWER

### SETup:DPOWER:COUNT:NUMBER:DIGital136

Function	Sets/queries the number of bursts for the Dynamic Power measurement in the DIG136 radio format whether or not that format is active.
Setting	Range: 1 to 999 Resolution: 1
Query	Range: 1 to 999 Resolution: 1
*RST	25
Programming Example  OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER:DIGITAL136 50" !Sets the number of measurement bursts.	

### SETup:DPOWER:EMDifference[:SElected]

Function	<p>Sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement for the active (that is the selected) radio format. The units dB are optional.</p> <p>The Expected Maximum Difference from Previous Measurement parameter is used with the measured transmit power from the previous burst to set the maximum RF power that the base station emulator is expecting the mobile to transmit in the next burst.</p> <p>The setting of this parameter does not affect the receiver Expected Power parameter. See "RFANalyzer:MANual:DIGital:POWer[:SElected]" on page 406.</p>
Setting	Range: -30 dB to +30 dB Resolution: 0.01 dB
Query	Range: -30 dB to +30 dB Resolution: 0.01 dB
*RST	3 dB
Programming Example  OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE:SELECTED 20" !Sets the Expected Maximum Difference !in measurement value.	

## SETup:DPOWer:EMDifference:DIGital136

Function	<p>Sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement in the DIG136 radio format whether or not that format is active. The units dB are optional.</p> <p>The Expected Maximum Difference from Previous Measurement parameter is used with the measured transmit power from the previous burst to set the maximum RF power that the base station emulator is expecting the mobile to transmit in the next burst.</p> <p>The setting of this parameter does not affect the receiver Expected Power parameter. See “RFANalyzer:MANual:DIGital:POWer[:SElected]” on page 406.</p>
Setting	<p>Range: -30 dB to +30 dB</p> <p>Resolution: 0.01 dB</p>
Query	<p>Range: -30 dB to +30 dB</p> <p>Resolution: 0.01 dB</p>
*RST	3 dB
<p>Programming Example</p> <pre>OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE:DIGITAL136 10" !Sets the Expected Maximum Difference !in measurement value.</pre>	

## SETup:DPOWer:TIMEout[:STIME][:SElected]

Function	<p>Sets/queries the Dynamic Power measurement timeout value in seconds and sets the timeout state to on for the active (that is the selected) radio format. The units (S   MS) are optional, if no units are specified then the default is S.</p>
Setting	<p>Range: 0.1 to 999</p> <p>Resolution: 0.1</p>
Query	<p>Range: 0.1 to 999</p> <p>Resolution: 0.1</p>
*RST	10 seconds
<p>Programming Example</p> <pre>OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME:SELECTED 12S" !Sets the timeout state and value.</pre>	

## SETup:DPOWER

### SETup:DPOWER:TIMEout[:STIME]:DIGital136

Function	Sets/queries the Dynamic Power measurement timeout value in seconds and sets the timeout state to on for the DIG136 radio format whether or not that format is active. The units (S   MS) are optional, if no units are specified then the default is S.
Setting	Range: 0.1 to 999 Resolution: 0.1
Query	Range: 0.1 to 999 Resolution: 0.1
*RST	10 seconds
Programming Example OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME:DIGITAL136 20" !Sets the timeout state and value.	

### SETup:DPOWER:TIMEout:STATE[:SElected]

Function	Sets/queries the timeout state for the Dynamic Power measurement for the active (that is the selected) radio format.
Setting	0   OFF   1   ON
Query	0   1
*RST	0 (off)
Programming Example OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STATE:SELECTED ON" !Sets the timeout state.	

### SETup:DPOWER:TIMEout:STATE:DIGital136

Function	Sets/queries the timeout state for the Dynamic Power measurement in the DIG136 radio format whether or not that format is active.
Setting	0   OFF   1   ON
Query	0   1
*RST	0 (off)
Programming Example OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STATE:DIGITAL136 ON" !Sets the timeout state.	

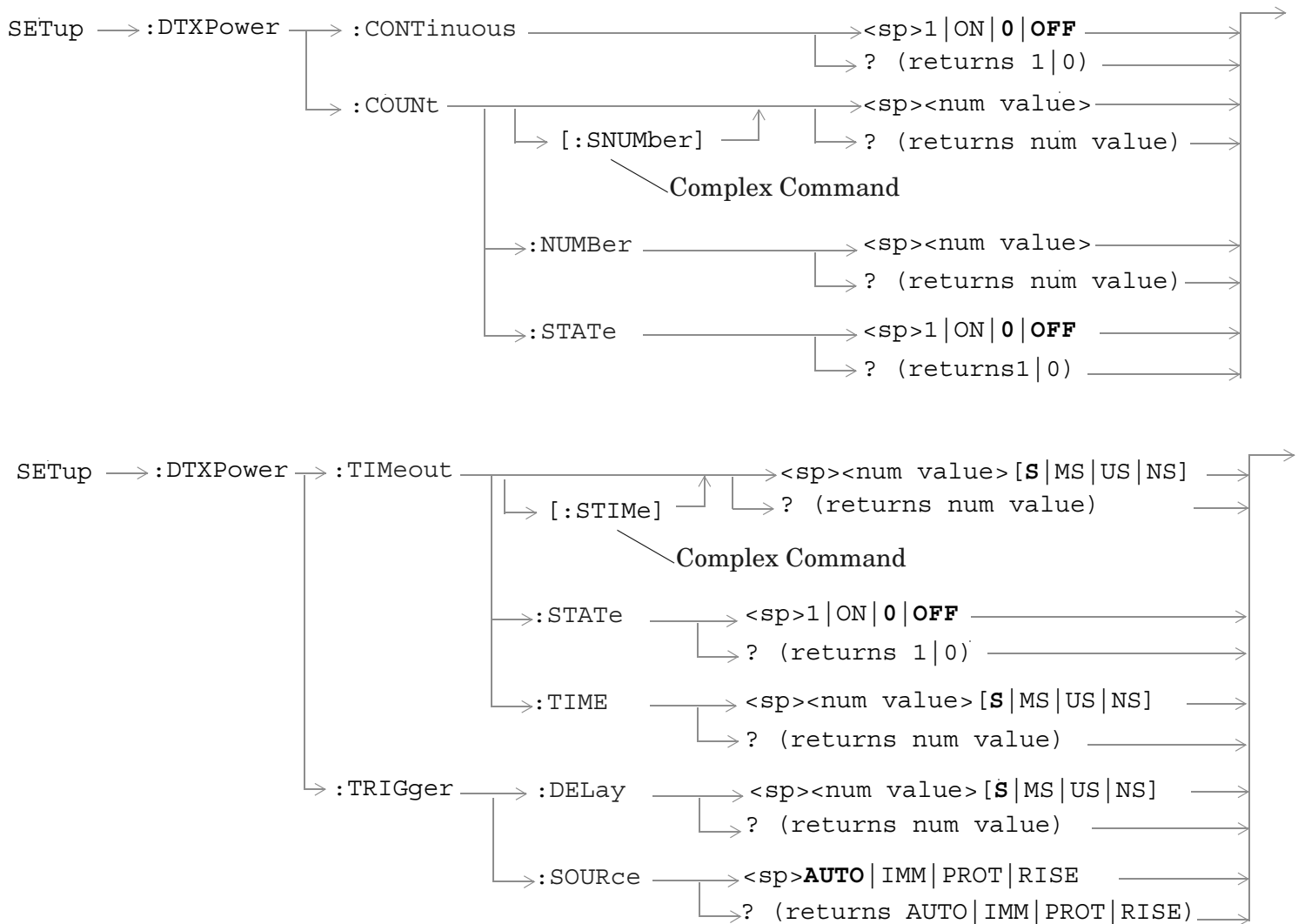
**SETup:DPOWer:TIMEout:TIME[:SElected]**

Function	Sets/queries the timeout value in seconds that is used for the Dynamic Power measurement for the active (that is the selected) radio format. The timeout state must be ON. The units (S MS) are optional, if no units are specified then the default is S.
Setting	Range: 0.1 to 999 Resolution: 0.1
Query	Range: 0.1 to 999 Resolution: 0.1
*RST	10 seconds
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME:SELECTED 15" !Sets the timeout value.	

**SETup:DPOWer:TIMEout:TIME:DIGital136**

Function	Sets/queries the timeout value in seconds that is used for the Dynamic Power measurement in the DIG136 radio format whether or not that format is active. The timeout state must be ON. The units (S MS) are optional, if no units are specified then the default is S.
Setting	Range: 0.1 to 999 Resolution: 0.1
Query	Range: 0.1 to 999 Resolution: 0.1
*RST	10 seconds
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME:DIGITAL136 10S" !Sets the timeout value.	

## SETup:DTXPower



“Diagram Conventions” on page 233

**SETup:DTXPower:CONTInuous**

Function	Sets/queries the trigger arm state for the digital transmitter power 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:DTXPOWER:CONTINUOUS ON" !Sets measurement to continuous trigger mode.	

**SETup:DTXPower:COUNT[:SNUMber]**

Function	Sets/queries the number of digital transmitter power 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	10, on
<b>Programming Example</b> OUTPUT 714;"SETUP:DTXPOWER:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.	

**SETup:DTXPower:COUNT:NUMBer**

Function	Sets/queries the number of digital transmitter power 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:DTXPOWER:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

## SETup:DTXPower

### SETup:DTXPower:COUNT:STATE

Function	Sets/queries the multi-measurement state of the digital transmitter power measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:DTXPOWER:COUNT:STATE ON" !Turns on multi-measurements.	

### SETup:DTXPower:TIMEout[:STIME]

Function	Sets/queries the digital transmitter power 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:DTXPOWER:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

### SETup:DTXPower:TIMEout:STATE

Function	Sets/queries the digital transmitter power measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:DTXPOWER:TIMEOUT:STATE ON"	



**SETup:DTXPower:TIMEout:TIME**

Function	Sets/queries the digital transmitter power 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, on
Programming Example OUTPUT 714 ; "SETUP:DTXPOWER:TIMEOUT:TIME 5S"	

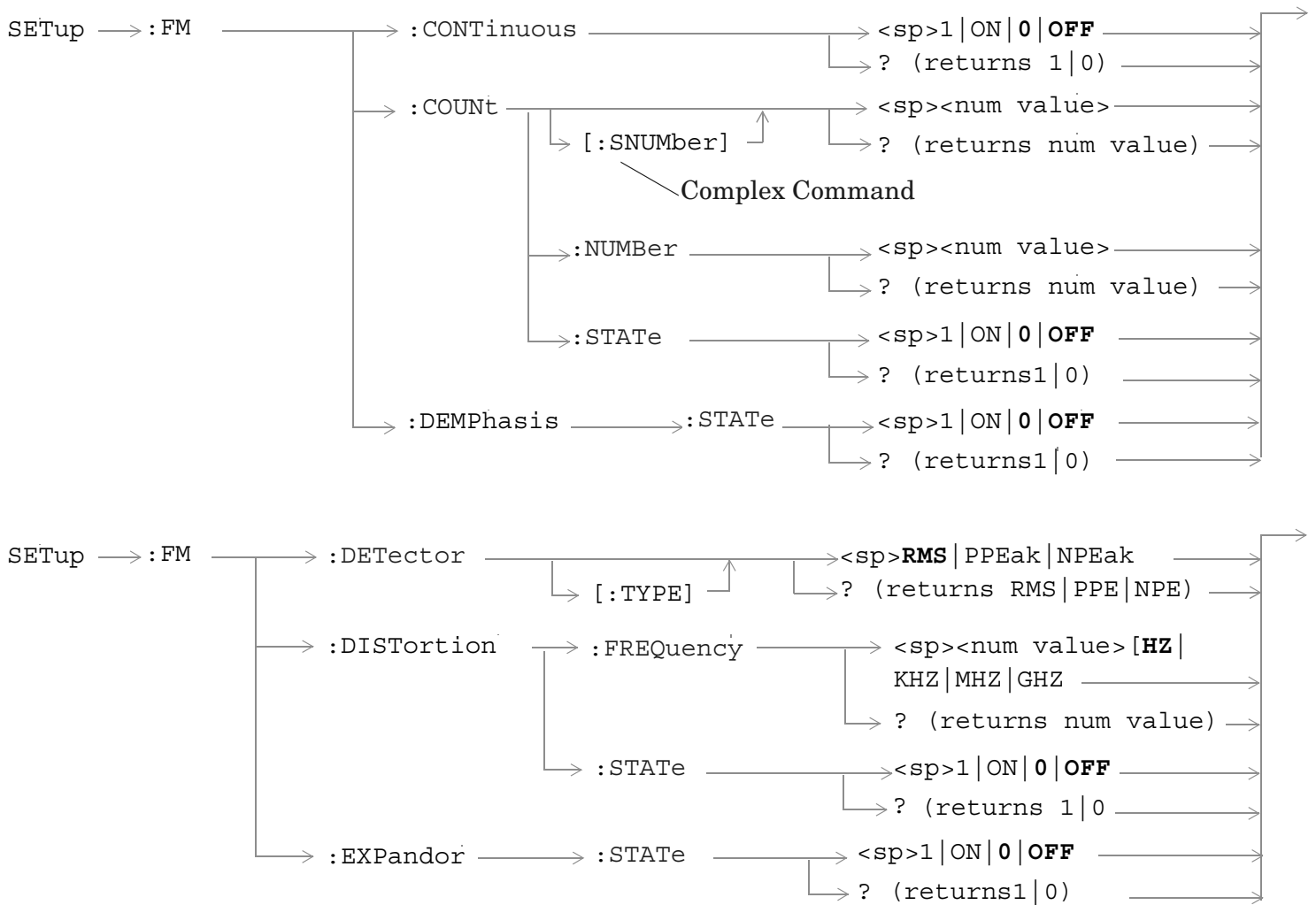
**SETup:DTXPower:TRIGger:DELay**

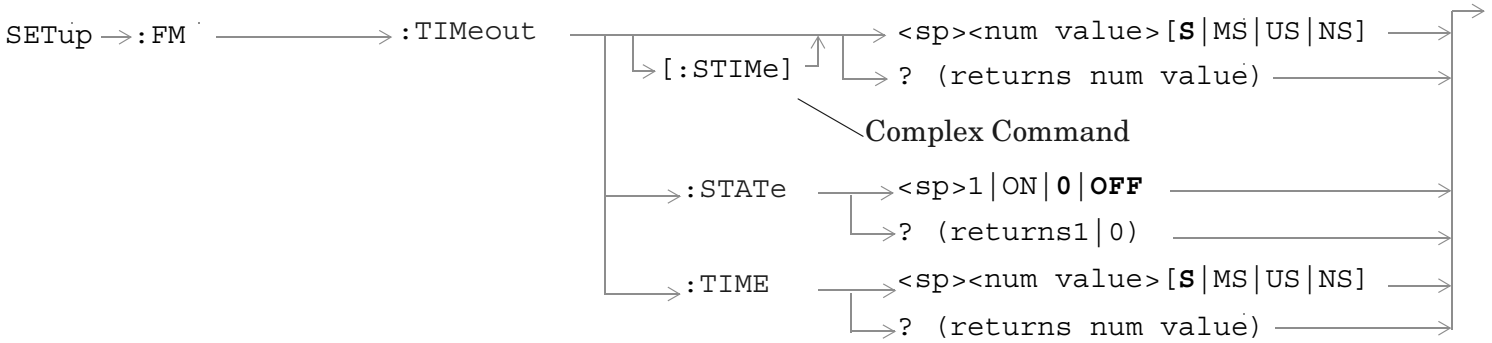
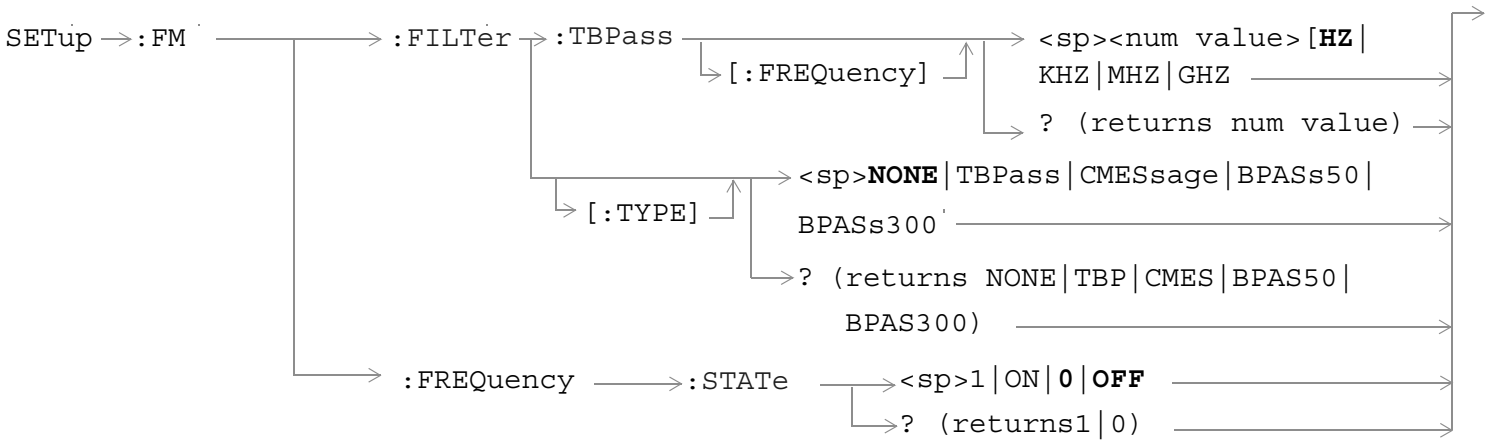
Function	Sets/queries the trigger delay for the digital transmitter power measurement.
Setting	Range: -20 to 20 ms Resolution: 10 us
Query	Range: -20 to 20 ms
*RST Setting	0 seconds
Programming Example OUTPUT 714 ; "SETUP:DTXPOWER:TRIGGER:DELAY 1S"	

**SETup:DTXPower:TRIGger:SOURce**

Function	Sets/queries the trigger source for the digital transmitter power measurement.
Setting	Range: AUTO   IMMEDIATE   PROTOCOL   RISE   EXTERNAL
Query	Range: AUTO   IMM   PROT   RISE   EXT
*RST Setting	AUTO
Programming Example OUTPUT 714 ; "SETUP:DTXPOWER:TRIGGER:SOURCE RISE"	

## SETup:FM





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**SETup:FM:CONTInuous**

Function	Sets/queries the trigger arm state for the FM 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:FM:CONTINUOUS ON" !Sets measurement to continuous trigger mode.	

## SETup:FM

### SETup:FM:COUNT[:SNUMber]

Function	Sets/queries the number of FM 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	10, on
Programming Example OUTPUT 714;"SETUP:FM:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.	

### SETup:FM:COUNT:NUMBer

Function	Sets/queries the number of FM measurements to be made when multi-measurement state is ON.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
Programming Example OUTPUT 714;"SETUP:FM:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

### SETup:FM:COUNT:STATe

Function	Sets/queries the multi-measurement state of the FM measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:FM:COUNT:STATE ON" !Turns on multi-measurements.	

### SETup:FM: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 10 OUTPUT 714;"SETUP:FM:DEMPHISIS:STATE ON"	

**SETup:FM:DETECTOR[:TYPE]**

Function	Sets/queries the detector type for FM measurements.
Setting	Range: RMS   PPEak   NPEak
Query	Range: RMS   PPE   NPE
*RST setting	RMS
Programming Example	
10 OUTPUT 714;"SETUP:FM:DETECTOR:TYPE PEAK"	

**SETup:FM:DIStortion:FREQuency**

Function	Sets/queries the FM distortion fundamental frequency.
Setting	Range: 100 to 10000 Hz Resolution: 1 Hz
Query	Range: 100 to 10000 Hz
*RST setting	1004 Hz
Programming Example	
10 OUTPUT 714;"SETUP:FM:DIStORTION:FREQUENCY 300HZ"	

**SETup:FM:DIStortion:STATe**

Function	Sets/queris whether the FM distortion measurement is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
Programming Example	
10 OUTPUT 714;"SETUP:FM:SDIStORTION:STATE ON"	

**SETup:FM:EXPandor:STATe**

Function	Sets/queries whether the expander is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
Programming Example	
10 OUTPUT 714;"SETUP:FM:EXPandOR:STATE ON"	

## SETup:FM

### SETup:FM:FILTer[:TYPE]

Function	Sets/queries the filter type for FM measurements.
Setting	Range: NONE   TBPass   CMESsage   BPASs50   BPASs300
Query	Range: NONE   TBP   CMES   BPAS50   BPAS300
*RST setting	NONE
Programming Example	
10 OUTPUT 714;"SETUP:FM:FILTER:TYPE BPAS50" !Selects the 50 Hz to 15 kHz bandpass filter.	

### SETup:FM:FILTer:TBPass[:FREQUENCY]

Function	Sets/queries the center frequency for the 100 Hz tunable bandpass filter (TBPass).
Setting	Range: 300.0 to 15000 Hz Resolution: 0.1 Hz
Query	Range: 300.0 to 15000 Hz
*RST setting	1004 Hz
Programming Example	
10 OUTPUT 714;"SETUP:FM:FILTER:TBPASS:FREQUENCY 300HZ"	

### SETup:FM:FREQUENCY:STATe

Function	Sets/queries whether the FM modulation frequency measurement is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST setting	0 (off)
Programming Example	
OUTPUT 714;"SETUP:FM:FREQUENCY:STATE ON"	

**SETup:FM:TIMEout[:STIME]**

Function	Sets/queries the FM 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
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FM:TIMEOUT:STIME 5S"</pre> !Sets timeout state to ON and sets the timeout time to 5 seconds.	

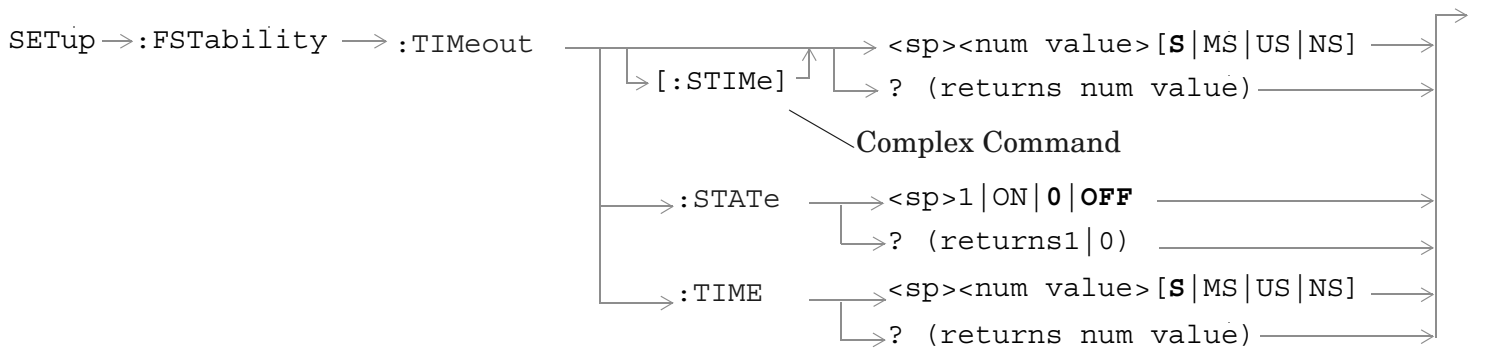
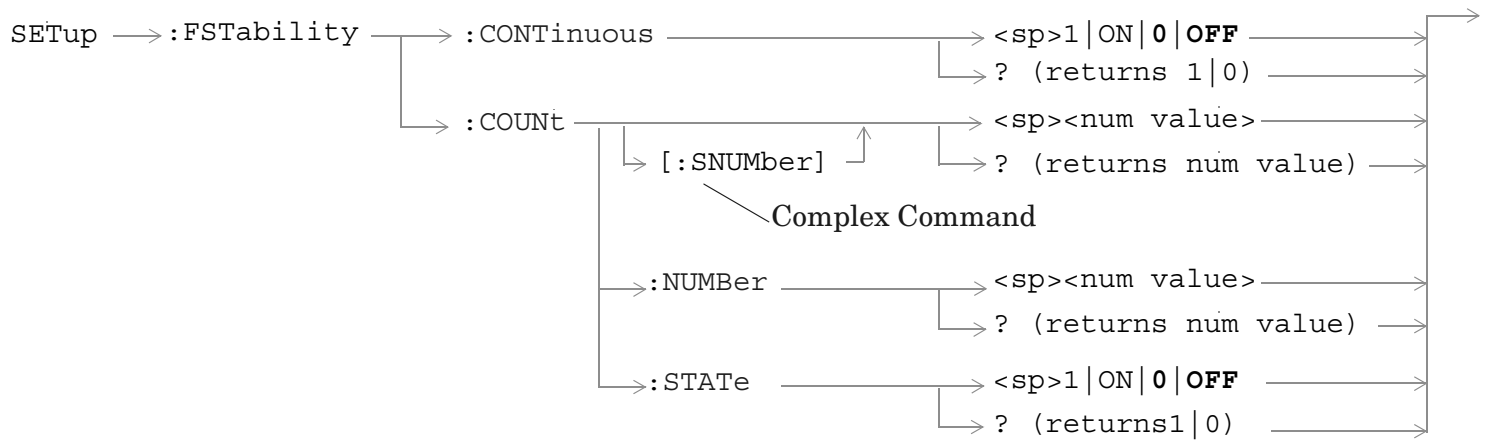
**SETup:FM:TIMEout:STATE**

Function	Sets/queries the FM measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FM:TIMEOUT:STATE ON"</pre>	

**SETup:FM:TIMEout:TIME**

Function	Sets/queries the FM 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
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FM:TIMEOUT:TIME 5S"</pre>	

## SETup:FSTability



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**SETup:FSTability:CONTInuous**

Function	Sets/queries the trigger arm state for the frequency stability 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:FSTABILITY:CONTINUOUS ON" !Sets measurement to continuous trigger mode.</pre>	

**SETup:FSTability:COUNT[:SNUMBER]**

Function	Sets/queries the number of frequency stability 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	10, on
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FSTABILITY:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.</pre>	

**SETup:FSTability:COUNT:NUMBER**

Function	Sets/queries the number of frequency stability 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> <pre>OUTPUT 714;"SETUP:FSTABILITY:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.</pre>	

## SETup:FSTability

### SETup:FSTability:COUNT:STATE

Function	Sets/queries the multi-measurement state of the frequency stability measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:FSTABILITY:COUNT:STATE ON" !Turns on multi-measurements.	

### SETup:FSTability:TIMEout[:STIME]

Function	Sets/queries the frequency stability measurement's timeout setting and automatically sets the timeout state to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds, on
Programming Example OUTPUT 714;"SETUP:FSTABILITY:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

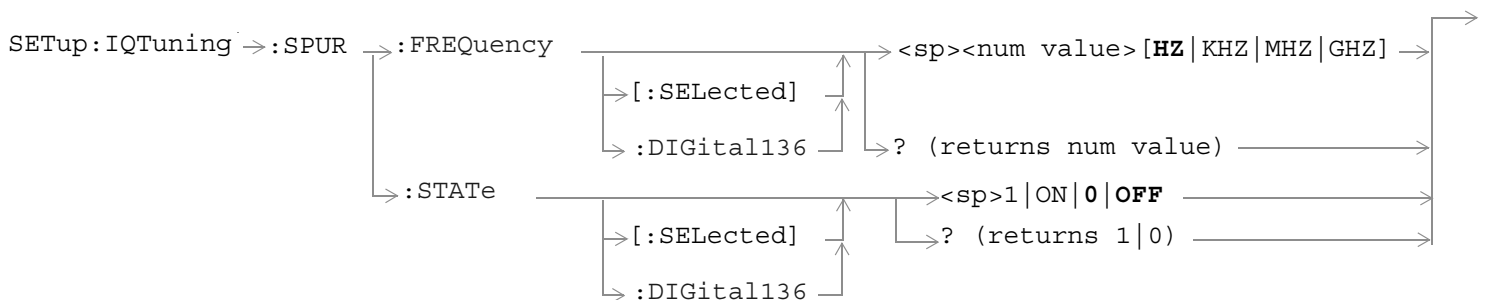
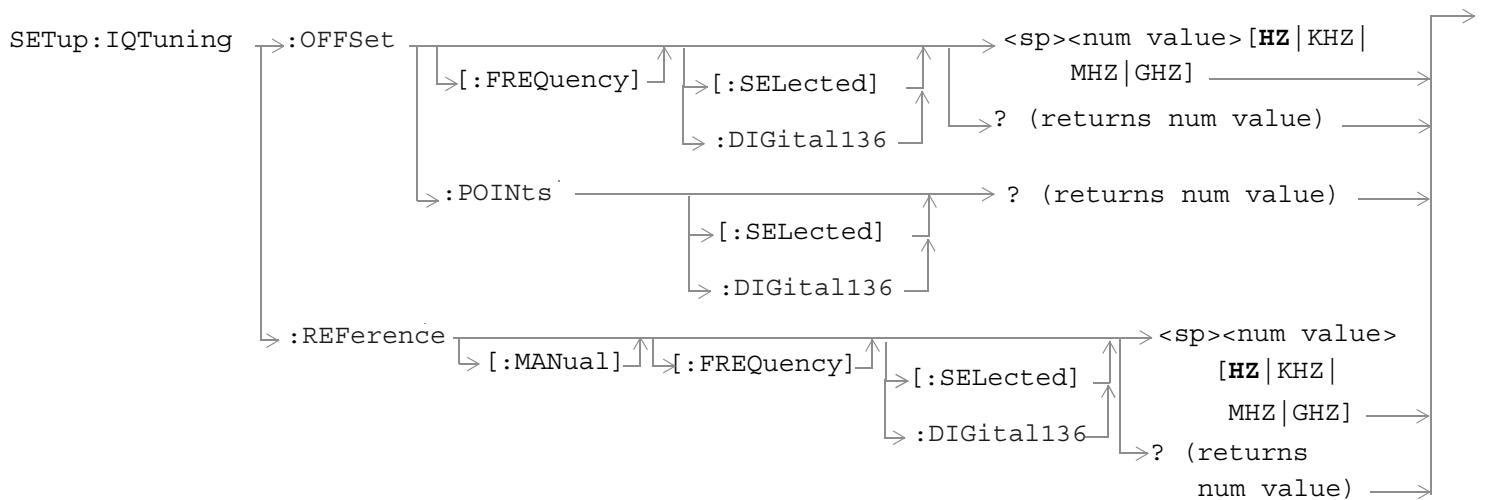
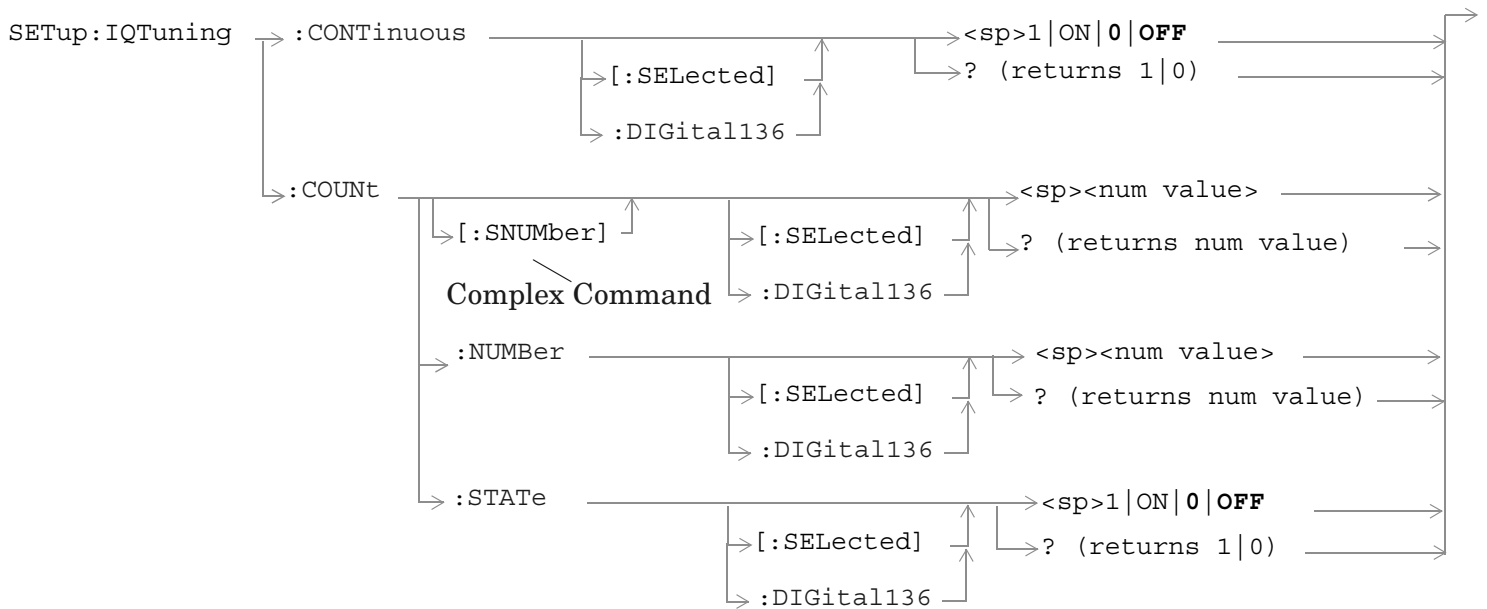
### SETup:FSTability:TIMEout:STATE

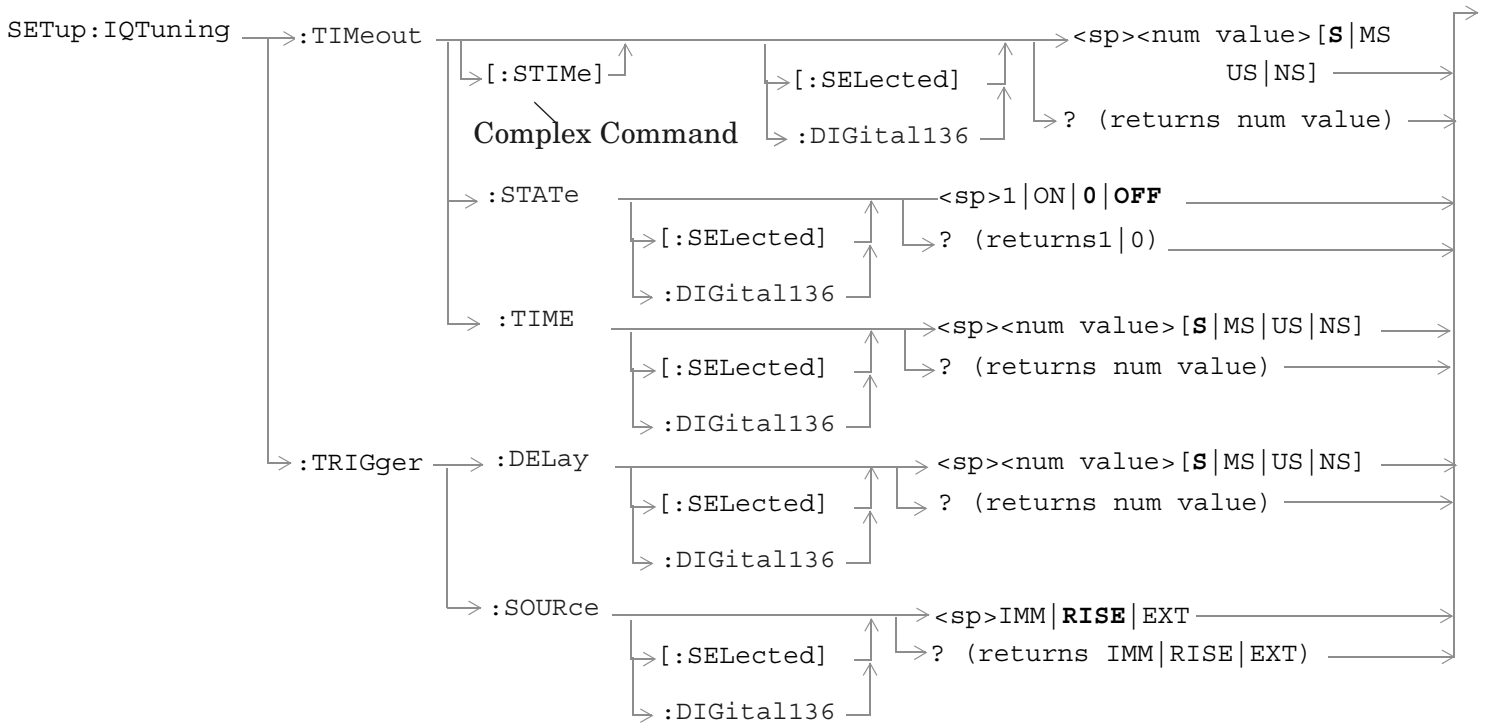
Function	Sets/queries the frequency stability measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:FSTABILITY:TIMEOUT:STATE ON"	

**SETup:FSTability:TIMEout:TIME**

Function	Sets/queries the frequency stability measurement's timeout setting.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999 seconds Resolution: 0.1 second
*RST Setting	10 seconds, on
Programming Example	
OUTPUT 714 ; "SETUP:FSTABILITY:TIMEOUT:TIME 5S"	

## SETup:IQTuning





“Diagram Conventions” on page 233

## SETup:IQTuning

### SETup:IQTuning:CONTInuous[:SElected]

Function	Sets/queries the trigger arm state for the IQ tuning measurement in the active (that is the selected) radio format. 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:IQTUNING:CONTINUOUS:SELECTED ON" !Sets measurement to continuous trigger mode.</pre>	

### SETup:IQTuning:CONTInuous:DIGital136

Function	Sets/queries the trigger arm state for the IQ tuning measurement in the DIG136 radio format whether or not that format is active. 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:IQTUNING:CONTINUOUS:DIGITAL136 ON" !Sets measurement to continuous trigger mode.</pre>	

### SETup:IQTuning:COUNT[:SNUMBER][:SElected]

Function	Sets/queries the number of IQ tuning measurements to be made in a multi-measurement setup for the active (that is the selected) radio format. 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, on
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER:SELECTED 30" !Sets multi-measurement !count value and state to on.</pre>	

**SETup:IQTuning:COUNT[:SNUMber]:DIGital136**

Function	Sets/queries the number of IQ tuning measurements to be made in a multi-measurement setup for the DIG136 radio format whether or not that format is active. 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, on
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER:DIGITAL136 30" !Sets multi-measurement !count value and state to on.</pre>	

**SETup:IQTuning:COUNT:NUMBER[:SElected]**

Function	Sets/queries the number of IQ tuning measurements to be made for the active (that is the selected) radio format. The multi-measurement state must be set to ON.
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:COUNT:NUMBER:SELECTED 30" !Sets multi-measurement count to value.</pre>	

**SETup:IQTuning:COUNT:NUMBER:DIGital136**

Function	Sets/queries the number of IQ tuning measurements to be made for the DIG136 radio format whether or not that format is active. The multi-measurement state must be set to ON .
Setting	Range: 1 to 999
Query	Range: 1 to 999
*RST Setting	10
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:COUNT:NUMBER:DIGITAL136 30" Sets multi-measurement count to value.</pre>	

## SETup:IQTuning

### SETup:IQTuning:COUNT:STATE[:SElected]

Function	Sets/queries the multi-measurement state for the IQ tuning measurement in the active (that is the selected) radio format.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE:SELECTED ON" Sets the multi-measurement count state.	

### SETup:IQTuning:COUNT:STATE:DIGital136

Function	Sets/queries the multi-measurement state for the IQ tuning measurement in the DIG136 radio format whether or not that format is active.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE:DIGITAL136 ON" Sets the multi-measurement count state.	



## SETup:IQTuning:OFFSet[:FREQUENCY][:SELEcted]

Function	Sets/queries the offset frequencies (frequency list) at which the IQ tuning offset measurement is made for the active (that is the selected) radio format. Values are set/returned as a comma-separated list.
Setting	Range: -16000 to +16000 Hz and 9.91E37 (NAN) Resolution: 0.1 Hz Number of Offsets: 4 (maximum)
Query	Range: The returned comma-separated list contains the current values for each offset that is not turned off. No values are returned for offsets that are off. For example, if offsets 1 and 3 are turned off and offsets 2 and 4 are turned on, values are only returned for offsets 2 and 4. Returns 9.91 E+37 if all offsets are off.
*RST Setting	Offset 1: 0 Hz (ON) Offset 2 : -3037.5 Hz (OFF) Offset 3: +9112.5 Hz (OFF) Offset 4: -9112.5 Hz (OFF)
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:OFFSET:FREQUENCY:SELECTED 0,-3076,9113,-9113" !Sets values for 4 offsets.</pre>	

## SETup:IQTuning

### SETup:IQTuning:OFFSet[:FREQUENCY]:DIGital136

Function	Sets/queries the offset frequencies (frequency list) at which the IQ tuning offset measurement is made. Values are set/returned as a comma-separated list.  This command/query affects the DIG136 radio format whether or not that format is active.
Setting	Range: -16000 to +16000 Hz and 9.91E37 (NAN)  Resolution: 0.1 Hz  Number of Offsets: 4 (maximum)
Query	Range:  The returned comma-separated list contains the current values for each offset that is not turned off. No values are returned for offsets that are off. For example, if offsets 1 and 3 are turned off and offsets 2 and 4 are turned on, values are only returned for offsets 2 and 4.  Returns 9.91 E+37 if all offsets are off.
*RST Setting	Offset 1: 0 Hz (ON)  Offset 2 : -3037.5 Hz (OFF)  Offset 3: +9112.5 Hz (OFF)  Offset 4: -9112.5 Hz (OFF)
Programming Example  OUTPUT 714;"SETUP:IQTUNING:OFFSET:FREQUENCY:DIGITAL136 0,-3076,9113,-9113" !Sets values for 4 offsets.	

### SETup:IQTuning:OFFSet:POINts[:SElected]?

Function	Queries the number of frequency offsets enabled in the IQ tuning offset frequency list for the active (that is the selected) radio format.
Query	Range: 0 to 4
Programming Example  OUTPUT 714;"SETUP:IQTUNING:OFFSET:POINTS:SELECTED?" !Queries the number of offsets set.	

### SETup:IQTuning:OFFSet:POINts:DIGital136?

Function	Queries the number of frequency offsets enabled in the IQ tuning offset frequency list for the DIG136 radio format whether or not that format is active.
Query	Range: 0 to 4
Programming Example  OUTPUT 714;"SETUP:IQTUNING:OFFSET:POINTS:DIGITAL136?" !Queries the number of offsets set.	

**SETup:IQTuning:REference[:MANual][:FREQuency][:SElected]**

Function	Sets/queries the reference offset frequency to use as the reference level for the four IQ tuning offset measurements and the spur measurement in the active (that is the selected) radio format.
Setting	Range: -16000 to +16000 Hz Resolution: 0.1 Hz
Query	Range: -16000 to +16000 Hz
*RST Setting	+3037.5 Hz
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:SELECTED 3037.5" !Sets the reference offset Freq.	

**SETup:IQTuning:REference[:MANual][:FREQuency]:DIGital136**

Function	Sets/queries the reference offset frequency to use as the reference level for the four IQ tuning offset measurements and the spur measurement in the DIG136 radio format whether or not that format is active.
Setting	Range: -16000 to +16000 Hz Resolution: 0.1 Hz
Query	Range: -16000 to +16000 Hz
*RST Setting	+3037.5 Hz
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:DIGITAL136 5000" !Sets the reference offset Freq.	

**SETup:IQTuning:SPUR:FREQuency[:SElected]**

Function	Sets/queries the frequency offset from the carrier frequency at which the additional spur measurement will be made. The measurement's state must be set to ON. This command/query affects the active (that is the selected) radio format.
Setting	Range: -15.0 to -1.0 MHz, +1.0 to +15.0 MHz
Query	Range: -15.0 to -1.0 MHz, +1.0 to +15.0 MHz
*RST Setting	10 MHz
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY:SELECTED 5MHZ" !Sets the offset frequency.	

## SETup:IQTuning

### SETup:IQTuning:SPUR:FREQUENCY:DIGital136

Function	Sets/queries the frequency offset from the carrier frequency at which the additional spur measurement will be made when the measurement's state is set to ON. This command/query affects the DIG136 radio format whether or not that format is active.
Setting	Range: -15.0 to -1.0 MHz, +1.0 to +15.0 MHz
Query	Range: -15.0 to -1.0 MHz, +1.0 to +15.0 MHz
*RST Setting	10 MHz
Programming Example OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY:DIGITAL136 5MHZ" !Sets the offset frequency.	

### SETup:IQTuning:SPUR:STATE[:SElected]

Function	Sets/queries the IQ tuning spur measurement state to on or off in the active (that is the selected) radio format.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE:SELECTED ON" !Sets spur measurement state.	

### SETup:IQTuning:SPUR:STATE:DIGital136

Function	Sets/queries the IQ tuning spur measurement state to on or off in the DIG136 radio format whether or not that format is active.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE:DIGITAL136 ON" !Sets spur measurement state.	

**SETup:IQTuning:TIMEout[:STIME][:SElected]**

Function	Sets/queries the IQ tuning measurement's timeout setting and automatically sets the timeout state to ON for the active (that is the selected) radio format.
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds, off
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME:SELECTED 25" !Sets timeout state and value.</pre>	

**SETup:IQTuning:TIMEout[:STIME]:DIGital136**

Function	Sets/queries the IQ tuning measurement's timeout setting and automatically sets the timeout state to ON in the DIG136 radio format whether or not that format is active.
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds, off
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME:DIGITAL136 25" !Sets timeout state and value.</pre>	

**SETup:IQTuning:TIMEout:STATE[:SElected]**

Function	Sets/queries the IQ tuning measurement's timeout state for the active (that is the selected) radio format.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STATE:SELECTED 25" !Sets timeout state.</pre>	

## SETup:IQTuning

### SETup:IQTuning:TIMEout:STATE:DIGital136

Function	Sets/queries the IQ tuning measurement's timeout state in the DIG136 radio format whether or not that format is active.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STATE:DIGITAL136 25" !Sets timeout state.	

### SETup:IQTuning:TIMEout:TIME[:SElected]

Function	Sets/queries the IQ tuning measurement's timeout setting. This setup command/query is for the active (that is the selected) radio format. The timeout state must be set to ON.
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds
Programming Example OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME:SELECTED 25" !Sets timeout value.	

### SETup:IQTuning:TIMEout:TIME:DIGital136

Function	Sets/queries the IQ tuning measurement's timeout setting. This set up command/query is for the DIG136 radio format whether or not that format is active. The timeout state must be set to ON.
Setting	Range: 0.1 to 999.9 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999.9
*RST Setting	10 seconds
Programming Example OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME:DIGITAL136 25" !Sets timeout value.	

**SETup:IQTuning:TRIGger:DELAy[:SElected]**

Function	Sets/queries the trigger delay for the IQ tuning measurement for the active (that is the selected) radio format.
Setting	Range: -20 to 20 ms Resolution: 0.01 ms
Query	Range: -20 to 20 ms
*RST Setting	0 seconds
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY:SELECTED 10MS" !Sets trigger delay value.	

**SETup:IQTuning:TRIGger:DELAy:DIGital136**

Function	Sets/queries the trigger delay for the IQ tuning measurement in the DIG136 radio format whether or not that format is active.
Setting	Range: -20 to 20 ms Resolution: 0.01 ms
Query	Range: -20 to 20 ms
*RST Setting	0 seconds
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY:DIGITAL136 10MS" !Sets trigger delay value.	

**SETup:IQTuning:TRIGger:SOURce[:SElected]**

Function	Sets/queries the trigger source for the IQ tuning measurement for the active (that is the selected) radio format.
Setting	Range: IMMEDIATE   RISE   EXTERNAL
Query	Range: IMM   RISE   EXT
*RST Setting	RISE
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE:SELECTED IMMEDIATE" !Sets trigger source.	

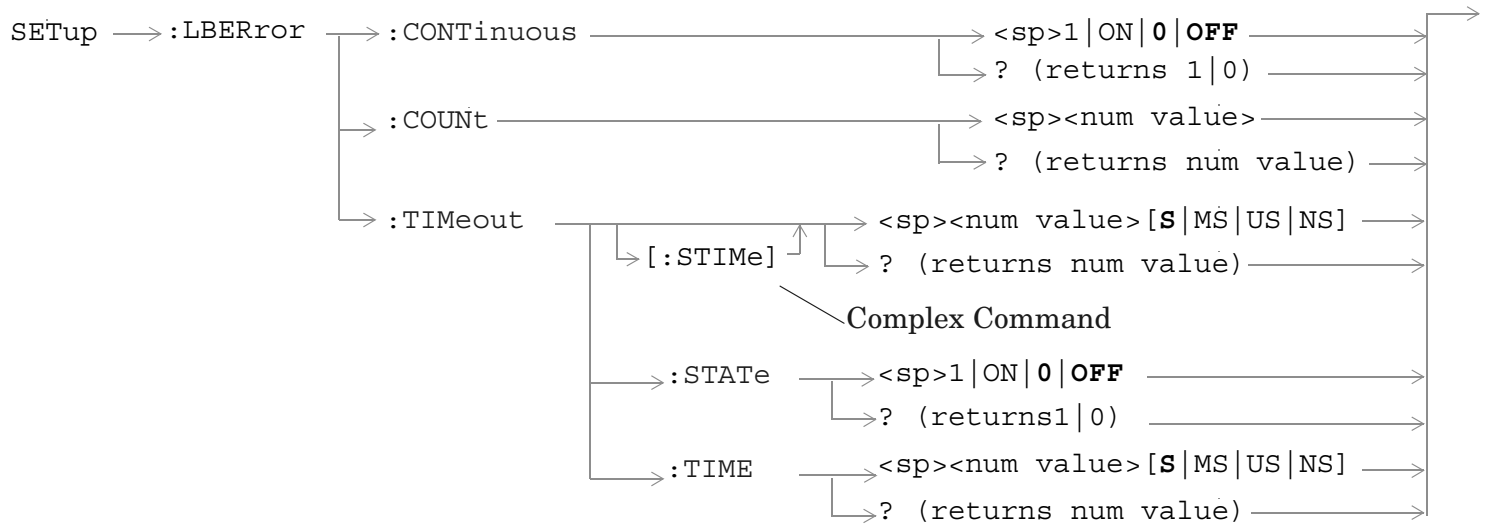
## SETup:IQTuning

### SETup:IQTuning:TRIGger:SOURce:DIGital136

Function	Sets/queries the trigger source for the IQ tuning measurement in the DIG136 radio format whether or not that format is active.
Setting	Range: IMMEDIATE   RISE   EXTERNAL
Query	Range: IMM   RISE   EXT
*RST Setting	RISE
<b>Programming Example</b>  OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE:DIGITAL136 IMMEDIATE" !Sets trigger source.	



## SETup:LBError



“Diagram Conventions” on page 233

## SETup:LBError

### SETup:LBError:CONTInuous

Function	Sets/queries the trigger arm state for the loopback bit error ratio 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)
Programming Example OUTPUT 714;"SETUP:LBERROR:CONTINUOUS ON" !Sets measurement to continuous trigger mode.	

### SETup:LBError:COUNT

Function	Sets/queries the number of bits to test in a loopback bit error ratio measurement.
Setting	Range: 1000 to 999000
Query	Range: 1000 to 999000
*RST Setting	10000
Programming Example OUTPUT 714;"SETUP:LBERROR:COUNT 5000" !Sets the number of bits to test to 5000.	

### SETup:LBError:TIMEout[:STIME]

Function	Sets/queries the loopback bit error ratio measurement's timeout setting and automatically sets the timeout state to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds, on
Programming Example OUTPUT 714;"SETUP:LBERROR:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

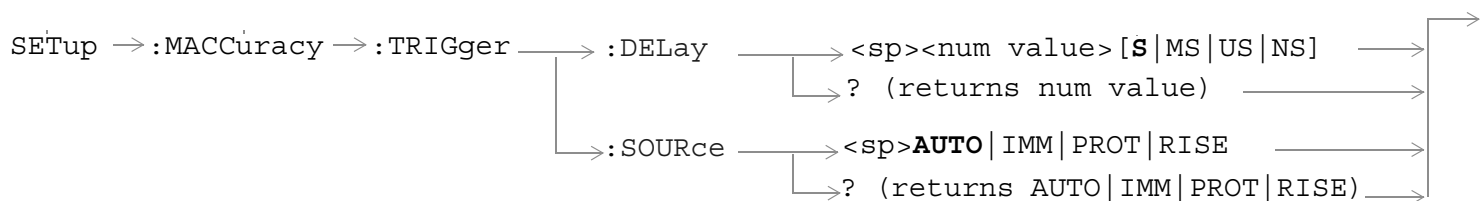
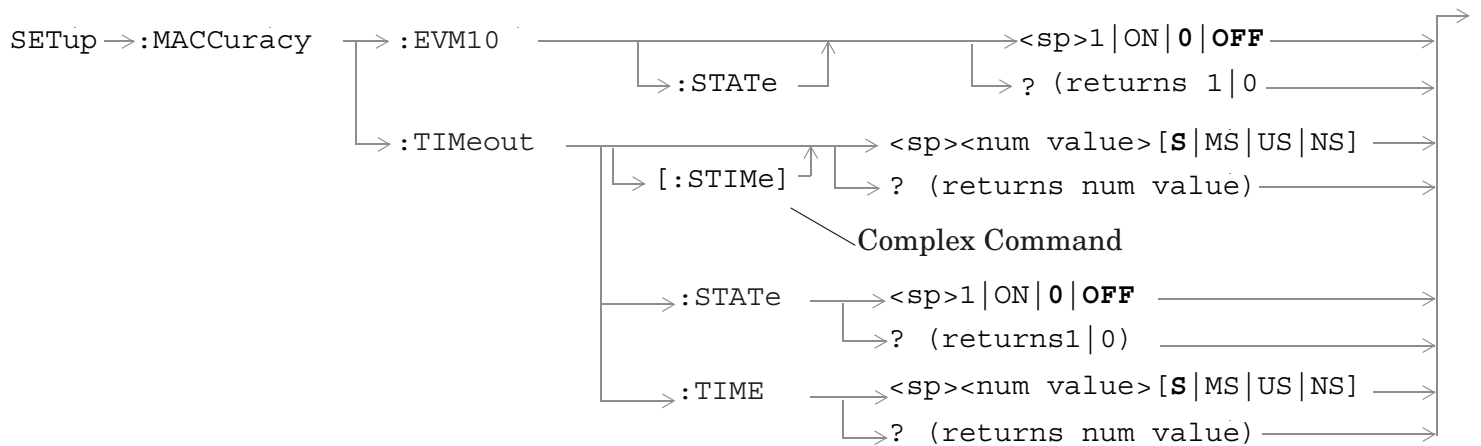
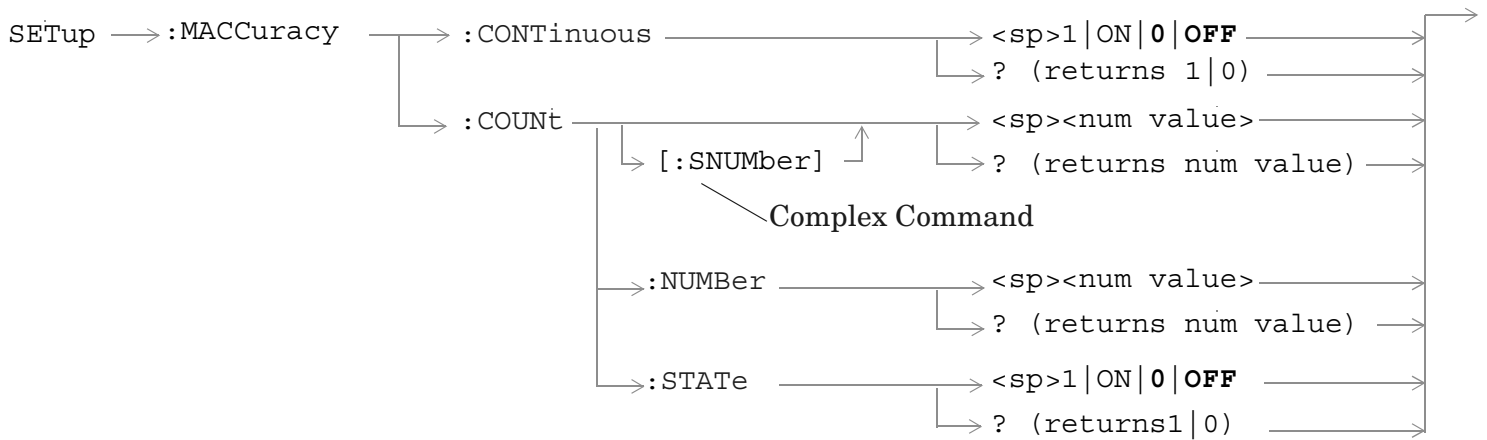
**SETup:LBError:TIMEout:STATE**

Function	Sets/queries the loopback bit error ratio measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example	
OUTPUT 714 ; "SETUP:LBERROR:TIMEOUT:STATE ON"	

**SETup:LBError:TIMEout:TIME**

Function	Sets/queries the loopback bit error ratio measurement's timeout setting to be used when the timeout state is set to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds
Programming Example	
OUTPUT 714 ; "SETUP:LBERROR:TIMEOUT:TIME 5S"	

## SETup:MACCuracy



“Diagram Conventions” on page 233

**SETup:MACCuracy:CONTInuous**

Function	Sets/queries the trigger arm state for the modulation accuracy 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:MACCURITY:CONTINUOUS ON" !Sets measurement to continuous trigger mode.	

**SETup:MACCuracy:COUNT[:SNUMber]**

Function	Sets/queries the number of modulation accuracy 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	10, on
<b>Programming Example</b> OUTPUT 714;"SETUP:MACCURITY:COUNT:SNUMBER 5" !Turns on multi-measurements and sets the number of measurements to 5.	

**SETup:MACCuracy:COUNT:NUMBER**

Function	Sets/queries the number of modulation accuracy 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:MACCURITY:COUNT:NUMBER 5" !Sets the number of measurements to 5 when the multi-measurement state is set to ON.	

## SETup:MACCuracy

### SETup:MACCuracy:COUNT:STATE

Function	Sets/queries the multi-measurement state of the modulation accuracy measurement.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:MACCURITY:COUNT:STATE ON" !Turns on multi-measurements.	

### SETup:MACCuracy:EVM10[:STATE]

Function	Sets/queries whether the error vector magnitude measurement (10 burst average) is enabled.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:MACCURITY:EVM10:STATE ON" !Turns on the EVM10 measurement.	

### SETup:MACCuracy:TIMEout[:STIME]

Function	Sets/queries the modulation accuracy measurement's timeout setting and automatically sets the timeout state to ON.
Setting	Range:0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds, on
Programming Example OUTPUT 714;"SETUP:MACCURITY:TIMEOUT:STIME 5S" !Sets timeout state to ON and sets the timeout time to 5 seconds.	

### SETup:MACCuracy:TIMEout:STATE

Function	Sets/queries the modulation accuracy measurement's timeout state.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
Programming Example OUTPUT 714;"SETUP:MACCURITY:TIMEOUT:STATE ON"	

**SETup:MACCuracy:TIMEout:TIME**

Function	Sets/queries the modulation accuracy measurement's timeout setting to be used when the timeout state is set to ON.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 second
Query	Range: 0.1 to 999
*RST Setting	10 seconds
Programming Example OUTPUT 714 ; "SETUP:MACCURACY:TIMEOUT:TIME 5S"	

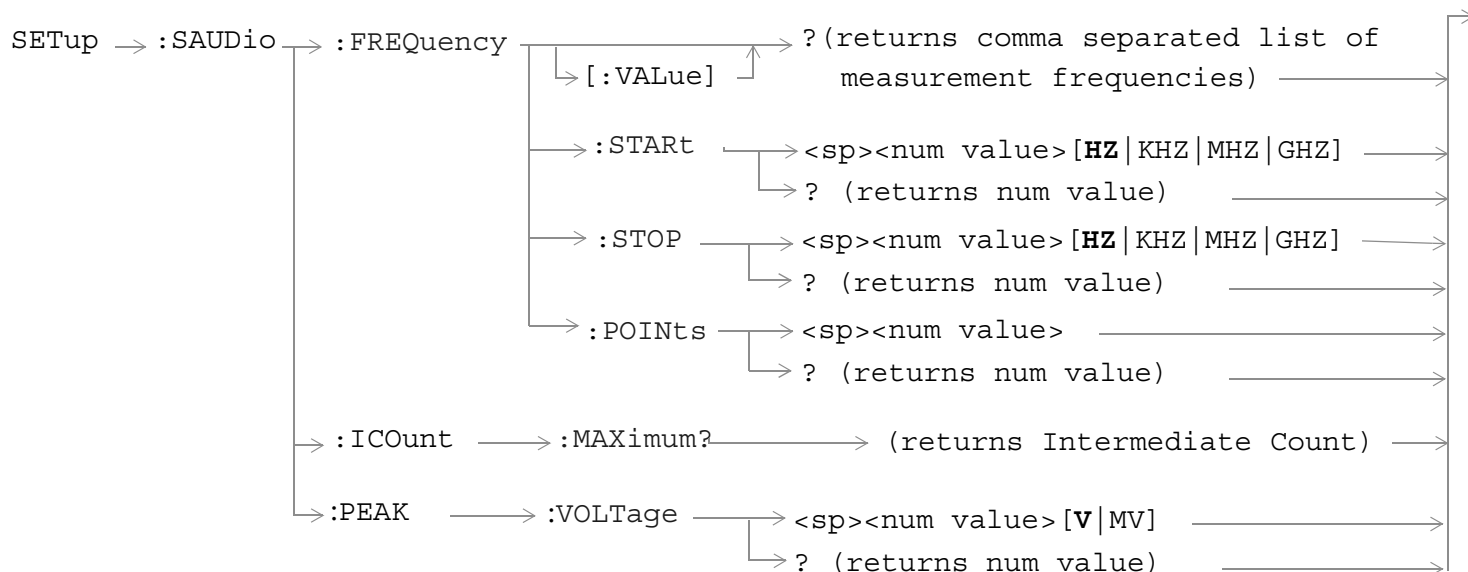
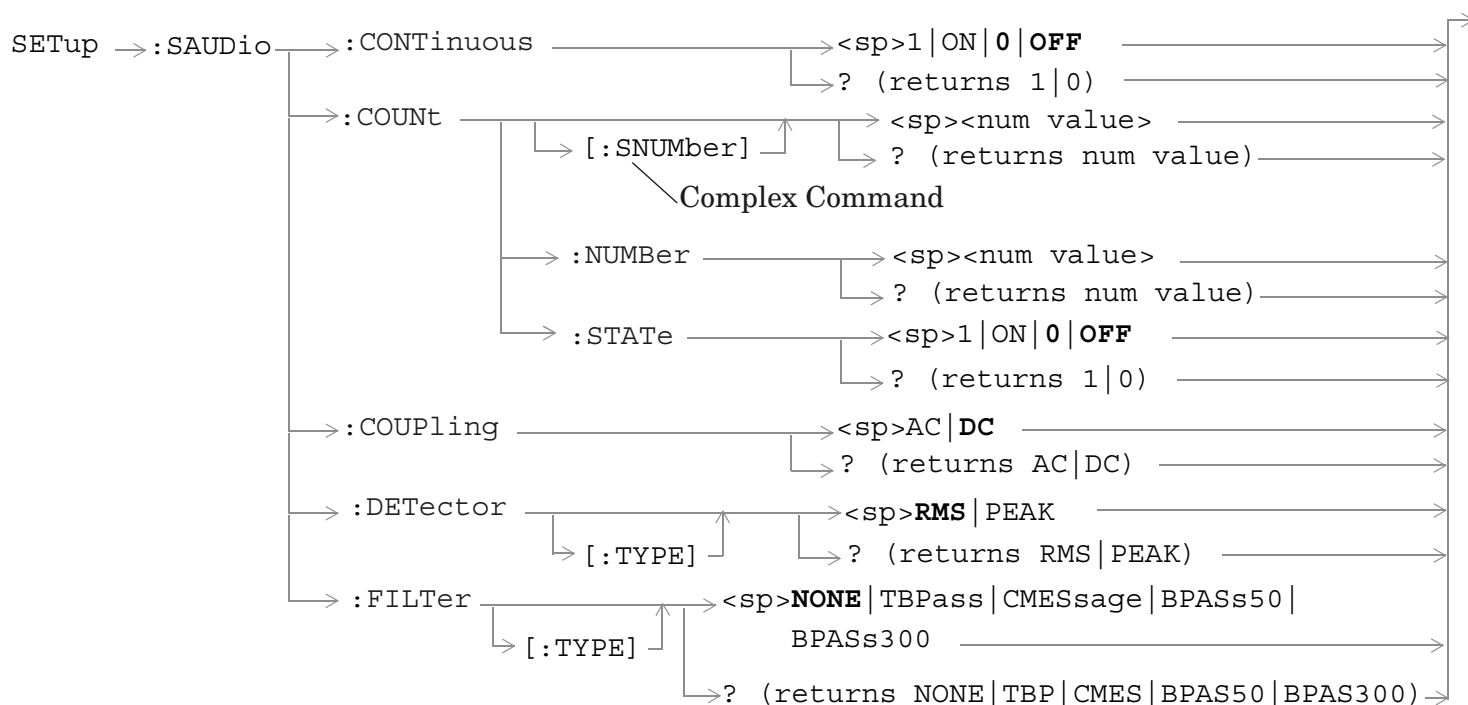
**SETup:MACCuracy:TRIGger:DELay**

Function	Sets/queries the trigger delay for the modulation accuracy measurement.
Setting	Range: -20 to 20 ms Resolution: 10 us
Query	Range: -20 to 20 ms
*RST Setting	0 seconds
Programming Example OUTPUT 714 ; "SETUP:MACCURACY:TRIGGER:DELAY 1S"	

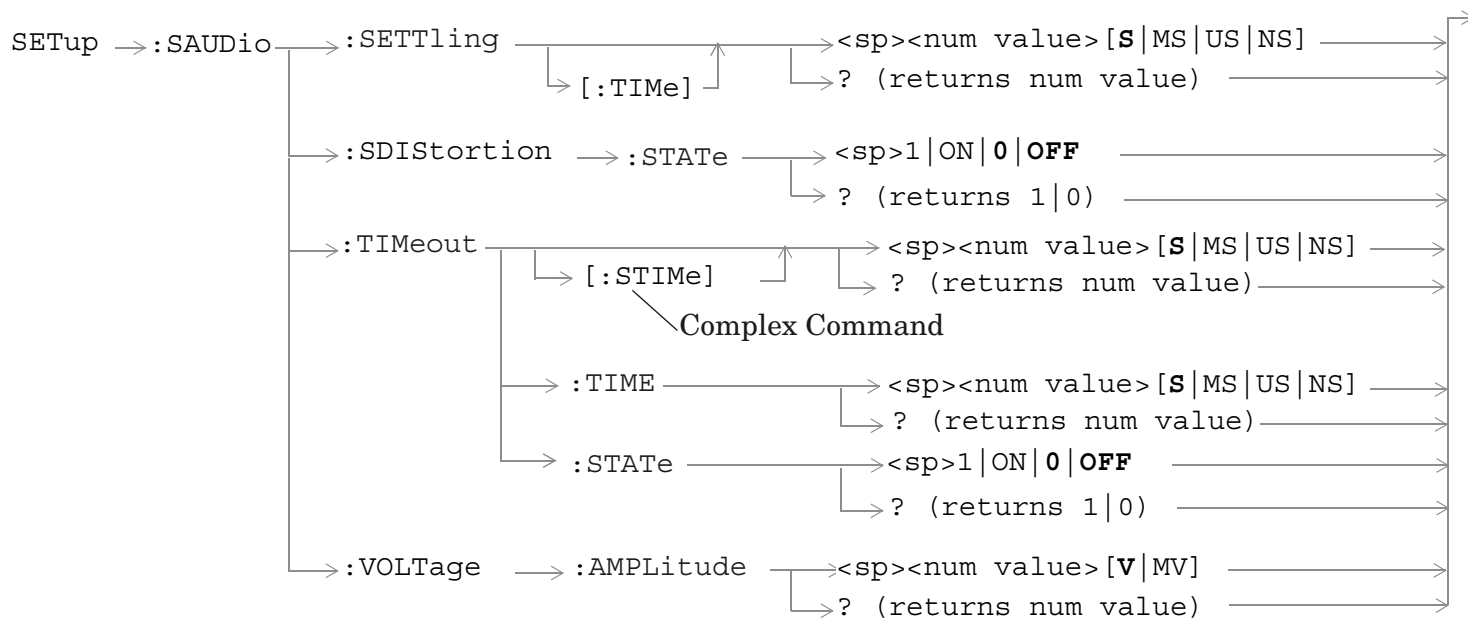
**SETup:MACCuracy:TRIGger:SOURce**

Function	Sets/queries the trigger source for the modulation accuracy measurement.
Setting	Range: AUTO   IMMEDIATE   PROTOCOL   RISE   EXTERNAL
Query	Range: AUTO   IMM   PROT   RISE   EXT
*RST Setting	AUTO
Programming Example OUTPUT 714 ; "SETUP:MACCURACY:TRIGGER:SOURCE RISE"	

## SETup:SAUDio







## SETup:SAUDio

### 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)
Programming Example OUTPUT 714;"SETUP:SAUDIO:CONTINUOUS ON" !Turns on continuous triggering.	

### 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
Programming Example OUTPUT 714;"SETUP:SAUDIO:COUNT:SNUMBER 5" !Turns on multi-measurements and makes 5 measurements at each frequency point in the sweep.	

### 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
Programming Example OUTPUT 714;"SETUP:SAUDIO:COUNT:NUMBER 5" !Makes 5 measurements at each frequency point in the sweep.	

**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

### 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
Programming Example 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 "SETup:SAUDio:FREQuency:POINts"). 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
Programming Example 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
Programming Example OUTPUT 714;"SETUP:SAUDIO:FREQUENCY:POINTS 20" !Make audio measurements at 20 frequency points in the sweep.	

**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
<b>Programming Example</b> 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
<b>Programming Example</b> 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
<b>Programming Example</b> OUTPUT 714;"SETUP:SAUDIO:ICOUNT:MAXIMUM?" !Queries the total number of measurements made.	

## SETup:SAUDio

### 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: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> <pre>OUTPUT 714;"SETUP:SAUDIO:TIMEOUT:STIME 10" !Enables timeouts and sets the value to 10 seconds.</pre>	

**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> <pre>OUTPUT 714;"SETUP:SAUDIO:TIMEout:TIME 10" !Sets the timeout value to 10 seconds.</pre>	

**SETup:SAUDio:TIMEout:STATE**

Function	Selects/queries the swept audio measurement timeout state. Timeout is set using the "SETup:SAUDio:TIMEout:TIME" command.
Setting	Range: 1   ON   0   OFF
Query	Range: 1   0
*RST Setting	0 (off)
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:SAUDIO:TIMEOUT:STATE ON" !Enables timeouts for swept audio measurements.</pre>	

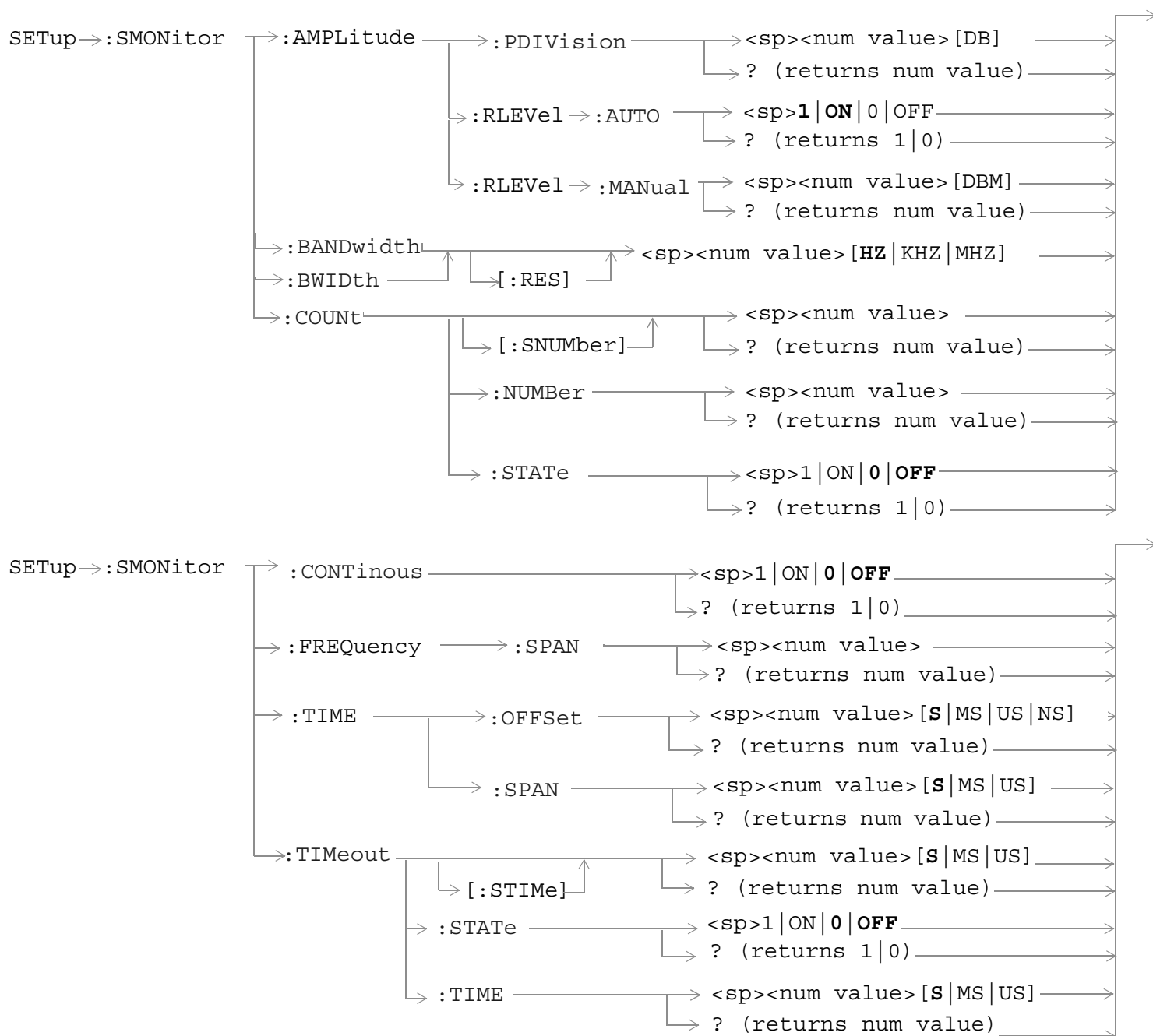
## SETup:SAUDio

### SETup:SAUDio:VOLTage:AMPLitude

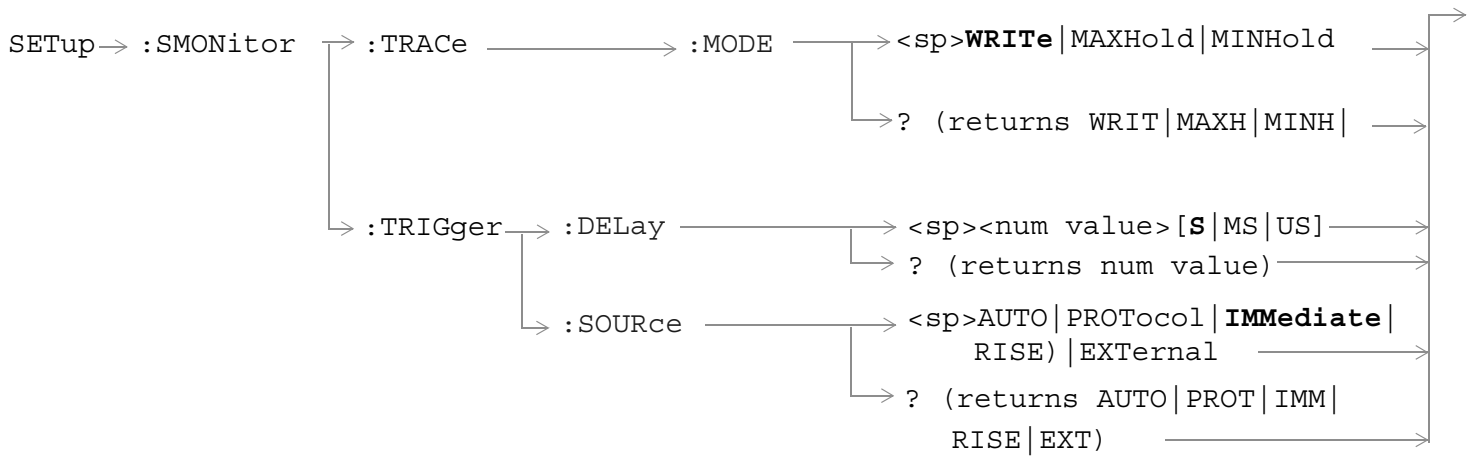
Function	Sets/queries the output level (peak voltage) of the audio generator when it is turned on. This command does not turn on the audio generator.
Setting	Range: 0.0 to 9.0 V peak ( $R_L > 600$ ohms) Resolution: <ul style="list-style-type: none"><li>• &lt; 0.5 mV peak (less than or equal to 1 V peak 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
Programming Example	
OUTPUT 714;"SETUP:SAUDIO:VOLTAGE:AMPLITUDE 1V" !Set the audio generator's output to 1Vpeak.	



## SETup:SMONitor



## SETup:SMONitor



“Diagram Conventions” on page 233

**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> <pre>OUTPUT 714;"SETup:SMONitor:AMPLitude:PDIVision 1DB"</pre> !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> <pre>OUTPUT 714;"SETup:SMONitor:AMPLitude:RLEVel:AUTO ON"</pre> !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 "SYSTem:CORRection" on page 539). 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> <pre>OUTPUT 714;"SETup:SMONitor:AMPLitude:RLEVel:MANual -20DBM"</pre> !Sets spectrum monitor's reference level to -20 dBm.	

## SETup:SMONitor

### SETup:SMONitor:BANDwidth[:RES]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 481, must be set to 0 Hz.  Any setting you enter is rounded to the hearest of the three settings.
Setting	Range: 100 kHz   300 kHz   1 MHz
Query	Range: 100 kHz   300 kHz   1 MHz
*RST Setting	300 kHz
Programming Example  OUTPUT 714;"SETup:SMONitor:BAND 100 KHZ"  !Sets spectrum monitor's resolution bandwidth to 100 kHz.	

### 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
Programming Example  OUTPUT 714;"SETup:SMONitor:COUNt 200"  !Sets the averaging count to 200 and sets the averaging the state to on.	

### 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
Programming Example  OUTPUT 714;"SETup:SMONitor:COUNt:NUMber 200" !Sets the averaging count to 200.	

**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

### 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 482. 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
Programming Example	
OUTPUT 714;"SETup:SMONitor:TIME:OFFSet 25 MS" ! Sets the spectrum monitor's time offset to 25 millisecond.	

### 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
Programming Example	
OUTPUT 714;"SETup:SMONitor:TIME:SPAN 30MS" ! Sets the spectrum monitor's time span to 30 millisecond.	

**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
Programming Example	
<pre>OUTPUT 714;"SETup:SMONitor:TIMEout:STIME 12S" ! Turns on the timeout timer and sets the timer to expire in 12 seconds.</pre>	

**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
Programming Example	
<pre>OUTPUT 714;"SETup:SMONitor:TIMEout:STATE 1" ! Turns on the timeout timer.</pre>	

**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
Programming Example	
<pre>OUTPUT 714;"SETup:SMONitor:TIMEout:TIME 20S" ! Generates a timeout error if no results are reported within 20 seconds.</pre>	

## SETup:SMONitor

### 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>	
OUTPUT 714;"SETup:SMONitor:TRACe:MODE MAXH" ! Sets the update method to maximim hold.	

### 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	Range: -50 ms to +50 ms Resolution: 5 significant digits or 100 ns, whichever is greater
Query	Range: -50 ms to +50 ms Resolution: 5 significant digits or 100 ns, whichever is greater
*RST Setting	350 us
<b>Programming Example</b>	
OUTPUT 714;"SETup:SMONitor:TRiGger:DELay 1MS" ! Sets the trigger delay to 1 millisecond.	



## 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> <pre>OUTPUT 714;"SETup:SMONitor:TRIGger:SOURce RISE" ! Sets the measurement to trigger on the rising edge of an RF burst.</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 487

“STATus:PRESet” on page 503

“STATus:QUEStionable” on page 504

“Standard Event Status Register” on page 522

“Status Byte Register” on page 521

### Status Register Bit Definitions

“Status Byte Register Bit Assignments” on page 521

“Standard Event Status Register Bit Assignment” on page 523

“STATus:QUEStionable Condition Register Bit Assignment” on page 508

“STATus:QUEStionable:CALL Condition Register Bit Assignment” on page 509

“STATus:QUEStionable:ERRors Condition Register Bit Assignment” on page 510

“STATus:QUEStionable:HARDware Condition Register Bit Assignment” on page 519

“STATus:OPERation Condition Register Bit Assignment” on page 491

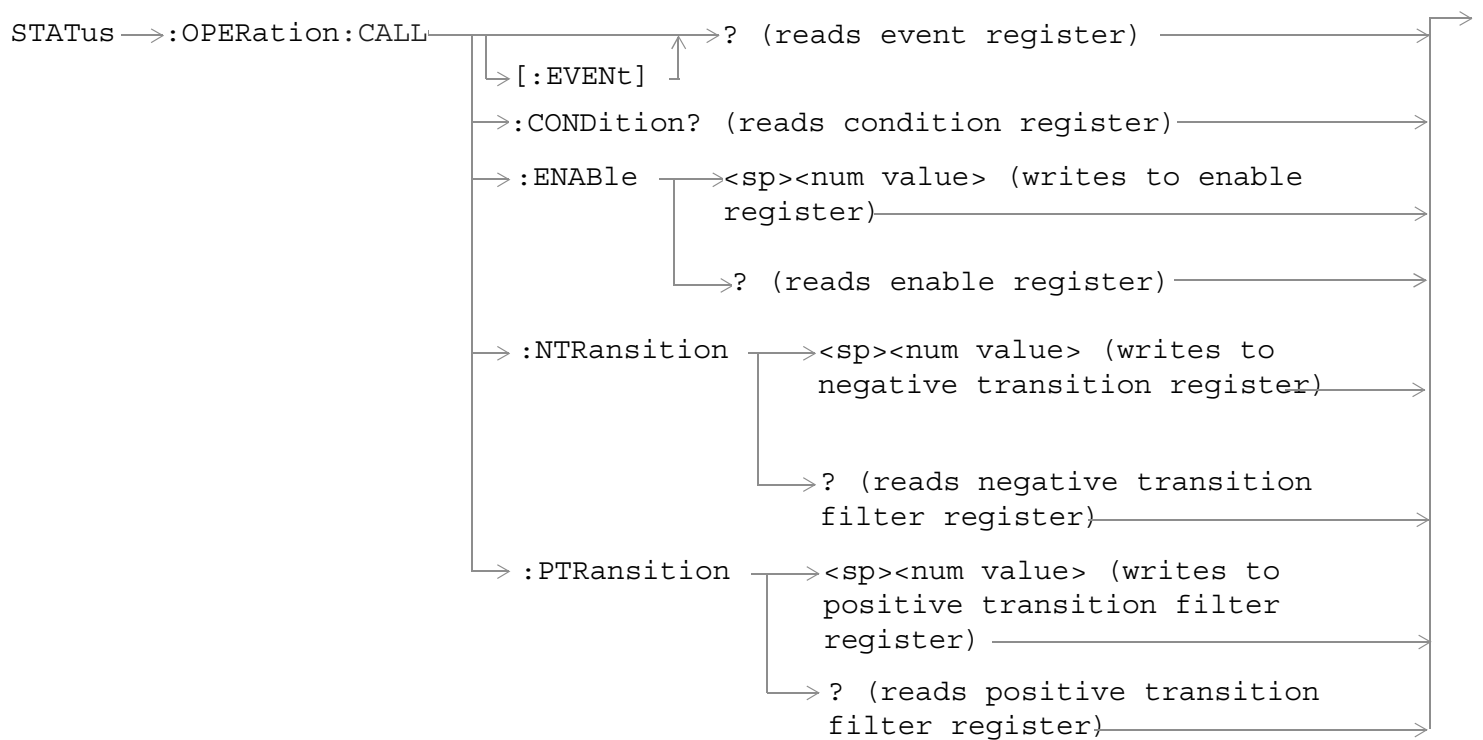
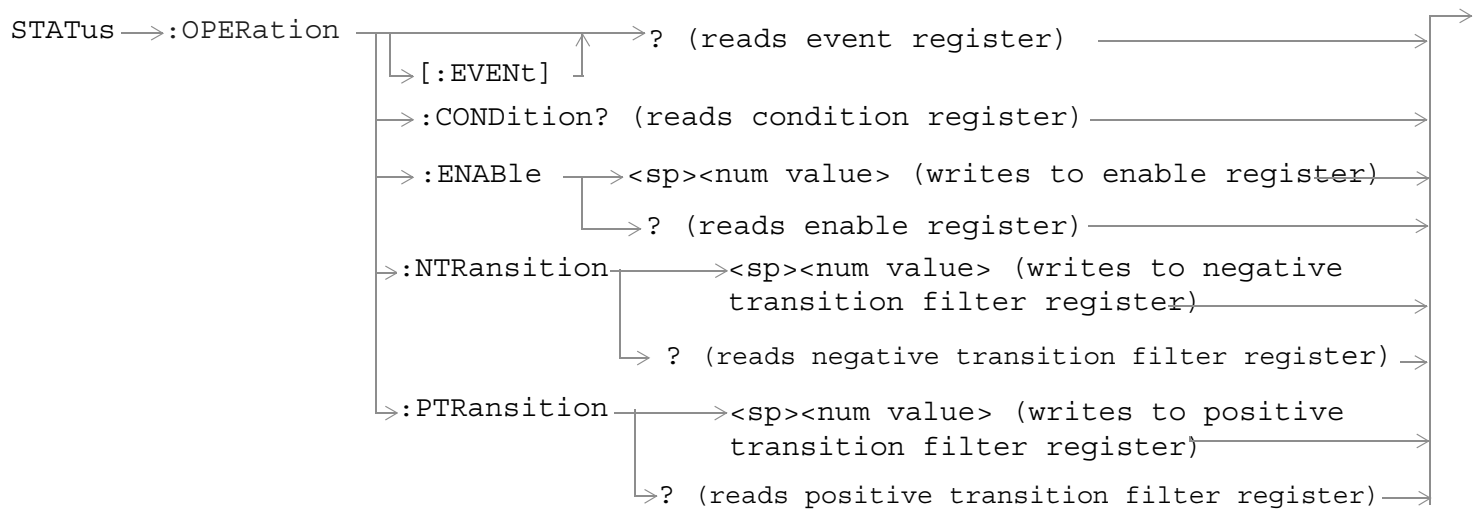
“STATus:OPERation:CALL Condition Register Bit Assignment” on page 492

“STATus:OPERation:NMRReady Condition Register Bit Assignment” on page 497

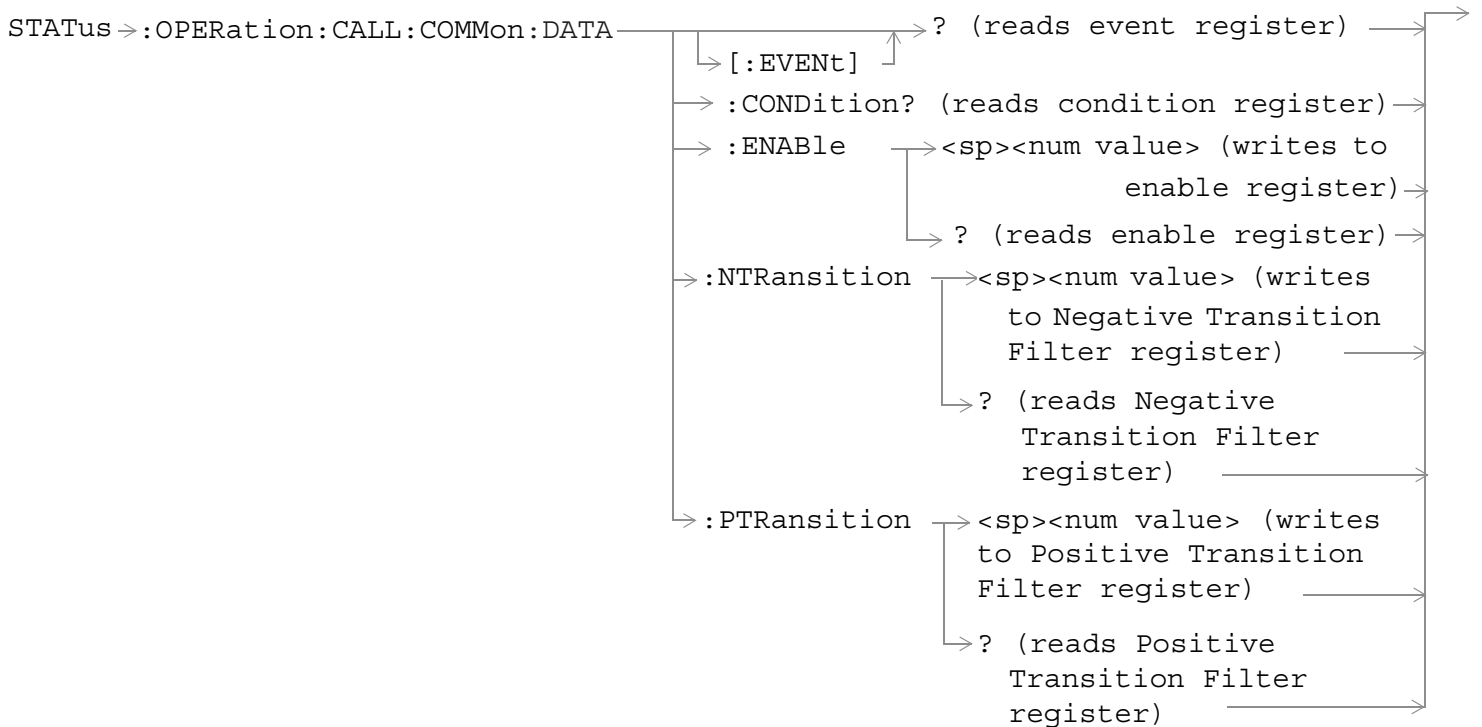
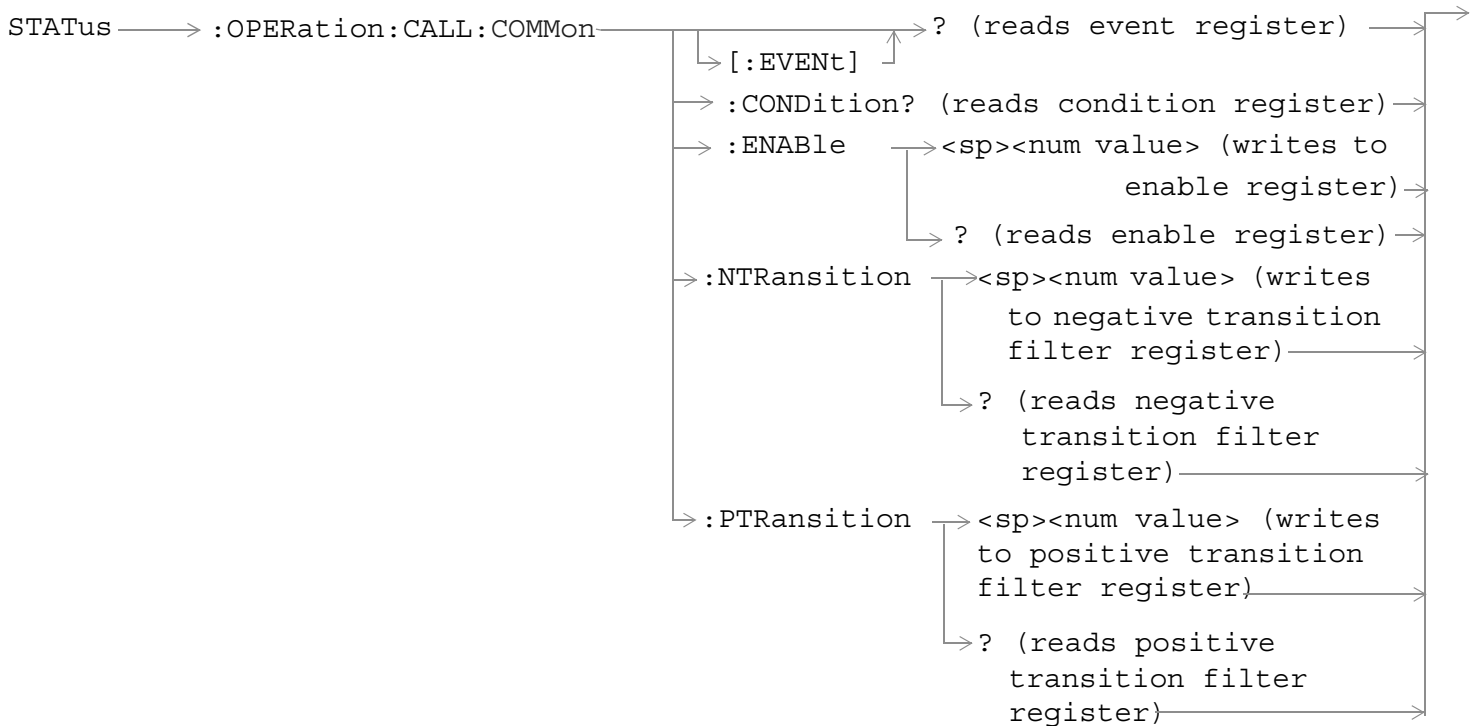
### Related Topics

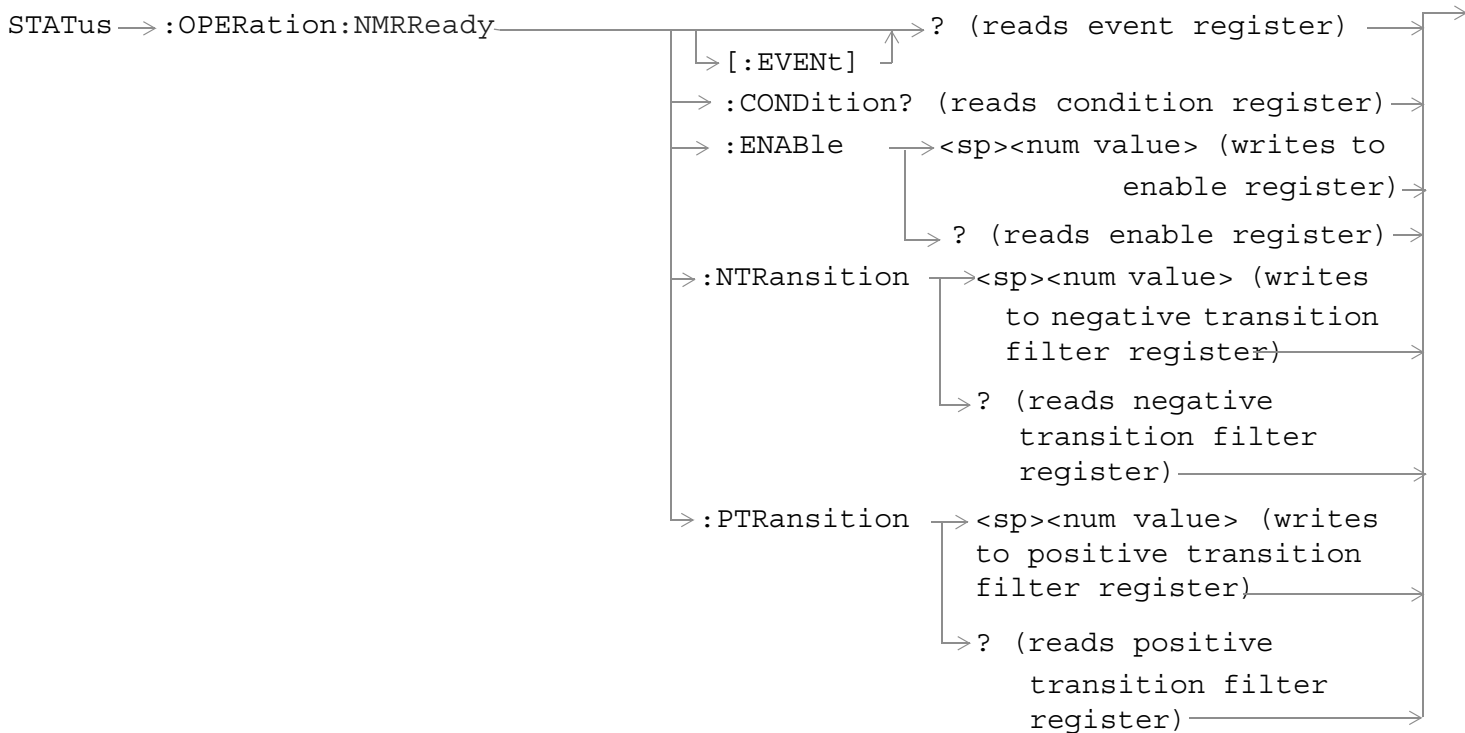
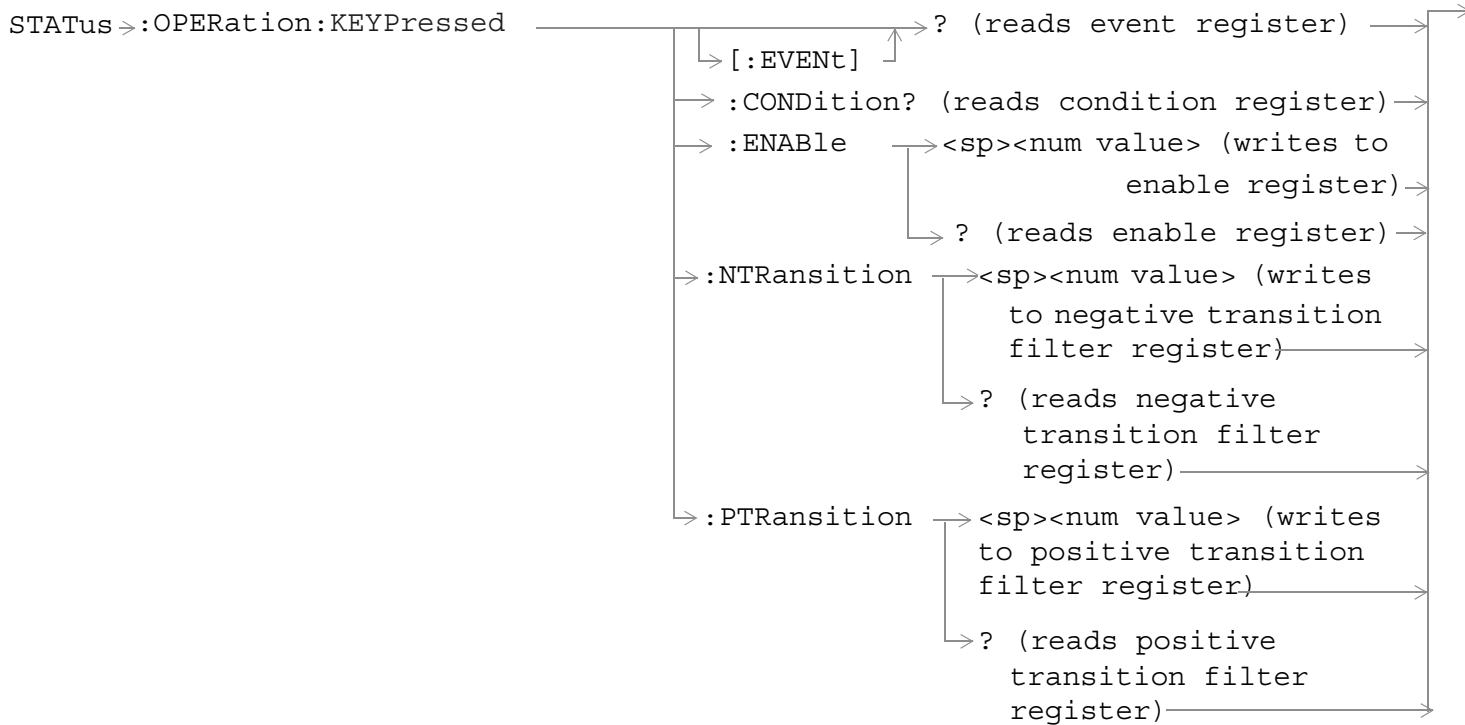
“Overview of STATus Reporting Structure” on page 174

## STATUS:OPERation

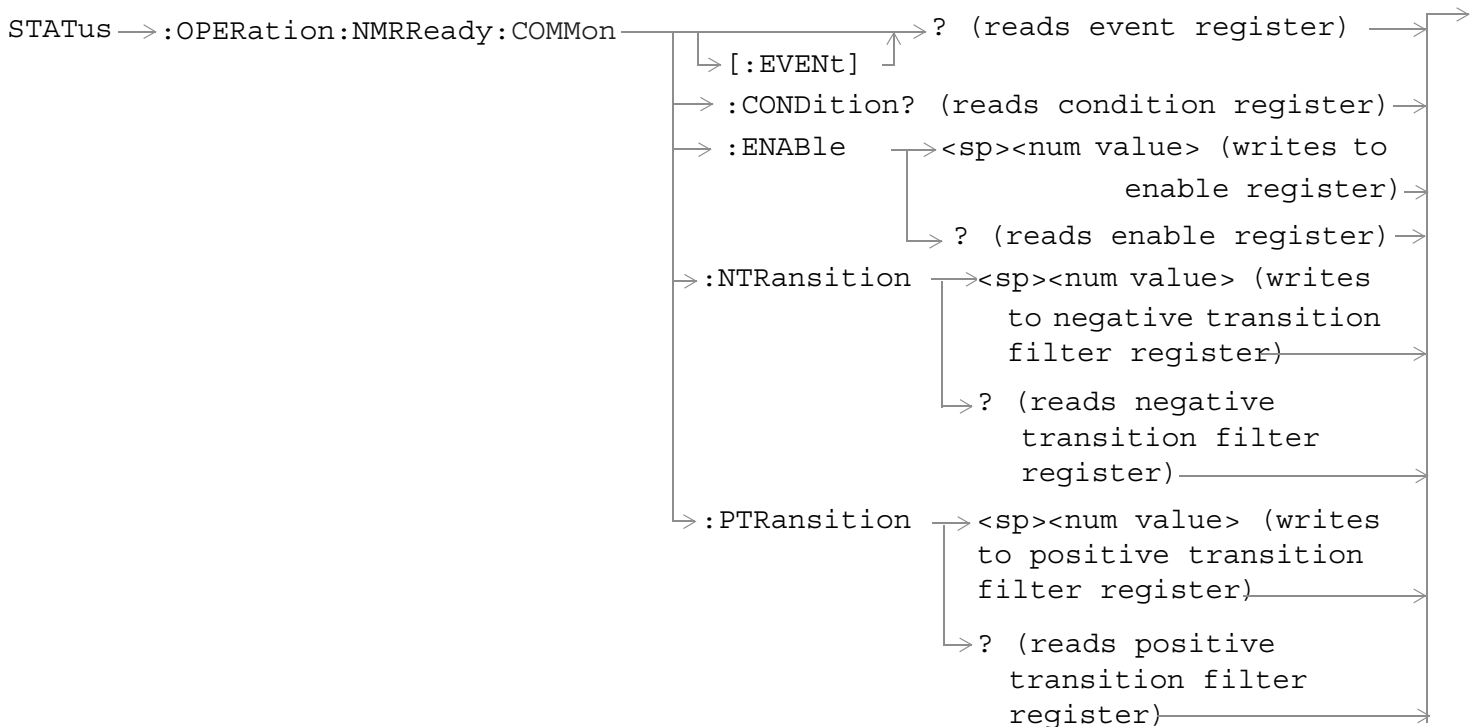
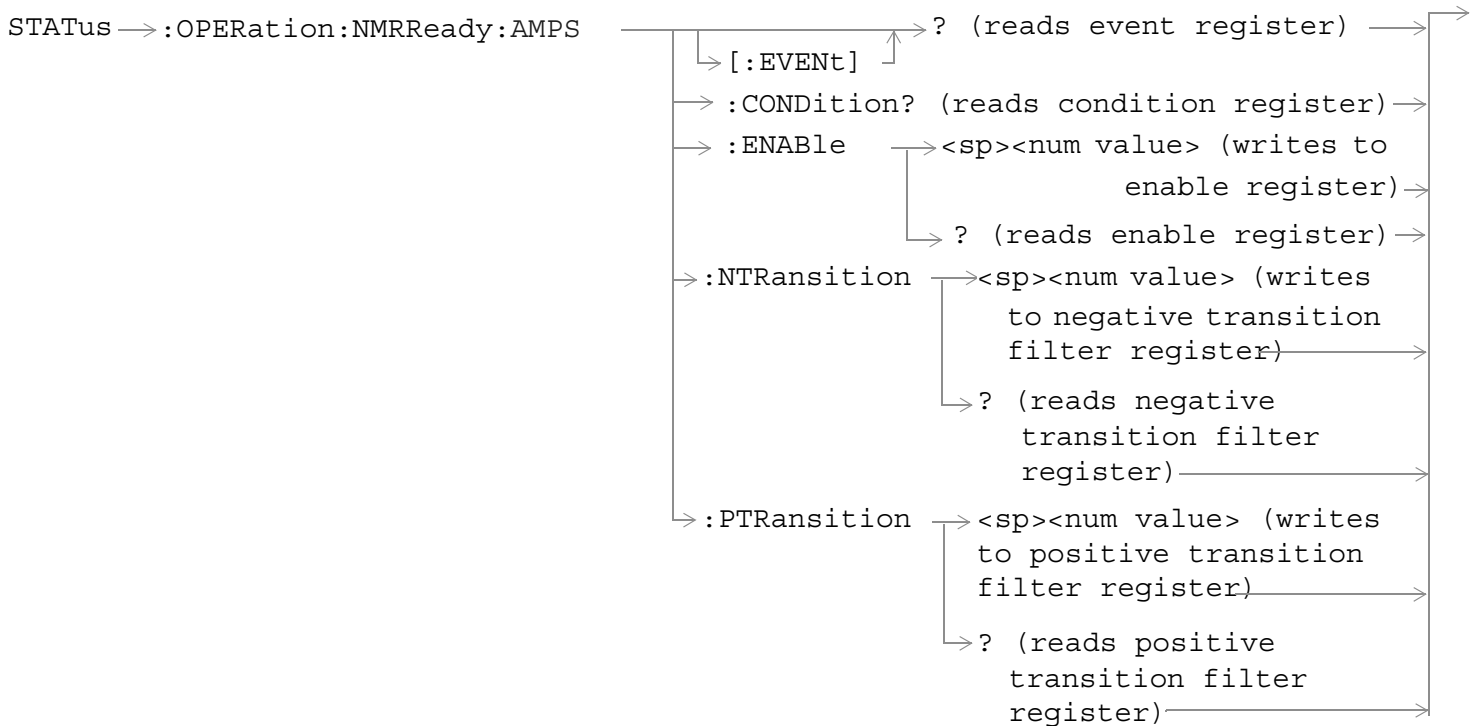


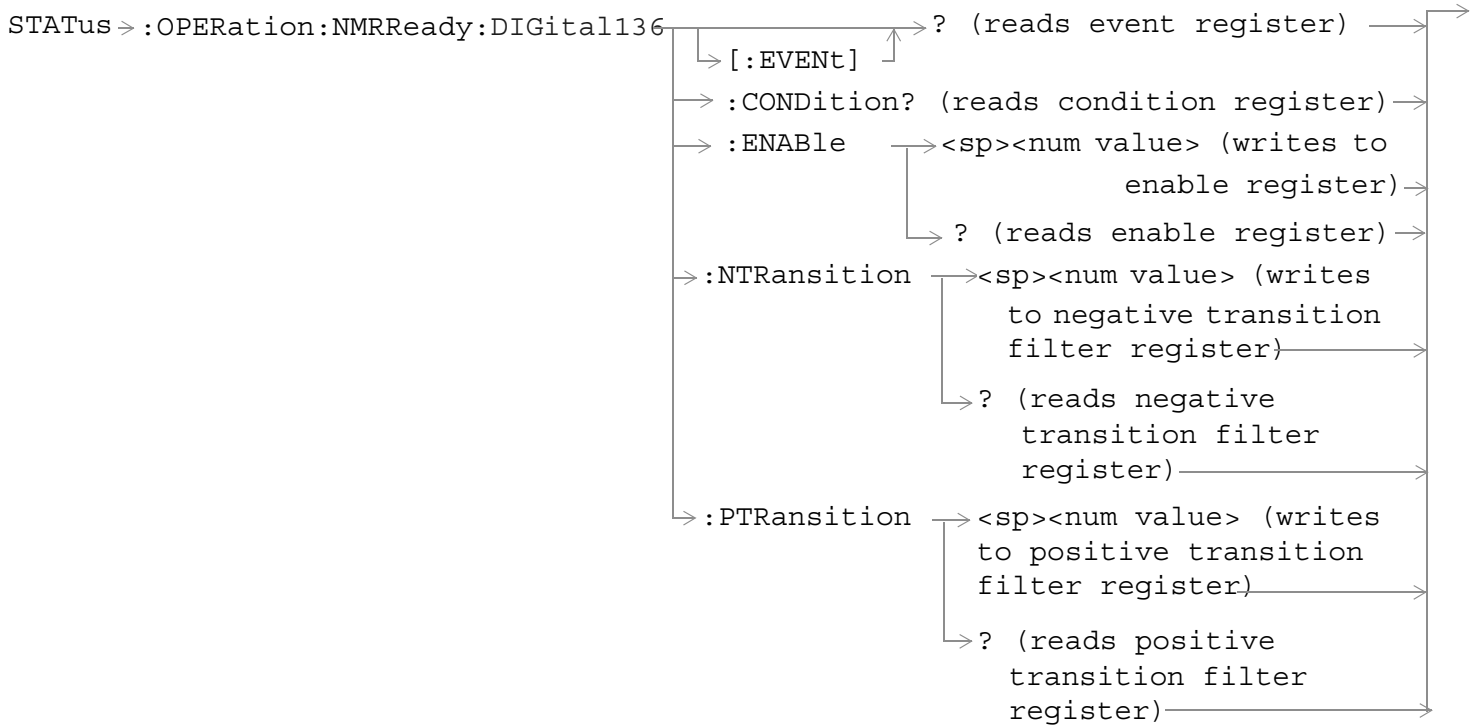
## STATUS:OPERation





## STATUS:OPERation





“Diagram Conventions” on page 233

**STATus:OPERation Condition Register Bit Assignment**

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	Reserved for future use.	This bit is always 0.
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	Reserved for future use	This bit is always 0.
10	1024	CALL Summary	This bit is the summary message bit for the STATus:OPERation:CALL register.
9	512	NMRReady (New Measurement Result Ready) Summary	This bit is the summary message bit for the STATus:OPERation:NMRReady register.

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
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 Positive Transition
!Register for bit 9.
```

### STATUS:OPERation:CALL Condition Register Bit Assignment

The STATUS:OPERation:CALL register bits are 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	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	TA2000 Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:TA2000 register.



Bit Number	Binary Weighting	Condition	Description
8	256	CDMA Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:CDMA register.
7	128	DIGital2000 Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:DIGital2000 register.
6	64	DIGital95 Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:DIGital95 register.
5	32	TA136 Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:DIGITAL136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:GSM register.
1	2	COMMMon Summary bit	This bit is the summary message bit for the STATUS:OPERation:CALL:COMMMon 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:COMMMon Condition Register Bit Assignment**

The STATUS:OPERation:CALL:COMMMon register bits are 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 message bit for the STATUS:QUESTionable:CALL:GSM:DATA register.

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
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	Reserved for future use.	This bit is always 0.
5	32	Reserved for future use.	This bit is always 0.
4	16	Call Control Status Registering	This bit is a 1 when the test set is in the call control status registering state.
3	8	Call Control Status is "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	Reserved for future use.	This bit is always 0.
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 a 1 when the data connection status is Transferring.
2	4	Data Connection Status Attached	This bit is a 1 when the data connection status is Attached.
1	2	Data Connection Status Idle	This bit is a 1 when the data connection status is Idle.
0	1	Extension Bit	This bit is always 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
    
```

## STATUS:OPERation

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:NTRANSITION 2" !Sets the Operation Call Common  
!Data Negative Transition Filter  
!Register for bit 1

OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:PTRANSITION 2" !Set the Operation Call Common  
!Data Positive Transition Filter  
!Register for bit 1

## STATUS:OPERation:KEYPressed 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.
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.

Bit Number	Binary Weighting	Condition	Description
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 Assignment**

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	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	TA2000 Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:TA2000 register.
8	256	CDMA Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:CDMA register.

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
7	128	DIGital2000 Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:DIGital2000 register.
6	64	DIGital95 Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:DIGital95 register.
5	32	TA136 Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:TA136 register.
4	16	DIGITAL136 Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:DIGITAL136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the STATUS:OPERation:NMRReady:AMPS register.
2	4	GSM Summary bit	STATUS:This bit is the summary message bit for the OPERATION:NMRReady:GSM register.
1	2	COMMON Summary bit	This bit is the summary message 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:NMRReady:AMPS Condition Register Bit Assignment

The STATUS:OPERation:NMRReady:AMPS 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.

Bit Number	Binary Weighting	Condition	Description
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	Frequency Modulation 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 "Measurement States" .
2	4	Frequency Stability New Measurement Result Ready	This 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 "Measurement States" .
1	2	Analog Transmit Power 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 "Measurement States" .
0	1	Extension Bit	This bit is always 0.

**Program Examples - STATUS:OPERation:NMRReady:AMPS**

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:AMPS:EVENT?" !Queries the New Measurement
                !Results Ready AMPS Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:AMPS:CONDITION?" !Queries the New Measurement
                !Results Ready AMPS
                !Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:AMPS:ENABLE 8" !Sets New Measurement Results
                !Ready AMPS Enable Register
                !for bit 3.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:AMPS:NTR 2" !Sets the New Measurement Results
    
```

## STATUS:OPERation

```
!Ready AMPS Negative Transition
!Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:AMPS:PTR 4" !Sets the New Measurement
!Results Ready AMPS Positive
!Transition Register
!for bit 2.
```

## STATUS:OPERation:NMRReady:COMMON Condition Register Bit Assignment

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	Reserved for future use.	This bit is always 0.
2	4	Swept Audio Measurement	This is the summary message bit for the STATUS:OPERation:NMRReady:COMMON Swept Audio measurement register.
1	2	Audio Analyzer	This is the summary message bit for the STATUS:OPERation:NMRReady:COMMON Audio Analyzer register.
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:DIGital136 Condition Register Bit Assignment**

The STATUS:OPERation:NMRReady:DIGital136 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	Digital Dynamic Power 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 "Measurement States" .
5	32	Digital IQ Tuning 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 "Measurement States" .
4	16	Loopback BER 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 "Measurement States" .

## STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
3	8	Adjacent Channel Power 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 "Measurement States" .
2	4	Modulation Accuracy 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 "Measurement States" .
1	2	Digital Transmit Power 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 "Measurement States"
0	1	Extension Bit	This bit is always 0.

### Program Examples - STATUS:OPERation:NMRReady:DIGital136

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL136:EVENT?" !Queries the New Measurement
!Results Ready Digital136 Event Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL136:CONDITION?" !Queries the New Measurement
!Results Ready Digital136
!Condition Register.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL136:ENABLE 16" !Sets New Measurement Results
!Ready Digital136 Enable Register
!for bit 4.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL136:NTR 2" !Sets the New Measurement Results
!Ready Digital136 Negative Transition
!Register for bit 1.
OUTPUT 714;"STATUS:OPERATION:NMRREADY:DIGITAL136:PTR 4" !Sets the New Measurement
!Results Ready Digital136 Positive
!Transition Register
!for bit 2.
```

## Related Topics

"Triggering of Measurements" on page 200

## STATus:PRESet

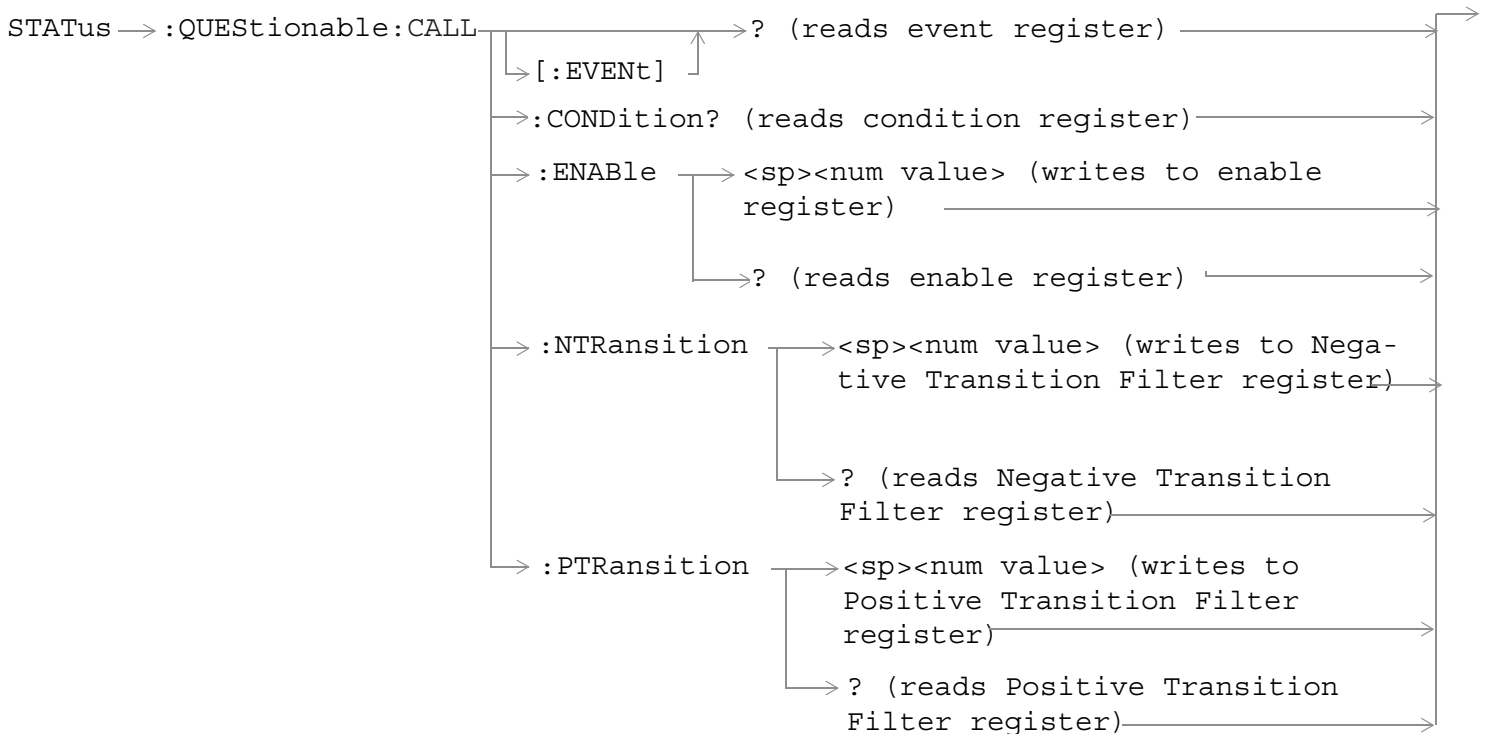
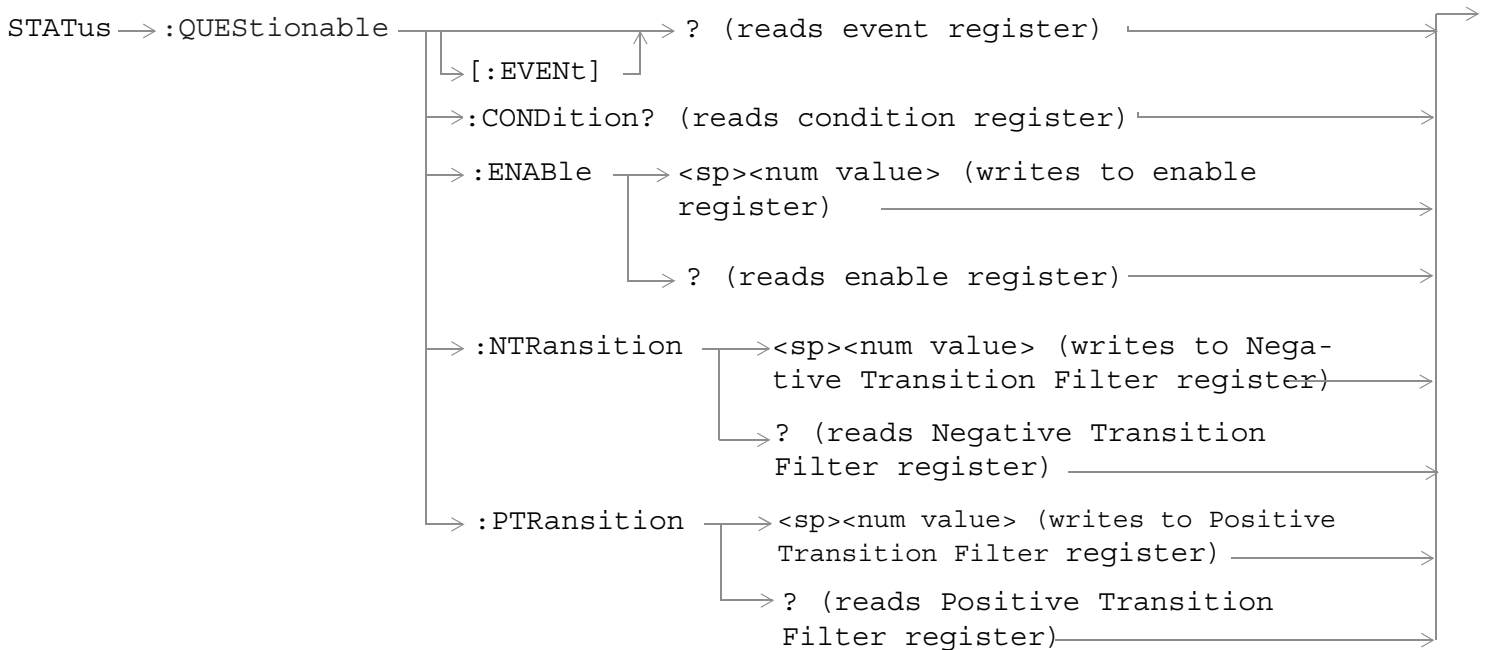
STATus → :PRESet

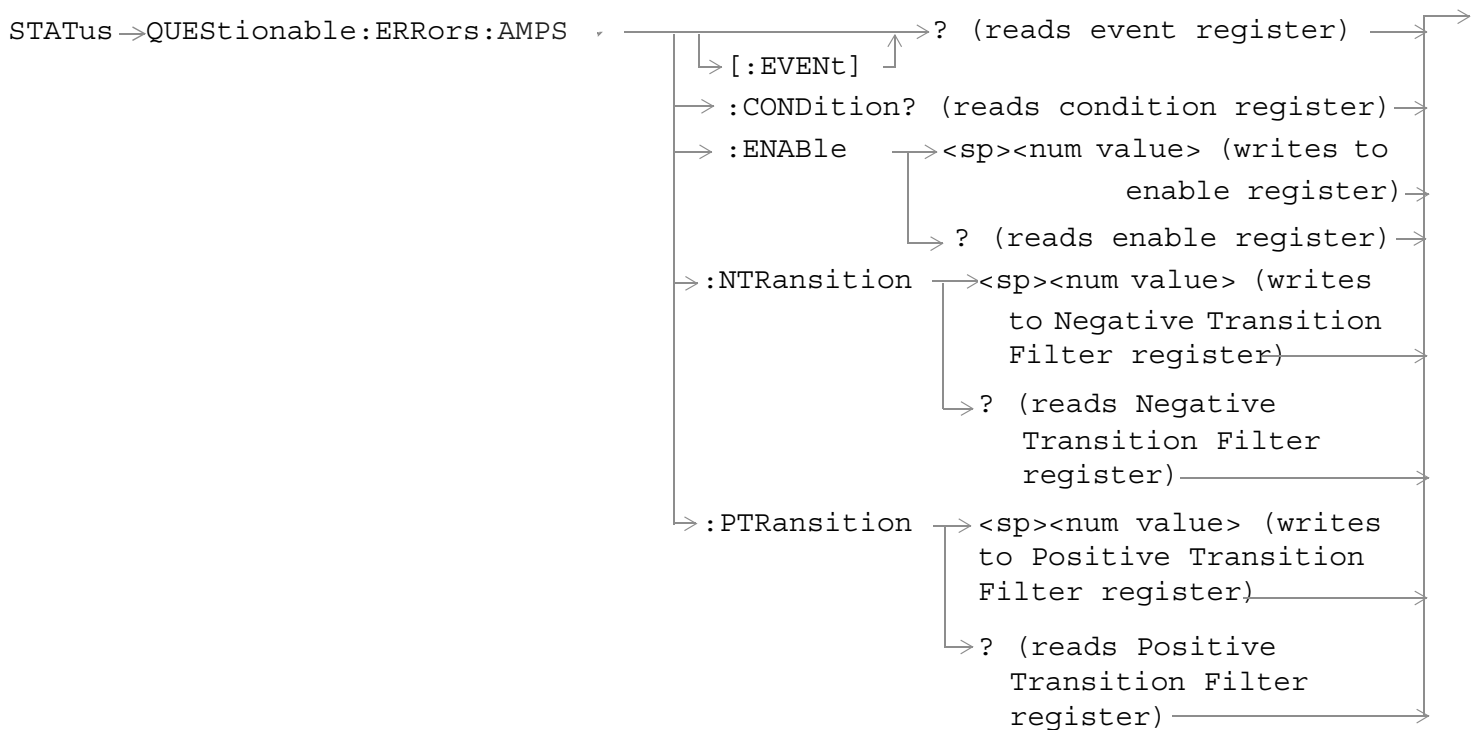
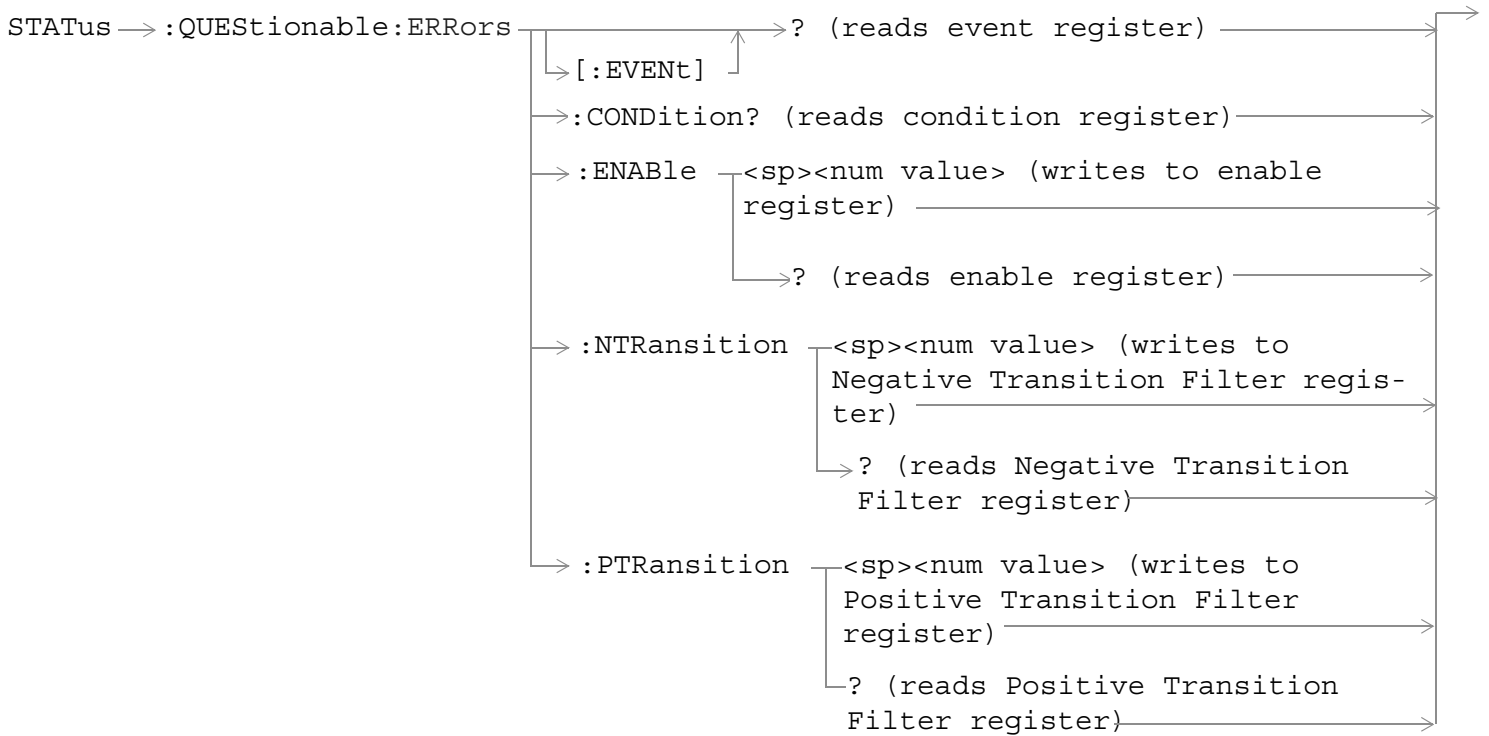
“Diagram Conventions” on page 233

### STATus:PRESet

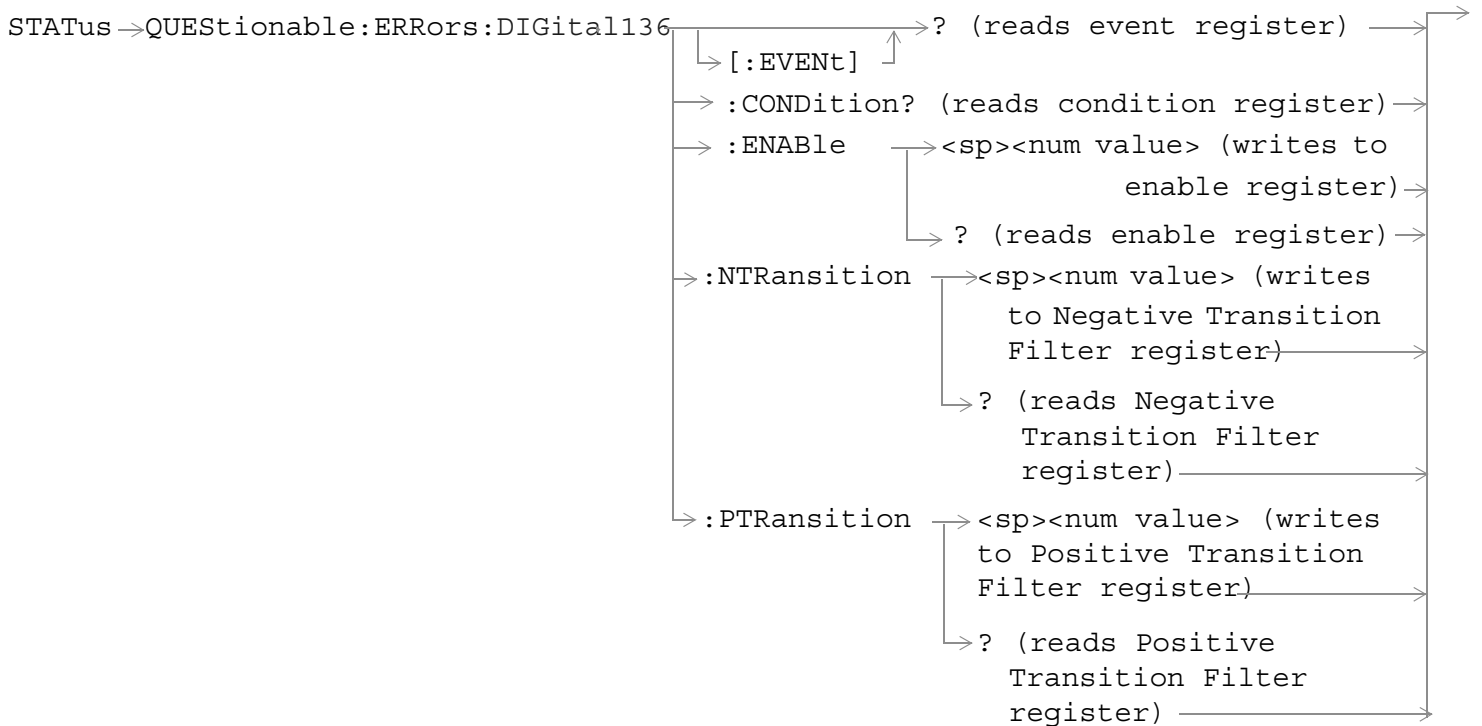
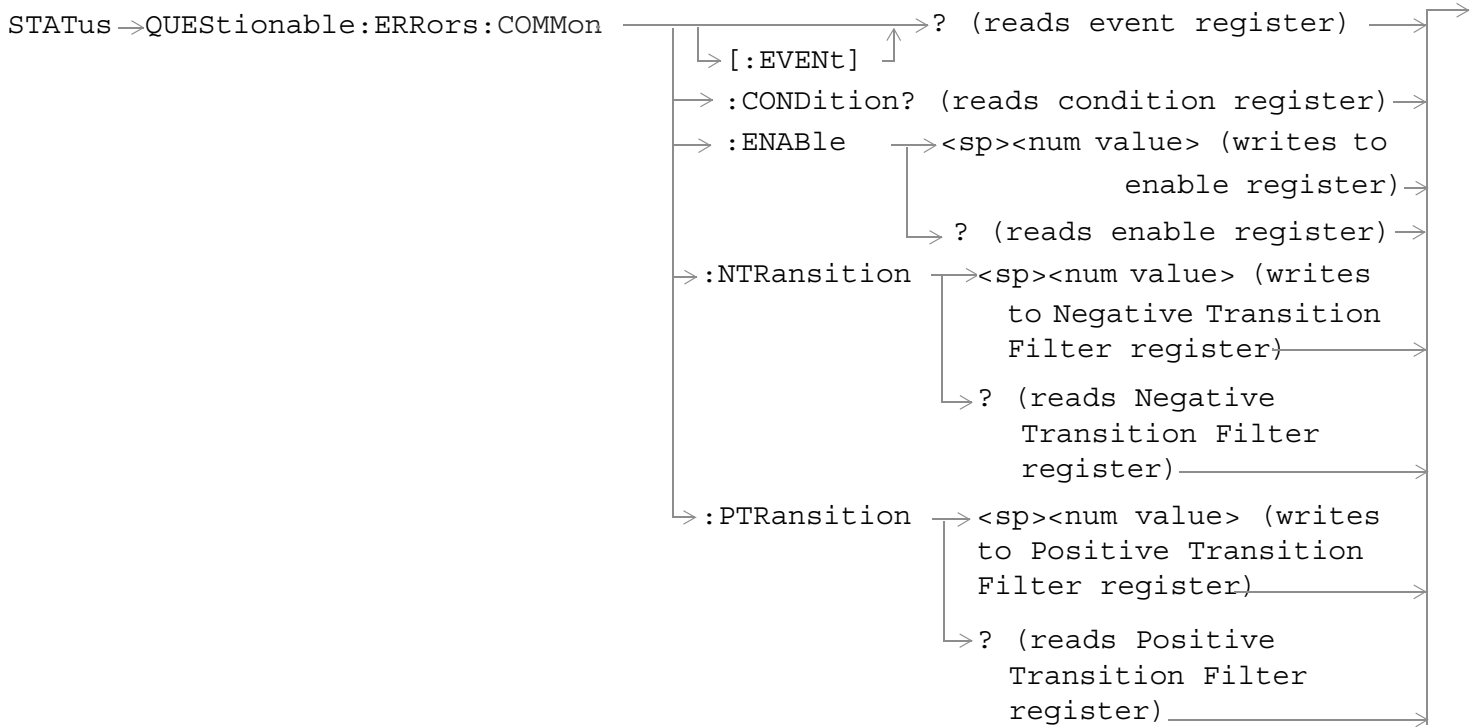
Function	<p>Presets the Status Subsystem</p> <p>Sets all Enable Registers to 0 (not enabled).</p> <p>Sets all Positive Transition Registers (PTR) to 1 (positive transitions enabled).</p> <p>Sets all Negative Transition Registers (NTR) to 0 (negative transitions disabled).</p>
----------	---

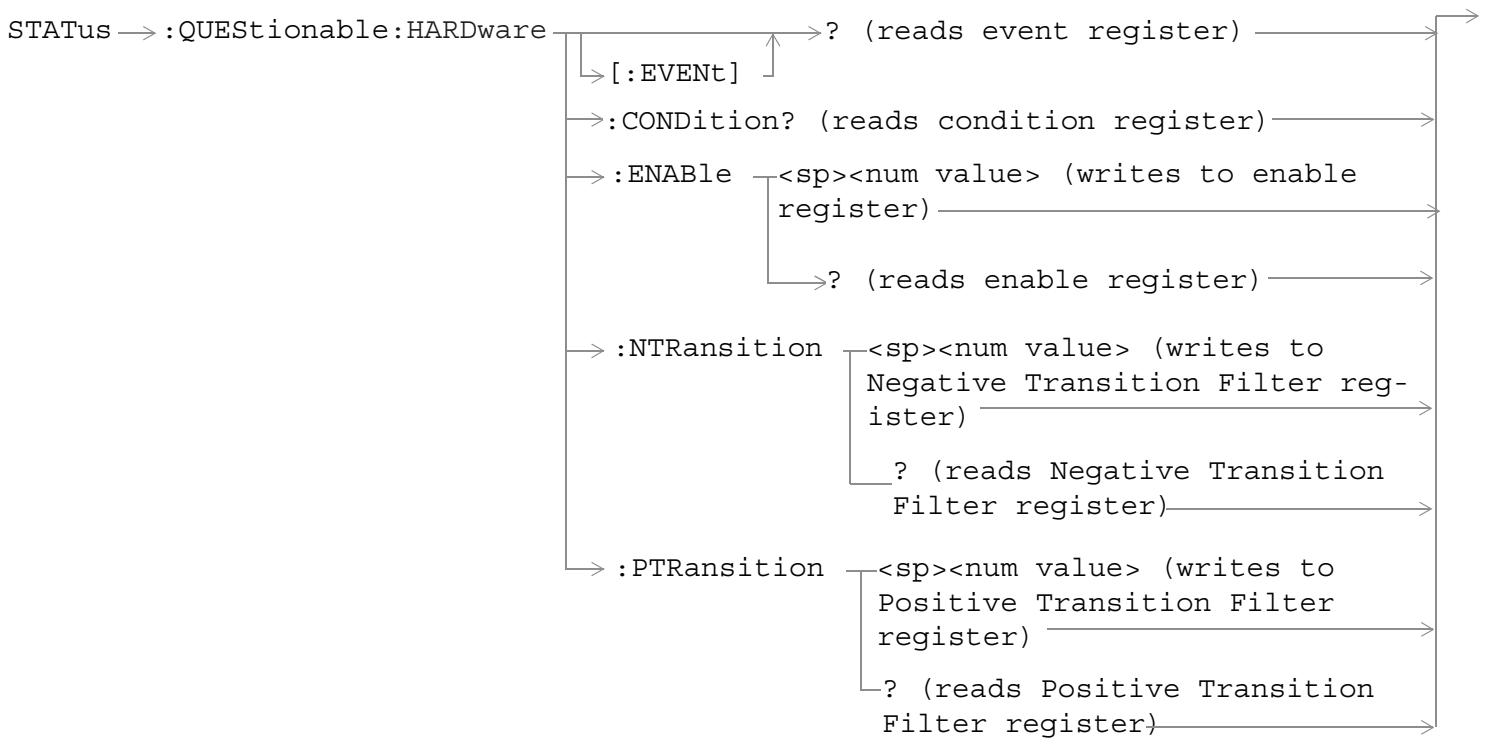
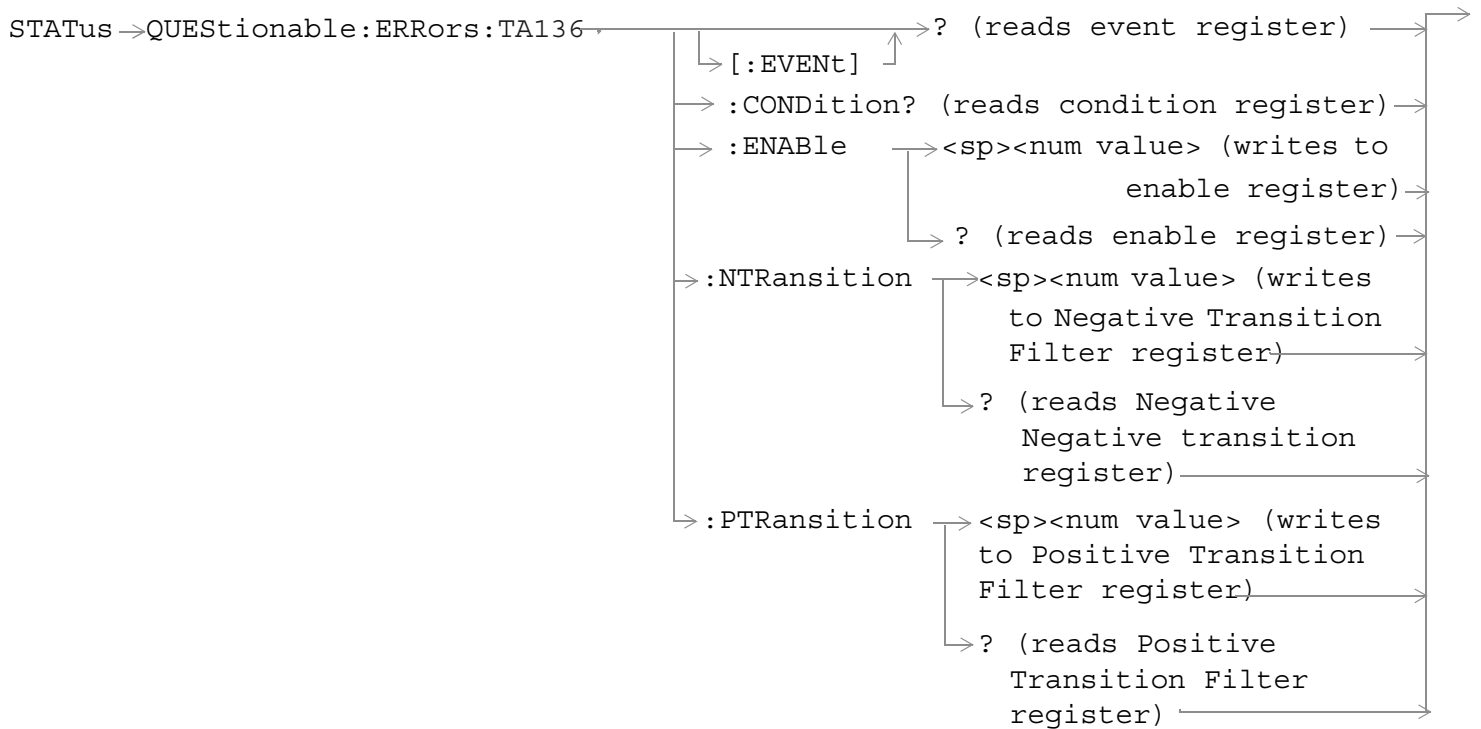
## STATUS:QUESTIONABLE





## STATUS:QUESTIONABLE





“Diagram Conventions” on page 233

## STATUS:QUESTIONABLE

### 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 message bit for the STATUS:QUESTIONABLE:HARDWARE register.
10	1024	QUESTIONABLE:CALL summary	This bit is the summary message 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 message bit for the STATUS:QUESTIONABLE:ERRORS register.
0	1	Reserved for future use.	This bit is always 0.

### Program Example - STATUS:QUESTIONABLE Condition Register Bit Assignment

```
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: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	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	TA136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:GSM register.
1	2	COMMon Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:COMMon register.
0	1	Extension Bit	This bit is always 0.

## STATUS:QUESTIONABLE

### 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: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	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	TA136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:ERRORS:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:ERRORS:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:ERRORS:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:ERRORS:GSM register.
1	2	COMMon Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:ERRORS register.

Bit Number	Binary Weighting	Condition	Description
0	1	Extension Bit	This bit is always 0.

**Program Example - STATUS:QUESTIONABLE:ERRORS Condition Register Bit Assignment**

```

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:COMMON Condition Register Bit Assignment**

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	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	+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.

**STATUS:QUESTIONABLE**

<b>Bit Number</b>	<b>Binary Weighting</b>	<b>Condition</b>	<b>Description</b>
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.
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 Condition Register Bit Assignment**

```

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:AMPS Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:ERRORS:AMPS register bits will be used to indicate information about AMPS 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 Messages	This bit is a 1 when a Maskable Message has occurred. Maskable Messages are not displayed on the test set display.
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.

**STATUS:QUESTIONABLE**

<b>Bit Number</b>	<b>Binary Weighting</b>	<b>Condition</b>	<b>Description</b>
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.
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 is be 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:AMPS Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:AMPS:EVENT?" !Queries and clears the Questionable
!Errors AMPS Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:AMPS:CONDITION?" !Queries and clears the Questionable
!Errors AMPS Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:AMPS:ENABLE 1024" !Sets the Questionable
!Errors AMPS Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:AMPS:NTRANSITION 2" !Sets the Questionable Errors
!AMPS Negative Transition
!Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:AMPS:PTRANSITION 2" !Sets the Questionable Errors
!AMPS Positive Transition
!Filter Register for bit 1
    
```

**STATUS:QUESTIONABLE:ERRORS:DIGITAL136 Condition Register Bit Assignment**

The STATUS:QUESTIONABLE:ERRORS:DIGITAL136 register bits will be used to indicate information about DIGITAL136 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	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	+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.

**STATUS:QUESTIONABLE**

Bit Number	Binary Weighting	Condition	Description
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. Query the Event Register to find out if one 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 is always 0.

**Program Example - STATUS:QUESTIONABLE:ERRORS:DIGITAL136 Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL136:EVENT?" !Queries and clears the
!Questionable Errors
!Digital136 Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL136:CONDITION?" !Queries and clears the
!Questionable Errors
!Digital136 Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL136:ENABLE 1024" !Sets the Questionable
!Errors Digital136 Enable

```



## STATUS:QUESTIONABLE

!Register for bit 10  
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL136:NTRANSITION 2" !Sets the Questionable  
!Errors Digital136 Negative  
!Transition Filter  
!Register for bit 1  
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:DIGITAL136:PTRANSITION 2" !Sets the Questionable  
!Errors Digital136 Positive  
!Transition Filter  
!Register for bit 1

### STATUS:QUESTIONABLE:ERRORS:TA136 Condition Register Bit Assignment

The STATUS:QUESTIONABLE:ERRORS:TA136 register bits will be used to indicate information about TA136 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	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	+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.

**STATUS:QUESTIONABLE**

Bit Number	Binary Weighting	Condition	Description
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.
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:TA136 Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA136:EVENT?" !Queries and clears the
                                     !Questionable Errors
                                     !TA136 Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA136:CONDITION?" !Queries and clears the
                                     !Questionable Errors
                                     !TA136 Condition Register

```

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA136:ENABLE 1024" !Sets the Questionable
!Errors TA136 Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA136:NTRANSITION 2" !Sets the Questionable
!Errors TA136 Negative
!Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:TA136:PTRANSITION 2" !Sets the Questionable
!Errors TA136 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 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	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 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 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
    
```

## STATUS:QUESTIONABLE

```
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 233

## 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 526

“SYSTEM:BEEPer” on page 533

“SYSTEM:COMMunicate” on page 535

“SYSTEM:CONFigure:INFormation:HARDware:VERBose?”  
on page 534

“SYSTEM:CORRection” on page 539

“SYSTEM:CURRent:TA” on page 545

“SYSTEM:DATE” on page 546

“SYSTEM:ERRor?” on page 547

“SYSTEM:FTRigger” on page 548

“SYSTEM:MEASurement:RESet” on page 551

“SYSTEM:PRESet” on page 552

“SYSTEM:ROSCillator” on page 554

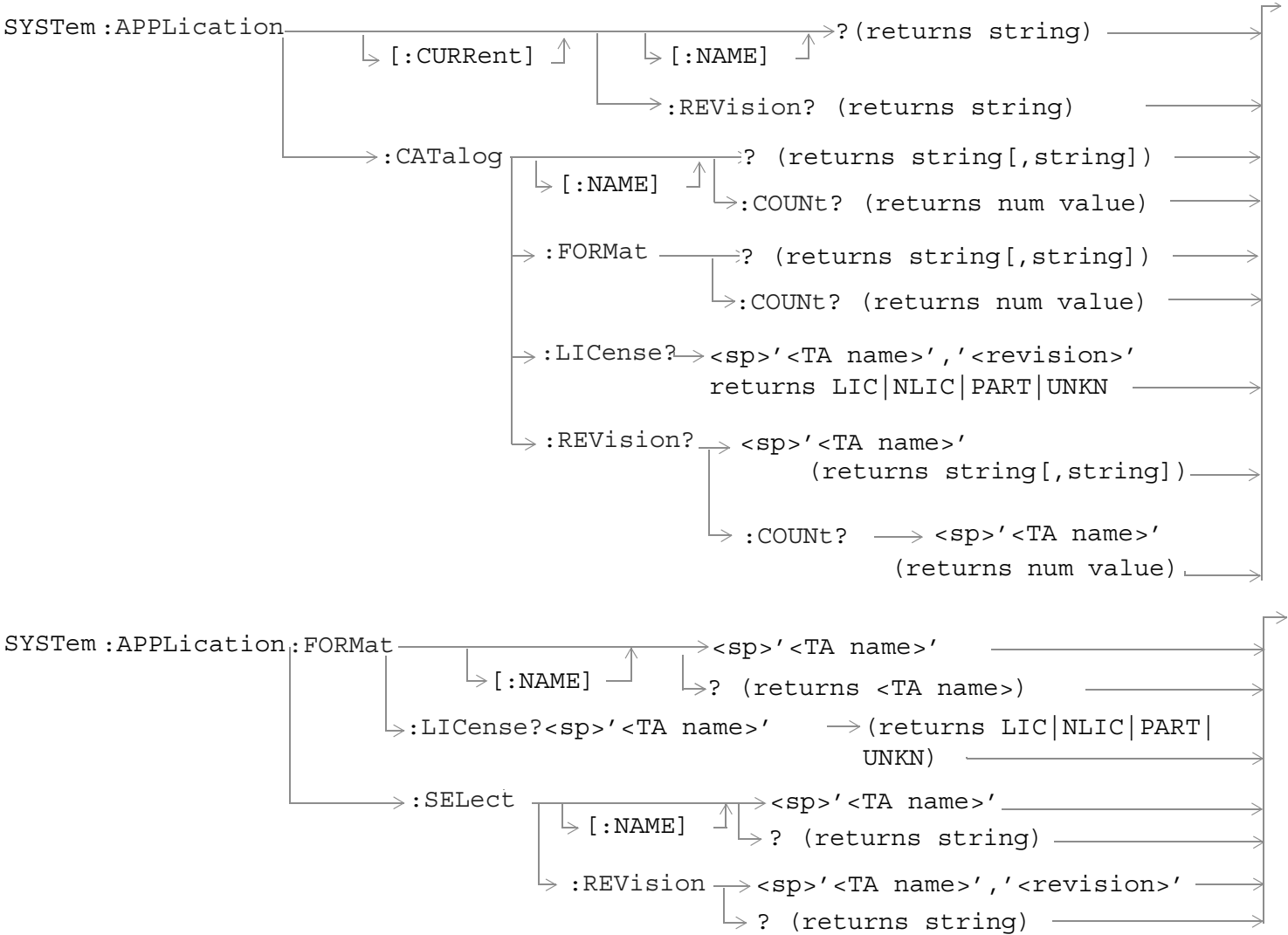
“SYSTEM:SYNChronized” on page 555

“SYSTEM:TIME” on page 556

“SYSTEM:TZONE” on page 557

“SYSTEM:UTC” on page 558

# SYSTem:APPLication



“Diagram Conventions” on page 233

**SYSTem:APPLiCation[:CURRent][:NAME]?**

Function	Query the test set for the name of the currently running test application.
Query	Range: See “SYSTem:APPLiCation:CATAlOG[:NAME]?” and null string.
Programming Example	
OUTPUT 714 ; " SYSTEM : APPLICATION : CURRENT : NAME ? "	

**SYSTem:APPLiCation[:CURRent]:REVision?**

Function	Query the test set for the currently running test 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[:NAME]?**

Function	Query the test set for all of the names of the test applications stored on the hard drive. This query returns one or more strings, each string is separated by a comma.
Query	Range: AMPS/136 Mobile Test CDMA 2000 Mobile Test GSM Mobile Test GSM/GPRS Mobile Test GSM_AMPS/136_GPRS_WCDMA WCDMA Mobile Test
Programming Example	
OUTPUT 714 ; " SYSTEM : APPLICATION : CATALOG : NAME ? "	

**SYSTem:APPLiCation:CATAlOG[:NAME]:COUNT?**

Function	Query the test set for the total number test application names stored on the hard drive. Up to 30 test applications can be stored.
Query	Range: 0 through 30
Programming Example	
OUTPUT 714 ; " SYSTEM : APPLICATION : CATALOG : NAME : COUNT ? "	

## SYSTEM:APPLICATION

### SYSTEM:APPLICATION:CATALOG:FORMAT?

Function	Queries the test set for the names of all formats that are available in a fast switching test application. A licensed fast switching test application must be selected to use this command.  This query returns one or more strings, each string is separated by a comma.
Query	Range: A string up to 25 characters, or the null string. <ul style="list-style-type: none"><li>• "GSM"</li><li>• "AMPS/136"</li><li>• "GPRS"</li><li>• 'IS-2000/IS-95/AMPS'</li><li>• "WCDMA"</li></ul>
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:FORMAT?"	

### SYSTEM:APPLICATION:CATALOG:FORMAT:COUNT?

Function	Queries the test set for the total number of formats available in a fast switching test application. A licensed fast switching test application must be selected to use this command.
Query	Range: 0 to 3
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:FORMAT:COUNT?"	

### SYSTEM:APPLICATION:CATALOG:LICENSE? Ô<test 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 test application name and revision must be entered as they appear in the test 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 test application.</li><li>• "NLIC" indicates this is not a licensed test application.</li><li>• "PART" not all test applications that correspond to the fast switching test application radio formats are licensed.</li><li>• "UNKN" indicates that license status is unknown.</li></ul>
Query	Range: LIC   NLIC   PART   UNKN
Programming Example	
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.00'"	

**SYSTem:APPLication:CATalog:REVision? Ô<test application name>Õ**

Function	<p>Query the test set for all revision numbers stored on the test set's hard drive for a specific test application. You must specify a test application.</p> <p>The test application name must be entered as it appears in the test 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>
Query	Range: One or more comma separated strings or a null string
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? `AMPS/136 MOBILE TEST`"</pre>	

**SYSTem:APPLication:CATalog:REVision:COUnT? Ô<test application name>Õ**

Function	<p>Query the test set for the number of revisions present on the hard disk for a specified test application. Up to 30 revisions can be stored for a test application.</p> <p>The test application name must be entered as it appears in the test 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>
Query	Range: 0 through 30
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? `AMPS/136 MOBILE TEST`"</pre>	

## SYSTEM:APPLICATION

### SYSTEM:APPLICATION: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>• 'IS-2000/IS-95/AMPS'</li><li>• 'WCDMA'</li></ul>
Query	Range: A string up to 25 characters, or the null string. <ul style="list-style-type: none"><li>• "GSM"</li><li>• "AMPS/136"</li><li>• 'GPRS'</li><li>• 'S-2000/IS-95/AMPS'</li><li>• 'WCDMA'</li></ul>
Programming Example  OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME 'AMPS/136' "  OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME?"	

### SYSTEM:APPLICATION:FORMAT:LICense? Ô<format name>Õ

Function	Queries the test set for the license status 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
Programming Example  OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:LICENSE? 'AMPS/136' "	

**SYSTem:APPLication:SElect[:NAME] Ô<test application name>Õ**

Function	<p>Selects a test application and reboots the test set. This will switch the test 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 test application that is selected and will run after the next reboot of the test set.</p> <p>The test application name must be entered as it appears in the test 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 a test application is important. This information should be reviewed before proceeding. The directions for how to determine test application name and revision are found in this document.</p> <hr/>
Setting	Range: See "SYSTem:APPLication:CATalog[:NAME]?" .
Query	Range: See "SYSTem:APPLication:CATalog[:NAME]?" and null string.
<p>Programming Example</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 Ô<test application name>Õ,Õ<revision>Õ**

Function	<p>Selects a revision for particular test application.</p> <p>The revision does not need to be set in order to switch test applications. The only time you select revisions is to change revisions.</p> <p>Queries the test set for the revision of a specified test application.</p> <p>The test application name and revision must be entered as they appear in the test 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 test application switching and provide no way to return to revisions that have switching. Users will need to reload a revision that has test application switching following the download process for upgrading firmware.</p> <hr/>
Setting	Range: A valid test application name and revision number for any licensed test application.
Query	Range: A string up to 20 characters, or the null string.
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM MOBILE TEST', 'A.04.00' "</pre> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? 'GSM MOBILE TEST' "</pre>	

## **SYSTEM:APPLICATION**

### **Related Topics**

“Test Application Switching” on page 677

“Test Application Revisions and Licenses” on page 679

“Test Application Name” on page 681

“SYSTEM:CURRENT:TA” on page 545



## SYSTem:BEEPer



“Diagram Conventions” on page 233

### 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)
<b>Programming Example</b> OUTPUT 714;"SYSTEM:BEEPER:STATE OFF" !Sets beeper state to off.	

## SYSTem:CONFIgure:INFormation:HARDware:VERBoSe?

SYSTem——:CONFIgure ——> :INFormation ——> :HARDware ——> :VERBoSe? ——>

“Diagram Conventions” on page 233

### 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.
Programming Example	
OUTPUT 714;"SYSTEM:CONFIGURE:INFORMATION:HARDWARE:VERBOSE?" !Queries system hardware.	

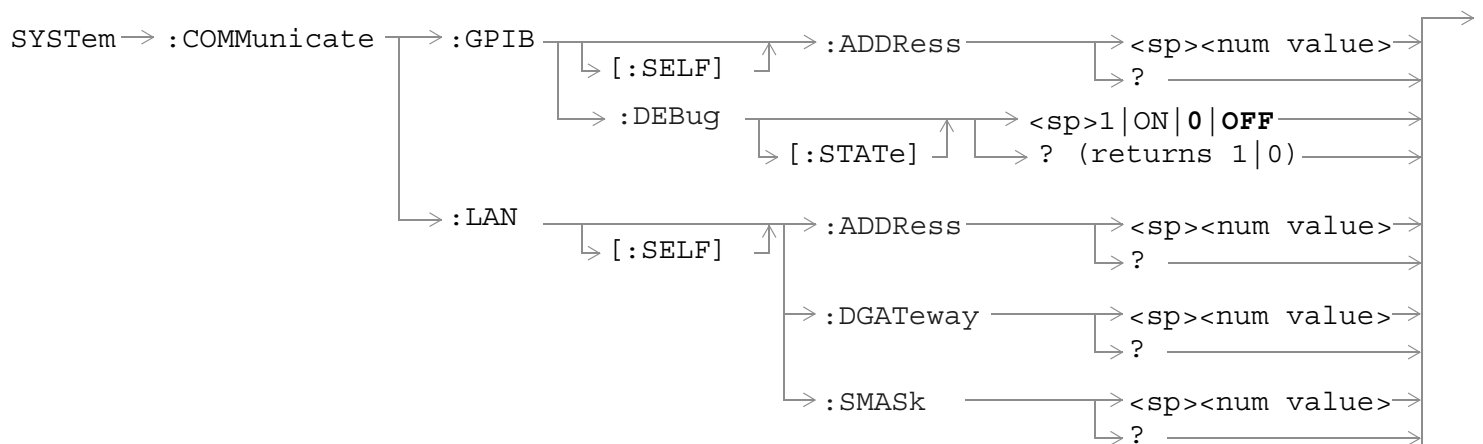
### Related Topics

“Hardware Configuration Report” on page 664

“SYSTem:CURRent:TA” on page 545

“Obtaining Identification Information \*IDN?” on page 663

## SYSTem:COMMunicate



“Diagram Conventions” on page 233

### 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	“Configuring the Test Set’s GPIB Address” on page 675
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 (generated from GPIB commands with syntax errors) are shown the test set 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. See “Error Messages” on page 622 for a list of the errors.</p> <p>The debugger state should be set to on only during GPIB code development. Test times will increase if the debugger state is left on.</p>
Setting	Range: 0   OFF   1   ON

## SYSTem:COMMunicate

Query	0 1
*RST setting	0 (off)
Programming Example	
OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:DEBUG:STATE ON" !Sets debugger to 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 "SYSTem:COMMunicate:LAN[:SELF]:SMASK" on page 538.  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>	"Configuring the Test Set's LAN" on page 673
<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**

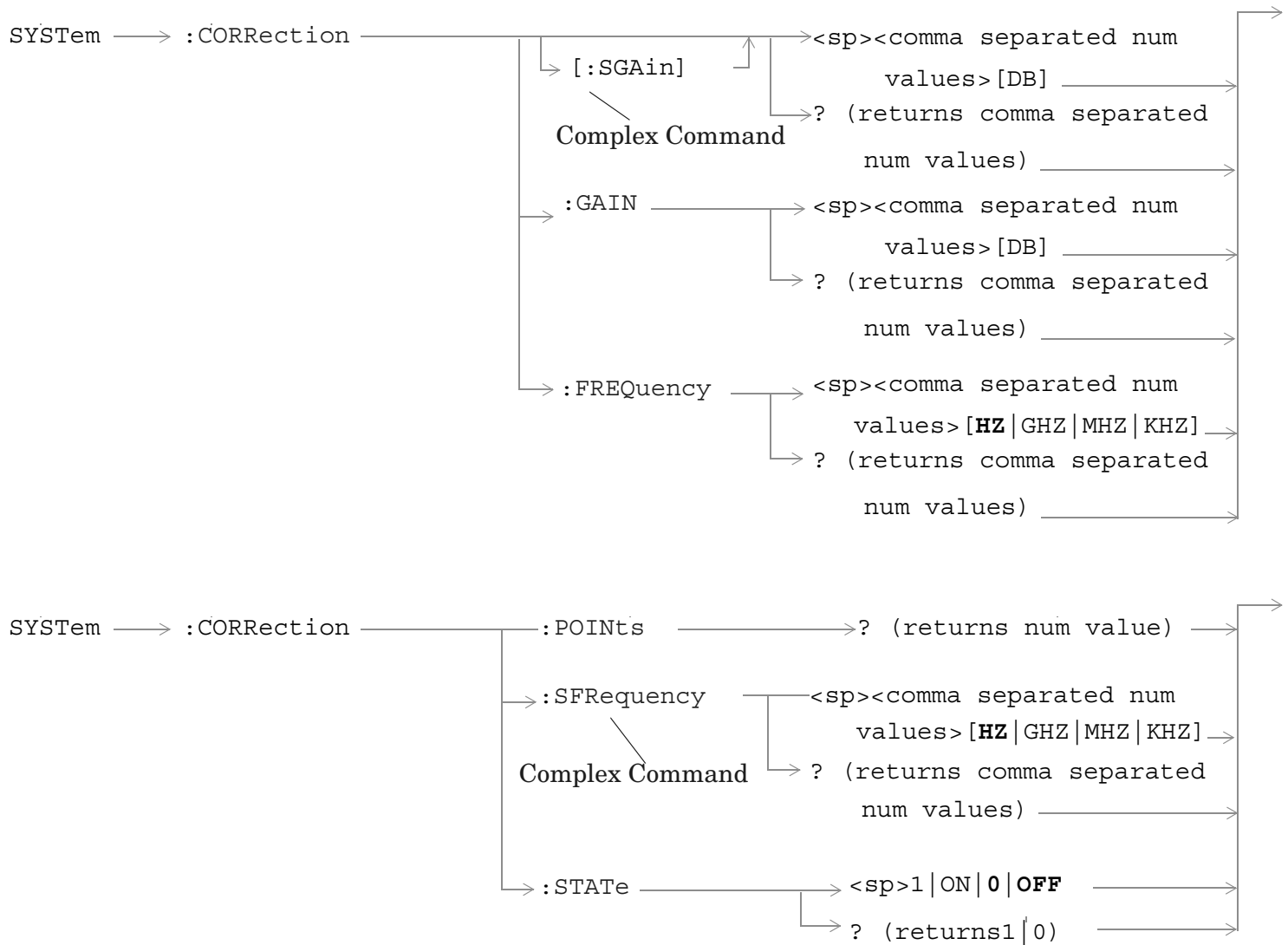
Function	Sets/queries the LAN IP router/gateway address for the test set.
Setting	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces), blank field
Query	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D = 0 to 255 (no embedded spaces). 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>  OUTPUT 714 ; "SYSTEM:COMMUNICATE:LAN:SELF:SMASK '255.2.6.200'"	

## SYSTem:CORRection



“Diagram Conventions” on page 233

## SYSTem:CORRection

### SYSTem:CORRection[:SGain]

Function	Sets/queries up to 20 comma separated offset values in dB. This command sets the state to On. See “Amplitude Offset” on page 63. The units, dB, are optional. If no units are specified then 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
<b>Programming Example</b>  <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:FREQuency

Function	Sets/queries up to 20 comma separated frequency values in MHz. The units, (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to Hz. See “Amplitude Offset” on page 63. Sending a null list (no values) sets the state of all frequencies to Off.
Setting	Range: 0 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query	Range: 1 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz, and NAN (9.91E+37) Resolution: 1 HZ



<p><b>Factory Setting</b></p>	<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</pre>	
<pre>OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY" !Sets the state for all frequencies and offsets to Off</pre>	

## SYSTem:CORRection

### SYSTem:CORRection:GAIN

Function	Sets/queries the up to 20 comma separated offset values in dB. See “Amplitude Offset” on page 63. 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
<b>Programming Example</b> <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 “Amplitude Offset” on page 63.
Query	Range: 1 to 20, and NAN (9.91E+37) Resolution: 1
<b>Programming Example</b> <pre>OUTPUT 714;"SYSTEM:CORRECTION:POINTS?" !Returns the number of frequencies and offsets !with their state set to On</pre>	

**SYSTem:CORRection:SFRequency**

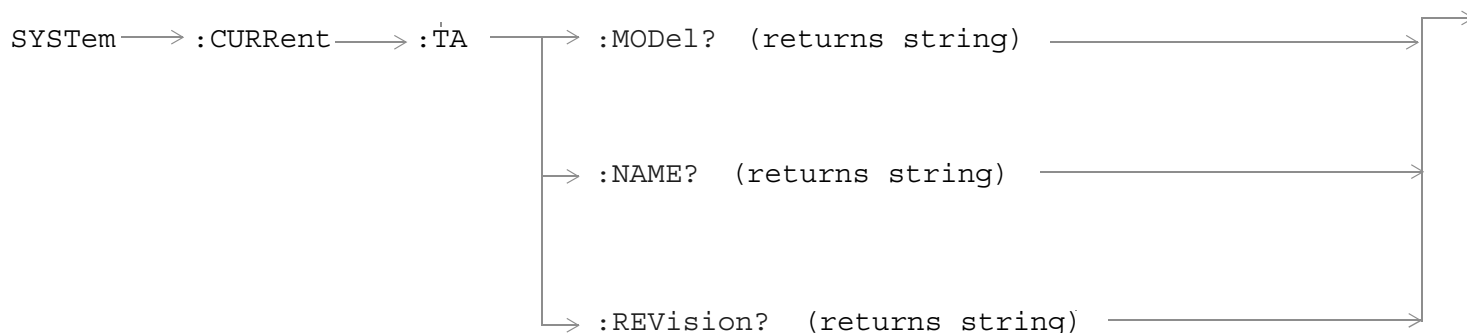
Function	<p>Sets/queries up to 20 comma separated frequency values in MHz. This command sets the state to On.</p> <p>The units (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to MHz.</p> <p>See “Amplitude Offset” on page 63.</p> <p>Sending a null list (no values) sets the state of all frequencies to Off.</p>
Setting	<p>Range: 0 to 20 comma separated values from 292.5 MHz to 2700 MHz</p> <p>Resolution: 1 Hz</p>
Query	<p>Range: 1 to 20 comma separated values 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: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                 </pre>	

## SYSTem:CORRection

### 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 “Amplitude Offset” on page 63.</p>
Setting	0   OFF   1   ON
Query	0   1
Factory Setting	0 (off)
<b>Programming Example</b> <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 233

### SYSTem:CURRent:TA:MODEL?

Function	Query 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

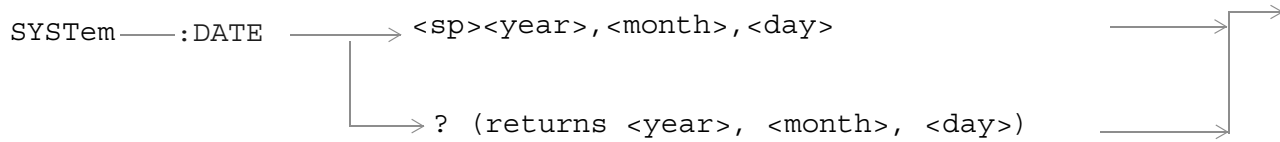
### SYSTem:CURRent:TA:NAME?

Function	Query the name of the test application running. Printable ASCII characters up to a 25 character string. This command is not recommended see “SYSTem:APPLication” on page 526.
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	Query 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” on page 526.
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 233

## SYSTem:DATE

Function	Sets/queries the date.
Setting	Range: <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	Range: <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: A.05.05 and above
<b>Programming Example</b> OUTPUT 714;"SYSTEM:DATE 2001,9,27" !Sets the date to September 27,2001. OUTPUT 714;"SYSTEM:DATE? !Returns "+2001,+9,+27" if the date has been set to September 27,2001.	

## Related Topics

“SYSTem:UTC:DATE”

## SYSTem:ERRor?

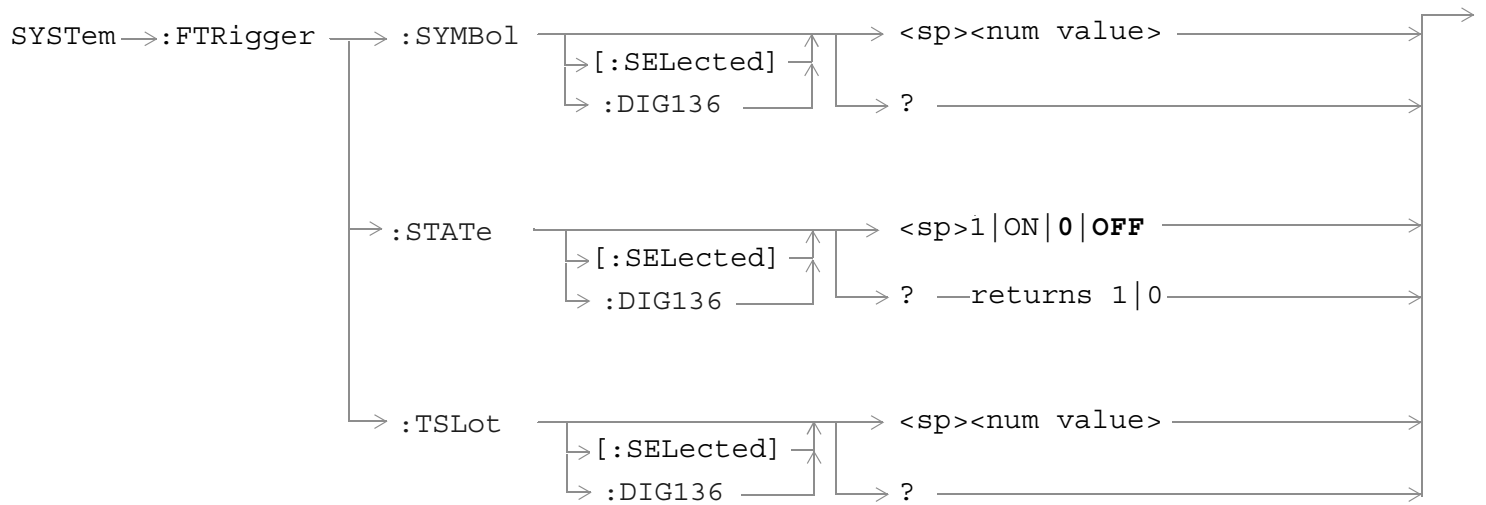


“Diagram Conventions” on page 233

### 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. Example, manual user errors are not displayed with SYSTem:ERRor? they are viewed from the Message Log. See “Error Messages” on page 622.</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>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:ERROR?" !Queries the contents of the Error/Event Queue</pre>	

## SYSTEM:FTRigger



“Diagram Conventions” on page 233



**SYSTem:FTRigger:SYMBOL[:SElected]**

Function	This command selects/queries which symbol, after zero, will be used for frame trigger pulse positioning in the active (that is the selected) radio format. See “Setting Frame Trigger Parameters” on page 211
Setting	Range: 0 to 972 Resolution: 1
Query	Range: 0 to 972 Resolution: 1
*RST Setting	zero
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:FTRIGGER:SYMBOL 14"</pre> <p>!Would cause external frame trigger pulses to occur 14 symbols after symbol 0 of the selected timeslot.</p>	

**SYSTem:FTRiggerSYMBOL:DIG136**

Function	This command selects/queries which symbol, after zero, will be used for frame trigger pulse positioning in the AMPS/136 radio format whether or not that format is active. See “Setting Frame Trigger Parameters” on page 211.
Setting	Range: 0 to 1250 Resolution: 1
Query	Range: 0 to 1250 Resolution: 1
*RST Setting	zero
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:FTRIGGER:SYMBOL:DIG136 7"</pre> <p>!Would cause external frame trigger pulses to occur 7 symbols after symbol 0 of the selected !timeslot.</p>	

**SYSTem:FTRigger:STATe[:SElected]**

Function	This command sets/queries the frame trigger state in the active (that is the selected) radio format. See “Setting Frame Trigger Parameters” on page 211.
Setting	Range: 0   OFF   1   ON
Query	Range: 0   1
*RST Setting	0 (off)
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:FTRIGGER:STATE ON" !Set frame trigger state to on.</pre>	

## SYSTem:FTRigger

### SYSTem:FTRigger:STATe:DIG136

Function	This command sets/queries the frame trigger state in the AMPS/136 radio format whether or not that format is active. See “Setting Frame Trigger Parameters” on page 211.
Setting	Range: 0   OFF   1   ON
Query	Range: 0   1
*RST Setting	0 (off)
Programming Example	
OUTPUT 714;"SYSTEM:FTRIGGER:STATE:DIG136 ON" !Set frame trigger state to on.	

### SYSTem:FTRigger:TSLot[:SElected]

Function	This command selects/queries the timeslot for frame trigger pulse positioning in the active (that is the selected) radio format. See “Setting Frame Trigger Parameters” on page 211.
Setting	Range: 1 to 6 Resolution: 1
Query	Range: 1 to 6 Resolution: 1
*RST Setting	zero
Programming Example	
OUTPUT 714;"SYSTEM:FTRIGGER:TSLOT 5" !Sets the frame trigger timeslot to 5.	

### SYSTem:FTRigger:TSLot:DIG136

Function	This command selects/queries the timeslot for frame trigger pulse positioning in the GPRS radio format whether or not that format is active. See “Setting Frame Trigger Parameters” on page 211.
Setting	Range: 1 to 6 Resolution: 1
Query	Range: 1 to 6 Resolution: 1
*RST Setting	zero
Programming Example	
OUTPUT 714;"SYSTEM:FTRIGGER:TSLOT:DIG136 2" !Sets the frame trigger timeslot to 2.	

## SYSTem:MEASurement:RESet

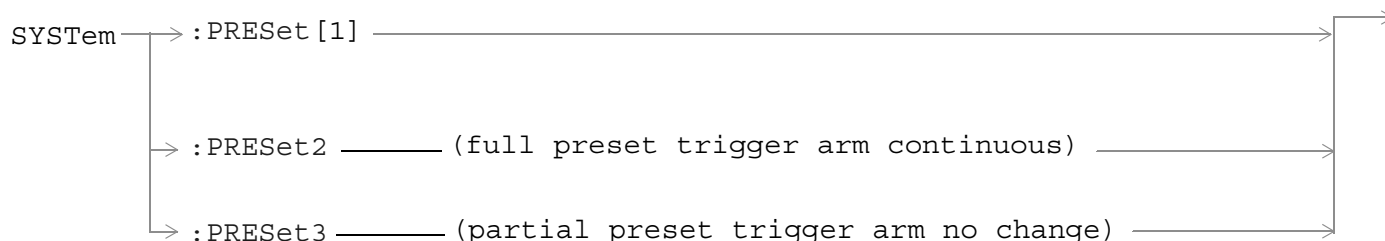


“Diagram Conventions” on page 233

### SYSTem:MEASurement:RESet

Function	Sets all measurements to abort. If continuous triggering is enabled, measurements will begin a new measurement cycle.
Setting	These results are set to their default values when measurement reset occurs.

## SYSTem:PRESet



“Diagram Conventions” on page 233

### SYSTem:PRESet[1] (not recommended for use)

Function	<p>Not recommended for use at this time, use the SYSTem:PRESET3 command for partial preset.</p> <p>Performs a partial preset. This is the recommended command when a user wants to change 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 “Trigger Arm (Single or Continuous) Description” on page 203.</p>
Related Topics	See “Partial Preset” on page 166 for more details
<b>Programming Example</b> OUTPUT 714;"SYSTEM:PRESET" !Partial preset when changing from remote to manual operation.	

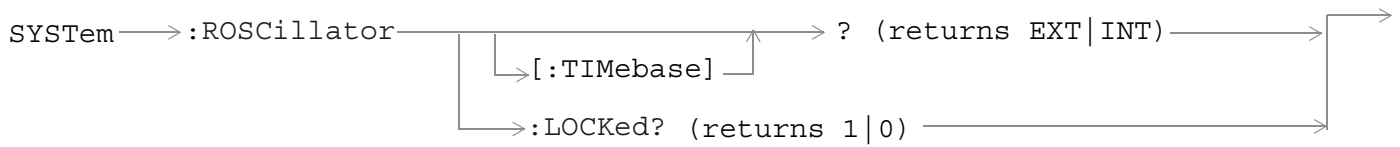
### SYSTem:PRESet2

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 “Trigger Arm (Single or Continuous) Description” on page 203.</p> <p>The *RST command will set the trigger arm to single.</p>
Related Topics	See “Full Preset” on page 167 or details about the *RST full preset.
<b>Programming Example</b> OUTPUT 714;"SYSTEM:PRESET2" !Full preset, trigger arm set to continuous.	

**SYSTem:PRESet3**

Function	<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. See “Trigger Arm (Single or Continuous) Description” on page 203.</p>
Related Topics	See “Partial Preset” on page 166 for more details.
<b>Programming Example</b>  OUTPUT 714;"SYSTEM:PRESET3" !Partial preset when in remote operation.	

## SYSTem:ROSCillator



“Diagram Conventions” on page 233

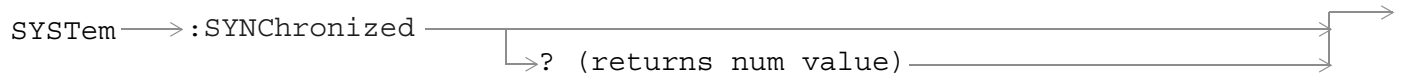
### SYSTem:ROSCillator[:TIMEbase]?

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

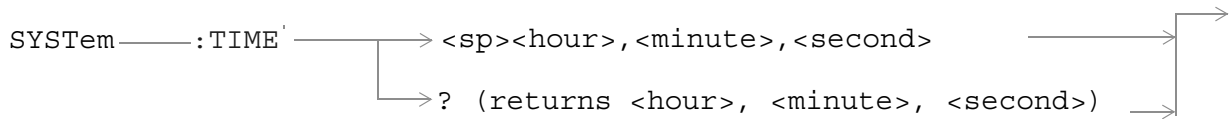


“Diagram Conventions” on page 233

### 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 233

### 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: A.05.05 and above
<p>Programming Example</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>	

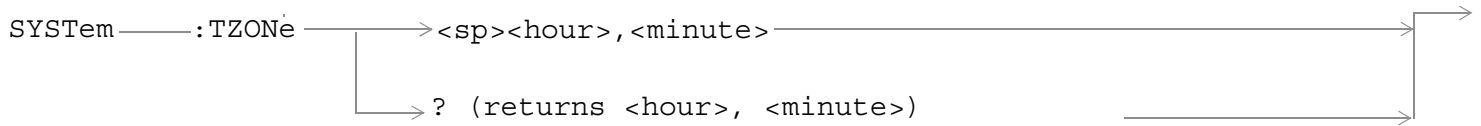
### Related Topics

“SYSTem:UTC[:TIME]”

“SYSTem:TZONE”



## SYSTem:TZONE



“Diagram Conventions” on page 233

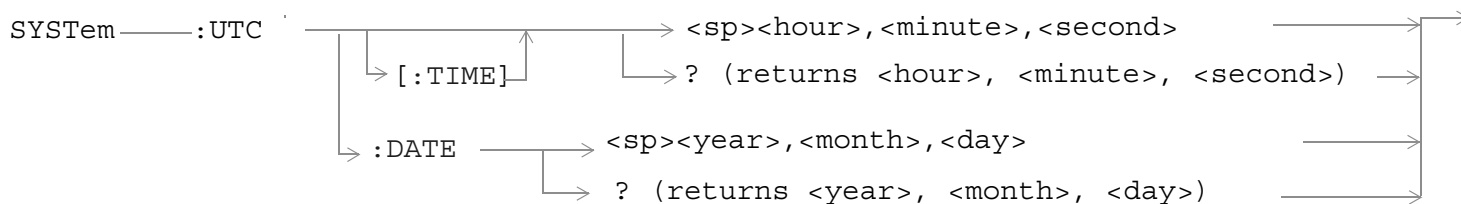
### SYSTem:TZONE

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: A.05.05 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”

## SYSTem:UTC



“Diagram Conventions” on page 233

### SYSTem:UTC[:TIME]

Function	Sets/queries the Universal Coordinated Time (UTC) time of day. (UTC is also known as UCT, Zulu, and Greenwich Mean Time.)  Local time will track UTC time settings. Also, if new settings are made to local time, UTC time will track local time.
Setting	Range: <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/> <b>NOTE</b> The resolution of the UTC time setting is minutes. A number within the parameter range must be entered for <second> but it will not affect the minute setting.
Query	Range: <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/> <b>NOTE</b> The resolution of the UTC time setting is minutes. The value returned for <second> will not provide useful information.
*RST Setting	This feature is not affected by instrument preset
Requirements	Test Application Revision: A.05.05 and above
<b>Programming Example</b> 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.	

**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: A.05.05 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>	

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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.

## IEEE 488.2 Common Commands

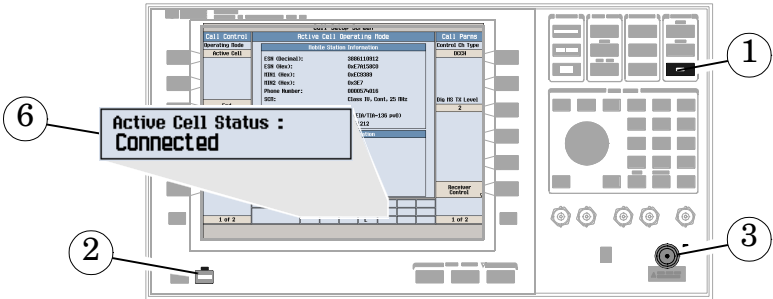
# 5 Manual Operation





# How Do I Make Measurements on a Mobile?

## A. Establish a call.

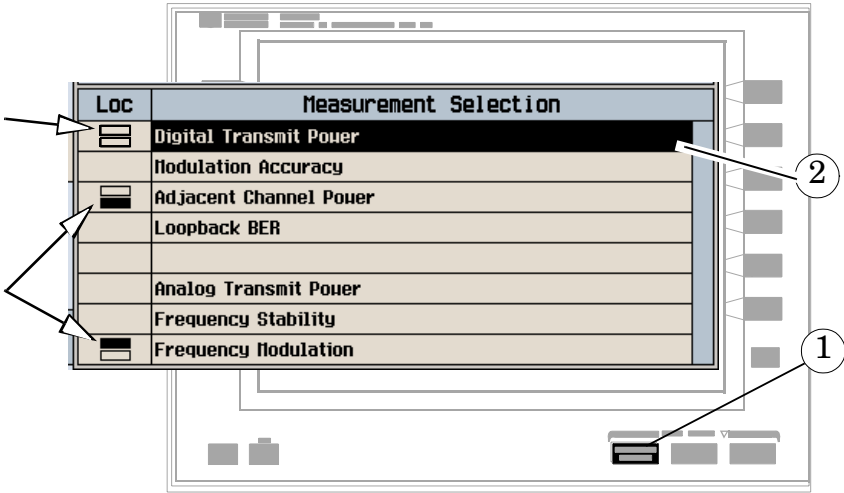


1. Press the blue **SHIFT** key.
2. Press the green **PRESET** key.
3. Connect the mobile to the RF IN/OUT port.
4. Turn the mobile on and wait for it to camp.
5. On the mobile, press 1, 2, 3, then press send.
6. Check for Connected in the Active Cell Status: field.

## B. Select measurements.

The gray boxes indicate that the measurement is being made, but the results are not being displayed.

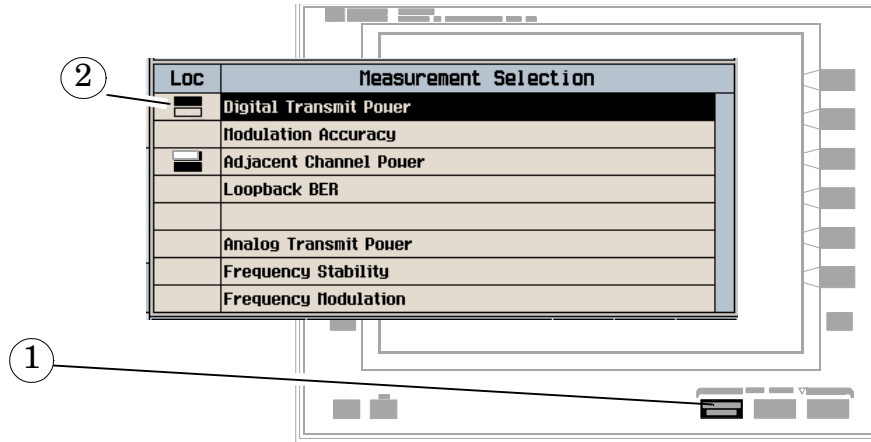
These black boxes indicate that adjacent channel power measurement results are being displayed in the lower measurement window, and frequency modulation measurement results are being displayed in the upper measurement window.



1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

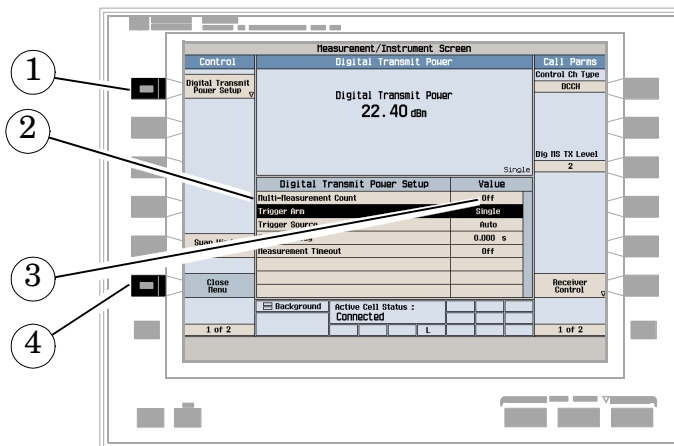
## How Do I Change Measurement Setup?

### A. Select a measurement.



1. Press the **Measurement selection** key.
2. Highlight a measurement to setup (the measurement must already be enabled) and press the knob.

### B. Set up the measurement.

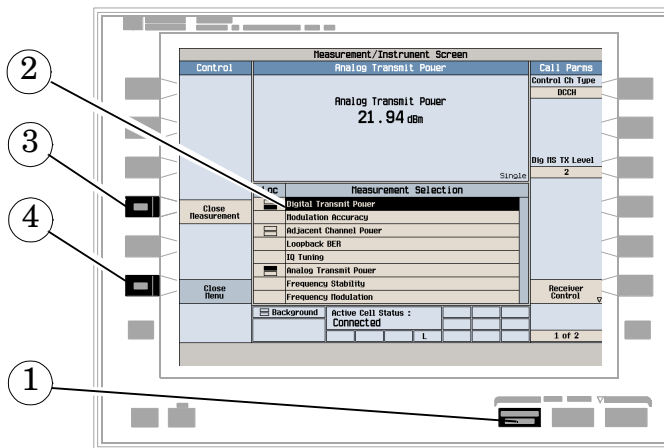


1. Press the measurement's setup key (**F1**).
2. Highlight a parameter and press the knob.
3. Enter a value or selection and press the knob.

**NOTE** For statistical measurement results, change the Multi-Measurement Count parameter from Off to a number >1.

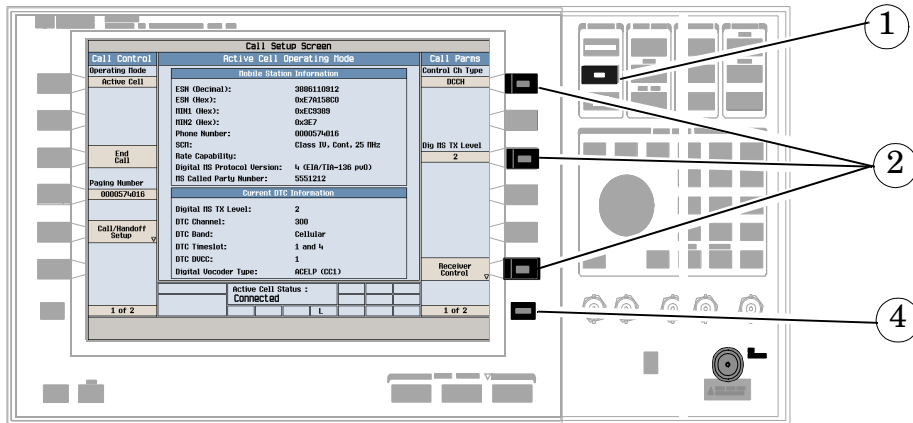
4. Press the **Close Menu (F6)** key.

## How Do I Turn Off a Measurement?



1. Press the **Measurement selection** key.
2. Highlight the measurement you want to turn off.
3. Press the Close Measurement (**F4**) key.
4. Press the Close Menu (**F6**) key.

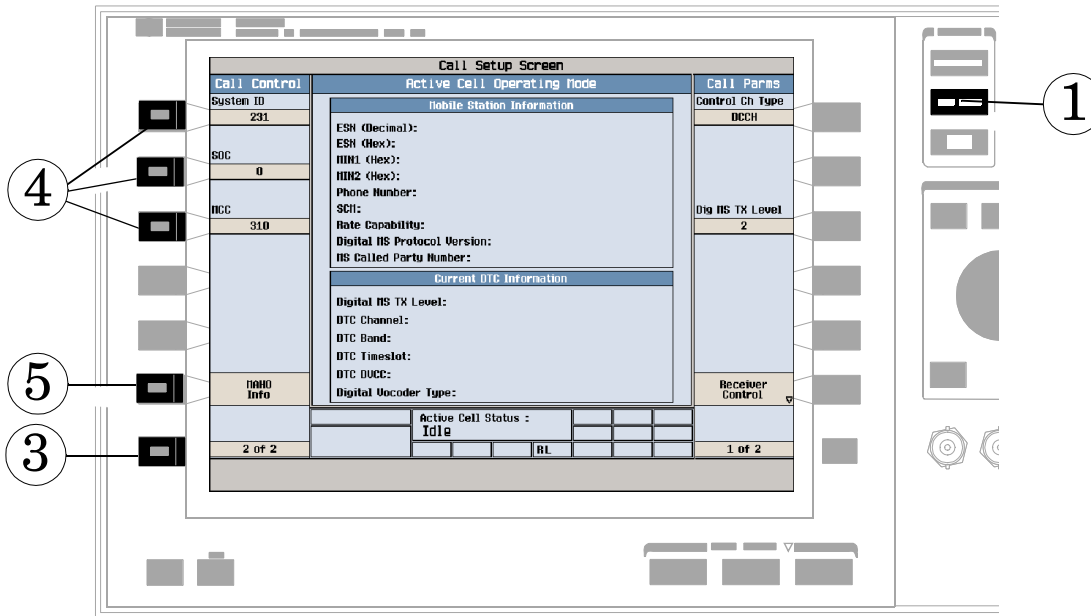
## How Do I Change Call Parameters?



1. Press the **CALL SETUP** key.
2. On the Call Params menu (1 of 2) press **F7**, **F9** or **F12**.
3. Enter a value or highlight a selection and press the knob.
4. Press the **More** key for additional call parameters.

## How Do I Change Cell Parameters?

Cell parameters specify the information sent to the mobile to identify the cell and to tell the mobile to report mobile assisted handoff (MAHO) information.



1. Press the **CALL SETUP** key.
2. Press the Operating Mode (**F1**) key and select Active Cell operating mode.
3. Press the **More** key to select screen 2 of 2.
4. Press **F1**, **F2**, or **F3** to change available cell parameters: digital control channel uses System ID, SOC, and MCC. Analog Control Channel uses System ID.
5. Press the MAHO Info (**F6**) key to access MAHO BER and RSSI features (only available during digital traffic channel (DTC) operation).

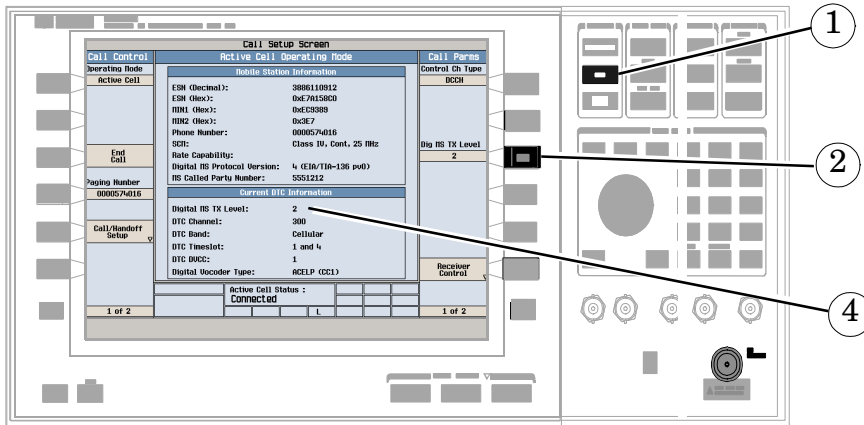
## How Do I Change the MS TX Level?

There are two ways to change the MS TX Level:

- A. Change level immediately
- B. Change level during a handoff

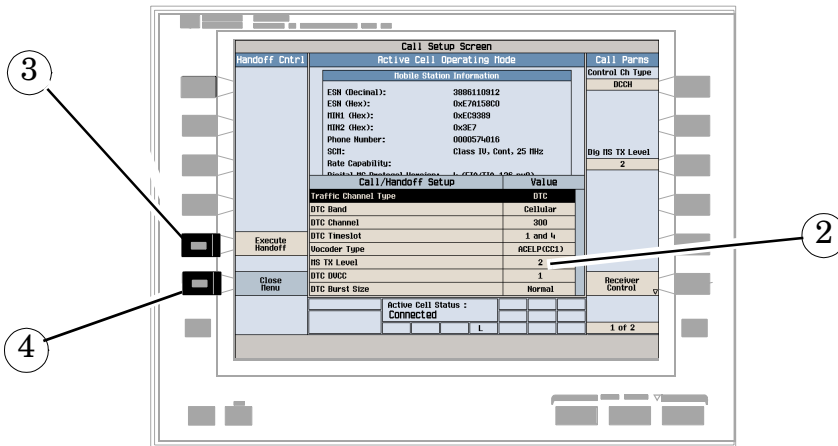
Both are explained below.

### A. Change the digital MS TX level immediately.



1. Press the **CALL SETUP** key.
2. On Call Params menu (1 of 2), press the Dig MS TX Level (**F9**) key.
3. Select a new MS TX level and press the knob.
4. Check the current traffic channel info to see the new MS TX level.

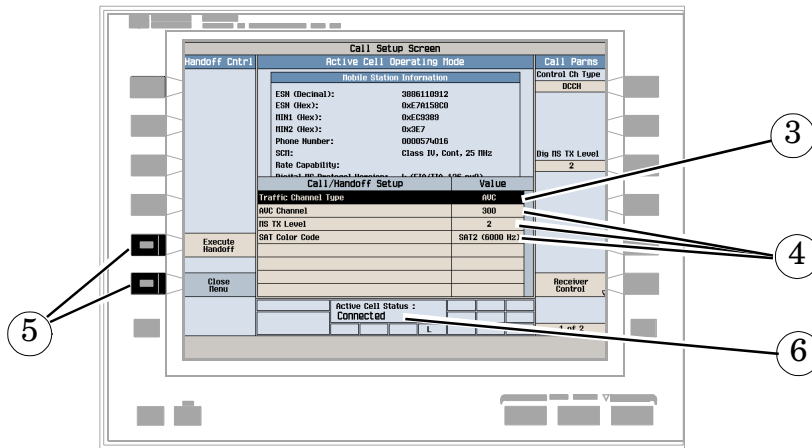
### B. Change the MS TX level during a handoff.



## How Do I Change the MS TX Level?

1. On Call Control menu, press the Call/Handoff Setup (**F5**) key.
2. Select and change the MS TX Level.
3. If you press the Execute Handoff (**F5**) key, the digital MS TX level changes.
4. If you abort the handoff by pressing the Close Menu (**F6**) key, digital MS TX level does not change.

## How do I Perform a Handoff?

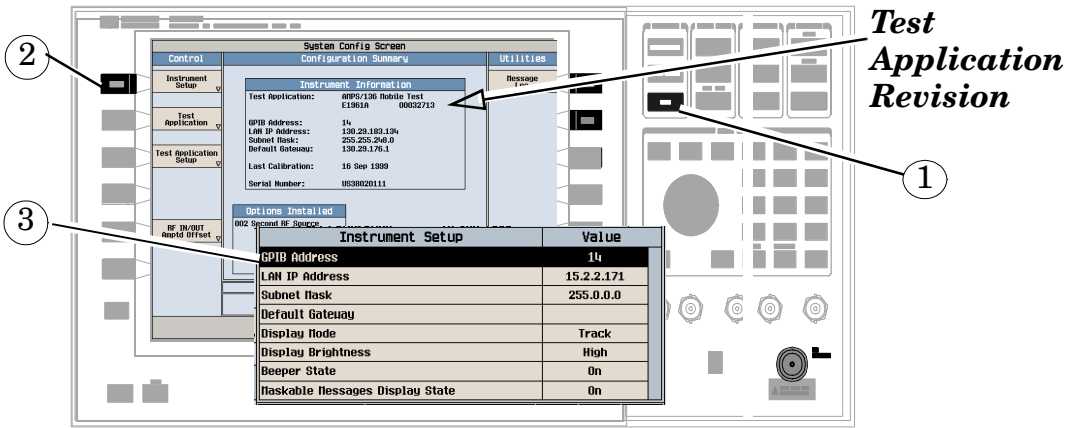


1. Press the **CALL SETUP** key.
2. Press the Call/Handoff Setup (**F5**) key.
3. Select the type of channel to hand off to (AVC or DTC).
4. Change the various parameters for the AVC or DTC.
5. Press the Execute Handoff (**F5**) key to complete the handoff, or press the Close Menu (**F6**) key to abort the handoff.
6. Check for Connected in the Active Cell Status: field.
7. Note the change in the current traffic channel information.



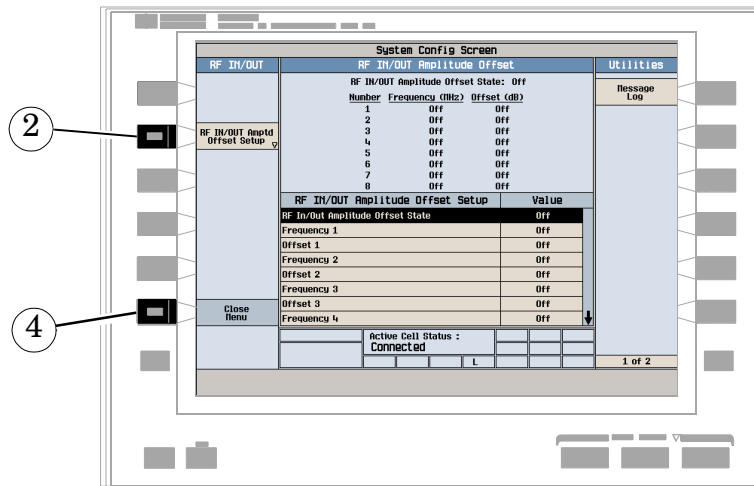
## How Do I Configure the Test Set for My Test System?

### A. Configure instrument information and setup.



1. Press the **SYSTEM CONFIG** key.
2. Press the Instrument Setup (**F1**) key.
3. Adjust an instrument setting and then press the Close Menu (**F6**) key.

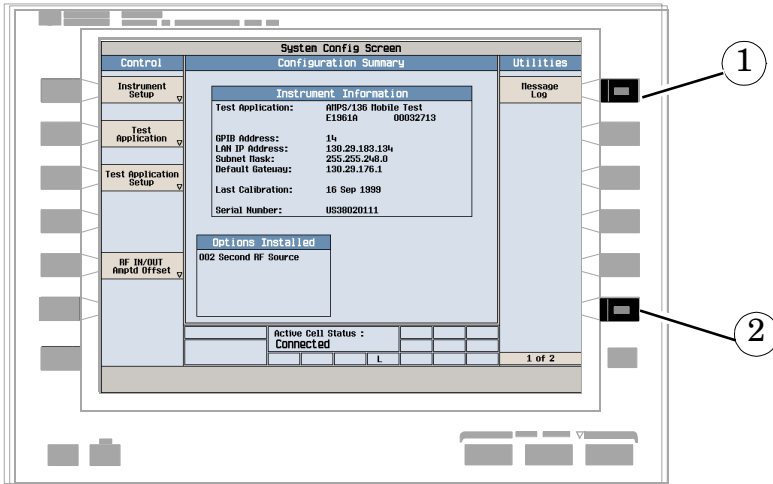
### B. Set amplitude offsets.



1. On the Configuration Summary Screen, 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.
5. Press the Return to Config Summary (**F6**) key.

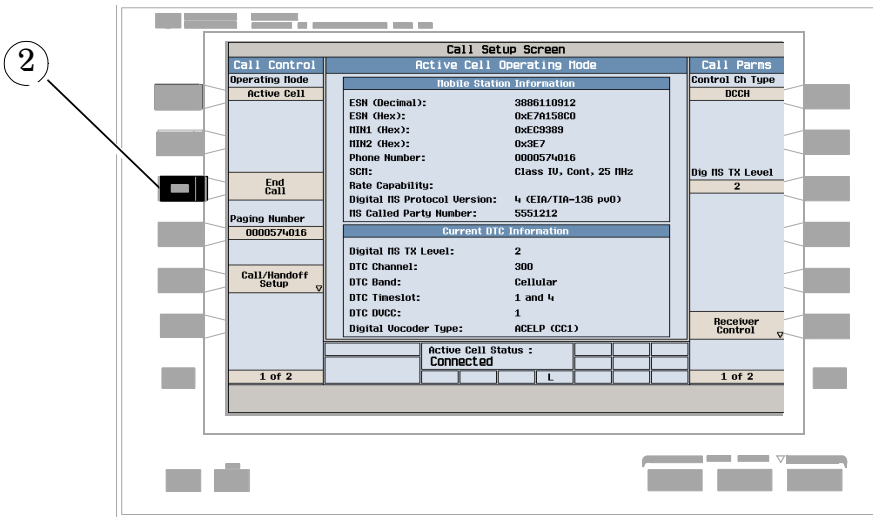
## How Do I Configure the Test Set for My Test System?

### C. Check the message log.



1. Press the Message Log (F7) key and view the message log.
2. Press the Return to Utilities (F12) key.

## How Do I End a Call?



1. Press the **CALL SETUP** key.
2. Press the End Call (**F3**) key, or end the call from the mobile.
3. Check for Idle in the Active Cell Status: field.

---

## AMPS/136 Mobile Measurements

The following step-by-step procedures explain how to perform specific measurements available on the AMPS/136 Test Application. A detailed description of each measurement is given in the *Reference* information on the documentation CD-ROM and at the Agilent 8960 support website ([www.agilent.com/find/8960support](http://www.agilent.com/find/8960support)).

*Setup parameters for each measurement are assumed to be set to their default (full preset) values unless otherwise stated.*

The following measurement procedures are provided:

- “Measuring Digital Transmit Power” on page 576
- “Measuring Modulation Accuracy” on page 577
- “Measuring Adjacent Channel Power” on page 578
- “Measuring Bit Error Ratio” on page 578
- “Measuring IQ Tuning” on page 579
- “Measuring Analog Transmit Power” on page 580
- “Measuring Frequency Stability” on page 581
- “Measuring Frequency Modulation” on page 582

### Measuring Digital Transmit Power

*This measurement can only be performed with the mobile on a digital traffic channel.*

1. Establish a call with the mobile on a digital traffic channel.
2. Press the **Measurement selection** key.
3. Select the Digital Transmit Power measurement.
4. Press the Digital Transmit Power Setup (**F1**) key.

- Set the measurement parameters as needed for your measurement situation.

*Observe how sending a change power level command causes the mobile's output level to change.*

Digital Transmit Power		Call Parms
Digital Transmit Power <b>28.11 dBm</b>		Control Ch Type
		DCCH
Continuous		Dig MS TX Level
		2

To see the effects of sending a change power level command to the mobile, press Dig MS TX Level (F9) and slowly change the setting while observing the Digital Transmit Power display.

### Measuring Modulation Accuracy

*This measurement can only be performed with the mobile on a digital traffic channel.*

- Establish a call with the mobile on a digital traffic channel.
- Press the **Measurement selection** key.
- Select the Modulation Accuracy measurement.
- Press the Modulation Accuracy Setup (F1) key.
- Set the measurement parameters as needed for your measurement situation, including:  
 Multi-Measurement Count = 20 (not required, but used in this example so you can see the effects of using multi-measurements)

Modulation Accuracy			
	Minimum	Maximum	Average
RMS EVM1 (%)	3.61	5.39	4.26
Freq Error (Hz)	-4.16	10.75	4.36
Origin Offset (dBc)	-40.57	-34.24	-37.09
RMS Phase Error (°)	1.67	2.81	2.07
RMS Mag Error (%)	2.04	2.62	2.23
RMS EVM10 (%)	----	----	----
20 / 20		Continuous	

## AMPS/136 Mobile Measurements

Typical modulation accuracy results when using multi-measurements are shown above.

### Measuring Adjacent Channel Power

*This measurement can only be performed with the mobile on a digital traffic channel.*

1. Establish a call with the mobile on a digital traffic channel.
2. Press the **Measurement selection** key.
3. Select the Adjacent Channel Power measurement.
4. Press the Adjacent Chan Power Setup (**F1**) key.
5. Set the measurement parameters as needed for your measurement situation, including:  
Multi-Measurement Count = 10 (not required, but used in this example)

Adjacent Channel Power		
Channel	Lower (dBc)	Upper (dBc)
Adjacent	-28.30	-28.26
1st Alternate	-51.21	-51.04
2nd Alternate	-55.82	-55.98

10 / 10 Continuous

Typical adjacent channel power results when using multi-measurements are shown above.

### Measuring Bit Error Ratio

*This measurement can only be performed with the mobile on a digital traffic channel in DTC Test mode.*

1. Establish a call on a digital traffic channel in test mode.
  - a. Set the test set's Operating Mode (**F1**) to DTC Test.
  - b. Put the mobile into digital test mode.
2. Press the **Measurement selection** key.
3. Select the Loopback BER measurement.
4. Press the Loopback BER Setup (**F1**) key.

5. Set the measurement parameters as needed for your measurement situation.

*Observe how reducing the cell power to low levels causes the bit error ratio to increase.*

Loopback BER		Control Parms
Bit Error Ratio <b>6.381%</b> Bit Error Count: 647		Cell Power
		-110.00
10000 / 10000		dBm
Continuous		

To see how low levels of cell power into the mobile affect the bit error ratio, press Cell Power (F7) and slowly reduce the level.

## Measuring IQ Tuning

*This measurement can only be performed with the mobile on a digital traffic channel.*

1. Establish a call on a digital traffic channel. If the mobile is configured in test mode, which is typically the case for this measurement, use the following steps:
  - a. Set the test set's Operating Mode (F1) to DTC Test.
  - b. Put the mobile into digital test mode.
2. Press the **Measurement selection** key.
3. Select the IQ Tuning measurement.
4. Press the IQ Tuning Setup (F1) key.
5. Press the Measurement Setup (F1) key.
6. Set the measurement parameters as needed for your measurement situation, including:
  - Multi-Measurement Count = 50 (not required, but used in this example)
7. Press the IQ Tuning Offset Freqs (F2) key and enter the desired offset frequencies.

## AMPS/136 Mobile Measurements

- Set the mobile to transmit a pattern of 00 (00, 00, 00, ...).

IQ Tuning			
Offset (Hz)	Level (dB)	Offset (Hz)	Level (dB)
0.00	-36.34	9112.50	-41.04
-3037.50	-40.05	-9112.50	-40.82

Ref Offset Freq: 3037.50 Hz  
Spur Power: ---- dB

50 /50 Continuous

The results are displayed on the IQ Tuning screen. Notice that when the mobile is transmitting a series of all zeros the carrier offset is at +3037.50 Hz.

- Change the settings on the mobile to transmit a repeating pattern of 10 (10, 10, 10,...).

IQ Tuning			
Offset (Hz)	Level (dB)	Offset (Hz)	Level (dB)
0.00	-36.36	9112.50	-41.12
-3037.50	0.00	-9112.50	-40.21

Ref Offset Freq: -3037.50 Hz  
Spur Power: ---- dB

50 /50 Continuous

The results are displayed on the IQ Tuning screen. Notice that when the mobile is transmitting a repeating pattern of 10 the carrier offset is at -3037.50 Hz.

## Measuring Analog Transmit Power

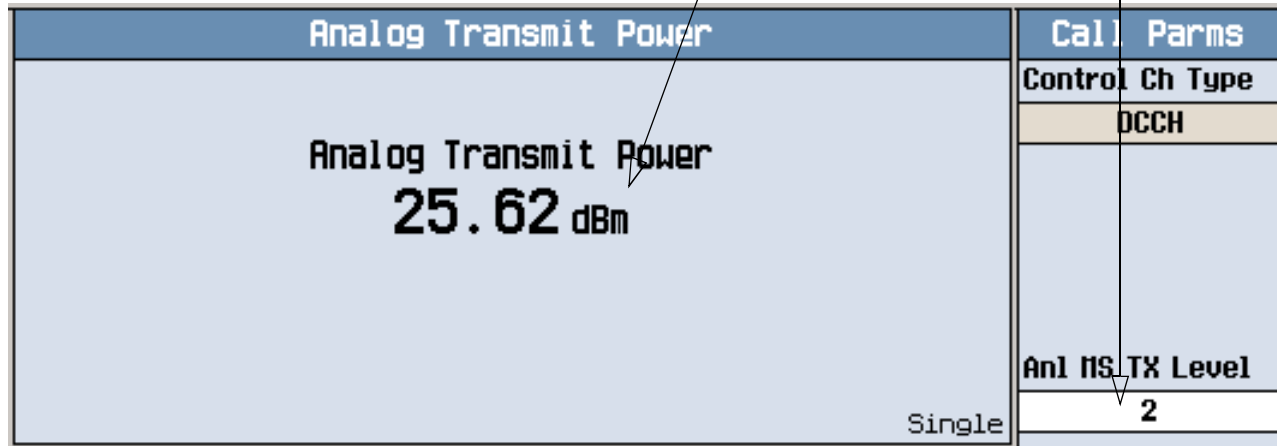
*This measurement can only be performed with the mobile on an analog voice channel (AVC).*

- Establish a call with the mobile on an analog voice channel.
- Press the **Measurement selection** key.
- Select the Analog Transmit Power measurement.
- Press the Analog Transmit Power Setup (**F1**) key.



5. Set the measurement parameters as needed for your measurement situation.

*Observe how sending a change power level command causes the mobile's output level to change.*

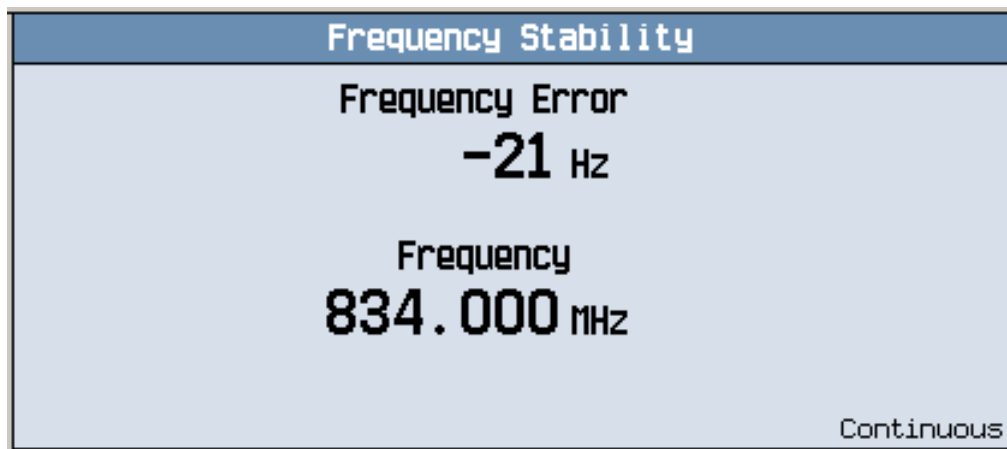


To see the effects of sending a power level change command to the mobile, press Anl MS TX Level (F9) and slowly change the setting while observing the Analog Transmit Power display.

### Measuring Frequency Stability

*This measurement can only be performed with the mobile on an analog voice channel (AVC).*

1. Establish a call with the mobile on an analog voice channel.
2. Press the **Measurement selection** key.
3. Select the Frequency Stability measurement.
4. Press the Frequency Stability Setup (F1) key.
5. Set the measurement parameters as needed for your measurement situation.



A typical frequency stability measurement result is shown above.

## Measuring Frequency Modulation

*This measurement can only be performed with the mobile on an analog voice channel (AVC).*

1. Establish a call with the mobile on an analog voice channel.
2. Press the **Measurement selection** key.
3. Select the Frequency Modulation measurement.
4. Press the Frequency Mod Setup (**F1**) key.
5. Set the measurement parameters as needed for your measurement situation, including these typical settings:

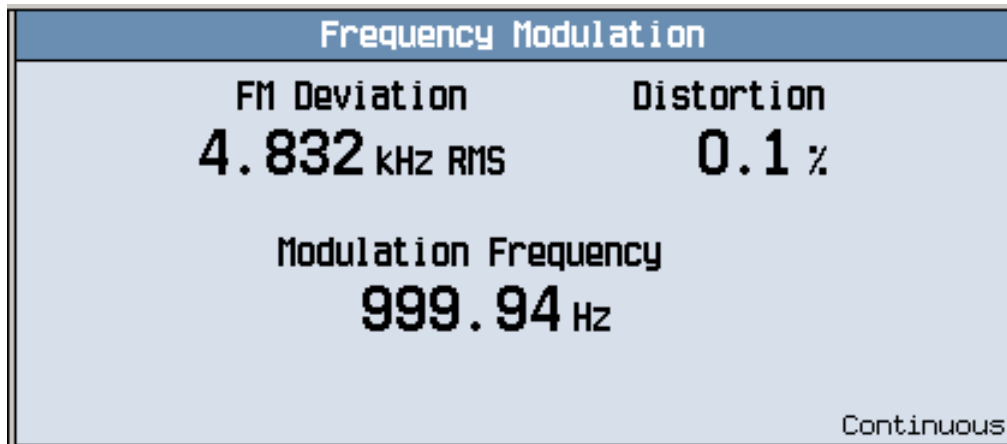
Distortion State = On

Modulation Frequency State = On

Distortion Fundamental Frequency = the modulation frequency

Filter Type = 100 Hz BW BPF (or as needed for the type of signal being measured)

100 Hz BW BPF Center Frequency = the modulation frequency (if this filter is used)



A typical frequency modulation measurement result is shown above. In this case, the mobile's microphone was stimulated by a 1 kHz tone. The Distortion Fundamental Frequency and 100 Hz BW BPF Center Frequency were therefore both set to 1 kHz.

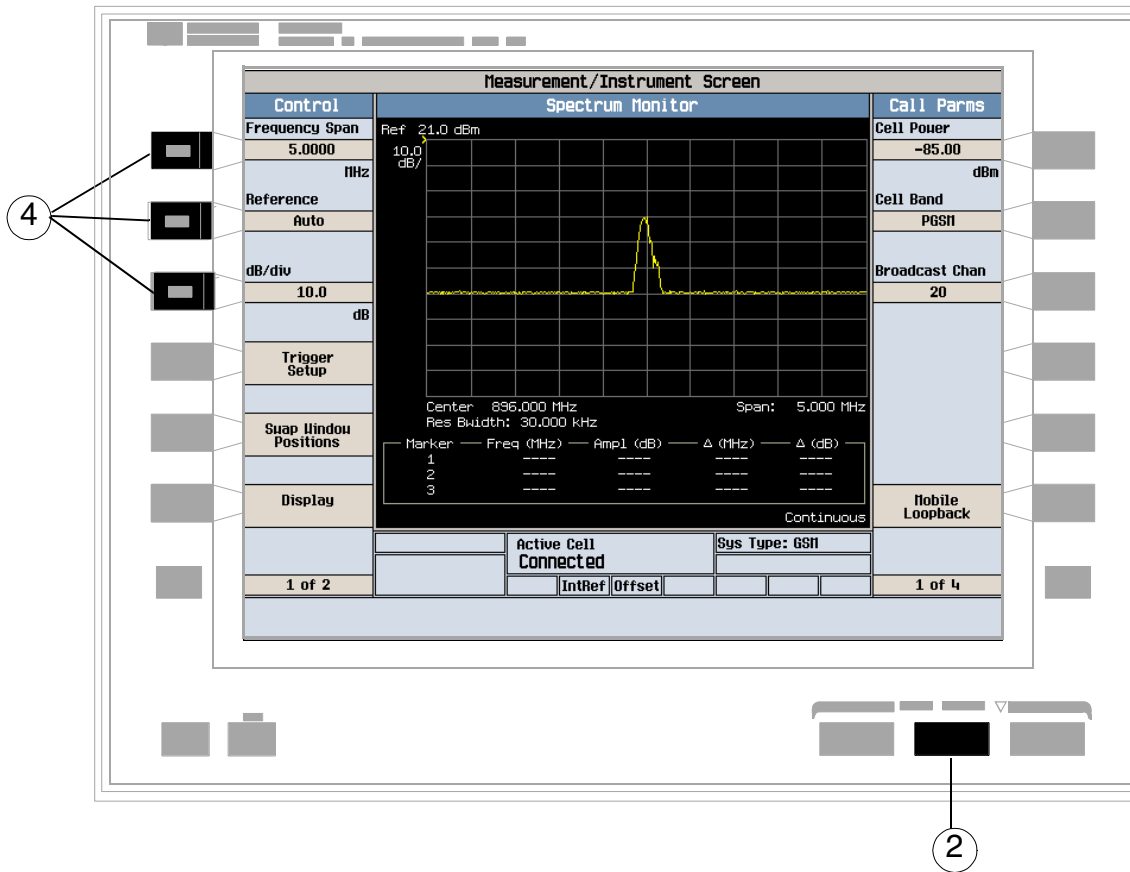
## How Do I Use the Spectrum Monitor?

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.

**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.

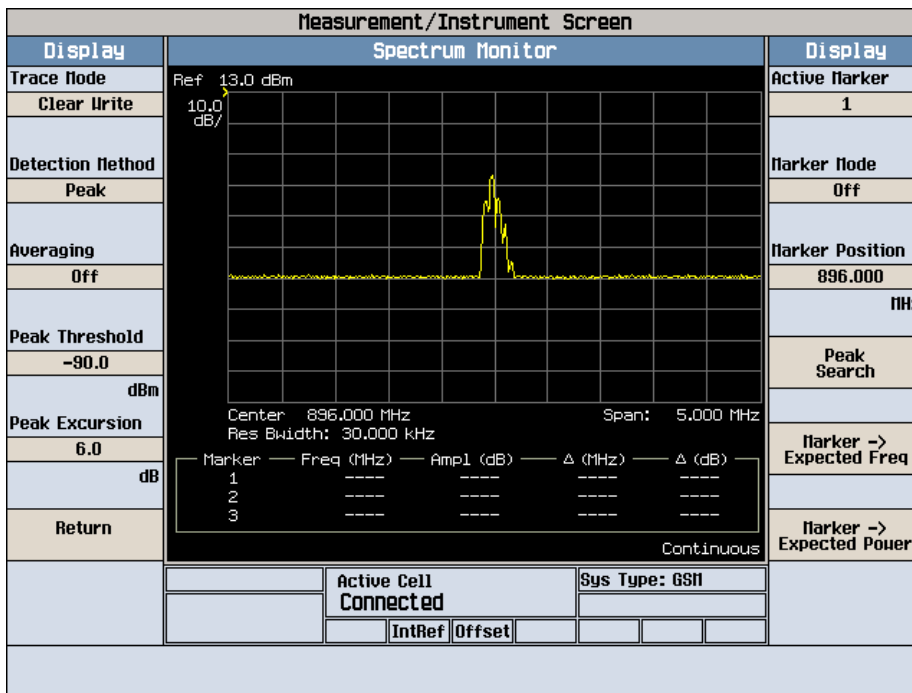


The spectrum monitor is displayed with the default settings as shown above. The center frequency is initially set at the expected frequency maintained by the test set's base station emulator. The Swap Window Positions (**F5**) key is only displayed when other measurements are active at the same time 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.

## How Do I Use the Spectrum Monitor?

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 (F4) 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 port 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.



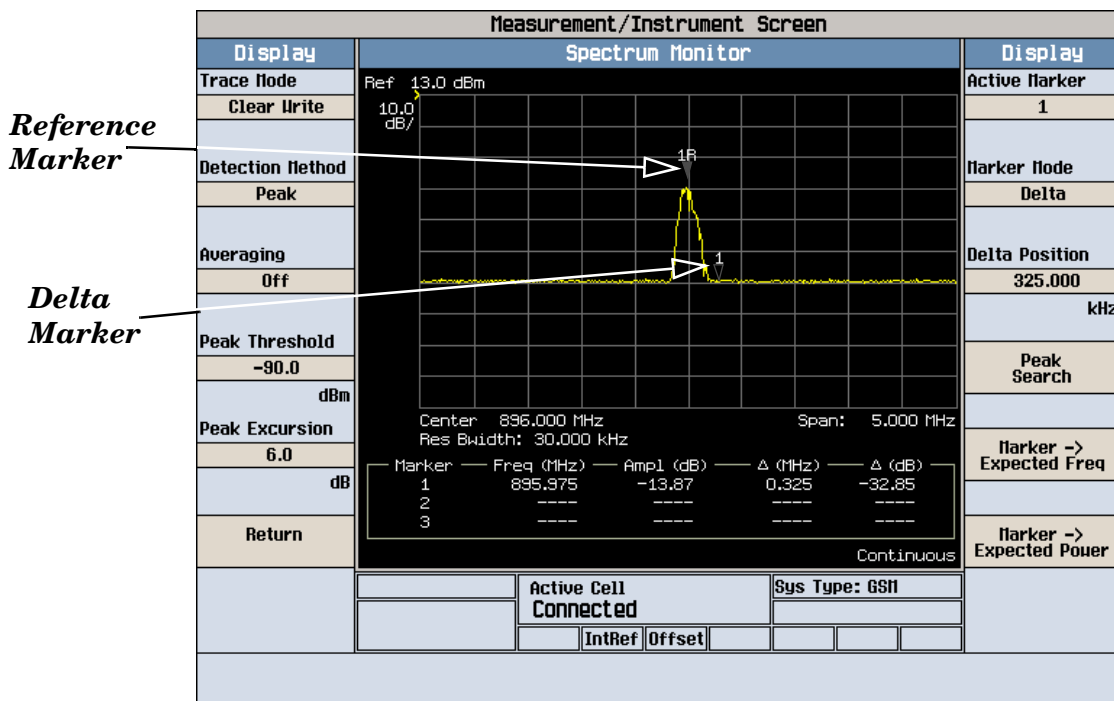
A typical spectrum monitor trace display is shown above. In this case, the Display menu is open allowing you to access all of the display control settings using the (F1) through (F12) keys.

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.

## How Do I Use the Spectrum Monitor?

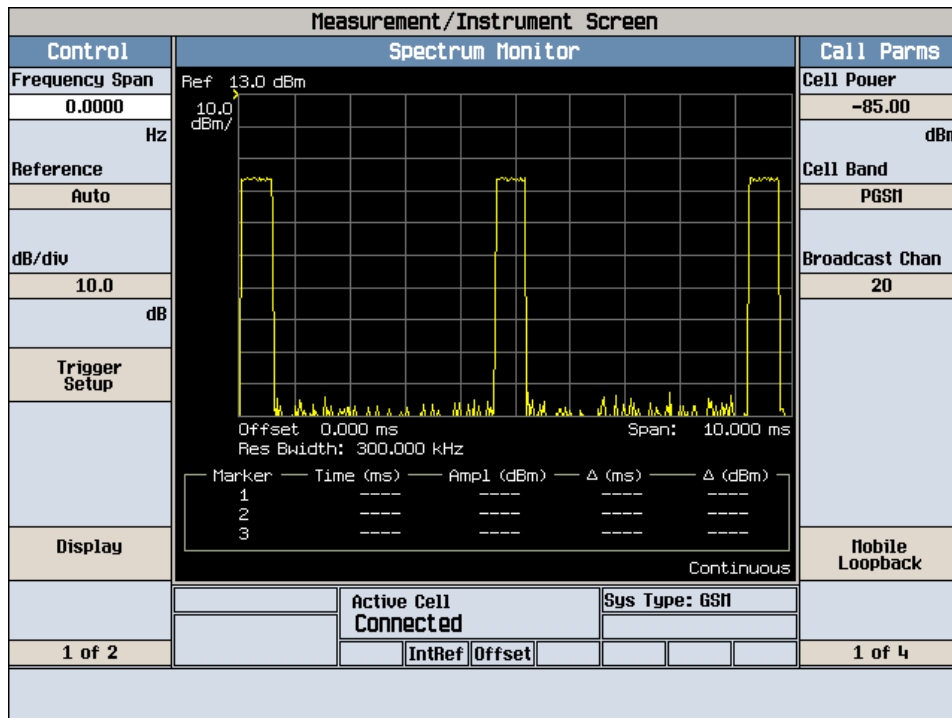
- Marker Mode (**F8**) sets the mode of the active marker. Position mode activates a single frequency marker at the center frequency. (Note that the center frequency can be changed by setting the Receiver Control to Manual, and changing the Manual Freq setting.) Delta mode freezes the active marker at 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.
- 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.

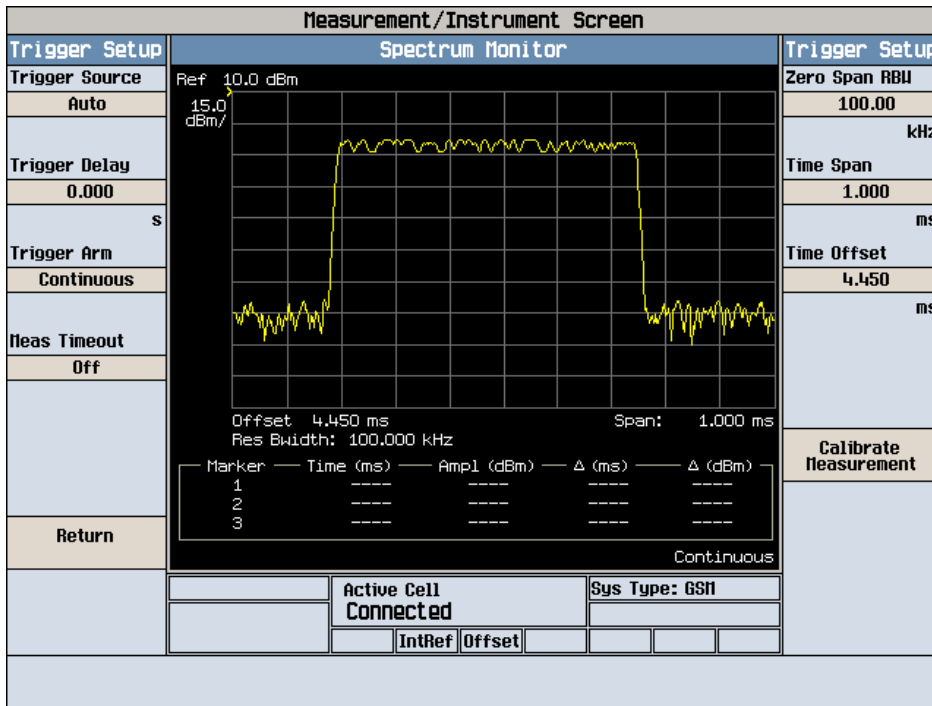
## How Do I Use the Spectrum Monitor?



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.

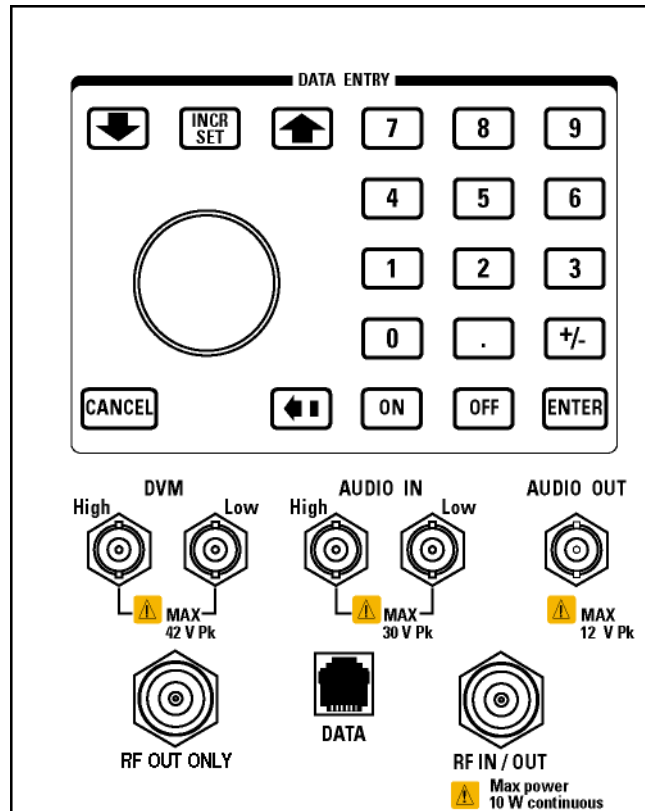


A typical zero span mode spectrum monitor display showing a bursted signal. The viewing window has been adjusted to zoom in on a single burst.

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.

## 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 to the test set's audio generator. Refer to the technical specifications for more information.

### 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

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**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).

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This Type-N connector is an optional path for all RF signals out of the test set. 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.

### Related Topics

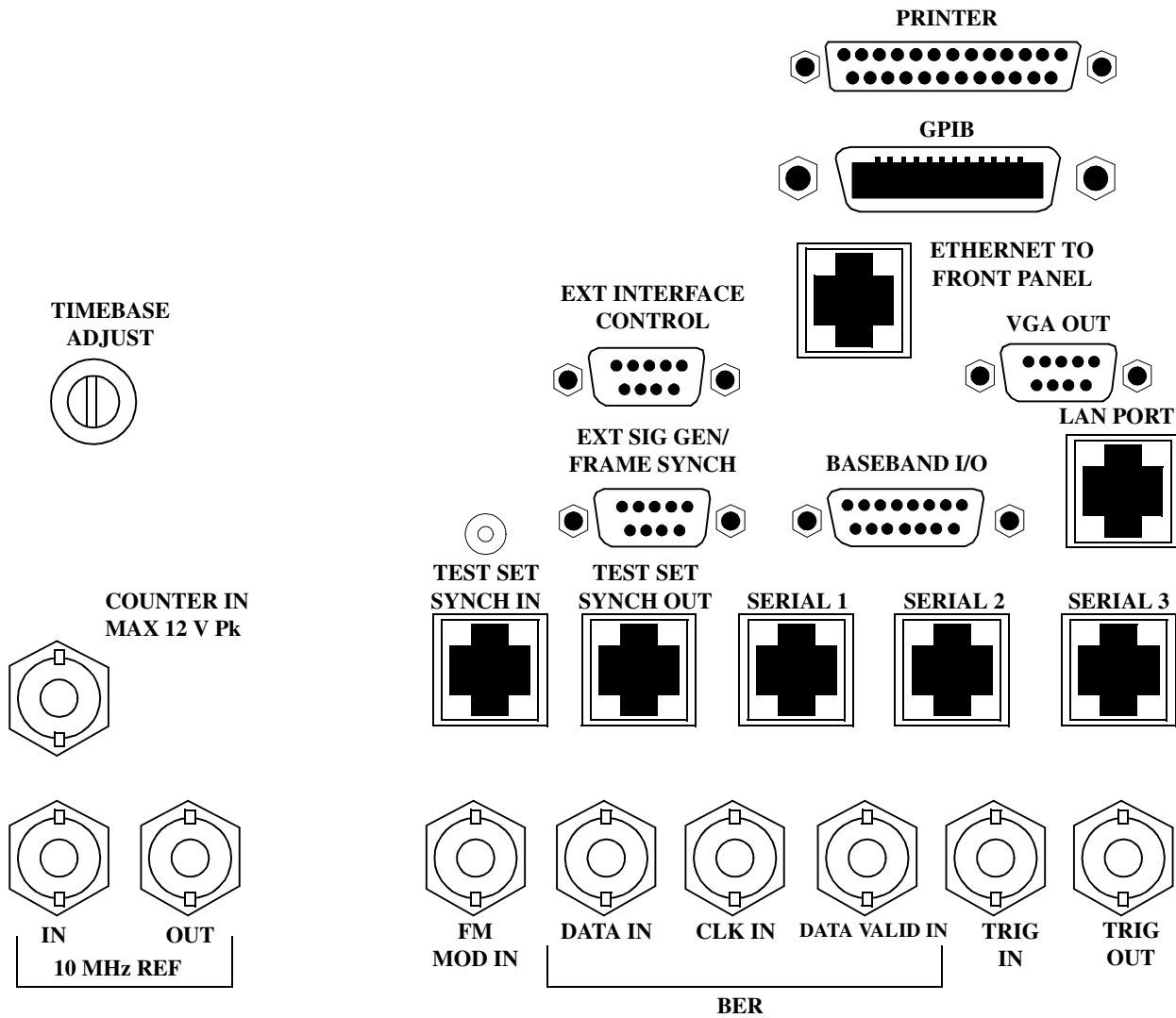
“Audio Level Measurement Description” on page 39

“AFGenerator” on page 239

“Configuring the Test Set’s LAN” on page 673

# Rear Panel Connectors

## Description



### BASEBAND I/O

Not functional for this release.

### 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.

## **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.

## **Rear Panel Connectors**

### **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.

## Related Topics

“Timebase Description/Configuration” on page 672

“SYSTEM:ROSCillator” on page 554

“Configuring the Test Set’s GPIB Address” on page 675

“Configuring the Test Set’s LAN” on page 673

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## 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.

---

# 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.

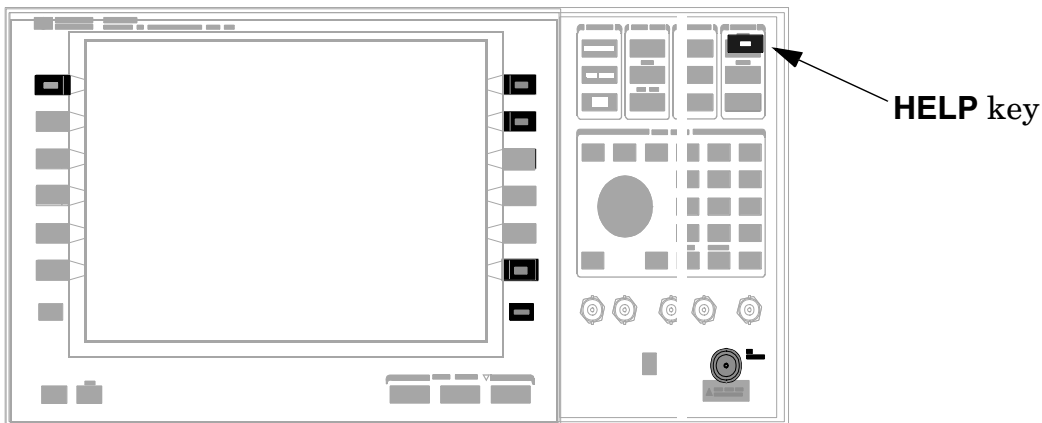
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**NOTE** Operating the test set in Help Mode does not prevent you from changing parameters from the front panel. The parameters you change while in Help Mode are applied just as they would be normally.

---

## How do I use the help mode?

1. Put the test set into help mode by pressing the **HELP** key on the front panel.







## Functions currently supporting Help Mode in the AMPS/136 Test Application

- System Configuration
  - Instrument Setup
  - Application Selection
  - Amplitude Offset
- Audio Generator
- Audio Analyzer
- Swept Audio
- Spectrum Monitor
- Measurement Control
  - Measurement Reset
  - Continuous Trigger ON

---

## 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.

## 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.

## Printing Screens

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.

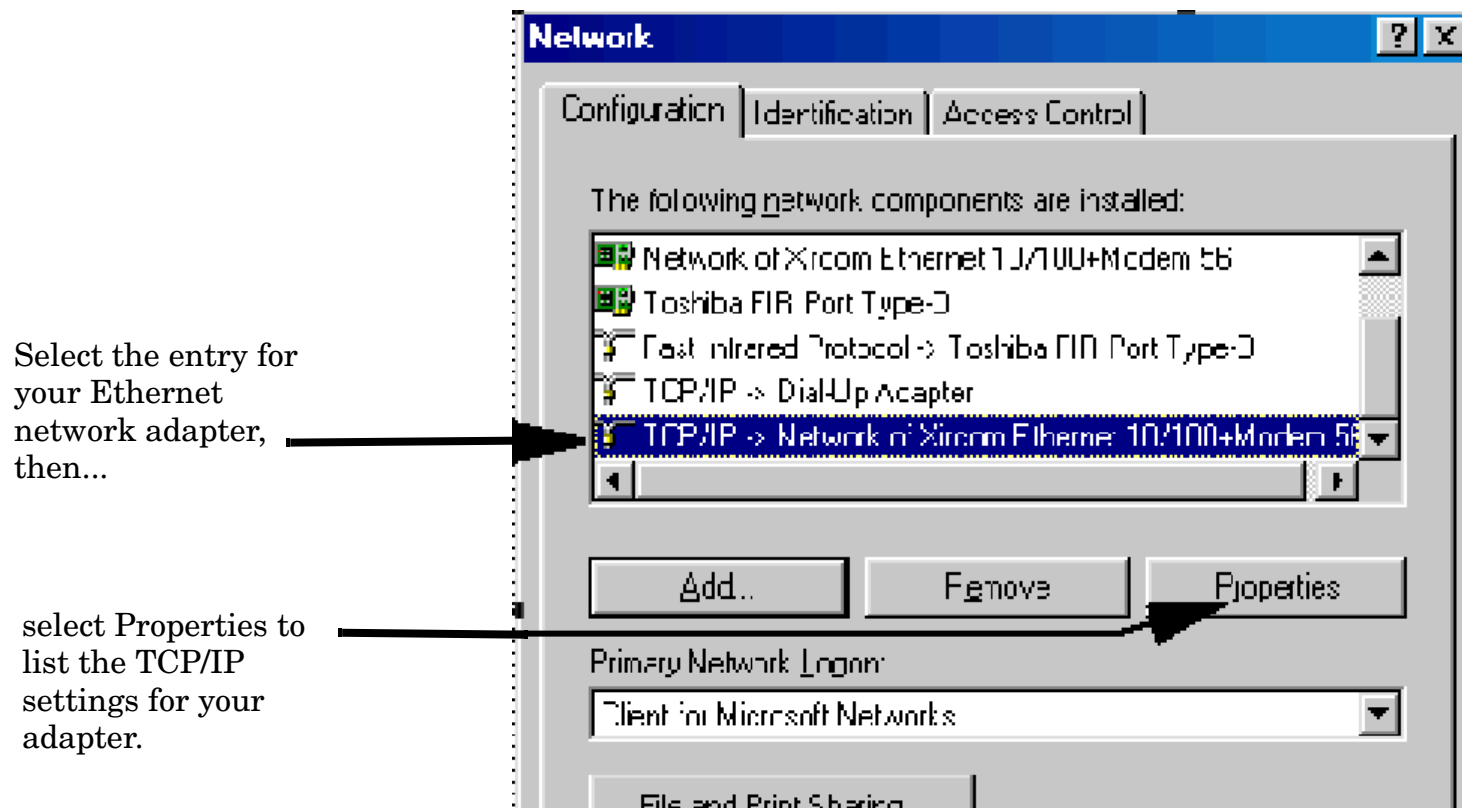
**Changing the LAN Setting on Your Computer** Network configuration procedures vary between operating systems. You may have to refer to your computer's help system, or your LAN adapter card's documentation, for assistance.

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.

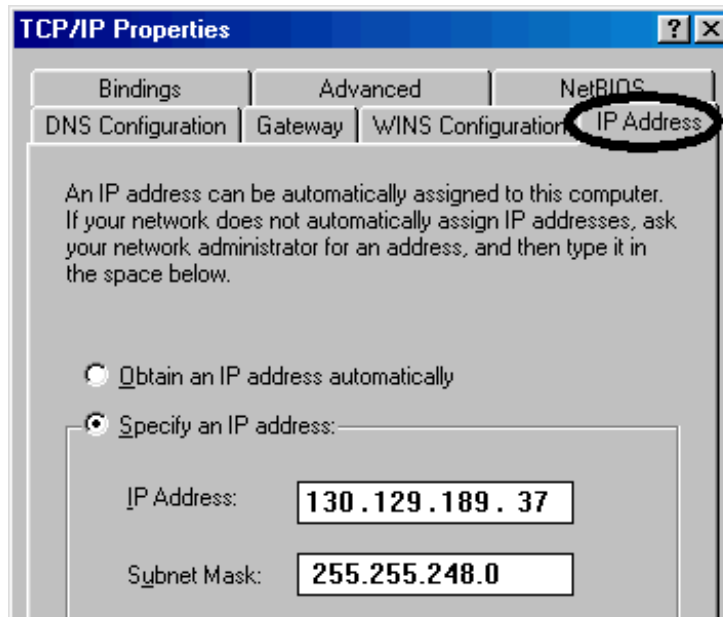
**Figure 15. Accessing Your Computer's LAN Settings**



### 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).

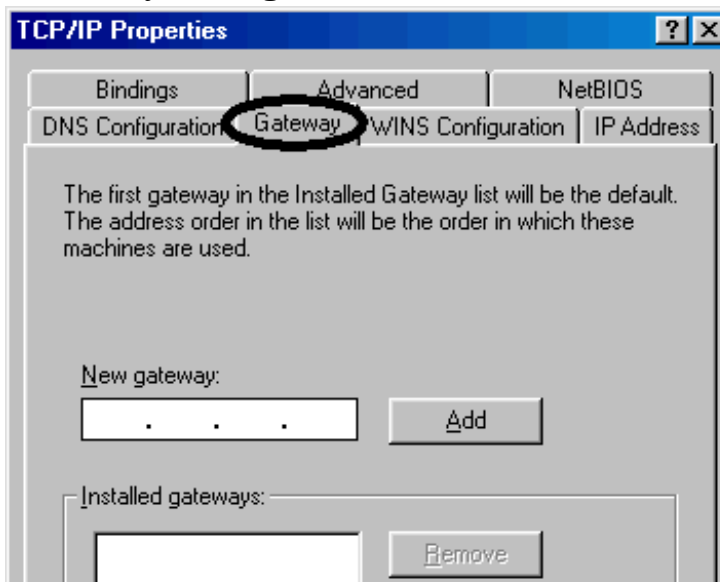
**Figure 16. Specifying the Computer's IP Address and Subnet Mask**



**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 17. Accessing the Gateway Setting**



**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																	
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		
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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> <tr> <td>Power State</td> <td>On</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	Power State	On	
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Subnet Mask	255.255.248.0																	
Default Gateway																		
Display Mode	Track																	
Display Brightness	High																	
Power State	On																	
Port Configuration ▾																		

2. Press the **F1** (Instrument Setup) key.

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**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.

---

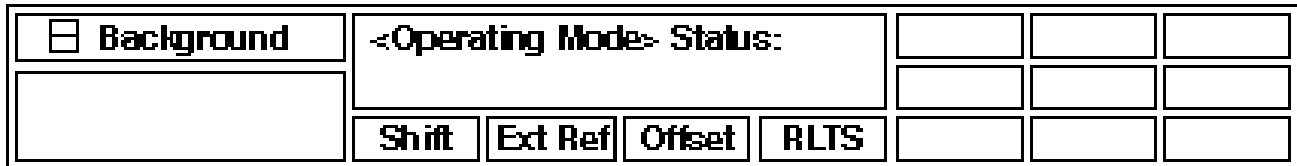
3. Turn the knob to highlight the setting you want to change.
4. Press the knob to select the setting.
5. Enter the new value using the keypad, and press the knob to complete the setting.
6. Turn the test set off and back on to start using the new settings.

## Instrument Status Area

### Description

The Instrument status area is found on the bottom center of the test set's display.

**Figure 18. 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.

### RLTS

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.



## Instrument Status Area

- Talk annunciator. 'T' turns on when the test set is providing information over GPIB.
- SRQ annunciator. 'S' turns on when an SRQ is active.

## Instrument Status Area

# 6 Troubleshooting



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## Adjacent Channel Power Troubleshooting

### Possible Setup Issues

During remote operation of the Adjacent Channel Power measurement, you should configure the Trigger Arm to Single. See “SETup:ACPower” on page 413. If single triggering is used during manual operation, press the START SINGLE key to trigger each measurement.

The expected signal amplitude and channel number (or frequency) must be specified for accurate measurements. See “Active Cell Operating Mode” on page 71, “DTC Test Operating Mode” on page 78, and “Receiver Control” on page 169 for information on setting the expected input frequency and power level.

To meet specifications, the input level at the test set’s RF IN/OUT connector must be no lower than -15 dBm, and be within 3 dB of the expected input power level. The measured signal’s frequency must be in the range of 800 MHz to 960 MHz, or 1.7 GHz to 2.0 GHz, and the signal’s center frequency must be within 200 Hz of the expected frequency.

The Trigger Source should normally be set to Auto.

See [“Triggering of Measurements” on page 200](#) for a description of each trigger setting.

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 206](#).

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 3 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the input power is more than 10 dB below the expected input power level.

If the signal has both over range and under range conditions, only the over range (5) will be indicated.

---

## Analog Transmit Power Troubleshooting

### Possible Setup Issues

During remote operation of the Analog Transmit Power measurement, you should configure the Trigger Arm to Single. See “SETup:ATXPower” on page 424. If single triggering is used during manual operation, press the START SINGLE key to trigger each measurement.

If digital measurements are active, turn them off or set their trigger source to Immediate. See “Triggering Considerations When Making Manual Measurements” on page 204.

The measurement results are altered by the Amplitude Offset value. See “Description” on page 63.

The expected signal amplitude and channel number (or frequency) must be specified for accurate measurements. See “Active Cell Operating Mode” on page 71, “AVC Test Operating Mode” on page 75, and “Receiver Control” on page 169 for information on setting the expected input frequency and power level.

The trigger source is always immediate for the Analog Transmit Power measurement. No synchronization or external signals are required.

Over range and under range conditions may occur when testing a power class 4 mobile at power levels 0 or 1, or when testing a power class 1 mobile at power levels 8, 9, and 10 (digital mode only). See “Cellular Band (800 MHz) Mobile Power Class Considerations for Expected Input Level” on page 171 for an explanation of why this occurs and what to do about it.

### Interpreting Integrity Indicator values

See “Integrity Indicator” on page 206.

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 3 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the Analog Transmit Power result is more than 10 dB below the expected input power level. Under range is also indicated if the input power is more than 2 dB below the calibrated range of the test set’s power detector (-30 dBm).

If the signal has both over range and under range conditions only the over range (5) will be indicated.

---

## AFANalyzer 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 Considerations When Making Manual Measurements” on page 204.

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 34 and “Audio Analyzer Block Diagram” on page 37.

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 39).

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 39).

### Interpreting Integrity Indicator Values

See “Integrity Indicator” on page 206.

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.

---

## Digital Transmit Power Troubleshooting

### Possible Setup Issues

During remote operation of the Digital Transmit Power measurement, you should configure the Trigger Arm to Single. See “SETup:DTXPower” on page 434. If single triggering is used during manual operation, press the START SINGLE key to trigger each measurement.

The measurement results are altered by the Amplitude Offset value. See “Description” on page 63.

The expected signal amplitude and channel number (or frequency) must be specified for accurate measurements. See “Active Cell Operating Mode” on page 71, “DTC Test Operating Mode” on page 78, and “Receiver Control” on page 169 for information on setting the expected input frequency and power level.

The Trigger Source setting is very important to making accurate measurements. Since a mobile’s signal is bursted when transmitting on a digital traffic channel, triggering must occur while the transmitter is on for proper measurements. The input signal must be a normal, full-rate DTC burst with a valid sync word.

See “[Triggering of Measurements](#)” on page 200 for a description of each trigger setting.

Over range and under range conditions may occur when testing a power class 4 mobile at power levels 0 or 1, or when testing a power class 1 mobile at power levels 8, 9, and 10. See “Cellular Band (800 MHz) Mobile Power Class Considerations for Expected Input Level” on page 171 for an explanation of why this occurs and what to do about it.

### Interpreting Integrity Indicator values

See “Integrity Indicator” on page 206.

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 3 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the Digital Transmit Power result is more than 10 dB below the expected input power level. Under range is also indicated if the input power is more than 2 dB below the calibrated range of the test set’s power detector (-30 dBm).

If the signal has both over range and under range conditions, only the over range (5) will be indicated.

If Sync Not Found (11) is returned; the SYNC word in the mobile’s TDMA burst could not be found to use as a trigger. Either the transmitter is in an analog mode, and therefore not bursting, or the burst does not contain a valid SYNC word, or a Trigger Delay value has been entered that causes the signal to be sampled during a time when the SYNC word is not present. If Protocol triggering is used for the Trigger Source, the test set will not display a measurement value if the SYNC word is not found. If protocol triggering was used, change the trigger source to Auto (recommended for this measurement).

If Trigger Early or Fall Early (8) is returned; the burst is rising or falling in amplitude before the test set expects it. Try changing the Trigger Delay setting to correct for this timing problem. By using the Trigger Delay, you may be able to change the trigger point until the Digital Transmit Power reading rises to about its maximum expected value; providing a good indication of how late or early the trigger is occurring.



---

## Frequency Modulation (FM) Troubleshooting

### Possible Setup Issues

The Trigger Arm should always be set to Single for GPIB operation (not Continuous).

If digital measurements are active, turn them off or set their trigger source to Immediate. See “Triggering Considerations When Making Manual Measurements” on page 204.

The distortion measurement is only returned if it has been enabled (SET:FM:DIST:STAT ON), otherwise the value 9.91E+37 is returned, signifying that a valid measurement was not made.

Distortion measurements require that the Distortion Fundamental Frequency to be specified (SET:FM:DIST:FREQ <value in Hz>).

The modulation frequency measurement is only returned if it has been enabled (SET:FM:FREQ:STAT ON), otherwise the value 9.91E+37 is returned, signifying that a valid measurement was not made.

Both FM distortion and audio distortion measurements are available in the test set. Make sure you are querying the FM Distortion measurement (FETCh:FM:DIST?) in your program and *not* the audio distortion measurement (FETCh:AFAN:DIST?) when making an FM distortion measurement.

Be sure to use the type of detector specified for deviation measurements in the applicable standard. For example, if the measurement specification is for *peak* deviation, be sure to use the Peak+ or Peak- detector instead of the RMS detector. If the signal being measured is noisy, you can use the RMS detector to make a more stable measurement and then multiply the result by 1.414 to arrive at the peak value.

All measurements are performed after any filtering, de-emphasis, and expansion are performed. When measuring SAT deviation and frequency, the Filter Type should normally be set to 100 Hz BW BPF and the 100 Hz BW BPF Center Frequency should be set to the SAT frequency. The C-message filter is often used for measurements made on signals with FM rates in the normal voice frequency range (such as the 1004 Hz tone used for distortion measurements).

This measurement can only be used for analog signals, such as an analog voice channel (AVC). You cannot use this measurement when the mobile is on a digital traffic channel (DTC).

The expected signal frequency (or AVC channel number) and input level must be specified in your program for accurate measurements. This is done either through the base station emulator settings, when the mobile is first put on an AVC, or by manually controlling the test set's measurement receiver. See “Active Cell Operating Mode” on page 71, “AVC Test Operating Mode” on page 75, and “Receiver Control” on page 169 for information on setting the expected input frequency.

To meet performance specifications, the input signal must be in the frequency range of 800 MHz to 960 MHz or 1.70 GHz to 2.0 GHz, and be within 2.5 kHz of the expected input frequency, at a power level (at the RF IN/OUT connector) of -15 dBm to +40 dBm. The specified FM deviation range is 0 Hz to 16 kHz, at a modulation rate of 100 Hz to 15 kHz. FM Distortion is specified over the modulation rate range of 100 Hz to 10 kHz.

The trigger source is always immediate for this measurement. No trigger delay or protocol triggering is used.

### Interpreting Integrity Indicator values

See “Integrity Indicator” on page 206.

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 6 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the measured input power is more than 20 dB below the expected input power level. Under range is also indicated if the input power is more than 2 dB below the calibrated range of the test set’s power detector (-30 dBm). If the expected input power setting is correctly set for the signal level into the test set, an under range condition can still occur if the receiver has not been tuned to the signal’s frequency.

If the signal has both over range and under range conditions only the over range (5) will be indicated.

---

## Frequency Stability Troubleshooting

### Possible Setup Issues

The Trigger Arm should always be set to Single for GPIB operation (not Continuous).

If digital measurements are active, turn them off or set their trigger source to Immediate. See “Triggering Considerations When Making Manual Measurements” on page 204.

This measurement can only be used for analog signals, such as an analog voice channel (AVC). Frequency modulation, such as SAT or other FM signals, can be present. However, you cannot use this measurement when the mobile is on a digital traffic channel (DTC).

The expected signal frequency (or AVC channel number) and input level must be specified in your program for accurate measurements. This is done either through the base station emulator settings, when the mobile is first put on an AVC, or by manually controlling the test set’s measurement receiver. See “Active Cell Operating Mode” on page 71, “AVC Test Operating Mode” on page 75, and “Receiver Control” on page 169 for information on setting the expected input frequency.

To meet performance specifications, the signal must be in the frequency range of 800 MHz to 960 MHz or 1.70 GHz to 2.0 GHz, and frequency modulated signals must have a modulation index of no more than 3 and an FM rate of 100 Hz to 15 kHz. No amplitude modulation (AM) may be present. Also, the signal level must be within 3 dB of the expected input level.

The signal’s frequency must be within 200 kHz of the expected frequency for the test set to make the frequency stability measurement.

The trigger source is always immediate for this measurement. No trigger delay or protocol triggering is used.

### Interpreting Integrity Indicator values

See “Integrity Indicator” on page 206.

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 6 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the measured input power is more than 20 dB below the expected input power level. Under range is also indicated if the input power is more than 2 dB below the calibrated range of the test set’s power detector (-30 dBm). If the expected input power setting is correctly set for the signal level into the test set, an under range condition can still occur if the receiver has not been tuned to the signal’s frequency.

If the signal has both over range and under range conditions only the over range (5) will be indicated.

---

## **IQ Tuning Troubleshooting**

### **Possible Setup Issues**

If no measurements are returned after using the INITiate and FETCh (or READ) commands, and the measurement times out (if a time-out has been set), the measurement is probably not being triggered. This happens if the mobile's signal is not bursted but the trigger source is set to RF Rise. Change the trigger to IMMEDIATE or change the mobile's output to be a bursted signal.

If your measurement results are invalid or look as if they are centered around the wrong frequency it may be that the carrier frequency is not correctly specified or the Reference Offset Frequency is incorrect.

- The carrier frequency is normally derived from the current DTC Channel number, but can also be set using manual receiver control and specifying the Measurement Frequency. See "Receiver Control" on page 169 for information on automatic and manual receiver control.
- The Reference Offset Frequency determines the frequency used as the reference for all of the IQ Tuning power measurements. If the incorrect reference offset frequency is used, all power measurements will be incorrect. See "Reference Offset Frequency" on page 49.

The expected input level must be specified to make accurate measurements. The expected input level is normally derived from the MS TX Level setting, but can also be set using manual receiver control and specifying the level. See "Expected Power" on page 171 for information on automatic and manual receiver control.

Invalid measurements may be also be caused by modulation data other than all 01 or all 00 symbols, for example, it may be that a synch word is being transmitted.

### **Interpreting Integrity Indicator Values**

See "Integrity Indicator" on page 206.

---

## Loopback Bit Error Ratio (BER) Troubleshooting

### Possible Setup Issues

During remote operation of the Loopback BER measurement, you should configure the Trigger Arm to Single. See “SETup:LBError” on page 461. If single triggering is used during manual operation, press the START SINGLE key to trigger each measurement.

The measurement results are affected by the Amplitude Offset value, especially when testing at very low signal levels (such as -110 dBm). See “Description” on page 63.

The Loopback BER measurement can only be made when the mobile is in digital loopback mode and is transmitting on a DTC that is synchronized with the test set in DTC Test operating mode. If this measurement is initiated with the test set in any other operating mode, the returned Bit Error Ratio result is 9.91+E37 (Not A Number), and the integrity indicator is 11 (Sync Not Found). Because the DTC Test operating mode has no provision for overhead signaling to put the mobile on a DTC, getting the mobile into loopback test mode and synchronizing it to the test set is the user’s responsibility.

The expected signal amplitude and channel number (or frequency) must be specified for accurate measurements. See “DTC Test Operating Mode” on page 78, and “Receiver Control” on page 169 for information on setting the expected input frequency and power level.

### Interpreting Integrity Indicator values

See “Integrity Indicator” on page 206.

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 3 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the input power is more than 10 dB below the expected input power level. Under range is also indicated if the input power is more than 2 dB below the calibrated range of the test set’s power detector (-30 dBm at the RF IN/OUT connector).

If Sync Not Found (11) is returned; the test set cannot synchronize to the mobile. This occurs if the test set is set to any operating mode other than DTC Test, if the mobile is not transmitting, or if the mobile is transmitting on a DTC but has not been synchronized to the test set.

---

## MAHO BER/RSSI Troubleshooting

### Possible Setup Issues

MAHO BER and RSSI measurements must be made with the mobile on a Digital Traffic Channel (DTC) using the test set's Active Cell operating mode. Measurements cannot be made with the mobile on a DTC in DTC Test operating mode.

The measurement results are affected by the Amplitude Offset value. See "Amplitude Offset" on page 63.

If the MAHO BER value is greater than expected, make sure the DTC Induced Err function is set correctly. If induced bit errors are not desired, set the value to Off using the `CALL:DTC:IBERror:STATe OFF` syntax.

### Measurement Timing Issues

Due to the AMPS/136 protocol processes in the mobile, it takes a minimum of 1.28 seconds for the mobile to make MAHO measurements after receiving a request from the test set. Additional time is needed by the mobile to forward the results on the reverse DTC back to the test set.

If you query the MAHO values using the `CALL:MS:MAHO:<BERR | RSSI>[:LAST]` syntax before the mobile has had time to respond to the test set's MAHO request, one of the following results occur:

- The value "UNKN" is returned for the BER measurement and 9.91E+37 is returned for the RSSI measurement. This occurs when no MAHO measurements have received by the test set.
- The previous MAHO measurement is returned. This is because the test set hasn't received the new measurement values from the mobile.

Therefore, when MAHO reporting is first enabled, and any time the signal into the mobile is changed to alter the reported MAHO values, your program must either use the `CALL:MS:REPorted:MAHO:<BERR | RSSI>:NEW` syntax to retrieve new measurement values, or wait for the mobile to respond with the correct MAHO values before querying the measurement values.

If you use the `CALL:MS:REPorted:MAHO:<BERR | RSSI>:NEW` syntax, you should discard the first returned value and re-query the measurement to ensure that the mobile's report values reflect the new signal conditions. See "Querying Last and New Measurements" on page 51.

### Interpreting Integrity Indicator values

See "Integrity Indicator" on page 206.

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## Digital Modulation Accuracy Troubleshooting

### Possible Setup Issues

During remote operation of the Modulation Accuracy measurements, you should configure the Trigger Arm to Single. See “SETup:MACCuracy” on page 464. If single triggering is used during manual operation, press the START SINGLE key to trigger each measurement.

The input level must be at least -15 dBm to make measurements.

If Modulation Accuracy measurement results are extremely bad (such as EVM1 = 100%), use the Digital Transmit Power measurement (with RF Rise triggering) to verify that the mobile is actually transmitting on a digital traffic channel.

The Trigger Source setting should be set to Auto. Modulation Accuracy measurements must be synchronized to the sync word in the mobile’s transmitted burst to be accurate.

See “Triggering of Measurements” on page 200 for a description of each trigger setting.

### If the Frequency Error Value Seems High

If a Modulation Accuracy measurement is made immediately after handing off the DTC to a new channel, the Frequency Error value may be higher than expected. This may be due to the test set making a measurement before the mobile’s frequency has fully settled to the new value. This situation can usually be corrected by making the Adjacent Channel Power and/or MAHO measurement(s) before measuring Modulation Accuracy. This gives the mobile additional time to settle before making the Frequency Error measurement.

### Interpreting Integrity Indicator values

See “Integrity Indicator” on page 206.

If over range (5) is returned; the input power has exceeded the test set’s internal sampler maximum value by at least 3 dB during some part of the sampling or the input power has exceeded the calibrated range of the test set’s power detector for the expected power setting.

If under range (6) is returned; the input power is more than 10 dB below the expected input power level. Under range is also indicated if the input power is more than 2 dB below the calibrated range of the test set’s power detector (-30 dBm).

If the signal has both over range and under range conditions, only the over range (5) will be indicated: the test set considers the over range condition more critical than an under range condition.

If Sync Not Found (11) is returned; the SYNC word in the mobile’s TDMA burst could not be found to use as a trigger. Either the transmitter is in an analog mode, and therefore not bursting, or the burst does not contain a valid SYNC word, or a Trigger Delay value has been entered that causes the signal to be sampled during a time when the SYNC word is not present. If Protocol triggering is used for the Trigger Source, the test set will not display a measurement value if the SYNC word is not found. If protocol triggering was used, change the trigger source to Auto (recommended for this measurement).

If Trigger Early or Fall Early (8) is returned; the burst is rising or falling in amplitude before the test set expects it. Try changing the Trigger Delay setting to correct for this timing problem. By using the Trigger Delay, you may be able to change the trigger point until the test set’s sampler may find the SYNC word and make a good measurement.

---

## 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 Considerations When Making Manual Measurements” on page 204.

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 34 and “Audio Analyzer Block Diagram” on page 37.

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 Level Measurement Description” on page 39).

### Interpreting Integrity Indicator Values

See “Integrity Indicator” on page 206.

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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## 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 477.

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 202.

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 206.

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## Error Messages

### Error Message Descriptions

“Fixed Timer Messages” on page 626

“Manual User Error Messages” on page 629

“-400 to -499 Query Errors” on page 632

“-300 to -399 SCPI Specified Device-Specific Errors” on page 633

“-200 to -299 Execution Errors” on page 635

“-100 to -199 Command Errors” on page 638

“+100 to +199 Core Device-Specific Error” on page 642

“+200 to +299 Call Processing Device-Specific Error” on page 645

“+300 to +399 Link Control Device-Specific Error” on page 647

“+400 to +499 Core Hardware Device-Specific Error” on page 648

“+500 to +599 Test Application Hardware Device-Specific Error” on page 651

“+600 to +699 Instrument Device-Specific Error” on page 652

“+700 to +799 Test Application Measurement Device-Specific Error” on page 653

“+800 to +899 Core Measurement Device-Specific Error” on page 654

## 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.

## Error Messages

### AMPS/136 Mobile Test Maskable Messages

- Digital 136 measurement warning; Digital Transmit Power measurement has been closed.
- Digital 136 measurement warning; Modulation Accuracy measurement has been closed.
- Digital 136 measurement warning; Adjacent Channel Power measurement has been closed.
- Digital 136 measurement warning; Loopback Bit Error measurement has been closed.

### Related Topics

“SYSTEM:COMMunicate:GPIB:DEBug[:STATe]” on page 535

“Test Set Beeper” on page 671

“SYSTEM:ERRor?” on page 547

“Integrity Indicator” on page 206

“FETCh? Subsystem” on page 328

“DISPlay:MESSAge:MASKable:STATe” on page 326

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## 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 622

## 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.

## AMPS/136 Specific Measurement Maskable Messages

These messages are maskable so that they can be blocked from appearing on the display. See “Error Messages” on page 622.

Dynamic power can only be measured with all other measurements turned off. A warning message is displayed when the dynamic power measurement is first made, alerting you to the fact that previously active measurements have been closed. Re-enabling other measurements automatically disables the dynamic power measurement.

**Table 26. Digital 136 Specific Measurement Maskable Messages**

Messages	Description
Digital 136 measurement warning; Digital Transmit Power measurement has been closed	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.
Digital 136 measurement warning; Modulation Accuracy measurement has been closed	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.
Digital 136 measurement warning; Adjacent Channel Power measurement has been closed	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.
Digital 136 measurement warning; Loopback Bit Error measurement has been closed	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.
Digital 136 protocol warning; No response to handoff, retrying.	The test set’s base station emulator commanded the mobile to perform and handoff, but no response was received from the mobile. The handoff will be attempted again.
Digital 136 measurement warning; Dynamic Power measurement has been closed.	The dynamic power measurement was closed because another measurement was selected. Dynamic power measurements can not be performed while other measurements are active.

**Table 27. AMPS Specific Measurement Maskable Messages**

Error Message	Description
AMPS measurement warning; Analog Transmit Power measurement has been closed.	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.

**Table 27. AMPS Specific Measurement Maskable Messages**

Error Message	Description
AMPS measurement warning; Frequency Stability measurement has been closed.	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.
AMPS measurement warning; Frequency Modulation measurement has been closed.	Indicates that a measurement has been inactivated because of a resource conflict. This message is typically generated when dynamic power measurements are initiated.
AMPS protocol warning; No response to handoff, retrying.	The test set's base station emulator commanded the mobile to perform and handoff, but no response was received from the mobile. The handoff will be attempted again.
AMPS protocol warning; No response to power level change, retrying.	The test set's base station emulator commanded the mobile to change power level, but no response was received from the mobile. A power level change will be attempted again.

## -400 to -499 Query Errors

### 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 to -399 SCPI Specified Device-Specific Errors

### 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 to -399 SCPI Specified Device-Specific Errors

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.

### Related Topics

“Standard Event Status Register” on page 522

## -200 to -299 Execution Errors

### 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.

## -200 to -299 Execution Errors

Error Message	Description
-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.
-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.



Error Message	Description
-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.
-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 to -199 Command Errors

### 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.

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 to -199 Command Errors

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.

Error Message	Description
-184 Macro parameter error	Indicates that a command inside the macro definition had the wrong number or type of parameters.

### Related Topics

“Standard Event Status Register” on page 522

## +100 to +199 Core Device-Specific Error

### 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> <p style="padding-left: 40px;">;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> <p style="padding-left: 40px;">;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> <p style="padding-left: 40px;">;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 to +199 Core Device-Specific Error**

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 to +199 Core Device-Specific Error

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.
+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.



## +200 to +299 Call Processing Device-Specific Error

These errors are generated when a problem occurs maintaining the link between the test set and the DUT. These errors generally occur as a result of a problem on the link such as if the DUT did not respond to a message, or the user attempted to perform an invalid operation in the current instrument state.

### Protocol Failure Messages

Many of the call processing errors are the result of protocol signals not being received from the mobile. Protocol failures do not necessarily cause a call to be disconnected, but are displayed to inform the user of a protocol error occurring during call processing operation.

**Table 28. Digital 136 Call Processing Error Messages**

Error Message	Description
+201 Digital 136 call disconnected; Reverse channel failure.	The test set stopped receiving a valid reverse DTC signal from the mobile while in the connected state.
+202 Digital 136 call disconnected; No response to release.	The mobile did not respond when a command was sent by the test set to release the call while connected.
+250 Digital 136 protocol failure; Signal not found on new traffic channel.	The test set commanded the mobile to go to a new traffic channel, but the test set could not find the mobile's signal at the new channel setting.
+251 Digital 136 protocol failure; No response to power level change.	The test set commanded the mobile to change its output power setting, but the mobile's level did not change.
+252 Digital 136 protocol failure; No response to alert during paging.	The mobile was paged, but it did not respond to the alert message.
+253 Digital 136 protocol failure; No response to connect.	The mobile was paged, but it did not send a connect response when the call was answered.
+255 Digital 136 protocol failure; No response to start MAHO.	The test set commanded the mobile to send MAHO information when on a DTC, but the mobile did not respond.
+256 Digital 136 protocol failure; No response to stop MAHO.	The test set commanded the mobile to stop sending MAHO information when on a DTC, but the mobile did not respond.
+258 Digital 136 protocol failure; No response to handoff.	The test set commanded the mobile to change one or more traffic channel settings (handoff) while on a DTC, but the mobile did not respond.

**Table 29. AMPS Call Processing Error Messages**

Error Message	Description
+201 AMPS call disconnected; Reverse channel failure.	The test set stopped receiving a valid reverse AVC signal from the mobile while in the connected state.

## +200 to +299 Call Processing Device-Specific Error

**Table 29. AMPS Call Processing Error Messages**

Error Message	Description
+202 AMPS call disconnected; No response message to release.	The mobile did not respond when a command was sent by the test set to release the call while connected.
+203 AMPS call disconnected; No signaling tone response to release.	The mobile did not send the expected signaling tone when commanded to release the call while connected.
+250 AMPS protocol failure; Signal not found on new traffic channel.	The test set commanded the mobile to go to a new traffic channel, but the test set could not find the mobile's signal at the new channel setting.
+251 AMPS protocol failure; No response to alert.	The mobile was paged, but it did not respond to the alert message.
+252 AMPS protocol failure; No answer.	The mobile was paged, and the active cell status was in the alerting state, but the page was not answered.
+258 AMPS protocol failure; No response to handoff.	The test set commanded the mobile to change one or more traffic channel settings (handoff) while on an AVC, but the mobile did not respond.
+259 AMPS protocol failure; No response to power level change.	The test set commanded the mobile to change its output power setting, but the mobile's level did not change.

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## **+300 to +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 522 for information on this register.

**No link control errors are currently defined for this test application.**

Error Message

## +400 to +499 Core Hardware Device-Specific Error

### 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 to +499 Core Hardware Device-Specific Error**

<b>Error Message</b>	<b>Description</b>
+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 to +499 Core Hardware Device-Specific Error

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

## Related Topics

“Standard Event Status Register” on page 522

## +500 to +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.

**Table 30. TA136 Hardware Error Messages**

Error Message	Description
+500 TA136 hardware failure; Base station emulator hardware is not responding.	The test set's base station emulator hardware is not responding to a command when using the AMPS/136 test application.
+501 TA136 hardware failure; Base station emulator trigger hardware is not responding.	The test set's base station emulator trigger hardware is not responding to a command when using the AMPS/136 test application.
+502 TA136 hardware failure; DSP Demod Hardware is not responding.	The test set's Digital Signal Processing demodulation hardware is not responding to a command when using the AMPS/136 test application.

**Table 31. Digital 136 Hardware Error Messages**

Error Message	Description
+500 Digital 136 hardware failure; Base station emulator hardware is not responding.	The test set hardware responsible for creating a digital control channel (DCCCH) or a digital traffic channel (DTC) is not responding to a command.

**Table 32. AMPS Hardware Error Messages**

Error Message	Description
+500 AMPS hardware failure; Base station emulator hardware is not responding.	The test set hardware responsible for creating an analog control channel (ACC) or an analog voice channel (AVC) is not responding to a command.
+503 AMPS hardware failure; Base station emulator trigger hardware is not responding.	The test set's base station emulator trigger hardware is not responding to a command when connected on an analog voice channel (AVC).

### Related Topics

"Standard Event Status Register" on page 522

## +600 to +699 Instrument Device-Specific Error

### 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.

### Related Topics

"Standard Event Status Register" on page 522



## +700 to +799 Test Application Measurement Device-Specific Error

These errors are generated when a problem occurs that is specific to one of the test set's measurements. These are test application specific. When one of these errors is generated, the '+700 errors' bit in the questionable error status register is set. Refer to "STATus:QUEStionable" on page 504 for information on this register.

**Table 33. Digital 136 Specific Measurement Error Messages**

Error Message	Description
+701 Digital 136 measurement failure; Digital Transmit Power hardware is not responding.	The test set's digital power measurement hardware is not operating correctly.
+702 Digital 136 measurement failure; Modulation Accuracy hardware is not responding.	The test set's modulation accuracy measurement hardware is not operating correctly.
+703 Digital 136 measurement failure; Adjacent Channel Power hardware is not responding.	The test set's adjacent channel power measurement hardware is not operating correctly.
+704 Digital 136 measurement failure; Loopback Bit Error hardware is not responding.	The test set's loopback bit error measurement hardware is not operating correctly.
+705 Digital 136 measurement failure; IQ Tuning hardware is not responding	The test set's IQ Tuning measurement hardware is not operating correctly.

**Table 34. AMPS Specific Measurement Error Messages**

Error Message	Description
+701 AMPS measurement failure; Analog Transmit Power hardware is not responding.	The test set's analog transmit power measurement hardware is not operating correctly.
+702 AMPS measurement failure; Frequency Stability hardware is not responding.	The test set's frequency stability measurement hardware is not operating correctly.
+703 AMPS measurement failure; Frequency Modulation hardware is not responding.	The test set's frequency modulation measurement hardware is not operating correctly.

### Related Topics

See "Integrity Indicator" on page 206.

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## +800 to +899 Core Measurement Device-Specific Error

### 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.

### Related Topics

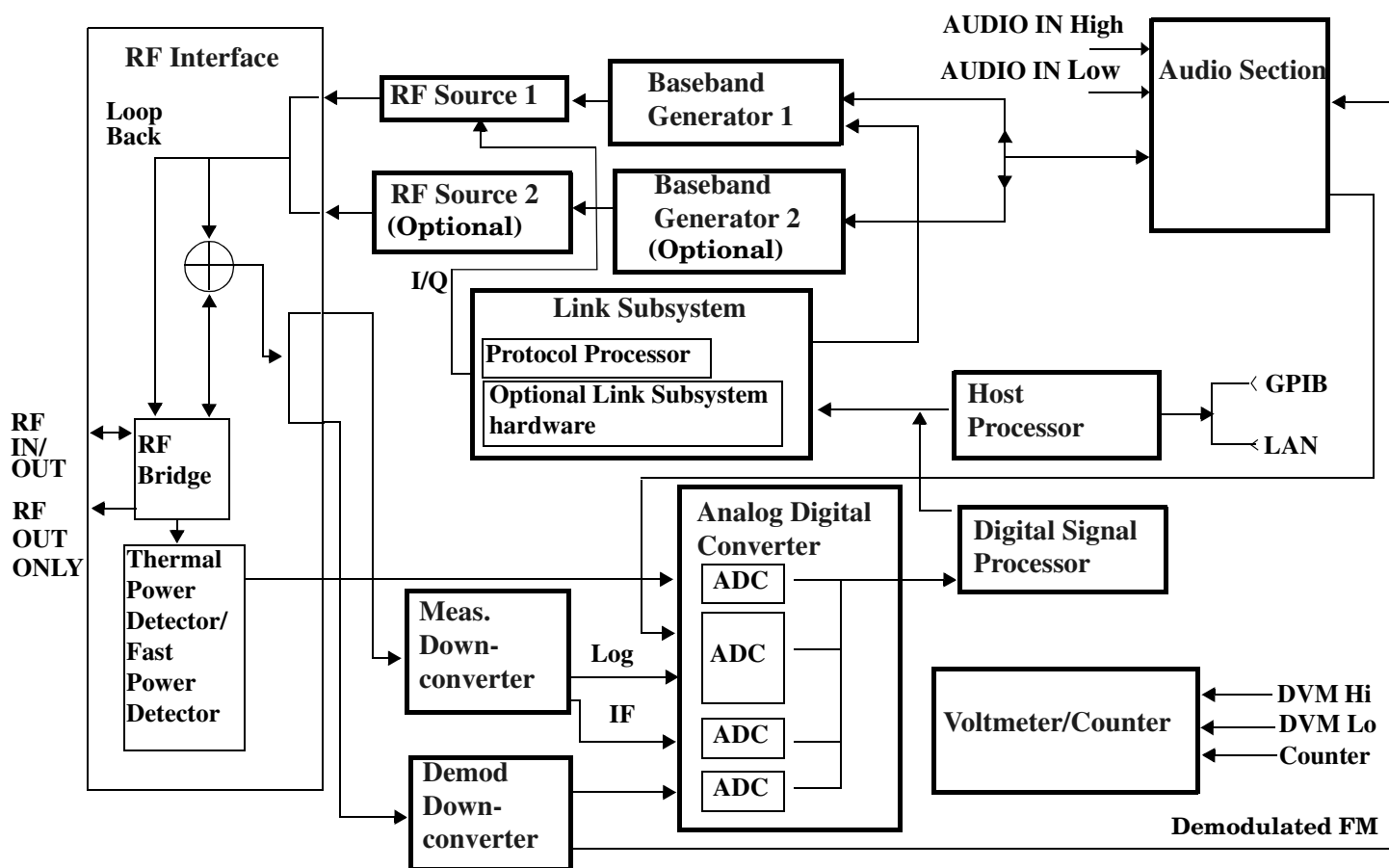
"Standard Event Status Register" on page 522

## Block Diagram

The hardware architecture of the test set provides a number of parallel signal paths through the instrument. This parallel architecture allows the measurement hardware to run some measurements concurrently.

See “Concurrent Measurements” on page 195.

## Description



## Block Diagram

### 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

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:

- demodulating 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)

## Block Diagram

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.

## 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.

## Block Diagram

### 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.

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



# 7 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 664

“SYSTEM:CURRENT:TA” on page 545

“IEEE 488.2 Common Commands” on page 560

“CALibration” on page 244

“SYSTEM:COMMunicate” on page 535

---

# 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:

### Agilent Technologies 8960 Series 10 E5515A

**Serial Number: US00000097**

**Current Test Application:** E1960A, GSM Mobile Test, A.04.01

**Instrument Options Installed:** RF Source 2

**HOST BOOT ROM REV:** A.02.03\_BOOT

**PROTOCOL BOOT ROM REV:** MOM\_PROTOCOL\_BSP\_1.7

**DSP BOOT ROM REV:** A.00.01

## 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
```

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:INFORMATION:HARDWARE:VERBOSE?” on page 534

“SYSTEM:CURRENT:TA” on page 545

“Obtaining Identification Information \*IDN?” on page 663

“Rear Panel Connectors” on page 590

---

## AMPS/136 Revision Information

This document describes features and functionality that are part of the E1961A AMPS/136 Mobile 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.

- “A0.7 release - June 2002” on page 666
- “A0.6 release - March 2002” on page 666
- “A.05 release - July 2001” on page 667
- “A.04 release - March 2001” on page 667
- “A.03 release - November 2000” on page 667
- “A.02 Initial Release - June 2000” on page 668

### A0.7 release - June 2002

#### Measurements

A Spectrum Monitor measurement feature has been added. This allows you to find, identify and measure transmitted signals from your mobile phone. It can also be used for spur measurements in the transmit band. For more details refer to “Spectrum Monitor Description” on page 55.

For access to the spectrum monitor feature you require your chassis to be one of the following:

- an E5515C.
- an E5515B with serial number US40350362 or GB40470454 or higher.
- an E5515B with E5515BU option 085.
- an E5515A with E5515BU option 085.

### A0.6 release - March 2002

Use of the RF OUT ONLY port was added for test sets with this port. This provides a dedicated port for the RF generator output (forward channel) while using the RF IN/OUT port as a dedicated input for the received (reverse) channel. See “RFGenerator: OUTPut” for a description of the GPIB commands, and “Front Panel Connectors” for additional information.

The Cell Power setting used with CW operating mode no longer affects the Cell Power setting used with the other operating modes. See “CALL:POWer” for a description of the GPIB commands.

A frame trigger output has been added. This feature provides a TTL level signal at the rear-panel TRIG OUT port that is derived from the forward channel frame clock during Active Cell or DTC Test operation. See “Setting Frame Trigger Parameters” on page 211 and “SYSTEM:FTRigger” on page 548.

## A.05 release - July 2001

### Call Processing

No new features in this release.

### Measurements

Swept audio measurements were added (see “Swept Audio Measurements Description” on page 57). The frequencies of the test set’s audio generator and audio analyzer are synchronized to make measurements across a frequency range. Audio level, SINAD, and distortion measurements are made at up to 60 frequency points spaced linearly through the frequency sweep.

The measurement sweep is initiated with a single INITiate:SAUDio command. Results for the entire sweep are fetched using the FETCh:SAUDio? and FETCh:SAUDio:SINAD? queries. These queries return comma-separated values that correspond to each measurement point in the sweep.

### Other

Screen images can be captured and saved as .GIF files. This is useful when you want to save copies of measurement results or other screen images. See “Printing Screens” on page 598 for a complete explanation of this procedure.

## A.04 release - March 2001

Changes were made to GPIB syntax commands that are common to both the AMPS/136 and the GSM test applications. This was done for the E1985 Fast Switching test application that allows you to switch between these two formats almost instantly. Fast switching also allows you to make changes to the inactive test application’s settings while testing mobile stations using the active test application. The commands were altered to provide a method of specifying which test application the command is to affect. See “Diagram Conventions” on page 233.

New FETCh:DPOWer commands were added, and existing commands changed, to improve the usefulness of this measurement and make it compatible with the E1985 Fast Switching test application.

## A.03 release - November 2000

Two features were added for this release:

- Selectable AC or DC coupling between the Audio Generator and the front panel AUDIO OUT port.
- Induced bit errors on the forward DTC. You can specify the level of induced bit errors (from 0% to 20%) that are sent to the mobile while on a DTC.

## **A.02 Initial Release - June 2000**

### **Call Processing**

- “Active Cell Operating Mode”

### **Measurements**

- Analog Transmit Power
- Frequency Modulation (FM)
- Frequency Stability
- Digital Transmit Power
- Digital Modulation Accuracy
- Agilent Channel Power
- IQ Tuning
- Dynamic Power
- Loopback Bit Error Ratio
- Audio Analyzer

### **Other**

- “AVC Test Operating Mode”
- “DTC Test Operating Mode”
- “CW Operating Mode”



---

## 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:BRIGhtness" on page 325

---

## 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
```

### Related Topics

“DISPlay:MODE” on page 326

---

## 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 533

“Error Messages” on page 622

---

## 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 554

“Rear Panel Connectors” on page 590

---

## 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.

## Configuring the Test Set's LAN

### 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:LAN[:SELF]:ADDRess” on page 537

“SYSTem:COMMunicate:LAN[:SELF]:DGATeway” on page 537

“SYSTem:COMMunicate:LAN[:SELF]:SMASk” on page 538

## Configuring the Test Set's GPIB Address

### 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:GPIB:[:SELF]:ADDRess” on page 535

---

## Configuring System Time and Date

### Description

The test set provides the following time and date settings:

- **Time**  
This field provides entry of the local time in hours and minutes.  
The Universal Coordinated Time field will track changes made to the Time field.
- **Date**  
This field provides entry of the local date.
- **Universal Coordinated Time (UTC)**  
Also known as Zulu, Greenwich Mean Time, or UCT, this field provides entry of universal time in hours and minutes.  
The Time field will track changes made to the Universal Coordinated Time (UTC) field.
- **Universal Coordinated Time (UTC) Date**
- **Time Zone**  
The Time Zone field provides entry of a time offset to the universal coordinated time (UTC). Based on each new time zone setting and the current UTC, a new local time value is calculated and automatically entered into the Time field.

These features are accessed by pressing the **SYSTEM CONFIG** hardkey followed by the Instrument Setup (**F1**) softkey.

### Related Topics

“SYSTEM:DATE”

“SYSTEM:TIME”

“SYSTEM:TZONE”

“SYSTEM:UTC”



---

## 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 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.

## Test Application Switching

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 679

“SYSTEM:APPLICATION” on page 526

“SYSTEM:CURRENT:TA” on page 545

“Test Application Name” on page 681

---

## 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 Revisions and Licenses

### 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'"
```

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 677

“SYSTem:APPLication” on page 526

---

## 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 526

“Test Application Switching” on page 677

**Test Application Name**

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