**Agilent Technologies 8960 Series 10 Wireless Communications Test Set**
**Agilent Technologies E1960A GSM Mobile Test Application**
**Agilent Technologies E6701A GPRS Lab Application**
**Agilent Technologies E1964A GPRS Mobile Test Application**

# Reference Guide

GSM Test Application Revision A.08
GPRS Lab Application Revision A.01
GPRS Test Application Revision A.02

1000-1750 (not orderable)

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**www.agilent.com/find/8960support/**

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# Edition/Print Date

All Editions and Updates of this manual and their creation dates are listed below.

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GPRS Test Application Revision A.01

July 2001 - GSM Test Application Revision A.08
GPRS Test Application Revision A.02

November 2001 - GSM Test Application Revision A.08
GPRS Test Application Revision A.02
GPRS Lab Application Revision A.01

# 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.

**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.**

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

**Safety Symbols**

Caution, refer to accompanying documents

Warning, risk of electric shock

Earth (ground) terminal

 Alternating current

Frame or chassis terminal

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

# 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.

# 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*

# Agilent Technologies Warranty Statement for Commercial Products

**Agilent Technologies 8960 Series 10 E5515B Wireless Communications Test Set**
**Agilent Technologies E1960A GSM Mobile Test Application**
**Agilent Technologies E1964A GPRS Mobile Test Application**

**Duration of Warranty: 1 year**

1. Agilent Technologies warrants Agilent Technologies hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If Agilent Technologies receives notice of such defects during the warranty period, Agilent Technologies will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. Agilent Technologies warrants that Agilent Technologies software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If Agilent Technologies receives notice of such defects during the warranty period, Agilent Technologies will replace software media which does not execute its programming instructions due to such defects.
3. Agilent Technologies does not warrant that the operation of Agilent Technologies products will be uninterrupted or error free. If Agilent Technologies is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.
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5. The warranty period begins on the date of delivery or on the date of installation if installed by Agilent Technologies. If customer schedules or delays Agilent Technologies installation more than 30 days after delivery, warranty begins on the 31st day from delivery.
6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent Technologies, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.
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8. Agilent Technologies will be liable for damage to tangible property per incident up to the greater of $300,000 or the actual amount paid for the product that is the subject of the claim, and for damages for bodily injury or death, to the extent that all such damages are determined by a court of competent jurisdiction to have been directly caused by a defective Agilent Technologies product.

9. TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL AGILENT TECHNOLOGIES OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.

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   **Should Agilent have a negotiated contract with the User and should any of the contract terms conflict with these terms, the contract terms shall control.**

# 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.*

# 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**

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(852) 2506 9285 (FAX)

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

# DECLARATION OF CONFORMITY

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

| | | |
|---|---|---|
| **Manufacturer's Name:** | **Agilent Technologies UK Ltd.** | **Agilent Technologies, Inc.** |
| **Manufacturer's Address:** | **Electronic Products & Solutions Group - Queensferry South Queensferry West Lothian, EH30 9TG Scotland, United Kingdom** | **24001 E. Mission Avenue Liberty Lake Washington 99019-9599 USA** |

**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:**

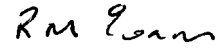
The product herewith compiles with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EFC (including 93/68/EFC) and carries the CE Marking accordingly.

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

**Supplemental Information:**

[1] 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***

# DECLARATION OF CONFORMITY

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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

# DECLARATION OF CONFORMITY

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

| | | |
|---|---|---|
| **Manufacturer's Name:** | **Agilent Technologies UK Ltd.** | **Agilent Technologies, Inc.** |
| **Manufacturer's Address:** | **Electronic Products & Solutions Group - Queensferry South Queensferry West Lothian, EH30 9TG Scotland, United Kingdom** | **24001 E. Mission Avenue Liberty Lake Washington 99019-9599 USA** |

**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.

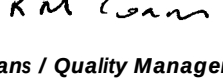
| **EMC** | **Standard** | Limit |
|---|---|---|
| | IEC 61326-1:1997+A1:1998/EN 61326:1997/A1:1998 | Group 1 Class A [1] |
| | CISPR 11:1990 / EN 55011:1991 | 4kV CD, 8kV AD |
| | IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995 | 3 V/m, 80-1000 MHz |
| | IEC 61000-4-3:1995 / EN 61000-4-3:1995 | 0.5kV signal lines, 1kV power lines |
| | IEC 61000-4-4:1995 / EN 61000-4-4:1995 | 0.5 kV line-line, 1 kV line-ground |
| | IEC 61000-4-5:1995 / EN 61000-4-5:1995 | 3V, 0.15-80 MHz |
| | IEC 61000-4-6:1996 / EN 61000-4-6:1996 | |
| | 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:**

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

***01 May 2001***



***R.M. Evans / Quality Manager***

# DECLARATION OF CONFORMITY

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

***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

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

## Herstellerbescheinigung

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

- Schalldruckpegel Lp < 70 dB(A).
- Am Arbeitsplatz.
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# 1 Measurements

# Analog Audio Measurement Description

This measurement is *not* applicable to GPRS.

## How is an analog audio measurement made?

The analog audio measurement 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.

SINAD is one of four measurements available from the Analog Audio measurement. However, SINAD measurements are not typically made when testing GSM mobiles but are more common when testing AMPS or analog mobiles.

See "Analog Audio Measurement Block Diagram" on page 38.

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.

### SINAD/Distortion State

Select On or Off to enable or disable the SINAD and Distortion measurements. This can be done remotely using the "SETup:AAUDio:SDIStortion:STATe" on page 646. When On, these measurement results are displayed on the screen below the Audio Level measurement. The SINAD/Distortion Fundamental Frequency must be entered to specify the audio frequency for the measurement (range: 100 Hz to 10 kHz).

### Audio Frequency State

Select On or Off to enable or disable the analog audio frequency measurement.

### Filter Type

- None - no filtering is provided (default).
- 100 Hz BW BPF - The 100 Hz BW Band Pass Filter (Tunable) setting is available when this filter is selected, and can be set in the range of 200 Hz to 20 kHz.
- C-Message - This type of filter is typically used when testing AMPS or other analog mobiles, and not GSM mobiles.
- 50 Hz to 15 kHz
- 300 Hz to 15 kHz

### Detector Type

Select either Peak or RMS (default) for making and displaying an analog 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 $V_{Peak}$ when the Peak detector is used. A 1-volt peak input signal would measure 0.707 $V_{RMS}$ when the RMS detector is used.

### Expected Peak Voltage

The Expected Peak Voltage 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 $mV_{peak}$ (5 $mV_{rms}$) to 20 $V_{peak}$. Remember, measuring a 1-volt rms sinewave input signal would require a 1.414 $V_{peak}$ 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.

### Expandor 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 expandor (state = Off).

### Trigger Source

Analog audio measurements use immediate triggering and are continuously re-triggered each time the Trigger Arm parameter is set to Continuous. Trigger timing is independent of any mobile protocol signaling.

## Related Topics

"Analog Audio Measurement Block Diagram" on page 38

"Analog Audio Troubleshooting" on page 958

"Audio Level Measurement Description" on page 40

"Audio Frequency Measurement Description" on page 39

"SINAD Measurement Description" on page 82

"Distortion Measurement Description" on page 52

"Programming an Audio Frequency Measurement" on page 198

"Programming an Audio Level Measurement" on page 196

"Programming a SINAD Measurement" on page 228

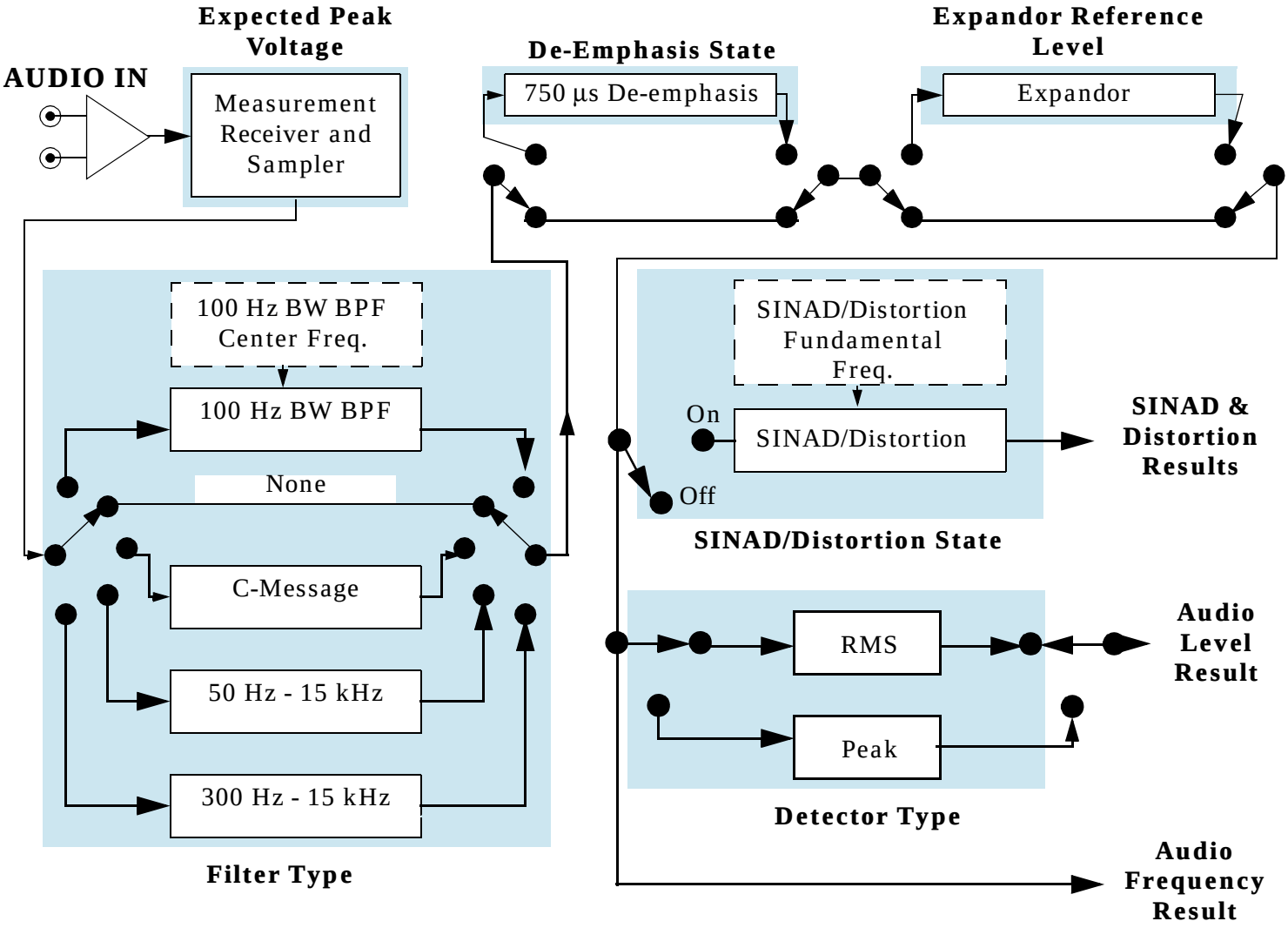
"Programming a Distortion Measurement" on page 206

"Statistical Measurement Results" on page 282 (Multi-measurements)

"Triggering of Measurements" on page 276

"Measurement Timeouts" on page 273

# Analog Audio Measurement Block Diagram




## Related Topics

"Analog Audio Measurement Description" on page 36

# Audio Frequency Measurement Description

This measurement is *not* applicable to GPRS.

## Related Topics

"Programming an Audio Frequency Measurement" on page 198

"Analog Audio Measurement Description" on page 36

"Analog Audio Measurement Block Diagram" on page 38

"Analog Audio Troubleshooting" on page 958

# Audio Level Measurement Description

This measurement is *not* applicable to GPRS.

## 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 Analog Audio measurements. Audio Level can be measured for signals in the frequency range of 100 Hz to 20 kHz, at levels from 1 $mV_{peak}$ to 20$V_{peak}$. 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 adjustable bandpass filter and the rms detector to reduce noise components.

## Related Topics

"Programming an Audio Level Measurement" on page 196

"Analog Audio Troubleshooting" on page 958

"Analog Audio Measurement Description" on page 36

"Analog Audio Measurement Block Diagram" on page 38

# Bit Error Measurement Description

The Bit Error Measurement is applicable to both GSM and GPRS. This measurement description contains two sections:


- "GSM Bit Error Measurement" on page 41
- "GPRS Bit Error Measurement" on page 45


## GSM Bit Error Measurement

### Bit Error Measurements versus Fast Bit Error Measurements

There are three commonly used types of bit error measurements in GSM:

- "BER with Frame Erasure" or "Residual BER" when the mobile station has been configured to loopback Type A.
- "BER without Frame Erasure" or "Non-residual BER" when the mobile station has been configured to loopback Type B.
- BER using burst-by-burst loopback when the mobile station has been configured to loopback Type C.

The test set allows you to select between Loopback Type A or B, and the fast bit error measurement, which uses Loopback Type C. Refer also to "Fast Bit Error Measurement Description" on page 55.

**NOTE** If the test set has codeware version A.02.00 or above, unnecessary loopback commands and delays can be eliminated by taking advantage of enhancements available.

Previous versions of the test set required you to set the loopback type, and did not have a feature that allowed time for the loop to close.

### How is a Bit Error (BER) Measurement Made?

During BER measurements, the test set generates a downlink TCH with pseudo-random binary sequence, PRBS-15, data at a known level. The mobile station receives the data, loops it back to its transmitter, and returns the data to the test set. The test set compares data sent to data received, and BER is calculated.

SETup subsystem commands are sent to the test set to specify the time taken to close its loopback path, whether to open or close a loop during downlink signaling operations (for example, channel assignment), the number of bits to test, measurement type, speech frames delay, measurements units, trigger arm, and measurement timeout values.

When a call is established on the TCH, the loopback type corresponding to one of the BER measurement types must be sent to the mobile station. The test set closes the loopback automatically and re-opens it when the measurement is closed (that is, when INITiate:BERRor is OFF).

You must set the measurement type from one of the six measurement types available, (see "SETup:BERRor[:TYPE]" on page 650). If you query a residual result when a non-residual measurement is initiated, the test set returns 9.91 E+37 (NAN). The Measurement type must be set before initiating a BER measurement. See "BER Measurement Types" on page 43

The loop must be closed before a BER test can start, using the close loop signalling delay time feature allows time for the loop to close. See "SETup:BERRor:CLSDelay[:STIMe]" on page 649 for more details.

Each mobile station may have a different time delay between receiving a speech frame and re-sending it on the uplink. By default, the test set is configured to LDControl:AUTO:ON, and the amount of delay needed is determined automatically when the test set has, for two frames, correctly received 80% of the downlink bits back on the uplink. The test set can be queried for the speech frames delay value.

If necessary, you can manually set the delay (see "SETup:BERRor:LDControl:AUTO" on page 652).

**NOTE** In case the test set is not able to correlate the data it transmits on the downlink with the data it receives on the uplink, a Measurement Timeout value should be set. If a timeout is not set and the test set is unable to correlate, the measurement will appear to "hang".

The BER measurement trigger source is always set to immediate. The BER measurement does not offer multi-measurement results. See "Statistical Measurement Results" on page 282

BER, FBER, and DAUDIO (uplink speech level) measurements are mutually exclusive measurements. Whichever of these measurements is activated last forces the others to stop.

### BER Measurement Types

Residual:

- Residual Type IA (50 bits per speech frame)
- Residual Type IB (132 bits per speech frame)
- Residual Type II (78 bits per speech frame)

Loopback Type A is sent to the mobile station when one of these residual measurement types is selected. A BER measurement with FE will return the frame erasure count or ratio results. The mobile station will indicate in the speech frame, if the downlink frame was received with CRC (cyclic redundancy check) errors the speech frames are erased. The mobile station sets all bits in the uplink speech frame to 0, indicating speech frames were erased.

Non-residual:

- Type IA (50 bits per speech frame)
- Type IB (132 bits per speech frame)
- Type II (78 bits per speech frame)

Loopback Type B is sent to the mobile station when one of these non-residual measurement types is selected. A BER measurement with CRC's (cyclic redundancy check) will return the CRC count or ratio results. The mobile station will not indicate if any speech frames in the downlink were erased.

### BER Measurement Results

The results of a BER measurement can be displayed in two ways, (number of errors counted) or (the ratio bad bits (errors) to total bits counted). If you are using the test set manually, select either Count or % from the Measurement Units field. If you are using the test set remotely, these results are available using the FETCh command, see "FETCh:BERRor:COUNt[:BITS]?" on page 533 or "FETCh:BERRor:RATio[:BITS]?" on page 536. Alternatively the "FETCh:BERRor[:ALL]?" on page 532 or "FETCh:BERRor:FULL?" on page 535 can also be used to return the results.

### Type A Residual Measurement Results

- Integrity Indicator
- Bit Error Ratio
- Bits Tested
- Bit Error Count
- Frame Erasure Ratio
- Frame Erasure Count

### Type B Non-Residual Measurement Results

- Integrity Indicator
- Bit Error Ratio
- Bits Tested
- Bit Error Count
- CRC Ratio
- CRC Count

### Related Topics for GSM

“Programming a Bit Error Measurement” on page 200

“Test Adherence to Standards” on page 86

“Fast Bit Error Measurement Description” on page 55

“Programming a Fast Bit Error Measurement” on page 211

“CALL:TCHannel:LOOPback” on page 515

“Bit Error Troubleshooting” on page 959

# GPRS Bit Error Measurement

## How is a Bit Error (BER) Measurement Made?

During BER measurements, the test set generates a downlink PDTCH with pseudo-random binary sequence, PRBS-15 data at a known level. The mobile station receives the data, loops it back to its transmitter, and returns the data to the test set. The test set compares data sent to data received, and BER is calculated.

If the test set's operating mode is set to Active Cell, the data connection type must be set to ETSI Type B in order to make BER measurements. This can be done using "CALL:FUNCtion:DATA:TYPE" on page 408. Alternatively, you can make BER measurements when the test set's operating mode is set to GPRS BCH+PDTCH test mode (see "CALL:OPERating:MODE" on page 442).

The recommended channel coding scheme for BER measurements is CS-4. You use the command "CALL:PDTCH:CSCHeme" on page 458 to set the coding scheme.

SETup subsystem commands are sent to the test set to specify the loopback delay control mode, number of bits to test, block delay, measurements units, trigger arm, and measurement timeout values.

Each mobile station may have a different time delay between receiving a block of data and re-sending it on the uplink. By default, the loopback delay control mode is set to automatic, and the amount of delay needed is determined when the test set has, for four consecutive blocks, correctly received 80% of the downlink bits back on the uplink. The test set can be queried for the block delay value using "FETCh:GBERror:DELay?" on page 550.

If necessary, you can manually set the delay using "SETup:GBERror:LDControl:AUTO" on page 676.

**NOTE** In case the test set is not able to correlate the data it transmits on the downlink with the data it receives on the uplink, a Measurement Timeout value should be set. If a timeout is not set and the test set is unable to correlate, the measurement will appear to "hang".

The BER measurement trigger source is always set to immediate. The BER measurement does not offer multi-measurement results. If you require more details on multi-measurement results, see "Statistical Measurement Results" on page 282.

## Types of Signal BER can Measure

BER measurements can be made on these types of input signals:

- One or more GPRS uplink and downlink PDTCH pairs with the mobile station in active cell mode and the data connection type set to ETSI Type B. It is important that the mobile station is set up for the same number of uplink and downlink PDTCHs to optimize measurement speed.
- One or more GPRS uplink and downlink PDTCH pairs with the mobile station in GPRS BCH+PDTCH test mode (see "CALL:OPERating:MODE" on page 442 for details on setting the cell operating mode). Note that you have to manually set your mobile station to synchronize its internal frequency and timing reference with the test set. You also have to command the mobile station to loop back the PDTCH data.

### BER Measurement Results

The results of a BER measurement can be displayed in two ways; the number of errors counted or the ratio of bad bits (errors) to total bits counted. If you are using the test set manually, both Count and Bit Error Ratio are displayed on the Bit Error measurement screen. If you are using the test set remotely, these results are available using the FETCh command, see "FETCh:GBERror:COUNt?" on page 549 or "FETCh:GBERror:RATio?" on page 550. Alternatively the command "FETCh:GBERror[:ALL]?" on page 549 can be used to return all of the following results:

- Integrity Indicator
- Bit Error Ratio
- Bits Tested
- Bit Error Count

In addition, the Intermediate Count of Bits Tested result can be queried using "FETCh:GBERror:ICOunt?" on page 550 and the Block Delay can be queried using "FETCh:GBERror:DELay?" on page 550.

### Related Topics for GPRS

"Programming a Bit Error Measurement" on page 200

"Test Adherence to Standards" on page 86

"Bit Error Troubleshooting" on page 959

# Block Error Rate (BLER) Report Measurement Description

This measurement is *not* applicable to GSM.

Block Error Rate (BLER) reports can be used in the production process to test the performance of a GPRS mobile station's receiver. The BLER result is derived from the Radio Link Control (RLC) layer's Packet ACK/NACK (Acknowledged/Not Acknowledged) message. BLER is simply the ratio of the number of negatively acknowledged blocks to the total number of blocks acknowledged by the mobile station.

The test set uses an Agilent proprietary data connection to enable BLER reports to be retrieved from the mobile station (For details on how to set the data connection type to BLER, see "CALL:FUNCtion:DATA:TYPE" on page 408).

The BLER reports which the test set provides are based on GPRS receiver tests defined in 3GPP 51.010 (formerly ETSI GSM 11.10), section 14.16.

## When are BLER Report Measurements Made?

You obtain BLER results using the GPIB query "CALL:STATus:PDTCH | PDTChannel:BLERror?" on page 505. This query returns the percentage of blocks tested that were in error and the total number of blocks used to generate the BLER result. To reset the BLER result you must use "SYSTem:MEASurement:RESet" on page 864. The BLER result does not reset automatically when you connect a different GPRS mobile station.

The BLER results are only available when the data connection status is transferring (TRAN). If you require details on data connection states, see "Data Connection Processing State Synchronization" on page 317.

## Using Different Power Levels on Downlink Timeslots

The BLER results are calculated across all active downlink timeslots, not on any individual downlink timeslot.

**NOTE** When using the multislot configurations which provide two downlinks (D2U1 and D2U2), the test set requests Packet ACK/NACK (Acknowledged/Not Acknowledged) messages from the mobile station on timeslot 4. ETSI specifies that the mobile station must respond to these requests on the same timeslot. If the downlink on timeslot 4 degrades severely (and thus has a large number of block errors), the mobile station may be unaware of a request for Packet ACK/NACK messages. If this happens, the BLER reports may hang for long periods or stop completely. This may cause the data connection to stop after a few seconds.

## Programming a BLER Report Measurement

This section provides an example of how to use BLER reports to test your mobile station's receiver via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See "Step 4: Make a connection" on page 159.

1. Configure the BCH and PDTCH parameters using the CALL subsystem.
2. Reset the BLER results using the SYSTem:MEASurement:RESet command.
3. Use the CALL:STATus:PDTCH:BLERror? query to obtain the first BLER results.
4. Re-configure the downlink PDTCH power level of one of the bursts using the CALL subsystem.
5. Reset the BLER results again using the SYSTem:MEASurement:RESet command.
6. Use the CALL:STATus:PDTCH:BLERror? query to obtain the second BLER results.

### Programming Example

```
10    ! This code assumes that the current data connection state is Transferring.
20    !
30    ! Configure BCH and PDTCH parameters
40    OUTPUT 714;"CALL:PDTCH:BAND PGSM" ! Set the PDTCH band.
50    OUTPUT 714;"CALL:POW -60" ! Set the BCH level to -60 dBm
60    OUTPUT 714;"CALL:PDTCH:MSL:CONF D2U1" ! Set the multislot configuration to
70                                          ! two downlinks, one uplink.
80    OUTPUT 714;"CALL:PDTCH:PZER:LEV 30" ! Set the P0 reference level to 30 dB.
90    OUTPUT 714;"CALL:PDTCH:CSCH CS4" ! Set the channel coding scheme to CS4.
100   !
110   ! Perform a measurement reset to ensure a stable data connection.
120   OUTPUT 714;"SYST:MEAS:RES"
130   ! Read initial BLER ensuring that result is over 2000 blocks at least
140   REPEAT
150     OUTPUT 714;"CALL:STAT:PDTCH:BLER?"
160     ENTER 714;Bler_initial,Blocks_initial
170   UNTIL (Blocks_initial>=2000 AND Blocks_initial<=2300) ! <= required for
180                                                         ! NAN (9.91E+37) case.
190   !
200   ! Print results at initial downlink PDTCH power level
210   ! of -90 dBm(-60 dBm BCH level - 30 dB P0 level)
220   PRINT "Blocks tested at -90 dBm = ";Blocks_initial
230   PRINT "BLER Result at downlink PDTCH power of -90 dBm = ";Bler_initial
240   !
250   ! Set up and select the downlink PDTCH power reduction levels.
260   OUTPUT 714;"CALL:PDTCH:PRED:LEV1 11db"
270   OUTPUT 714;"CALL:PDTCH:PRED:LEV2 0dB"
280   OUTPUT 714;"CALL:PDTCH:PRED:BURS1 PRL1"
290   OUTPUT 714;"CALL:PDTCH:PRED:BURS2 PRL2"
300   OUTPUT 714;"SYST:MEAS:RES" ! Reset the BLER results
310   !
320   ! Now obtain the second set of BLER results when burst 1 has a lower
330   ! power level which introduces more block errors.
340   REPEAT
350     OUTPUT 714;"CALL:STAT:PDTCH:BLER?"
```

```
360     ENTER 714;Bler_second,Blocks_second
370   UNTIL (Blocks_second>=2000 AND Blocks_second<=2300)
380   !
390   ! Print results when downlink burst 1 is at lower downlink PDTCH
400   ! power level of -101 dBm(-60 dBm BCH level - 30 dB P0 level - 11 dB power
410   ! reduction level).
420   PRINT
430   PRINT "Blocks tested at -101 dBm = ";Blocks_second
440   PRINT "BLER Result at downlink PDTCH power of -101 dBm = ";Bler_second
450   END
```

### Returned Values

The measurement reports returned by this program are:

- `Blocks_initial` returns the number of blocks tested to calculate the first BLER result.
- `Bler_initial` returns the BLER result, in percent (%) when the downlink PDTCH power levels of both bursts are at -90 dBm.
- `Blocks_second` returns the number of blocks tested to calculate the second BLER result.
- `Bler_second` returns the second BLER result, in percent (%). This result has been obtained when the downlink PDTCH power level of the first burst has been reduced by 11 dB to -101 dBm.

## Related Topics

"Testing a GPRS Mobile Station" on page 241

"CALL:STATus:PDTCH | PDTChannel:BLERror?" on page 505

"Programming: Getting Started Guide for E1964A GPRS Mobile Test Application Rev. A.02 E6701A GPRS Lab Application Rev. A.01" on page 150

# Decoded Audio Measurement Description

This measurement is *not* applicable to GPRS.

## How is a decoded audio (DAUDIO) measurement made?

This measurement is also known as decoded audio or uplink speech level measurement. The DAUDIO measurement tests the ability of the mobile station to encode an audio signal onto the uplink traffic channel.

1. The audio signal originates from the test set's AUDIO OUT connector. The audio signal is connected to the mobile station by means of an audio frequency input connector, or acoustically through a speaker placed near the microphone of the mobile station. See "AFGenerator" on page 330 for set up commands for the test set's audio generator.
2. The mobile station digitizes and encodes the audio signal that is transmitted on the uplink TCH.
3. The uplink TCH is decoded with a bit accurate GSM RPE-LTP decoder to yield a block of 13-bit PCM samples within the DSP. As described in ETSI GSM 06.10.

**NOTE** The MS needs to be stimulated with a pulsed audio signal during a DAUDIO measurement. The audio signal must be pulsed at a 10 Hz rate with 50% duty cycle. See "AFGenerator:PULSe[:STATe]" on page 331.

The decoded audio measurement returns the rms value, in percent of full scale, of the speech signal present on the uplink (encoded) audio signal over a 100 ms (10 Hz) period of time.

The DAUDIO measurement performs an rms level measurement of a speech signal on the uplink TCH with optional bandpass filtering. Speech data can be filtered using a tunable 100 Hz bandpass filter prior to analysis. The center frequency of the 100 Hz bandpass filter may be tuned from 200 Hz to 3.6 kHz. Setting the frequency will activate the filter.

The trigger source for a DAUDIO measurement is always set to Immediate.

The DAUDIO measurement, BER and Fast BER measurements are mutually exclusive. Whichever of these measurements is activated last forces the other to become inactive.

### Single or Multi-Measurements

The DAUDIO measurement can return single or averaged measurements defined by the multi-measurement count. A single measurement (multi-measurement count off) returns an estimate of the rms value of the decoded speech signal after removal of any dc component. The measurement units are in percent of full scale (%FS), ranging from 0 to 100%. Values greater than 70.70% may only result from non-sinusoidal signals. Multiple measurements (multi-measurement count >1) provide average, minimum, maximum, and standard deviation results. An integrity indicator is returned for both multi-measurement states. None of the results are affected by amplitude offset.

## Trigger Source

DAUDIO measurement does not support any trigger source other than immediate.

## Related Topics

"Programming a Decoded Audio Measurement" on page 204

"Test Adherence to Standards" on page 86

# Distortion Measurement Description

This measurement is *not* applicable to GPRS.

## 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 measured after digital demodulation of the traffic channel.

The test set makes two measurements to determine distortion. First, the test set measures the total audio signal level. 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.

The distortion measurement can be used to perform the audio harmonic distortion test. For example in an analog system like AMPS, two audio signals are used: a 1004 Hz tone and the 6000 Hz Supervisory Audio Tone (SAT). The 1004 Hz tone is notched out to make the measurement.

## Related Topics

“Analog Audio Measurement Description” on page 36

“Analog Audio Troubleshooting” on page 958

“Programming a Distortion Measurement” on page 206

“Test Adherence to Standards” on page 86

# Dynamic Power Measurement Description

This measurement is *not* applicable to GPRS.

## 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 an ETSI 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 663). 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 these types of input signals:

- Normal GSM TCH burst with mobile station in active cell mode.
- Normal GSM TCH burst with mobile station in test mode (no protocol).

## 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 -20 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 within the currently selected band.

## Trigger Source

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

## Related Topics

“Programming a Dynamic Power Measurement” on page 208

“SETup:DPOWer” on page 661

“FETCh:DPOWer” on page 542

“Test Adherence to Standards” on page 86

# Fast Bit Error Measurement Description

This measurement is *not* applicable to GPRS.

## Bit Error Measurements vs. Fast Bit Error Measurements

There are three commonly used types of bit error measurements in GSM:

- "BER with Frame Erasure" or "Residual BER" when the mobile station has been configured to loopback Type A.
- "BER without Frame Erasure" or "Non-residual BER" when the mobile station has been configured to loopback Type B.
- BER using burst-by-burst loopback when the mobile station has been configured to loopback Type C.

The test set allows you to select between Loopback Type A or B, and the Fast Bit Error Measurement, which uses Loopback Type C. Refer also to "Bit Error Measurement Description" on page 41.

**NOTE** If the test set has codeware version A.02.00 or above, unnecessary loopback commands and delays can be eliminated by taking advantage of enhancements available.

Previous versions of the test set required you to set the loopback type, and did not have a feature that allowed time for the loop to close.

## How is a fast bit error (FBER) measurement made?

During FBER measurements, the test set generates a downlink TCH with (Pseudo Random Binary Sequence) PRBS-15 data at a known low level. The mobile station receives the data, loops it back to its transmitter, and returns the data to the test set. The test set compares data sent to data received, and FBER is calculated. see "CALL:TCHannel" on page 508

SETup subsystem commands are sent to the test set to specify close loop delay, signal loopback control, the number of bits to test, TDMA frames delay, measurement unit, trigger arm, and measurement timeout values.

When a call is established on the TCH, the loopback type is sent to the mobile station if the signal loopback control is on, see "SETup:FBERror:SLControl[:STATe]" on page 673. If you set signal loopback control to off, the loopback type is controlled using "CALL:TCHannel:LOOPback" on page 515. If you are using the test set manually, the loopback type is controlled using **Mobile Loopback** (**F12**) on **Call Parms** menu **1 of 4**.

FBER measurements use mobile station burst-by-burst loopback, referred to as loopback type C. In loopback type C the comparison is made between the 114 bits of data sent from the test set to the mobile station, then looped back and received by the test set.

The loop must be closed before a FBER test can start, using the close loop signalling delay time feature allows time for the loop to close. See "SETup:FBERror:CLSDelay[:STIMe]" on page 669 for more details.

Each MS may have a different delay between receiving a TDMA frame and re-sending it on the uplink. By default, the test set is configured to LDControl:AUTO:ON, and the amount of delay needed is determined automatically when the test set has, for two frames, correctly received 80% of the downlink bits back on the uplink. The test set can be queried for the TDMA frames delay value.

If necessary, you can manually set the delay. See "SETup:FBERror:LDControl:AUTO" on page 671 or "SETup:FBERror:MANual:DELay" on page 672

**NOTE** In case the test set is not able to correlate the data it transmits on the downlink with the data it receives on the uplink, a Measurement Timeout value should be set. If a timeout is not set and the test set is unable to correlate, the measurement will appear to "hang".

The FBER, BERR and the DAUDIO (uplink speech level) measurements are mutually exclusive, that is which ever of these measurements is activated last forces the other to become inactive. see "Decoded Audio Measurement Description" on page 50

FBER measurement trigger source is always set to immediate. The FBER measurement does not offer multi-measurement results. see "Statistical Measurement Results" on page 282

## FBER measurement results

These the measurement results available from an FBER measurement.

The results of a FBER measurement can be displayed in two ways, (number of errors counted) or (the ratio bad bits (errors) to total bits counted). If you are using the test set remotely these results are available by using the FETCh command, see "FETCh:FBERror:COUNt?" on page 546 or "FETCh:FBERror:RATio?" on page 547. If you are using the test set manually select either Count or % from the Measurement Units field.

**Manual user interface results:**

- Fast BER Ratio (bad bits to total bits tested)
- Fast BER Count (bad bits found during a measurement)
- TDMA frame Delay (if TDMA Frame Loopback Delay Control = Manual)
- RX Level
- RX Quality

**Remote user interface results:**

- Fast BER Ratio (bad bits to total bits tested)
- Fast BER Count (bad bits found during a measurement)
- TDMA Frame Delay (if TDMA Frame Loopback Delay Control = Manual)
- Integrity Indicator
- Intermediate Count

## Related Topics

"Programming a Fast Bit Error Measurement" on page 211

"Test Adherence to Standards" on page 86

"Bit Error Measurement Description" on page 41

"Programming a Bit Error Measurement" on page 200

"CALL:TCHannel:LOOPback" on page 515

# I/Q Tuning Measurement Description

This measurement is *not* applicable to GPRS.

## How is an I/Q Tuning Measurement Made?

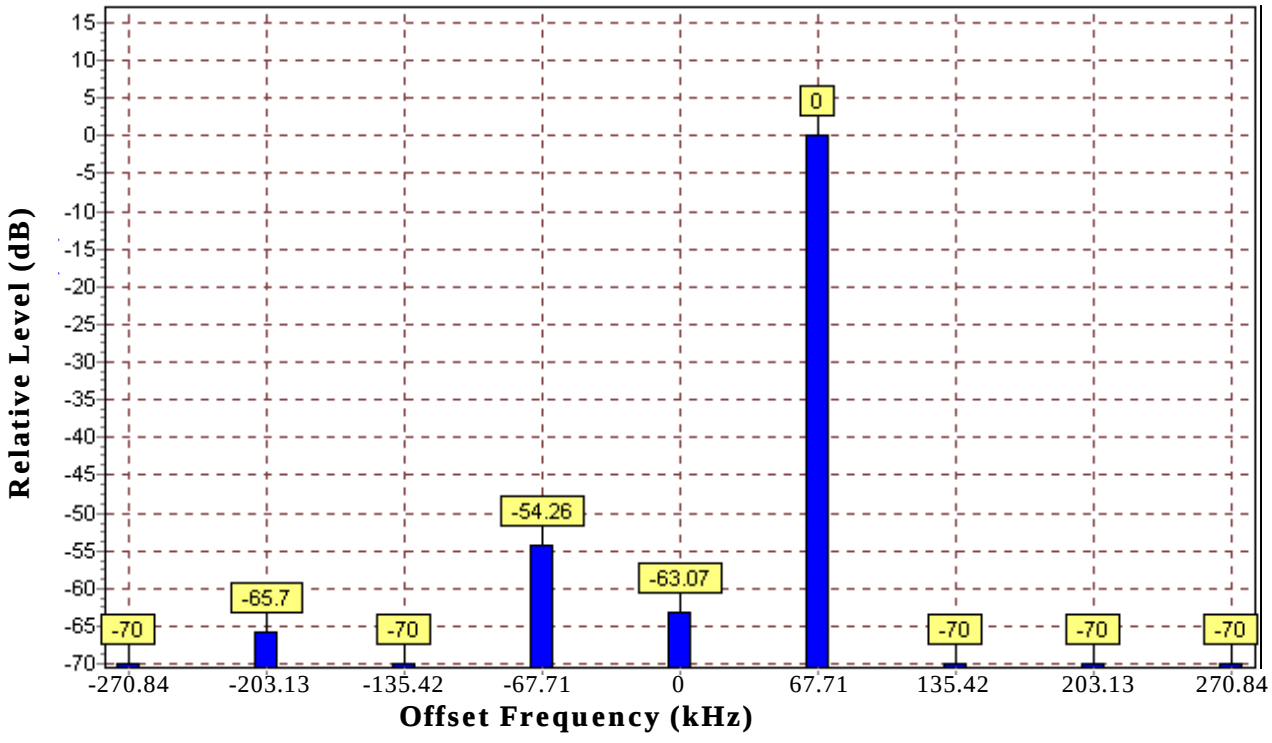
The I/Q Tuning measurement is used in the production process (normally at mobile pre-test) where the I/Q modulator of the mobile is being calibrated. The measurement is normally performed with the mobile station in test mode and transmitting a GMSK modulated sequence of all 0s or all 1s. The mobile can be transmitting either a bursted signal or a continuous wave signal. I/Q Tuning is not an ETSI specified measurement.

The carrier frequency is shifted up or down 67.7083 kHz by transmitting a sequence of all 0s (+67.7083 kHz) or all 1s (-67.7083 kHz). The accuracy of the mobile's I/Q modulator is determined by measuring the level of spurious signals relative to the desired signal (the desired signal being the carrier frequency +/-67.7083 kHz). The signals the test set measures are: the carrier frequency (Fc); Fc+/-67.7083 kHz; Fc+/-135.417 kHz; Fc+/-203.125 kHz and Fc+/-270.833 kHz. These signals are measured at the RF IN/OUT port.

The figure below shows a typical spectrum generated by a mobile transmitting a sequence of all 0s. The peak at the +67.7083 kHz offset is the one used as the reference.

The I/Q Tuning measurement also allows you to make an additional relative power measurement at any frequency you want between -13.0 MHz to -1.0 MHz and +1.0 MHz to +13.0 MHz relative to the carrier frequency.

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



## 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.

## Types of Signals I/Q Tuning can Measure

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

- Normal GSM TCH burst without a midamble.
- CW signal.

## I/Q 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 and -10 dB of the expected input level.
- Signal must be within 500 kHz of expected frequency for RF Rise triggering to function.

## Trigger Source

The trigger source depends on the type of input signal.

**Recommended Trigger Source Settings**

| Input Signal Type | Recommended Trigger Source |
|---|---|
| Normal GSM TCH burst without a midamble | RF Rise |
| CW signal | Immediate |

## Related Topics

"Programming an I/Q Tuning Measurement" on page 213

"Test Adherence to Standards" on page 86

# Output RF Spectrum Measurement Description

This section is applicable to both GSM and GPRS.

## How is an output RF spectrum (ORFS) measurement made?

ORFS is a narrow-band measurement that provides information about the distribution of the mobile station transmitter's out-of-channel spectral energy due to modulation and switching as defined in ETSI GSM 05.05, section 4.2, 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.4. For GPRS mobiles which support a single uplink timeslot, the measurement conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.3 at offsets < 1800 kHz (when the Multi-Measurement Count - Modulation parameter is set to Off using "SETup:ORFSpectrum:COUNt:STATe[:SELected]" on page 700).

The test set's measurements include both ORFS due to modulation and ORFS due to switching. Switching and modulation measurements may be performed from the same burst. If you request both modulation and switching results at the same frequency offsets, measurement throughput is improved. Measurements are made using a 30 kHz IF bandwidth, 5-pole synchronously tuned filter.

ORFS due to modulation measures out of channel interference during the useful part of the burst excluding the midamble. The measurement returns relative results in (dB) using the power in a 30 kHz bandwidth at zero offset as the reference. You can set 0 to 22 offsets.

ORFS due to switching measures out of channel interference over the entire burst, plus up to 10 additional bits on either side of the 147 bit wide normal burst. The measurement returns absolute power results (dBm) for each offset indicating the maximum value over the entire burst. You can set 0 to 8 ORFS due to switching offsets.

The number of measurements to be averaged for each offset may be different. The test set internally controls all other aspects of the measurement, including calibration.

TX power (average power), 30 kHz bandwidth power at zero offset, ORFS due to modulation average power, and ORFS due to switching maximum power are included in an ORFS measurement, when both modulation and switching measurements are made. (TX power is performed using the same method as described in the "Transmit Power Measurement Description" on page 83, which synchronizes the measurement with the burst amplitude).

### ORFS due to modulation

When multiple offsets for the ORFS due to modulation measurement are set, the DSP averages the power across the appropriate time segments (40 bits) of the burst with a 30 kHz resolution bandwidth, 5-pole, synchronously tuned filter placed at the center frequency of the burst and compares it to a time segment of the response of the same filter placed at some frequency offset. The result is a relative power measurement using the 30 kHz bandwidth power at zero offset as a reference. For each offset you specify, the DSP retunes the filter and measures the 30 kHz bandwidth power and compares it to the reference, giving a relative power measurement of signal power over the entire burst. The DSP processes the data and makes the results available to you. The 30 kHz bandwidth power at zero offset is measured only if you request at least one ORFS due to modulation measurement.

For offsets up to 1.799999 MHz, an ORFS due to modulation measurement uses the 30 kHz resolution bandwidth filter required in GSM 05.05. At the 1800 kHz offset frequency the ORFS due to modulation measurement is made using the 30 kHz resolution bandwidth filter, not the 100 kHz resolution bandwidth filter required by ETSI.

The ORFS due to modulation measurement measures both the front and back data portions of the burst. Measurements occur from bit 15 to 60 and from bit 87 to 132. GSM 11.10 recommends that this measurement is performed on only the back section of the burst. Measuring both the front and back of the burst has the speed advantage of providing two modulation measurements per burst.

### ORFS due to switching

When multiple offsets for the ORFS due to switching measurement are set, the DSP tunes the 30 kHz resolution bandwidth, 5-pole, synchronously tuned filter to the first requested offset and samples the power of the signal over the entire burst. The result for this measurement is the maximum of these sampled values and is reported as an absolute power measurement. The DSP then retunes the filter, samples the signal, processes the data for each requested offset, then provides the results.

The 30 kHz bandwidth power at zero offset measurement is not made during ORFS due to switching measurements. In order to make that measurement, you must request at least one ORFS due to *modulation* measurement.

### Single or Multi-Measurements

To obtain statistical measurement results, the multi-measurement count must be set for both switching and modulation measurements. (See "Statistical Measurement Results" on page 282 for more information.)

Changing the multi-measurement modulation or switching count number or setting multi-measurement to ON allows the test set to make multiple measurements at each frequency offset. For modulation measurements the offset values returned are the average power at each offset. For switching measurements the offset values returned are the maximum power at each offset. If you set Multi-measurement count state to OFF only one ORFS measurement is completed at each offset (that is, one ORFS due to modulation, and one ORFS due to switching measurement).

- If you want to make multiple ORFS due to *modulation* measurements and no ORFS due to switching measurements, a number must be entered in the multi-measurement modulation count, and all the *switching* offset frequencies must be off.
- In order to make multiple ORFS due to *switching* measurements and no ORFS due to modulation measurements, a number must be entered in the multi-measurement switching count, and all *modulation* offset frequencies must be off.

## Measuring ORFS on GPRS mobiles using the BLER data connection type

The result of the Output RF Spectrum measurement relies on pseudo random data being present in the data field of the RF burst. When using the BLER data connection type, these data fields do not contain pseudo random data, therefore the results may not be representative.

## Types of Signals ORFS can Measure

ORFS measurements can be made on these types of input signals:

- Normal GSM TCH or GPRS PDTCH burst with mobile station in active cell mode.
- Normal GSM TCH burst or GPRS PDTCH with mobile station in test mode.
- Non-bursted signal including GMSK modulation with mobile station in test mode.

  For a non-bursted signal, an ORFS due to switching measurement result is not useful.

## Input Signal Requirements

The ORFS measurement will complete and meet its accuracy specification under the following conditions:

- Input signal level is between –10 dBm and +43 dBm.
- Input signal level within +/–3 dB of the expected input level.
- Frequency is within +/–200 Hz of expected input frequency.

## Trigger Source

Auto triggering is the recommended trigger source for each measurement, allowing the test set to choose the preferred trigger source. However, you may want to select the trigger source.

**Table 1. Recommended Trigger Source Settings**

| Input Signal Type | Recommended Trigger Source |
|---|---|
| Normal GSM TCH or GPRS PDTCH burst with mobile station in active cell mode | Protocol |
| Normal GSM TCH or GPRS PDTCH burst with mobile station in test mode | RF Rise |
| CW signal | Immediate |

## Related Topics

“Programming an Output RF Spectrum Measurement” on page 215

“Test Adherence to Standards” on page 86

“ORFS Troubleshooting” on page 963

# Phase and Frequency Error Measurement Description

## How is a phase and frequency error (PFER) measurement made?

The PFER measurement performs a narrow-band (<200 kHz) measurement of the modulation quality and frequency accuracy of the mobile station's transmitter. The test set measures frequency error, rms phase error and peak phase error over the useful part of the burst.

The PFER measurement demodulates the data and compares the measured wave form with the "ideal" waveform that was expected for the data received. The frequency error is the difference in frequency, after adjustment for the effect of the modulation and phase error, between the RF transmission from the mobile station and the test set. The phase error is the difference in phase, after adjustment for the effect of the frequency error, between the mobile station and the theoretical "ideal" transmission. This measurement conforms to ETSI GSM 05.05; and ETSI GSM 11.10, section 13.1.

For GPRS mobiles which support a single uplink timeslot or two adjacent uplink timeslots, this measurement conforms to ETSI GSM 05.05 (Ver 8.2.0, 7.2.0, 6.6.0), section 4.6.1. It also conforms with 3GPP 51.010 (formerly ETSI GSM 11.10) if used as part of a type approval system. You can measure one of the two adjacent uplink bursts of the multislot configuration at any one time. You specify the burst to measure using "RFANalyzer:MSLot:MEASurement:BURSt" on page 636. If you want to measure the first of the two uplink bursts, there are no limits on the relative powers of the two uplink bursts in the multislot configuration. However, if you want to measure the second burst, the level of the first burst must not exceed the level of the second burst.

The PFER measurement is controlled by the DSP in the test set. No calibration is required by the user, the DSP gets calibration information during test set power up. PFER measurements can be initiated with any measurement made by the test set.

### Single or Multi-Measurements

The DSP demodulates the data and compares the measured waveform with the "ideal" waveform created by the DSP.

A single burst for a PFER measurement calculates the following:

- peak phase error
- rms phase error
- frequency error

A multiple burst PFER measurement is made when the multi-measurement state is on and calculates the maximum, minimum and average values for the following:

- peak phase error
- rms phase error
- frequency error
- worst frequency error (worst frequency error is the frequency furthest from zero.)

All of these results are available using the FETCh command. If the most positive and the most negative frequency error are the same value, the most positive frequency will be returned. Worst frequency error is only accessible through GPIB. The test set always has an integrity indicator available regardless of whether it is a single or multiple burst measurement.

### Types of Signals PFER can Measure

PFER measurements can be made on these types of input signals.

- Normal GSM TCH or GPRS PDTCH burst with mobile station in active cell mode.
- Access (RACH) burst with mobile station in active cell mode (GSM only).
- Normal GSM TCH or GPRS PDTCH burst with mobile station in test mode.
- Access (RACH) burst with mobile station in test mode (GSM only).
- Bursted signal with GMSK modulation without a valid midamble.

### Input Signal Requirements

The PFER measurement will complete and meet its accuracy specification of:

- Frequency error measurement accuracy of +/–12 Hz + timebase reference (+/–18 Hz for RACH bursts).
- rms phase error measurement accuracy of less than +/–1 degree.
- Peak phase error measurement accuracy of less than +/–4 degrees.

under these conditions:

- Level is between –15 dBm and +43 dBm.
- Level within +/–3 dB of the expected input level.
- Frequency is within +/–100 kHz of expected input frequency.

### Trigger Source

Auto triggering is the recommended trigger source for each measurement allowing the test set to choose the preferred trigger source. However, you may want to select the trigger source. Immediate trigger source is not recommended for PFER measurements.

**Table 2. Recommended Trigger Source settings**

| Input Signal Type | Recommended Trigger Source |
|---|---|
| Normal GSM TCH or GPRS PDTCH burst with mobile station in active cell mode | Protocol or RF Rise |
| RACH burst with mobile station in active cell mode (GSM only) | Protocol or RF Rise |
| Normal GSM TCH or GPRS PDTCH burst with mobile station in test mode | RF Rise |
| RACH burst with mobile station in test mode (GSM only) | RF Rise |
| Bursted signal with GMSK modulation but no valid midamble | RF Rise |
| Non-bursted (CW) signal with a manual frequency offset of +/- 67.7083 kHz | Immediate |

## Burst Synchronization

The PFER measurement provides you with a choice for the time reference (burst synchronization). (See "Burst Synchronization of Measurements" on page 280). For GPRS mobiles, you should note that only the Midamble synchronization method is available when you set the multislot configuration to D2U2 (2 downlink timeslots, 2 uplink timeslots). For more details on setting the multislot configuration, see "CALL:PDTCH:MSLot:CONFiguration" on page 460.

**Table 3.**

| Burst Synchronization | Description |
|---|---|
| Midamble | References measurement timing to the midamble transmitted within a timeslot. |
| RF Amplitude | The amplitude rise and fall of a transmitted burst determines the measurement time reference. |
| None | No edge of the burst is detected, the measurement is made using the first 87 or 147 bits of data found centered around the middle of the expected burst position. Can be used when measuring non-bursted signals |

## Related Topics

"Programming a Phase and Frequency Error Measurement" on page 218

"Test Adherence to Standards" on page 86

"Phase and Frequency Error Troubleshooting" on page 964

"Confidence Levels" on page 1035

# Power versus Time Measurement Description

The Power versus Time Measurement is applicable to both GSM and GPRS. This measurement description contains two sections:


- "GSM Power versus Time Measurement" on page 67
- "GPRS Power versus Time Measurement" on page 71


## GSM Power versus Time Measurement

### How is a Power versus Time (PvT) measurement made?

PvT measurements determine if the mobile station's transmitter power falls within specified power and timing ranges. Refer to the "Typical GSM PvT Measurement" on page 70.

During a PvT measurement, the test set makes a narrowband point-by-point measurement of the instantaneous power received during the signal burst. The number of individual samples measured across the burst is 2220. A pass or fail result is returned based on a mask comparison (defined in "ETSI GSM 05.05 Ver 8.2.0, 7.2.0, 6.6.0 Annex B").

Included with the narrowband point-by-point measurement is a broad-band PvT carrier power measurement, labeled as Transmit Power on the Summary screen. The PvT Transmit Power measurement is synchronized to the burst midamble as recommended in 3GPP 51.010 (formerly ETSI GSM 11.10). (The test set also provides a faster transmit power measurement that is synchronized to the burst's amplitude. See "Transmit Power Measurement Description" on page 83).

The dynamic range of the PvT measurement is approximately 70 dB.

This measurement conforms to 3Gpp 51.010 (formerly ETSI GSM 11.10), section 13.3. This is based on ETSI GSM 05.05 Ver 8.2.0, 7.2.0, 6.6.0 Annex B.

### Power versus Time Measurement Results

The primary result of a PvT measurement is the pass/fail result. The pass/fail result that the test set returns indicates whether the **entire** burst fell within power and timing ranges determined by a point-by-point comparison of the power versus time measurement mask.

The PvT measurement examines the burst to determine the points where the burst fails by the most or is closest to failing the upper and lower limits. These worst case points provide the upper and lower limit margin results. A negative value, along with the offset time, is returned for the result if the burst fails the mask. A positive value indicates the burst is within the mask. See "FETCh:PVTime:MASK:ALL?" on page 578.

For statistical analysis, the test set allows you to set up to 12 time markers. These markers do not define the mask, but are merely used to get results from specified points on the mask. See "SETup:PVTime:TIME[:OFFSet][:SELected]" on page 754. Note that these points are not the same as those used in the point-by-point comparison which determines the pass/fail result.

The following lists show the results available for single measurements, multi-measurements and statistical measurements:

- Results for a *single* PvT measurement are listed below. Results one through four can be obtained using the query "FETCh:PVTime[:ALL]?" on page 575. Results 5 through 8 can be obtained using the query

"FETCh:PVTime:MASK:ALL?" on page 578.

1. PvT measurement integrity indicator
2. PvT mask pass/fail result (0 = Pass, 1 & NaN = Fail)
3. Transmit carrier power with midamble synchronization (average power during the burst)
4. PvT maximum power at up to 12 time offsets
5. Upper limit timing margin worst case (the time offset where the signal came close to or exceeded upper timing limit)
6. Upper limit power margin worst case (how close to or where the signal exceeded upper power limit)
7. Lower limit timing margin worst case (the time offset where the signal came close to or exceeded lower timing limit)
8. Lower limit power margin worst case (how close or where the signal exceeded lower power limit)

- In addition to the results you can obtain for a single measurement the following results are also available for *multi-measurements*. These results can be obtained using the query "FETCh:PVTime:TXPower:ALL?" on page 576.

  1. Average of transmit carrier power measurements (average of averages)
  2. Minimum transmit carrier power measured across each burst
  3. Maximum transmit carrier power measured across each burst
  4. Standard deviation of transmit carrier power measured across each burst

- Statistical PvT measurement results, calculated from measurements taken at each of the active time offset markers or across a subset of the markers and available only through programming commands are listed below. These results can be obtained using the `FETCH:PVTime:POWer` queries.

  1. Average Power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
  2. Maximum power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
  3. Minimum power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
  4. Standard deviation of power (in dBc) measured at the marker(s) relative to transmit power (carrier power)

- The measurement integrity indicator is another result available for any completed PvT measurement. This result provides information about error conditions which occurred and may have affected the accuracy of the most recently completed measurement. For more information about measurement integrity, refer to "Integrity Indicator" on page 283.

- Measurement progress report is a feature that allows you to periodically see how far multi-measurement cycle has progressed. When the multi-measurement count is greater than 1, the progress report will indicate the number of individual sub-measurements that have been completed, *n*, out of the total number to be completed, *m*. "n" is referred to as ICOunt remotely. "m," the total number of measurements to be made, is based on the PvT settings you make and the input signal attributes.

  The progress report is displayed on the test set's screen in an "n of m" format. The number of measurements completed, *n*, increases from zero to the total number of measurements which need to be made, *m*.

## Types of Signals Power vs. Time Can Measure

The following list summarizes the input signal attributes and mobile station operating modes for which PvT can be measured with the test set.

1. Normal GSM TCH burst with mobile station in active cell mode.
2. Normal GSM TCH burst with mobile station in test mode (no protocol).
3. GSM RACH burst with valid midamble with mobile station in active cell mode.

### Power vs. Time Input Signal Requirements

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

1. Input signal level is between –15 dBm and +43 dBm.
2. Transmit power is within +/-3 dB of expected input level.
3. Input signal frequency is within +/-10 kHz of expected input frequency.

### Trigger Source

Triggering choices available for the PvT measurement are RF rise, protocol, immediate, and auto. In most cases, auto triggering provides the optimum measurement triggering condition for the PvT measurement.

When auto triggering is selected, the test set chooses a trigger source based on the optimum trigger source available. For example, PvT measurements will automatically be triggered by a protocol trigger if a call is connected or call processing events provide the protocol trigger source.

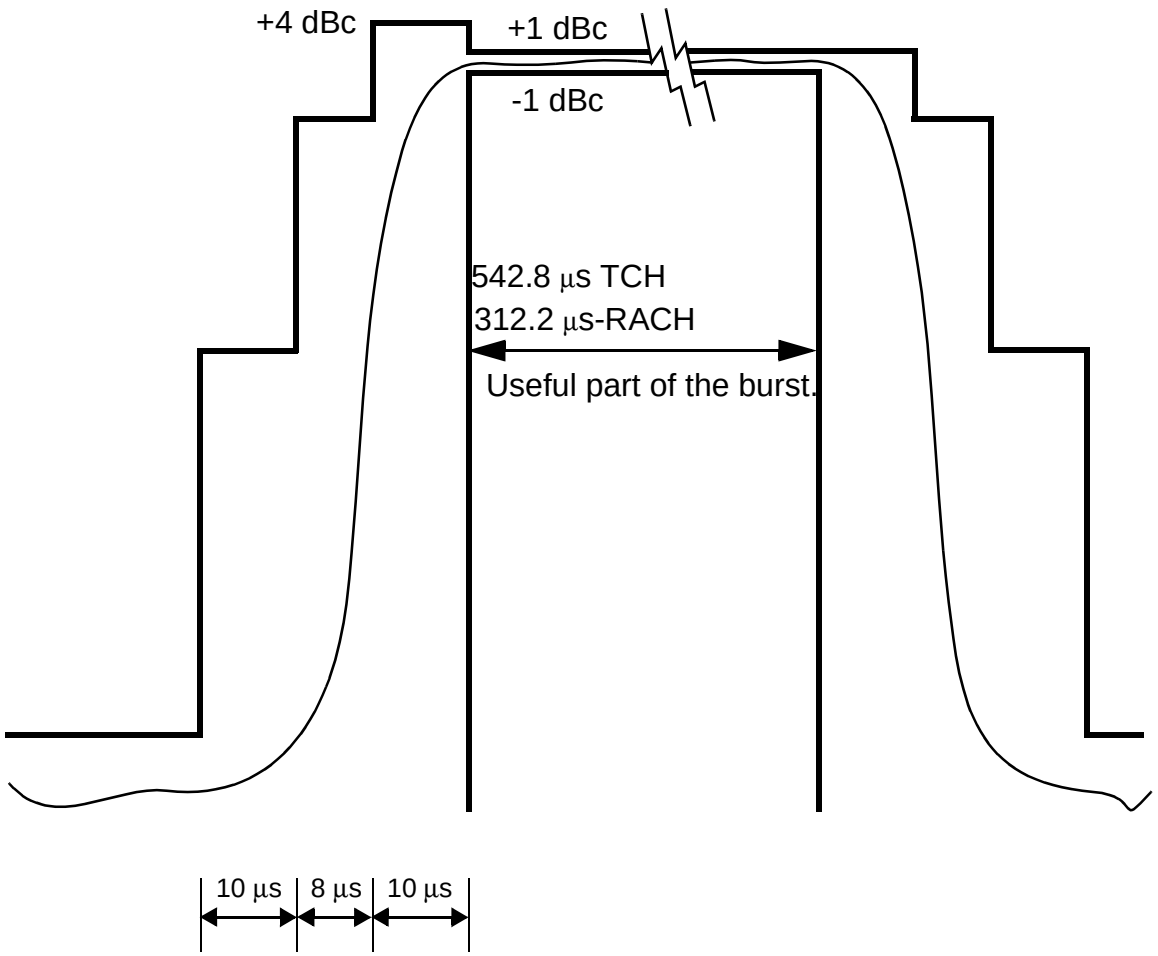
In situations where no protocol trigger is available, the test set will choose RF rise triggering for the PvT measurement. An example of this situation might be when the test set is in test mode operating mode.

**Table 4. Recommended Trigger Source Settings**

| Input Signal Type | Recommended Trigger Source |
|---|---|
| Normal GSM TCH burst with mobile station in active cell mode | RF Rise or Protocol |
| RACH burst with mobile station in active cell mode | RF Rise or Protocol |
| Normal GSM TCH burst with mobile station in test mode | RF Rise |
| RACH burst with mobile station in test mode | RF Rise |
| Bursted signal with GMSK modulation but no valid midamble | RF Rise |
| CW signal | Immediate |

For more information on measurement triggering, refer to “Triggering of Measurements” on page 276.

**Figure 2. Typical GSM PvT Measurement**




NOTE: dBc = dB relative to the power across the useful part of the burst

## Burst Synchronization

The PvT measurement provides you with a choice for the time reference setting (burst synchronization). (See "Burst Synchronization of Measurements" on page 280).

**Table 5.**

| Burst Synchronization | Description |
|---|---|
| Midamble | References measurement timing to the midamble transmitted within a timeslot. |
| RF Amplitude | The amplitude rise and fall of a transmitted burst determines the measurement time reference. |
| None | No edge of the burst will be detected, the measurement will be made using the first 87 or 147 bits of data found centered around the middle of the expected burst position. For may be used when measuring non-bursted signals |

### Related Topics

"Programming a Power versus Time Measurement" on page 222

"Test Adherence to Standards" on page 86

"Power versus Time Troubleshooting" on page 965

## GPRS Power versus Time Measurement

### How is a Power versus Time (PvT) measurement made?

PvT measurements determine if the mobile station's transmitter power falls within specified power and timing ranges. Refer to the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75.

During a PvT measurement, the test set makes a narrowband point-by-point measurement of the transmitted carrier power of the GPRS mobile station as it varies across a single burst or two adjacent GMSK modulated TDMA bursts. The number of individual samples measured across a single burst is 2220. When measuring multiple bursts, 2220 samples are taken on each burst, however there is an overlap of approximately 10%. A single pass or fail result is returned for the entire multislot configuration. This means that if any part of the multislot configuration fails the multislot mask, the result is a Fail. Additional information is provided to indicate which segments of the multislot configuration have failed.

When measuring two adjacent uplinks, each of these can have different power levels. However, the GPRS PvT measurement does not support multislot configurations where the first burst's level is greater than the second burst's level. This also applies to the GPRS PvT TX power measurement. A Potential Receiver Saturation (20) Integrity value will be returned if such a multislot configuration is measured. For more details on the range of Integrity Indicator values, see "Integrity Indicator" on page 283.

Included with the narrowband measurement are broad-band carrier power measurements of the average power for each of the individual bursts in the multislot configuration. The PvT Transmit Power measurement is synchronized to the burst midamble as recommended in 3Gpp 51.010 (formerly ETSI GSM 11.10). (The test set also provides a faster transmit power measurement that is synchronized to the burst's amplitude. See "Transmit Power Measurement Description" on page 83).

The dynamic range of the PvT measurement is approximately 70 dB.

When using the GPRS PvT measurement to measure two adjacent bursts, the Guard Period Length parameter must be set correctly to ensure accurate pass/fail testing of the first guard period. For more details on setting this parameter see "CALL:MS:TX:BURSt:GPLength" on page 434.

This measurement conforms to ETSI GSM 05.05 (Ver 8.2.0, 7.2.0, 6.6.0), section 4.5 and Annex B. It will also conform with 3Gpp 51.010 (formerly ETSI GSM 11.10) if used as part of a type approval system.

**Power versus Time Measurement Results** The primary result of a PvT measurement is the pass/fail result. The pass/fail result that the test set returns indicates whether the **entire** multislot configuration fell within power and timing ranges determined by a point-by-point comparison of the power versus time measurement mask.

The PvT measurement examines the multislot configuration to determine the points which have failed the most, or the points which are closest to failing the upper and lower limits. These worst case points provide the upper and lower limit margin results. A negative value, along with the offset time, is returned for the result if the multislot configuration fails the mask. A positive value indicates the multislot configuration is within the mask. The command "FETCh:PVTime[:BURSt[1]]:MASK:ALL? FETCh:PVTime:BURSt2:MASK:ALL?" on page 590 is used to return these values for the burst you specify.

For statistical analysis, the test set allows you to set up to 12 time markers per burst. These markers do not define the mask, but are merely used to get results from specified points on the mask. To set these markers you use "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" on page 756. Note that these points are a subset of those used in the point-by-point comparison which determines the pass/fail result.

The following lists show the results available for single measurements, multi-measurements and statistical measurements:

- Results for a *single* PvT measurement are listed below. Results one through four can be obtained using the query "FETCh:PVTime[:BURSt[1]][:ALL]? FETCh:PVTime:BURSt2[:ALL]?" on page 587. Results 5 through 8 can be obtained using the query"FETCh:PVTime[:BURSt[1]]:MASK:ALL? FETCh:PVTime:BURSt2:MASK:ALL?" on page 590.

  1. PvT measurement integrity indicator for each burst in the multislot configuration
  2. PvT multislot mask pass/fail result (0 = Pass, 1 & NaN = Fail)
  3. Transmit carrier power with midamble synchronization (average power during the burst) for each burst in the multislot configuration
  4. PvT maximum power at up to 12 time offsets
  5. PvT mask error code (this indicates which parts of the multislot configuration are causing failure). For more details on the mask error code result see "FETCh:PVTime:MASK[:FAIL]:SEGment?" on page 579.
  6. Upper limit timing margin worst case for each burst in the multislot configuration (the time offset where the signal came close to or exceeded upper timing limit)
  7. Upper limit power margin worst case for each burst in the multislot configuration (how close to or where the signal exceeded upper power limit)
  8. Lower limit timing margin worst case for each burst in the multislot configuration (the time offset where the signal came close to or exceeded lower timing limit)

9. Lower limit power margin worst case for each burst in the multislot configuration (how close or where the signal exceeded lower power limit)

- In addition to the results you can obtain for a single measurement the following results are also available for *multi-measurements*. These results can be obtained using the query "FETCh:PVTime[:BURSt[1]]:TXPower:ALL?FETCh:PVTime:BURSt2:TXPower:ALL?" on page 588

  1. Average of transmit carrier power measurements (average of averages) for each burst in the multislot configuration
  2. Minimum transmit carrier power measured across each burst
  3. Maximum transmit carrier power measured across each burst
  4. Standard deviation of transmit carrier power measured across each burst

- Statistical PvT measurement results, calculated from measurements taken at each of the active time offset markers or across a subset of the markers and available only through programming commands are listed below. These results can be obtained using the `FETCH:PVTime[:BURSt[1]]:POWer` and `FETCH:PVTime[:BURSt[2]]:POWer` queries.

  1. Average Power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
  2. Maximum power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
  3. Minimum power (in dBc) measured at the marker(s) relative to transmit power (carrier power)
  4. Standard deviation of power (in dBc) measured at the marker(s) relative to transmit power (carrier power)

- The measurement integrity indicator is another result available for any completed PvT measurement. This result provides information about error conditions which occurred and may have affected the accuracy of the most recently completed measurement. For more information about measurement integrity, refer to "Integrity Indicator" on page 283.

- The measurement progress report is a feature that allows you to periodically see how far a multi-measurement cycle has progressed. When the multi-measurement count is greater than 1, the progress report indicates the number of individual sub-measurements that have been completed, *n*, out of the total number to be completed, *m*. "n" is referred to as ICOunt remotely. "m," the total number of measurements to be made, is based on the PvT settings you make and the input signal attributes.

  The progress report is displayed on the test set's screen in an "n of m" format. The number of measurements completed, *n*, increases from zero to the total number of measurements which need to be made, *m*.

## Types of Signals Power vs. Time Can Measure

The following list summarizes the input signal attributes and mobile station operating modes for making PvT measurements.

1. All supported GPRS PDTCH multislot configurations with the mobile station in active cell mode.
2. All supported GPRS PDTCH multislot configurations with the mobile station in GPRS BCH or GPRS BCH+PDTCH test mode (no protocol).

For details on the multislot configurations which the test set supports, see "CALL:PDTCH:MSLot:CONFiguration" on page 460.

### Power vs. Time Input Signal Requirements

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

1. Input signal level is between –15 dBm and +43 dBm.
2. Input signal level is within +/-3 dB of expected input level.
3. Input signal frequency is within 10 kHz of the measurement frequency.

### Trigger Source

The triggering choices available for the PvT measurement are RF rise, protocol, immediate, and auto. In most cases, auto triggering provides the optimum measurement triggering condition for the PvT measurement.

When auto triggering is selected, the test set chooses a trigger source based on the optimum trigger source available. For example, PvT measurements are automatically triggered by a protocol trigger if a data connection is established or data connection processing events provide the protocol trigger source.

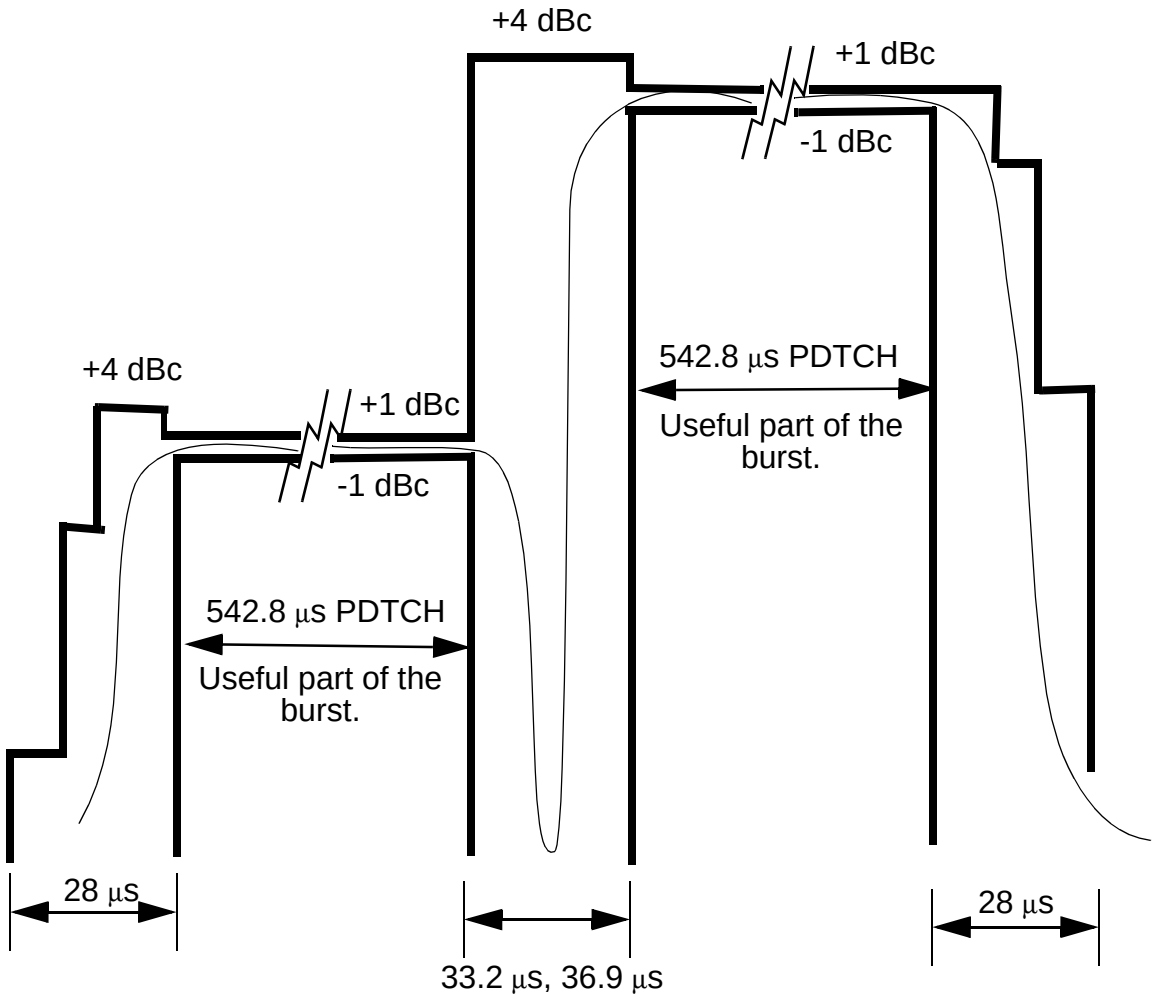
In situations where no protocol trigger is available, the test set chooses RF rise triggering for the PvT measurement. An example of this situation is when the test set is in one of the test mode operating modes.

**Table 6. Recommended Trigger Source Settings**

| Input Signal Type | Recommended Trigger Source |
|---|---|
| GPRS PDTCH multislot configuration with mobile station in active cell mode | RF Rise or Protocol |
| GPRS PDTCH multislot configuration with the test set in GPRS BCH or GPRS BCH+PDTCH test mode | RF Rise |
| Bursted signal with GMSK modulation but no valid midamble | RF Rise |
| CW signal | Immediate |

For more information on measurement triggering, refer to "Triggering of Measurements" on page 276.

**Figure 3. Typical GPRS PvT Mask for a Two Burst Multislot Configuration**




NOTE: dBc = dB relative to the power across the useful part of the appropriate burst

## Burst Synchronization

The PvT measurement provides you with a choice for the time reference setting (burst synchronization) for a single uplink burst. In the case of two adjacent uplink bursts the burst synchronization is fixed to Midamble. If a valid midamble cannot be found, the measurement will complete on a best effort basis using RF Amplitude synchronization. See "Burst Synchronization of Measurements" on page 280.

**Table 7.**

| Burst Synchronization | Description |
|---|---|
| Midamble | References measurement timing to the midamble transmitted within a timeslot. |
| RF Amplitude | The amplitude rise and fall of a transmitted burst determines the measurement time reference. |
| None | No edge of the burst will be detected, the measurement will be made using the first 87 or 147 bits of data found centered around the middle of the expected burst position. None may be used when measuring non-bursted (CW) signals. |

### Related Topics

"Programming a Power versus Time Measurement" on page 222

"Test Adherence to Standards" on page 86

"Power versus Time Troubleshooting" on page 965

# RACH Measurement Description

This measurement is *not* applicable to GPRS.

## What is a RACH?

When a mobile first attempts to originate a call it sends a RACH (Random Access Channel) burst. The RACH is transmitted on the uplink frequency of the channel number used by the Broadcast channel (BCH). The RACH is the first burst sent by the mobile. This burst is short, only 312.2 ms, as opposed to the normal GSM burst of 542.8 ms. The RACH is used by the base station to determine the timing advance which it then sends back to the mobile. Once the mobile receives this information it starts to transmit normal bursts.

## Measurements that can be performed on a RACH

The test set can perform the following three measurements on a RACH in Active Cell or Test mode:

- Power versus Time
- Transmit Power
- Phase and Frequency Error

**NOTE** Only one measurement at a time can be made on the RACH even if two measurements are initiated.

## Triggering

The type of triggering used is dependent on whether you are in Active Cell or Test mode:

Active Cell mode:
The default triggering of Auto is acceptable for most signals. (In Active Cell mode Auto is equivalent to Protocol.) However, if the mobile's RACH timing is outside the specified limits you may need to use RF Rise triggering.

Test mode:
The default triggering of Auto should be used. (In Test mode Auto is equivalent to RF Rise.)

## Overview of Measurement Procedure in Active Cell Mode

1. Set operating mode to Active Cell.
2. Set the receiver control to manual.
3. Set the test set's measurement receiver to the frequency the RACH will arrive on. The simplest way to do this is to set the manual channel (that is, the expected ARFCN) to the ARFCN of the BCH. Alternatively you could set the expected frequency to the uplink frequency of the BCH ARFCN.
4. Ensure trigger mode is set to Auto.

Once the RACH measurement is completed, in order to make further measurements on the TCH, ensure you reset the receiver control to Auto.

## Overview of Measurement Procedure in Test Mode

1. Set operating mode to Test.
2. Set the test function to either BCH, or, BCH + TCH.
3. Set the Broadcast Channel to the channel you wish to use.
4. Using your proprietary commands, initiate the mobile to generate a sequence of RACH bursts on the BCH.
5. Start the appropriate measurement.

## Example Procedure

The following procedure details how to make a power versus time RACH measurement manually while in Active Cell mode.

1. Press the blue **SHIFT** key then the green **Preset** key. The “Call Setup Screen” is displayed.
2. Press the **More** key (which is positioned immediately below **F12**) two times. This displays screen **3 of 4**.
3. Press **Receiver Control** (**F7**) and set to **Manual**.
4. Press **Manual Channel** (**F9**) and change from 30 to 20. (This sets it to the same channel as the **Broadcast Chan** on screen **1 of 4**.)
5. Press **Measurement selection**. (This key is positioned below the display.)
6. Select **Power vs Time**.
7. Press **Power vs Time Setup** (**F1**).
8. Press **Measurement Setup** (**F1**).
9. Set **Trigger Arm** to **Single**, then select **Close Menu** (**F6**).
10. Press **START SINGLE** on the front panel of the test set. (Note, you are starting the measurement before originating a call. This is to ensure that it is the RACH burst that is measured.)
11. Connect the mobile, then originate a call from the mobile.
12. Immediately you press send on the mobile the power versus time measurement result is displayed. You can confirm that the measurement has occurred on the RACH by examining the measurement results. With a RACH measurement, since the burst is shorter than normal, the power drops off rapidly after 331 µs. To examine the results select **Return to PvT Control** (**F6**), **Change View** (**F2**), then select **Numeric 1 of 2** (**F2**), and **Numeric 2 of 2** (**F3**).
13. To do further measurements on the TCH ensure that the Receiver Control is returned to Auto.

## Related Topics

“Programming a RACH Measurement” on page 226

“RACH Troubleshooting” on page 969

# SACCH Report Measurement Descriptions

This measurement is *not* applicable to GPRS.

When a call is established (the operating mode is active cell and the call status is not idle), the mobile station is required to report on the SACCH logical channel. The reported results available from the test set are shown here:

- MS TX Level Reported
- TCH Timing Advance Reported
- RX Level
- RX Qual
- Neighbour Channel
- Neighbour RX Level 1
- Neighbour NCC 1
- Neighbour BCC 1

## When are SACCH Report Measurements Made?

When the test set receives SACCH data from the mobile station, results are reported to you in the SACCH Report window (Call Setup screen), and the Neighbour Cell Report window (Cell Info screen). The results are reported remotely with the CALL:MS:REPORTED commands. No mechanism is provided to turn off SACCH data reports.

The SACCH reports are delayed, they reflect what the mobile station is actually experiencing. It is possible for SACCH reported MS TX level results to be different than the cell power level due to limitations of the mobile station. The SACCH reported TCH timing advance should eventually match the value in the Timing Advance field once the mobile station has time to react.

SACCH data will report any time there is a downlink TCH and the mobile station is synchronized to the test set transmitting a valid SACCH on the uplink.

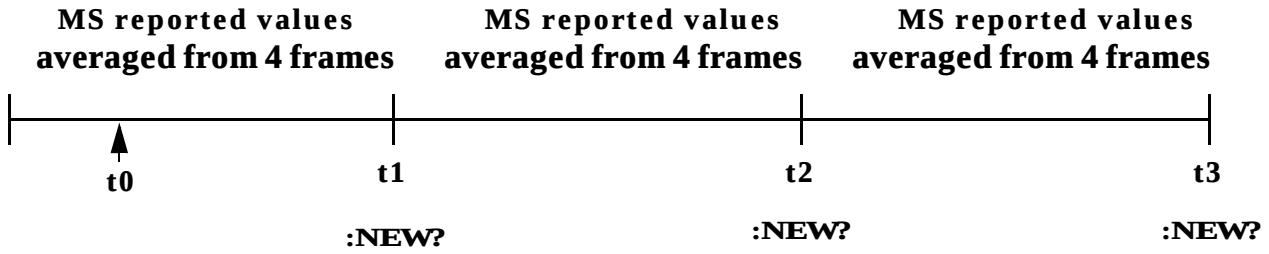
### :NEW? and [:LAST?] Queries

:NEW? queries hang until a new SACCH message is received by the test set or until 10 seconds have elapsed at which point the test set times out. The mobile station issues data updates on the SACCH every 480 ms, (4 frames).

Measurements made during this four frame period are averaged and the result of these averaged measurements are reported by the mobile station during the next period. Measurements must be stable in order to give valid (stable) results for a :NEW? query. Therefore, it may take up to three SACCH reports before a reported value accurately reflects a change to any of its parameters. See Figure 1.

After changing measurement parameters, you must send three consecutive :NEW? queries to obtain stable, accurate results. By querying :NEW? three times the value becomes stable for the second query, and meaningful stable results are then reported for the third query. The results from the first two queries should not be used.

**Figure 4. SACCH Report Measurement Cycle**




**t0**: measurement parameter is changed to a new value.
**t1-t2**: MS measures the new value.
**t3**: the test set receives the first SACCH report that contains valid results reflecting the new parameter value.

If several SACCH reported values are needed from the same report, the first value needed should be queried three times (to receive a stable new report). Then the additional values should be immediately queried using the :LAST? query before the next report arrives or the measurement parameters are changed again.

The :LAST? query is not a hanging query; values are returned from the last SACCH report. As shown in the following program example (line 60), the :LAST? command is optional. If :NEW? is not used in the MS:REPORTED command, the :LAST value is automatically reported.

### Programming Example

```
10    OUTPUT 714;"CALL:CELL:POW -83"
20    OUTPUT 714;"CALL:MS:TADV 11"
30    OUTPUT 714;"CALL:MS:TXL 11"
40    OUTPUT 714;"CALL:MS:REPORTED:TXL:NEW?;NEW?;NEW?"   ! Query 3 times
50    ENTER 714;Ignore_result,Ignore_result,Valid_result ! Only use Valid_result
60    OUTPUT 714;"CALL:MS:REPORTED:RXL?;TADV?"           ! Additional values
70    ENTER 714;Rceived_lvl,Timing_adv
80    END
```

## SACCH Report Measurement Results

- MS TX level reported results reflect the value set in the Call Parms, MS TX Level field.
- TCH timing advance reported results reflect the value set in the Call Parms, Timing Advance field.
- RX Level reported reflects the received level of TCH in dB, from the Call Parms, Cell Power field that the MS measured during the preceding SACCH.
- RX Qual reported reflects the perceived quality of the signal used for the RX level SACCH report.

## Neighbour Report Measurement Results

The mobile station determines what neighbour cells to measure from the BA tables transmitted on the BCH and the SACCH. The test set reports results from neighbour cell 1.

- Neighbour channel 1 results reflect the first ARFCN reported by the mobile station in the SACCH report.
- Neighbour NCC 1 results reflect the first network color code reported by the mobile station in the SACCH report.
- Neighbour BCC 1 results reflect the first base station color code reported by the mobile station in the SACCH report.
- Neighbour RX level 1 results reflect the first cell power level reported by the mobile station in the SACCH report.

## Related Topics

"Configuring Mobile Station Operating Parameters" on page 97

"CALL:MS:REPorted:TXLevel[:LAST]?" on page 432

"CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?" on page 433

"CALL:MS:REPorted:TADVance[:LAST]?" on page 432

"CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?" on page 432

"CALL:MS:REPorted:RXLevel[:LAST]?" on page 430

"CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?" on page 430

"CALL:MS:REPorted:RXQuality[:LAST]?" on page 431

"CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?" on page 431

"CALL:MS:REPorted:NEIGhbour[1]?" on page 426

# SINAD Measurement Description

This measurement is *not* applicable to GPRS.

## How is a SINAD measurement made?

SINAD is one of four measurements available from the Analog Audio measurement. However, SINAD measurements are not typically made when testing GSM mobiles but are more common when testing AMPS or other analog mobiles.

SINAD is a receiver audio quality measurement for mobiles. It is the ratio of Signal+Noise+Distortion divided by Noise+Distortion, expressed in dB. SINAD can be measured in the range of 100 Hz to 10 kHz.

The SINAD measurement is used to determine receiver RF sensitivity. SINAD is usually measured in 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 >=12 dB SINAD reading.

### 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 higher by up to 0.8 dB when measuring 12 dB SINAD. This is due to the more precise digital notch filter used by the Agilent 8960, allowing a more accurate noise measurement to be made. The Agilent 8920B uses an analog filter that does not have as precise a filter notch as the Agilent 8960.

## Related Topics

"Programming a SINAD Measurement" on page 228

"Analog Audio Troubleshooting" on page 958

"Analog Audio Measurement Description" on page 36

"Test Adherence to Standards" on page 86

# Transmit Power Measurement Description

This section is applicable to both GSM and GPRS.

## How is a transmit power (TXP) measurement made?

The TXP measurement performs a power measurement on a mobile station, averaged over the useful part of the burst. The signal is captured with a wide band 3 GHz fast RF power detector.

For GPRS mobiles, TXP provides a broadband measurement of the peak transmitted carrier power of a GMSK modulated signal for a specified burst in a multislot configuration which consists of adjacent timeslots. Only one burst which you specify using "RFANalyzer:MSLot:MEASurement:BURSt" on page 636 is measured at a time.

In order to provide you with a very fast TXP measurement the test set measures the power without synchronizing it to the midamble. The measurement is made with RF amplitude synchronization; therefore, the signal does not need to be demodulated to determine the midamble. This technique is different than the TXP measurement defined in 3GPP 51.010 (formerly ETSI GSM 11.10). (See "Burst Synchronization of Measurements" on page 280). The power versus time measurement provides a carrier power measurement that is synchronized to the burst's midamble, and conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.3 and 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.2. (See "Power versus Time Measurement Description" on page 67 for more details.)

The output RF spectrum measurement makes the TXP measurement as part of its measurement process, and makes this measurement result available along with output RF spectrum due to modulation and switching.

The TXP measurement is completely controlled by the digital signal processor (DSP) in the test set. Any power measurement requires calibration to ensure accuracy. The power meter used for this measurement is zeroed automatically by the DSP as needed, with no action required by you. No temperature dependent calibration is required because temperature compensation in the power detector circuits provide temperature stability.

### Single or Multi-Measurements

The DSP analyzes the data and calculates the results. A single burst for a TXP measurement calculates the average power over the useful part of the burst. A multiple burst transmit power measurement is made when the multi-measurement state is on. This measurement calculates average, minimum, maximum, and standard deviation of the average power measured. All of these results are available to the user with the FETCh command. The test set always has an integrity indicator available regardless of whether single or multiple burst measurements are selected.

## Types of Signals TX Power can Measure

TXP measurements can be made on these types of input signals.

- Normal GSM TCH or GPRS PDTCH burst with mobile station in active cell mode.
- Access (RACH) burst with mobile station in active cell mode (GSM only).
- Normal GSM TCH or GPRS PDTCH burst with mobile station in test mode.
- Access (RACH) burst with mobile station in test mode (GSM only).
- Bursted signal with GMSK modulation without a valid midamble.
- CW signal.

## Input Signal Requirements

The TX Power measurement will complete and meet its accuracy specification of less than +/-0.32 dB for 810 MHz to 960 MHz and +/-0.42 dB for 1.7 GHz to 1.99 GHz when.

- Level is between –30 dBm and +43 dBm.
- Level within +/–3 dB of the expected input level.
- Frequency is within +/–100 kHz of expected input frequency.

## Trigger Source

Auto triggering is the recommended trigger source for each measurement. This allows the test set to choose the preferred trigger source. However you may want to select the trigger source. See Table 8. on page 84

**Table 8. Recommended Trigger Source Settings**

| Input Signal Type | Recommended Trigger Source |
|---|---|
| Normal GSM TCH or GPRS PDTCH burst with mobile station in active cell mode | RF Rise or Protocol |
| RACH burst with mobile station in active cell mode (GSM only) | RF Rise or Protocol |
| Normal GSM TCH or GPRS PDTCH burst with mobile station in test mode | RF Rise |
| RACH burst with mobile station in test mode (GSM only) | RF Rise |
| Bursted signal with GMSK modulation but no valid midamble | RF Rise |
| CW signal | Immediate |

## Related Topics

"Programming a Transmit Power Measurement" on page 230

"Test Adherence to Standards" on page 86

"Transmit Power Troubleshooting" on page 967

# Test Adherence to Standards

The 8960 Series 10 is compliant with 3GPP 51.010 (formerly ETSI GSM 11.10).

## Frequency Error and Phase Error

### Standards Reference: 3GPP 51.010 (formerly ETSI GSM 11.10) sections 13.1 and 13.16.1

The method of test implemented by the test set's Phase and Frequency Error measurement conforms to the measurement method defined in 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.1. For GPRS mobiles which support a single uplink timeslot or two adjacent uplink timeslots, the Phase and Frequency Error measurement conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.1.

### Related Topics

"Phase and Frequency Error Measurement Description" on page 63

"Programming a Phase and Frequency Error Measurement for GSM" on page 218

"Programming a Phase and Frequency Error Measurement for GPRS" on page 219

## Transmitter Output Power and Burst Timing Error

### Standards Reference: 3GPP 51.010 (formerly ETSI GSM 11.10) sections 13.3 and 13.16.2

To make a transmitter output power measurement that conforms to 3GPP 51.010 (formerly ETSI GSM 11.10) standards, perform a Power versus Time measurement with the desired setup. An ETSI compliant, transmitter output power (TXPower) result is available as a result of this measurement. Pass/fail checking of the Power versus Time mask is also available by using the Power versus Time measurement. The Burst Timing Error result is available for GSM and GPRS on the Call Setup screen and by issuing a query to the CALL subsystem ("CALL:STATus:TCHannel:TERRor?" on page 507 for GSM, "CALL:STATus:PDTCH | PDTChannel:TERRor?" on page 505 for GPRS).

For GPRS mobiles which support a single uplink timeslot or two adjacent uplink timeslots, the transmitter output power result conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.2.

When measuring two adjacent uplinks, each of these can have different power levels. However, the GPRS PvT measurement does not support multislot configurations where the first burst's level is greater than the second burst's level. This also applies to the GPRS PvT TX power measurement. A Potential Receiver Saturation (20) Integrity value will be returned if such a multislot configuration is measured. For more details on the range of Integrity Indicator values, see "Integrity Indicator" on page 283.

### Making a faster transmitter output power measurement

An alternative method for testing the transmitter output power is using the TX Power measurement in the test set. The TX Power measurement implemented in the test set varies from the ETSI recommended method for measuring carrier power in terms of synchronization. The TX Power measurement synchronizes using RF amplitude synchronization instead of midamble synchronization. This was intentionally done to speed up the measurement, as this is one of the most common measurements performed in manufacturing. This alternative measurement technique is approximately four times faster than the synchronized method with the same accuracy. If the input signal meets the GSM Power versus Time characteristics, the TX Power measurement provides the same results as the Power versus Time - TX Power result (which is midamble synchronized and ETSI compliant).

Note that the output RF spectrum measurement makes the TX Power measurement as part of its measurement process.

### Related Topics

"Transmit Power Measurement Description" on page 83

"Programming a Transmit Power Measurement for GSM" on page 230

"Programming a Transmit Power Measurement for GPRS" on page 231

"GSM Power versus Time Measurement" on page 67

"GPRS Power versus Time Measurement" on page 71

"Programming a Power versus Time Measurement for GSM" on page 222

"Programming a Power versus Time Measurement for GPRS" on page 223

## Output RF Spectrum

### Standards Reference: 3GPP 51.010 (formerly ETSI GSM 11.10) sections 13.4 and 13.16.3

The Output RF Spectrum due to Switching method of test conforms to ETSI GSM 11.10, section 13.4 at offsets < 1800 kHz. For GPRS mobiles which support a single uplink timeslot, the measurement conforms to ETSI GSM 11.10, section 13.16.3 at offsets < 1800 kHz.

The Output RF Spectrum due to Modulation method of test conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.4 at offsets < 1800 kHz. For GPRS mobiles which support a single uplink timeslot, the measurement conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.3 at offsets < 1800 kHz (when the Multi-Measurement Count - Modulation parameter is set to Off using "SETup:ORFSpectrum:COUNt:STATe[:SELected]" on page 700).

### Making a faster ORFS measurement

When Multi-Measurement Count (Modulation) is greater than 1, the measurement is performed over 40 or more bits in each of the regions from bit 15 to 60 and bit 87 to 132 of the burst. In 3GPP 51.010 (formerly ETSI GSM 11.10), the measurement is only specified on the latter section of the burst.

Measuring on both the front and back of the burst has two advantages. First, this method provides two modulation measurements per burst, effectively doubling measurement speed. Secondly, it provides additional information regarding the spurious performance of the mobile.

The method of test in 3GPP 51.010 (formerly ETSI GSM 11.10) is based upon time-gated spectrum analysis; this technique only allows one measurement per burst. Modern DSP techniques employed in the test set makes it possible to measure more of the burst while still excluding the unwanted effects of the midamble and switching transients generated by burst modulation.

### Measuring ORFS on GPRS mobiles using the BLER data connection type

The result of the Output RF Spectrum measurement relies on pseudo random data being present in the data field of the RF burst. When using the BLER data connection type, these data fields do not contain pseudo random data, therefore the results may not be representative.

### Related Topics

"Output RF Spectrum Measurement Description" on page 60

"Programming an Output RF Spectrum Measurement for GSM" on page 215

"Programming an Output RF Spectrum Measurement for GPRS" on page 216

## Reference Sensitivity

### Standards Reference: 3GPP 51.010 (formerly ETSI GSM 11.10) section 14.2

The method of test implemented by the test set's Bit Error measurement conforms to the measurement method defined in 3GPP 51.010 (formerly ETSI GSM 11.10), section 14.2. The Bit Error measurement is available for both GSM and GPRS.

### Making a faster reference sensitivity measurement

An alternative method of test for making a Reference Sensitivity measurement is to use the Fast Bit Error (FBER) measurement in the test set. The FBER measurement is five times faster than the normal BER measurement.

The Fast Bit Error measurement is *not* applicable to GPRS.

### Related Topics

"GSM Bit Error Measurement" on page 41

"GPRS Bit Error Measurement" on page 45

"Programming a Bit Error Measurement for GSM" on page 200

"Programming a Bit Error Measurement for GPRS" on page 202

"Fast Bit Error Measurement Description" on page 55

"Programming a Fast Bit Error Measurement" on page 211

## I/Q Tuning Measurement

The I/Q Tuning measurement is not an ETSI specified measurement.

The I/Q Tuning measurement is *not* applicable to GPRS.

**Related Topics**

"I/Q Tuning Measurement Description" on page 58

"Programming an I/Q Tuning Measurement" on page 213

## Dynamic Power Measurement

The Dynamic Power measurement is not an ETSI specified measurement.

The Dynamic Power measurement is *not* applicable to GPRS.

**Related Topics**

"Dynamic Power Measurement Description" on page 53

"Programming a Dynamic Power Measurement" on page 208

## Analog Audio Measurements

The Analog Audio measurements are not ETSI specified measurements.

The Analog Audio measurements are *not* applicable to GPRS.

**Related Topics**

"Analog Audio Measurement Description" on page 36

# 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.

**GPIB 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.

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

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

### Examples of Amplitude Offset Behavior

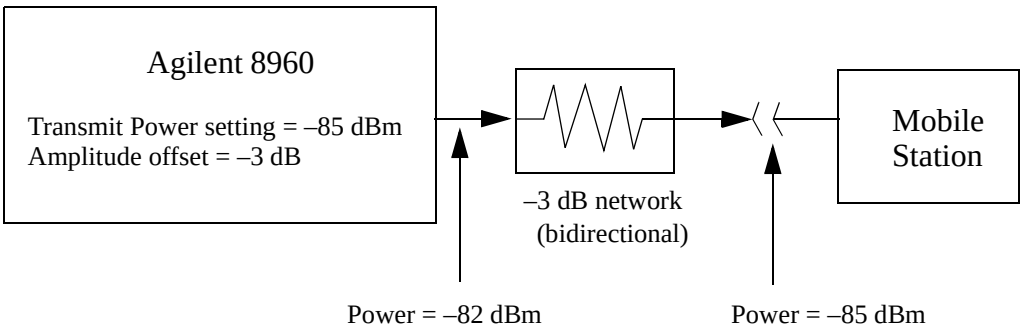
When the amplitude offset table entries accurately represent the loss in all components (cabling, connectors, and test fixturing) in the signal path between the test set and the mobile station, the test set will make the necessary adjustments in both receiver and transmitter measurements.

### Mobile Station Receiver Example

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

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 5. Amplitude Offset Mobile Station Receiver Example**



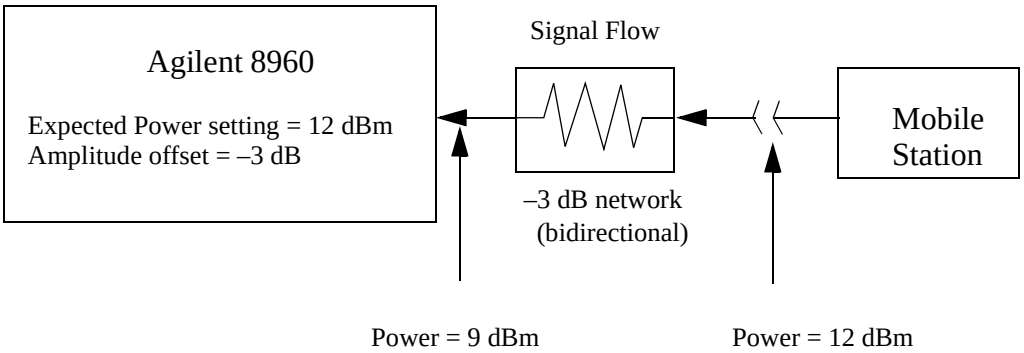

### Mobile Station Transmitter Example

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.

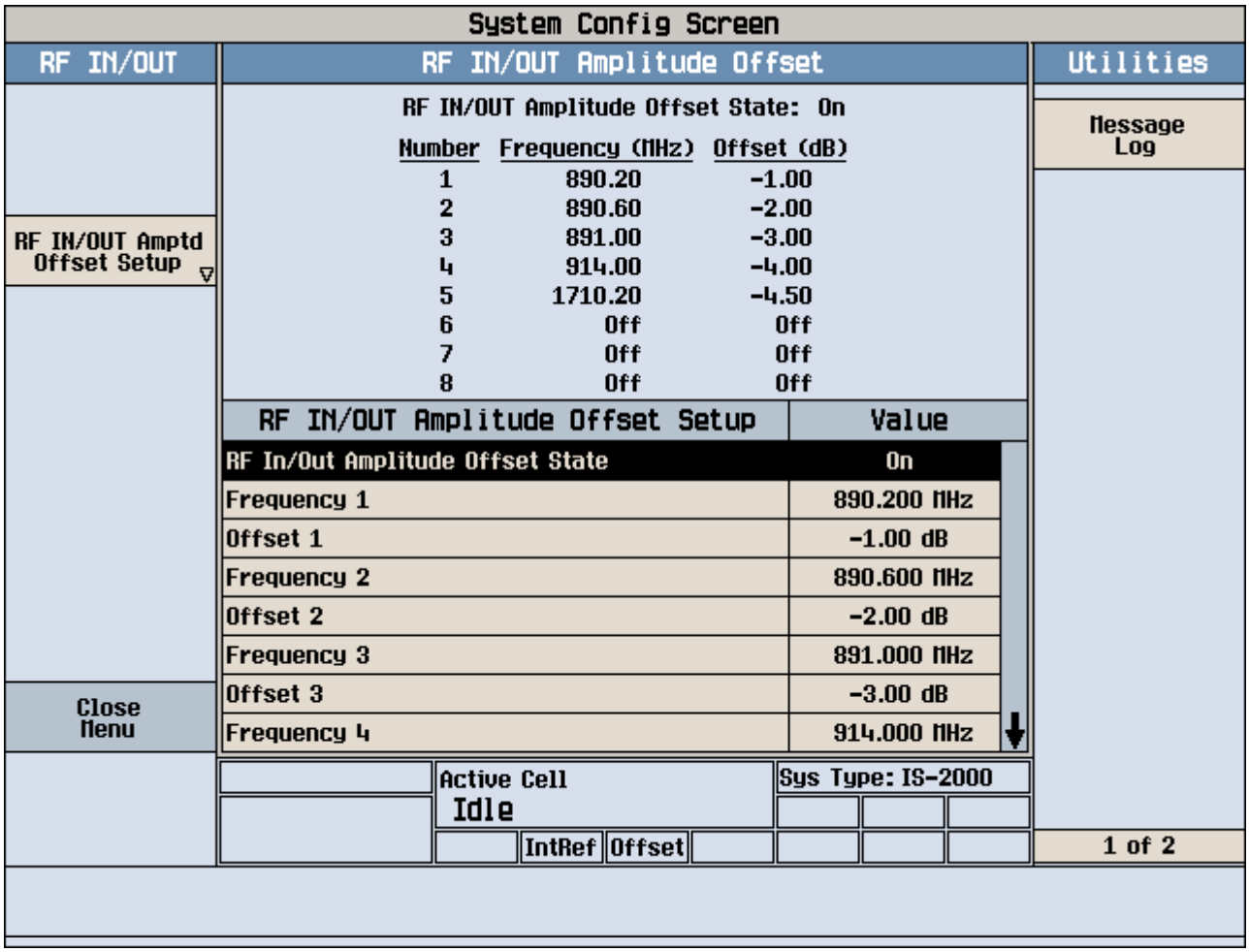
**Figure 6. Amplitude Offset Mobile Station Transmitter Example**



### 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.

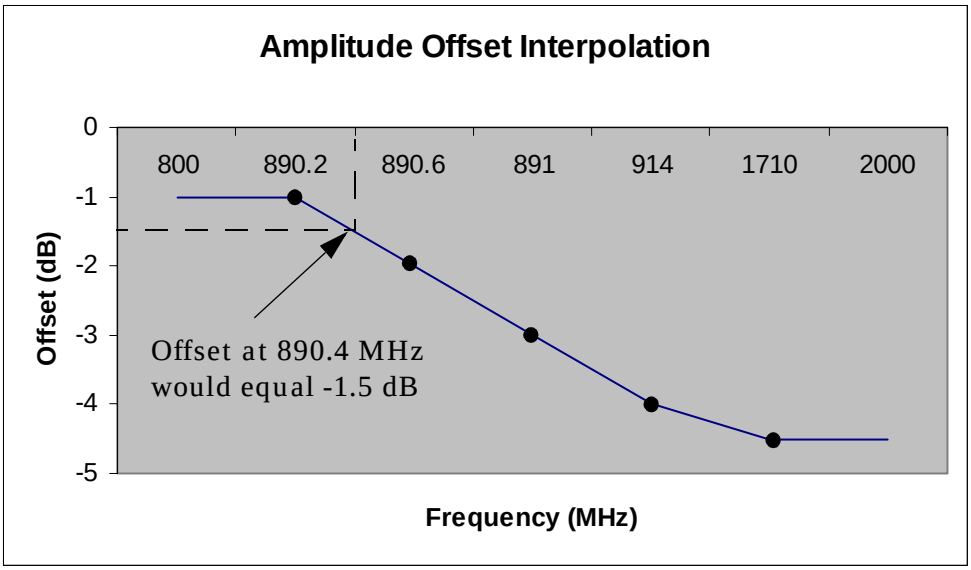
**Figure 7. RF IN/OUT Amplitude Offset Setup**




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 8. 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 7. "RF IN/OUT Amplitude Offset Setup". Each of the five points are shown on a non-scaled frequncy versus amplitude offset graph. At a test frequency of 890.4 MHz, which is midway between point number one (-1 dB) and point number two (-2 dB) the test set applies an offset of -1.5 dB. Be aware that since amplitude offsets are in units of dB, this piece-wise linear interpolation does not produce a linear transition from point to point.

**Figure 8. 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 850

**Amplitude Offset**

# 2 Call Processing

# Testing a Mobile for Enhanced Full Rate Speech Channel Mode

This test is *not* applicable to GPRS.

The channel mode function allows you to command a mobile to switch between full rate speech and enhanced full rate speech either before a call is originated, or during a call connected state with any or all of the supported measurements running.

The following measurements are supported in enhanced full rate speech mode:

- Analog Audio (AAUDio)
- Bit Error Rate (BERRor)
- Fast Bit Error Rate (FBERror)
- Dynamic Power (DPOWer)
- I/Q Tuning (IQTuning)
- Output RF Spectrum (ORFSpectrum)
- Phase and Frequency Error (PFERror)
- Power versus Time (PVTime)
- Transmitter Power (TXPower)

You can initiate a Decoded Audio (DAUDio) measurement in enhanced full rate speech mode. However, this measurement is not supported in this channel mode and the integrity indicator will report that the results are questionable (see "Decoded Audio Troubleshooting" on page 960).

If you change the channel mode when no call is connected, the mobile is requested to go into the selected channel mode the next time a mobile originated or mobile terminated call is initiated.

If you change the channel mode when a call is connected, the mobile is requested to go into the selected channel mode immediately.

The channel mode should only be changed when the test set is in active cell operating mode, not test operating mode.

**NOTE** GSM Phase 1 mobiles are not required to support enhanced full rate speech vocoder. Therefore, the behavior of a GSM Phase 1 mobile which does support enhanced full rate speech vocoder may be manufacturer dependent when used with the channel mode function.

If you switch the channel mode between enhanced full rate speech and full rate speech when the downlink speech source is set to Echo (see "CALL:TCHannel:DOWNlink:SPEech" on page 514), you may hear momentary unpleasant audio bursts from the mobile.

## Related Topics

"Programming a Channel Mode Change" on page 124

# Configuring Mobile Station Operating Parameters

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

For a complete list of GPIB commands in the call processing subsystem, refer to "CALL Subsystem" on page 337.

## GSM Mobile Station Operating Parameters

| Parameter | GPIB Command |
|---|---|
| Mobile station TX Level | "CALL:MS:TXLevel[:SELected]" on page 434 |
| Timing Advance | "CALL:MS:TADVance" on page 433 |
| Mobile DTX State | "CALL:MS:DTX[:STATe]" on page 424 |

## GPRS Mobile Station Operating Parameters

| Parameter | GPIB Command |
|---|---|
| Uplink Burst TX Level for selected PDTCH band | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |
| Uplink Burst TX Level for DCS band | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |
| Uplink Burst TX Level for EGSM band | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |
| Uplink Burst TX Level for PCS band | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |
| Uplink Burst TX Level for selected PGSM band | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |
| Deferred Uplink Burst TX Level for selected band | "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 494 |
| Guard Band Period Length | "CALL:MS:TX:BURSt:GPLength" on page 434 |

## Operating Considerations

### GSM

There are a number of parameters for the broadcast channel (see "Configuring the Broadcast Channel (BCH)" on page 110) and the traffic channel (see "Configuring the Traffic Channel (TCH)" on page 113) 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.

When Operating Mode = Active Cell, if a call is connected, changes to these parameters, including a change to the value of the parameter's current setting, causes signaling on the downlink to automatically initiate the change. No separate command is necessary to initiate the change. If a call is not connected, changes to the parameter are stored for when the next call is established

The mobile station TX Level parameter, besides informing the mobile station what uplink power to transmit to the test set, also updates the Expected Power parameter. See "RFANalyzer:EXPected:POWer[:SELected]" on page 625.

### GPRS

For details on the parameters you can use to configure the PDTCH, see "Configuring the Packet Data Traffic Channel (PDTCH)" on page 126.

# Active Cell Operating Mode

The operating mode changes the way in which the test set interacts with the mobile station.

For GSM, the test set can operate in two different operating modes, active cell mode or test mode (see "GSM Test Mode Operation" on page 101).

For GPRS, the test set can operate in four different operating modes, active cell mode, test mode BCH, test mode BCH+PDTCH, or cell off (see "GPRS Test Mode Operation" on page 108).

Active cell operating mode provides active signaling between the mobile station and the test set's base station emulator:

- "Active Cell For GSM" on page 99
- "Active Cell For GPRS" on page 100

## Active Cell For GSM

Active cell mode is the default operating mode for GSM, and is used when emulating a normal GSM cell. Test mode is used when it is not possible, or not desired, to communicate via over the-the-air signaling with the mobile station, but downlink stimulus and uplink measurements are still needed. For more details on test mode, see "Test Mode Operating Modes" on page 101.

Associated with the active cell operating mode is the cell activated state parameter. This parameter turns on and off the test set's control of the uplink and downlink (including all signalling operations, uplink demodulation and downlink (BCH and TCH) generation).

Trying to set any of the network configuration parameters while the cell is in the active state will generate the following error:

```
GSM operation rejected; Attempting to set <MCC|MNC|LAC|NCC|BCC> while generating a BCH
```

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

The test set's operating mode is set using the command, "CALL:OPERating:MODE" on page 442.

### Setting the Cell Activated State Parameter

The cell activated state parameter is set using "CALL[:CELL]:ACTivated[:STATe]" on page 338.

## Active Cell For GPRS

Active cell mode is used when emulating a normal GSM/GPRS cell.

In active cell operating mode the base station emulator, using the test set's GMSK modulated source, generates a downlink (base station to mobile station direction) broadcast channel (BCH) which represents a cell. The GPRS mobile station can "camp" to this signal, just as it would camp to a cell on a real network, and perform an attach procedure to register the mobile station with the network. A Packet Data Traffic Channel (PDTCH) can then be established using the ETSI defined GPRS Test Mode and data can be transferred in both the downlink and uplink directions.

For GPRS mobile stations which support a single uplink timeslot or two adjacent uplink timeslots, the following measurements can be made under essentially identical conditions to that which the mobile station would experience on a real network:

- Output RF Spectrum (ORFS) - see "Output RF Spectrum Measurement Description" on page 60.
- Transmit Power (TXP) - see "Transmit Power Measurement Description" on page 83
- Phase and Frequency (PFER) - see "Phase and Frequency Error Measurement Description" on page 63
- Power versus Time (PVT) - see "GPRS Power versus Time Measurement" on page 71
- Bit Error Rate - see "GPRS Bit Error Measurement" on page 45.

For a typical scenario detailing the steps you might take to test a GPRS mobile station, see "Testing a GPRS Mobile Station" on page 241.

## Related Topics

For GSM:

"Configuring the Broadcast Channel (BCH)" on page 110

"CALL:OPERating" on page 441

"Configuring the Traffic Channel (TCH)" on page 113

For GPRS:

"Configuring the Broadcast Channel (BCH)" on page 110

"Configuring the Packet Data Traffic Channel (PDTCH)" on page 126

"Testing a GPRS Mobile Station" on page 241

"Programming: Getting Started Guide for E1964A GPRS Mobile Test Application Rev. A.02 E6701A GPRS Lab Application Rev. A.01" on page 150

# Test Mode Operating Modes

The operating mode changes the way in which the test set interacts with the mobile station.

For GSM, the test set can operate in two different operating modes, active cell mode or test mode.

For GPRS, the test set can operate in four different operating modes, active cell mode, test mode BCH, test mode BCH+PDTCH, or cell off.

You use Test mode (see "CALL:OPERating" on page 441 for GPIB syntax) when it is not possible, or not desired, to communicate via over-the-air signalling with the mobile station, but downlink stimulus and uplink measurements are still needed:

- "GSM Test Mode Operation" on page 101
- "GPRS Test Mode Operation" on page 108

If you require details on active cell operating mode for GSM or GPRS, see "Active Cell Operating Mode" on page 99.

## GSM Test Mode Operation

Active cell mode is the default operating mode and is used when emulating a normal GSM cell. When test mode is selected, the choices of downlink stimulus (Test Function) are:

- BCH (broadcast channel) (see "BCH Test Function Behavior" on page 103)
- BCH + TCH (broadcast channel + traffic channel) (see "BCH + TCH Test Function Behavior" on page 105)
- CW (continuous wave) (see "CW Test Function Behavior" on page 107)

See "CALL:FUNCtion" on page 404 for test function GPIB syntax.

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

- No over-the-air signaling is available.
- No capability to demodulate and decode uplink RACH bursts is available.
- Test mode features are determined by the test function: BCH, BCH + TCH, or CW.
- When the operating mode is set to test mode, auto triggering sets the trigger source to RF Rise. See "RF Rise Trigger Source:" on page 276.

The test set's receiver remains on the uplink frequency determined by the broadcast channel see " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 as long as receiver control is set to auto. If you require manual control of the receiver parameters, receiver control should be set to manual. This gives access to the receiver parameters of manual band, manual channel and manual frequency. See "Receiver Control" on page 235.

**NOTE** "Setting the Cell Activated State Parameter" on page 99 has no effect while the test set is in test mode.

### Receiver Control - Auto

If the receiver control field is set to auto (see "RFANalyzer:CONTrol:AUTO" on page 625), the test set's receiver frequency is set according to the fields or GPIB commands in the following table.

**Table 1. Test Set Receiver Frequencies (Receiver Control = Auto)**

| Test Function | Receiver Frequency Fields | GPIB Command |
|---|---|---|
| BCH | Broadcast Chan (1) | " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 |
| BCH + TCH | Traffic Channel (2) | "CALL:TCHannel[:ARFCn][:SELected]" on page 510 |
| CW | RF Gen Channel | " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 |

### Table Footnotes

1 Actual frequency depends on current broadcast band (PGSM, EGSM, GSM850, PCS, or DCS), and is defined in GSM as the uplink frequency.

2 Actual frequency depends on current traffic channel band (PGSM, EGSM, GSM850, PCS, or DCS), and is defined in GSM as the uplink frequency.

### Receiver Control - Manual

If the Receiver Control field is set to Manual (see "RFANalyzer:CONTrol:AUTO" on page 625), the test set's receiver frequency is set according to the fields or GPIB commands in the following table.

**Table 2. Test Set Receiver Frequencies (Receiver Control = Manual)**

| Test Function | Receiver Frequency Fields | GPIB Command |
|---|---|---|
| Don't Care | Manual Channel (1) | "RFANalyzer:MANual:CHANnel[:SELected]" on page 629 |
| | Manual Frequency | "RFANalyzer:MANual:FREQuency" on page 632 |

### Table Footnotes

1 Actual frequency is defined in GSM as the uplink frequency.

### Expected Burst

This parameter is only used when the test set's operating mode is set to Test Mode or when the Cell Activated state is set to Off. (If it is not set, the test set may not synchronize to the input signal's midamble.) When operating mode is set to Active Cell and the Cell Activated state is set to On, the test set automatically selects the correct burst type.

A TCH can have one of eight midamble patterns. These patterns are called Training Sequence Codes (TSC). The Expected Burst parameter allows you to set the test set to expect a certain midamble pattern (TSC0 through TSC7) from the mobile. Alternatively, selecting RACH for this parameter allows you to set the test set to expect the special midamble pattern used by a RACH burst.

For details on the GPIB command, see "CALL:BURSt" on page 381. (If you are using the test set manually, the Expected Burst field is in the Call Parms window, screen 3 of 3, F12.)

```
OUTPUT 714;"CALL:BURST:TYPE TSC5" !Sets the test set to expect a TCH with midamble
                                  !pattern TSC5.
```

### BCH Test Function Behavior

- The test set generates a BCH without a TCH. BCH configuration and timeslot configuration are the same as when the operating mode is set to active cell.
- Cell power is set using the "CALL:POWer" on page 471 command.
- By default, the test set expects the mobile station to transmit on the uplink BCH. The test set's receiver frequency can be set manually, which de-couples the automatic setting.
- Changes to the mobile station TX level will couple to the expected power, and the mobile station TX Level parameter will be transmitted on the downlink BCCH.
- All measurements are available to you as if the operating mode was set to active mode.

### Example 1. BCH Test Function Using Auto Receiver Control

The following example shows how to set up a test mode measurement using the BCH test function. In this example the test set is configured to transmit a BCH on PGSM channel 21, and receive the mobile station on PGSM channel 21 at a power level of 12.

1. Select test mode.

   ```
   OUTPUT 714;"CALL:OPERATING:MODE TEST"
   ```

2. Select PGSM as the broadcast band.

   ```
   OUTPUT 714;"CALL:CELL:BAND PGSM"
   ```

3. Select BCH as the test function.

   ```
   OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCH"
   ```

4. Configure the receiver control to auto.

   ```
   OUTPUT 714;"RFANALYZER:CONTROL:AUTO ON"
   ```

5. Set the BCH to channel 21.

   ```
   OUTPUT 714;"CALL:BCH:PGSM 21"
   ```

6. Set the mobile station TX level to 12.

   ```
   OUTPUT 714;"CALL:MS:TXLEVEL 12"
   ```

7. To make the measurement, set up the mobile station to transmit on PGSM channel 21 at a power level of 12.

### Example 2. BCH Test Function Using Manual Receiver Control

The following example shows how to set up a test mode measurement using the BCH test function. In this example the test set is configured to transmit a BCH on PGSM channel 21. Manual receiver control is used to configure the test set to measure a signal from the mobile station at 895 MHz and 14 dBm. Note that the frequency can also be tuned by channel number.

1. Select test mode.

   ```
   OUTPUT 714;"CALL:OPERATING:MODE TEST"
   ```

2. Select PGSM as the broadcast band.

   ```
   OUTPUT 714;"CALL:CELL:BAND PGSM"
   ```

3. Select BCH as the test function.

   ```
   OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCH"
   ```

4. Set the BCH to channel 21.

   ```
   OUTPUT 714;"CALL:BCH:PGSM 21"
   ```

5. Configure the receiver control to manual.

   ```
   OUTPUT 714;"RFANALYZER:CONTROL:AUTO OFF"
   ```

6. Configure the test set's receiver frequency to 895 MHz.

   ```
   OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 895 MHZ"
   ```

   If tuning by channel number, see "RFANalyzer:MANual:CHANnel[:SELected]" on page 629

7. Set the receiver's expected power level to 14 dBm.

   ```
   OUTPUT 714;"RFANALYZER:EXPECTED:POWER 14 DBM"
   ```

8. To make the measurement, set up the mobile station to transmit at 895 MHz and at a power level of 14 dBm.

## BCH + TCH Test Function Behavior

- The test set generates BCH + TCH on the downlink path. The BCH + TCH burst modulation is the same as when the operating mode is set to active cell.
- Cell power is set using the "CALL:POWer" on page 471 command.
- Manually synchronizing the mobile station to the BCCH is not under direct control of the test set. You are responsible for this synchronization.
- Changes to the TCH timeslot and TCH ARFCN will reconfigure the downlink (although no channel assignment signaling will take place).
- By default, the test set's receiver is configured to receive the mobile station's signal at the TCH uplink frequency. The test set's receiver frequency can be set manually, which decouples the automatic setting.
- Changes to the mobile station TX level will couple to the expected power, and the mobile station TX Level parameter will be transmitted on the downlink BCCH and SACCH.
- Changes to TCH timing advance will also appear on the downlink SACCH. Whether the mobile station makes use of these parameters is a function of the mobile station.
- All measurements are available to you, the same as if the operating mode was active mode.

### Example 3. BCH + TCH Test Function Using Auto Receiver Control

The following example shows how to set up a test mode measurement using the test function BCH + TCH. In this example the test set is configured to transmit a BCH on PGSM channel 21, a TCH on PGSM channel 31, and receive the mobile station on PGSM channel 31 at power level 12.

1. Select test mode.

   ```
   OUTPUT 714;"CALL:OPERATING:MODE TEST"
   ```

2. Select PGSM as the broadcast band (traffic channel band will automatically be set to this band).

   ```
   OUTPUT 714;"CALL:CELL:BAND PGSM"
   ```

3. Select BCH as the test function.

   ```
   OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCHTCH"
   ```

4. Configure the receiver control to auto.

   ```
   OUTPUT 714;"RFANALYZER:CONTROL:AUTO ON"
   ```

5. Set the BCH to channel 21.

   ```
   OUTPUT 714;"CALL:BCH:PGSM 21"
   ```

6. Set the TCH to channel 31.

   ```
   OUTPUT 714;"CALL:TCH:PGSM 31"
   ```

7. Set the mobile station TX Level to 12.

   ```
   OUTPUT 714;"CALL:MS:TXLEVEL 12"
   ```

8. To make the measurement, set the mobile station to transmit on PGSM channel 31 at a power level of 12.

### Example 4. BCH + TCH Test Function Using Manual Receiver Control

The following example shows how to set up a test mode measurement using the test function BCH + TCH. In this example the test set transmits a BCH on PGSM channel 21 and a TCH on PGSM channel 31. Manual receiver control is used to configure the test set to measure a signal from the mobile station at 895 MHz, the frequency can also be tuned by channel number with the manual channel parameter. Expected power is set at +14 dBm.

1. Select test mode.

   ```
   OUTPUT 714;"CALL:OPERATING:MODE TEST"
   ```

2. Select PGSM as the broadcast band (the TCH will automatically be set to this band).

   ```
   OUTPUT 714;"CALL:CELL:BAND PGSM"
   ```

3. Select BCH + TCH as the test function.

   ```
   OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCHTCH"
   ```

4. Set the BCH to channel 21.

   ```
   OUTPUT 714;"CALL:BCH:PGSM 21"
   ```

5. Set the TCH to channel 31.

   ```
   OUTPUT 714;"CALL:TCH:PGSM 31"
   ```

6. Configure the receiver control to manual.

   ```
   OUTPUT 714;"RFANALYZER:CONTROL:AUTO OFF"
   ```

7. Configure the test set's receiver frequency to 895 MHz.

   ```
   OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 895 MHZ"
   ```

   If tuning by channel number, see "RFANalyzer:MANual:CHANnel[:SELected]" on page 629

8. Set the receivers expected power level to 14 dBm.

   ```
   OUTPUT 714;"RFANALYZER:EXPECTED:POWER 14 DBM"
   ```

9. To make the measurement, set up the mobile station to transmit at 895 MHz and at a power level of 14 dBm.

## CW Test Function Behavior

When the test set's downlink function is set to CW the test set operates like a signal generator with level and frequency controls. The Call Parms selections change from Cell Power to RF Gen Power, from Cell Band to RF Gen Band, from Broadcast Chan to RF Gen Channel. The CW setting also gives you the opportunity to set output frequency using the RF Gen Freq parameter.

- The test set generates an unmodulated CW downlink signal.
- The RF generator's power is set using the "CALL[:CELL]:RFGenerator:POWer[:SAMPLitude]" on page 483 command.
- The RF generator's band is set using the "CALL[:CELL]:RFGenerator:BAND" on page 478 command.
- The downlink frequency is controlled by the RF Gen Channel and RF Gen Freq fields. The RF Gen Channel field sets the generator to the frequency corresponding to the channel number in the current RF Gen Band field using the "CALL[:CELL]:RFGenerator:CHANnel[:SELected]" on page 479 command.
- The RF generator's frequency is set using the "CALL[:CELL]:RFGenerator:FREQuency[:SELected]" on page 482 command, in this mode the user has direct control of the output frequency without making a channel selection.
- By default, the test set's receiver is configured to receive the mobile station's signal at the current RF generator channel setting. The test set's receiver frequency can be set manually, which decouples the automatic setting.
- No uplink demodulation or channel decoding is available. BER and uplink audio measurements will not return any results.

When you update the RF Gen Channel parameter the RF Gen Freq parameter changes to indicate the frequency for that channel. When RF Gen Freq is changed the RF Channel parameter does not change. This is because you may select a frequency that is not a channel.

### Example 5. CW Test Function Using RF Generator Frequency

The following example shows how to set up a test mode using the CW test function. In this example the test set transmits a CW signal on DCS frequency 1805.4 mHz at an output power level of -80 dBm.

1. Set the RF generator output power to -80 dBm.

   ```
   OUTPUT 714;"CALL:CELL:RFGENERATOR:POWER -80"
   ```

2. Select test mode.

   ```
   OUTPUT 714;"CALL:OPERATING:MODE TEST"
   ```

3. Select PGSM as the RF generator band.

   ```
   OUTPUT 714;"CALL:CELL:RFGENERATOR:BAND DCS"
   ```

4. Select CW as the test function.

   ```
   OUTPUT 714;"CALL:FUNCTION:DOWNLINK CW"
   ```

5. Configure the test set's output frequency to 1805.4 MHz.

   ```
   OUTPUT 714;"CALL:CELL:RFGENERATOR:FREQUENCY 1805.4MHZ"
   ```

# GPRS Test Mode Operation

## GPRS Test Mode BCH Behavior

When Cell Operating Mode is set to “GPRS Test Mode BCH” (PBTest), the base station emulator produces the BCH but does not attempt to demodulate the uplink. Non-functional features (for example, “Start Data Connection”) of the BS Emulator do not result in an execution error.

## GPRS Test Mode BCH + PDTCH Behavior

When Cell Operating Mode is set to “GPRS Test Mode BCH + PDTCH” (PBPTest), the base station emulator produces the BCH and PDTCH. To specify the positions of the PDTCH use “CALL:PDTCH[:ARFCn][:SELected]” on page 457 and “CALL:PDTCH:MSLot:CONFiguration” on page 460. The locations of the specified uplink are demodulated but no signaling for control of a data connection is performed and PRACH bursts are not demodulated.

In this mode the following features are available:

- Generation of BCH + PDTCH on the downlink.
- If you manually synchronize the mobile station with the BCH, and then turn on the mobile station's own PDTCH, and both uplink and downlink use the same ARFCN and timeslot(s), what is sometimes known as a “forced” call is in progress. Demodulation and channel decoding of the uplink are available, although no messages are decoded.

  Manually synchronizing the mobile station to the BCH is usually initiated from the mobile station keypad, or over a special mobile station test bus. This is not under the direct control of the base station emulator and is your responsibility.
- When a “forced” call is in progress (as defined above), BER measurements can be made.
- Changes to the Multislot Configuration or PDTCH ARFCN [PDTCH Band] reconfigure the downlink (although no channel assignment signalling takes place). The BS Emulator's receiver is configured to receive at the modified frequency, timeslot and timing advance in the same way as when Cell Operating Mode is set to “Active Cell” (CELL).

## OFF Behavior

If you set Cell Operating Mode “OFF” it causes the following actions:

- If Cell Operating Mode was currently using CALL:OPERating OFF, the setting is ignored and the operation is assumed to have successfully completed immediately.
- If a mobile station is attached or a data connection is in progress, no attempt is made to use over-the-air signaling to disconnect or detach.
- All signaling operations, uplink demodulation and downlink (BCH, and PDTCH) generation are stopped.
- There is no RF power output.

### Expected Burst

This parameter is only used when the test set's operating mode is set to "GPRS Test Mode BCH" (PBTest) or "GPRS Test Mode BCH + PDTCH" (PBPTest). When operating mode is set to Active Cell, the test set automatically selects the correct burst type.

A PDTCH can have one of eight midamble patterns. These patterns are called Training Sequence Codes (TSC). The Expected Burst parameter allows you to set the test set to expect a certain midamble pattern (TSC0 through TSC7) from the mobile.

For details on the GPIB command, see "CALL:BURSt" on page 381. (If you are using the test set manually, the Expected Burst field is in the Call Parms window, screen 2 of 3, F12.)

```
OUTPUT 714;"CALL:BURST:TYPE TSC5" !Sets the test set to expect a TCH with midamble
                                  !pattern TSC5.
```

### RLC/MAC Header State

This parameter is only used when the test set's operating mode is set to "GPRS Test Mode BCH + PDTCH" (PBPTest).

The RLC/MAC header state parameter allows you to select whether or not a valid Radio Link Control (RLC)/Medium Access Control (MAC) header is present on the downlink PDTCH burst(s):

- If the RLC/MAC header state is set to OFF, all 53 octets (for CS4 encoding, for other coding schemes the number of octets will be less) in the burst are filled with PRBS data.
- If the RLC/MAC header state is set to ON, the first 3 octets in the burst contain a valid RLC/MAC header indicating the burst sequence number and the power reduction value. The remaining 50 octets (for CS4 encoding, for other coding schemes the number of octets will be less) in the burst are filled with PRBS data.

If the RLC/MAC header state is changed when the operating mode is any mode other than GPRS Test Mode BCH+PDTCH, the setting is remembered until GPRS Test Mode BCH+PDTCH is next used.

For details on the GPIB command, see "CALL:PBPTest:RLCMac[:HEADer]:STATe" on page 453. (If you are using the test set manually, the RLC/MAC Header field is in the Call Parms window, screen 2 of 3, F10).

```
OUTPUT 714;"CALL:PBPTest:RLCMac:HEADer:STATe ON" !Enables the RLC/MAC header.
```

## Related Topics

"Configuring the Broadcast Channel (BCH)" on page 110

"Configuring the Traffic Channel (TCH)" on page 113

"CALL:OPERating" on page 441

"Receiver Control" on page 235

"Configuring the Packet Data Traffic Channel (PDTCH)" on page 126

# Configuring the Broadcast Channel (BCH)

The broadcast channel parameters are configured using the following call processing subsystem commands. You should note that many of these parameters are *not* applicable to GPRS.

For a complete list of GPIB commands in the call processing subsystem, refer to "CALL Subsystem" on page 337.

## GSM Broadcast Channel Parameters

| Parameter | GPIB Command |
|---|---|
| Cell Band | "CALL[:CELL]:BAND[:SELected]" on page 364 |
| Cell Power | "CALL[:CELL]:POWer[:SAMPlitude][:SELected]" on page 472 |
| Cell Power State | "CALL[:CELL]:POWer:STATe[:SELected]" on page 476 |
| Broadcast Channel (ARFCN) - Selected band | " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 |
| Broadcast Channel (ARFCN) - DCS band | "CALL[:CELL]:BCHannel[:ARFCn]:DCS[:SELected]" on page 373 |
| Broadcast Channel (ARFCN) - EGSM band | "CALL[:CELL]:BCHannel[:ARFCn]:EGSM[:SELected]" on page 374 |
| Broadcast Channel (ARFCN) - PCS band | "CALL[:CELL]:BCHannel[:ARFCn]:PCS[:SELected]" on page 377 |
| Broadcast Channel (ARFCN) - GSM850 band | "CALL[:CELL]:BCHannel[:ARFCn]:GSM850[:SELected]" on page 376 |
| Broadcast Channel (ARFCN) - PGSM band | "CALL[:CELL]:BCHannel[:ARFCn]:PGSM[:SELected]" on page 379 |
| Mobile Country Code | "CALL:MCCode" on page 416 |
| Mobile Network Code | "CALL:MNCode" on page 418 |
| Location Area Code | "CALL:LACode" on page 413 |
| Network Color Code | "CALL:NCCode" on page 438 |
| Base Station Color Code | "CALL:BCCode" on page 366 |
| Paging IMSI | "CALL:PAGing:IMSI" on page 450 |
| Repeat Paging | "CALL:PAGing:REPeat[:STATe][:SELected]" on page 451 |
| Paging Mode | "CALL:PAGing:MODE" on page 450 |
| Paging Multiframes | "CALL:PAGing:MFRames" on page 451 |
| Auto IMEI Request | "CALL:IMEI" on page 412 |
| TX Level FACCH Signaling | "CALL:SIGNaling" on page 502 |
| BA Table | "CALL[:CELL]:BA:TABLe[:SELected][:SELected]" on page 343 |
| 3 Digit MNC for PCS | "CALL:PMNCode" on page 466 |

## GPRS Broadcast Channel Parameters

| Parameter | GPIB Command |
|---|---|
| Cell Band | "CALL[:CELL]:BAND[:SELected]" on page 364 |
| Cell Power | "CALL[:CELL]:POWer[:SAMPlitude][:SELected]" on page 472 |
| Broadcast Channel (ARFCN) - Selected band | " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 |
| Broadcast Channel (ARFCN) - DCS band | "CALL[:CELL]:BCHannel[:ARFCn]:DCS[:SELected]" on page 373 |
| Broadcast Channel (ARFCN) - EGSM band | "CALL[:CELL]:BCHannel[:ARFCn]:EGSM[:SELected]" on page 374 |
| Broadcast Channel (ARFCN) - PCS band | "CALL[:CELL]:BCHannel[:ARFCn]:PCS[:SELected]" on page 377 |
| Broadcast Channel (ARFCN) - GSM850 band | "CALL[:CELL]:BCHannel[:ARFCn]:GSM850[:SELected]" on page 376 |
| Broadcast Channel (ARFCN) - PGSM band | "CALL[:CELL]:BCHannel[:ARFCn]:PGSM[:SELected]" on page 379 |
| Set PCS 3 digit MNC state | "CALL[:CELL]:PMNCode:STATe[:SELected]" on page 470 |

## Operating Considerations

### GSM

There are a number of parameters for the broadcast channel and the traffic channel (see "Configuring the Traffic Channel (TCH)" on page 113) 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.

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

If the test set is in active cell operating mode, parameters MCC, MNC, LAC, NCC, and BCC can not be set unless the Cell Activated State is OFF. See "CALL:ACTivated" on page 338.

If the test set is in test mode (see "Test Mode Operating Modes" on page 101) operating mode, any BCH parameter can be set at any time.

The 3 Digit MNC for PCS parameter defines if the PCS BCCH should be configured using the standard 2-digit MNC (J-STD-007 coding), or the PCS 3-digit MNC (J-STD-007A coding, section 2.10.5.1.3). The PCS 3-digit MNC is used on the PCS BCCH instead of the 2-digit MNC only when the current cell band is PCS and the 3 Digit MNC for PCS parameter is set to on.

When TX Level FACCH Signaling is set to on, measurements are aborted and restarted as a result of mobile TX power level changes. However, when TX Level FACCH Signaling is set to off, measurements are not aborted and restarted. This may cause the integrity result for some measurements to indicate an under range or over range condition until the mobile's TX power level is within the specified measurement range. For more information about measurement integrity, see "Integrity Indicator" on page 283.

### GPRS

For GPRS, there are a number of BCH parameters which are currently set to fixed values. See “Fixed Parameters” on page 246.

## Related Topics

“Frequency Banded Parameters” on page 115

“Band Selection Parameters” on page 118

# Configuring the Traffic Channel (TCH)

This section is *not* applicable to GPRS.

The traffic channel parameters are configured using the following call processing subsystem commands.

For complete GPIB command syntax, see "CALL:TCHannel" on page 508.

## TCH Parameters

| Parameter | GPIB Command |
|---|---|
| Traffic Channel Band | "CALL:TCHannel:BAND" on page 513 |
| Traffic Channel (ARFCN) - Selected band | "CALL:TCHannel[:ARFCn][:SELected]" on page 510 |
| Traffic Channel (ARFCN) - DCS band | "CALL:TCHannel[:ARFCn]:DCS" on page 511 |
| Traffic Channel (ARFCN) - EGSM band | "CALL:TCHannel[:ARFCn]:EGSM" on page 511 |
| Traffic Channel (ARFCN) - GSM850 band | "CALL:TCHannel[:ARFCn]:GSM850" on page 512 |
| Traffic Channel (ARFCN) - PCS band | "CALL:TCHannel[ARFCN]:PCS" on page 512 |
| Traffic Channel (ARFCN) - PGSM band | "CALL:TCHannel[:ARFCn]:PGSM" on page 513 |
| Timeslot | "CALL:TCHannel:TSLot" on page 515 |
| Mobile Loopback | "CALL:TCHannel:LOOPback" on page 515 |
| Speech | "CALL:TCHannel:DOWNlink:SPEech" on page 514 |
| Max Frames Allowed for Assignment | "CALL:COUNt:TDMA:FRAMes" on page 392 |
| Channel Mode | "CALL:TCHannel:CMODe" on page 514 |

## Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see "CALL:BCHannel" on page 369) and the traffic channel (TCH). There are a number of parameters for the BCH and the TCH 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.

When Operating Mode = Active Cell, if a call is connected, changes to the traffic channel number (ARFCN) or traffic channel timeslot, **including a change to the value of the parameter's current setting**, causes signaling on the downlink FACCH to initiate a channel reassignment, see "How the Test Set Performs a Dualband Handover" on page 123. This configures the TCH to use the new parameter. If a call is not connected, changes to the parameter are stored for when the next call **is** established

When Operating Mode = Test Mode, if Test Mode Downlink Function (see “CALL:FUNCtion:DOWNlink” on page 409) = BCH+TCH, changes to the traffic channel number (ARFCN) or traffic channel timeslot will reconfigure the downlink TCH accordingly, but there will be no signaling initiated. The change will be immediate. If a TCH is not being generated, changes to the parameter are stored for when the next call is established

Downlink speech controls what kind of speech data is transmitted on the downlink TCH. A TCH with speech data is generated when call control status is connected (see “Call Processing State Synchronization” on page 305), or when in test mode with downlink function set to BCH+TCH.

When an FBER measurement is activated PRBS15 is transmitted on the downlink TCH, over riding the user setting of downlink speech source. Any changes to downlink speech source will be accepted and saved but not applied until FBER become inactive.

There are 6 different settings for the downlink speech source. See “CALL:TCHannel:DOWNlink:SPEech” on page 514.

- None
- Echo retransmits the uplink speech frames back to the downlink with a non-selectable delay of about 1 second.
- PRBS15 the 260 speech frame bits (prior to channel coding) are generated using a pseudo random bit sequence.
- SIN300 the sequence of 260 speech bit frames represent a sine wave at 300 Hz.
- SIN1000 the sequence of 260 speech bit frames represent a sine wave at 1000 Hz.
- SIN3000 the sequence of 260 speech bit frames represent a sine wave at 3000 Hz.

Traffic channel loopback type cannot be set to type C if the traffic channel band is PGSM.

The Max Frames Allowed for Assignment parameter, is used to specify the maximum number of TDMA frames the mobile station is allowed to take for a channel assignment. This is only applicable to changes in TCH band, traffic channel, or TCH timeslot. Changes to any other TCH parameter will not cause an error to be generated if, the number of frames taken to perform the change exceeds the setting of the maximum frames allowed for assignment. If the mobile station does not complete the channel assignment within the specified number of frames, the test set will generate an error message, but this will not cause a call to drop. If the mobile DTX state (discontinuous transmission) parameter is on (see “CALL:MS:DTX[:STATe]” on page 424), the error is not generated, because when a mobile station is in discontinuous transmission mode, it is not required to transmit on the new channel, at least not until a SACCH, FACCH, or SID frame is ready. In this case, the mobile station may actually have changed channels in the correct time, but had nothing to transmit.

## Related Topics

“Configuring the Broadcast Channel (BCH)” on page 110

“Configuring Mobile Station Operating Parameters” on page 97

“Receiver Control” on page 235

“Traffic Band Parameter” on page 118

“CALL:TCHannel” on page 508

“Fast Bit Error Measurement Description” on page 55

# Frequency Banded Parameters

The majority of the test set's parameters are active regardless of the frequency band selected. There are a number of parameters for GSM and GPRS that allow you to specify a band; PGSM, EGSM, GSM850, DCS, or PCS. These exceptions are called frequency banded parameters.

Frequency banded parameters are activated upon selection of a band. Parameters that select frequency bands include cell band and traffic band (see "Band Selection Parameters" on page 118).

You can set parameter values for a band that is not currently selected, and the test set stores the settings for future use. For example, during a call on the PGSM band, the MS TX level can be set to 10 for the DCS frequency band. When a handover (see "How the Test Set Performs a Dualband Handover" on page 123) to the DCS band is made, the MS TX level of 10 for DCS will already be set.

If you do not specify a frequency band when setting frequency banded parameters, settings to the parameter are made in the currently selected band.


- "GSM Frequency Banded Parameters" on page 115
- "GPRS Frequency Banded Parameters" on page 116


## GSM Frequency Banded Parameters

| Parameter | GPIB Command |
|---|---|
| Broadcast Channel (ARFCN) | " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 |
| BA Table | "CALL[:CELL]:BA:TABLe[:SELected][:SELected]" on page 343 |
| BA Table Points | " CALL[:CELL]:BA:TABLe:POINts[:SELected][:SELected]?" on page 357 |
| Traffic Channel (ARFCN) | "CALL:TCHannel[:ARFCn][:SELected]" on page 510 |
| MS TX Level | "CALL:MS:TXLevel[:SELected]" on page 434 |
| Manual Channel | "RFANalyzer:MANual:CHANnel[:SELected]" on page 629 |
| Expected Power | "RFANalyzer:EXPected:POWer[:SELected]" on page 625 |
| RF Generator Channel | "CALL[:CELL]:RFGenerator:CHANnel[:SELected]" on page 479 |

### GSM Programming Example

This section provides an example of how to use frequency banded parameters.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

```
10  OUTPUT 714;"CALL:TCH:PGSM 124" !Sets traffic channel to 124 for PGSM band.
20  OUTPUT 714;"CALL:MS:TXL:PGSM 7" !Sets the mobile station uplink power control
30                                   !level to 7 for PGSM band.
40  ! Now set up frequency banded parameters for DCS band.
50  OUTPUT 714;"CALL:TCH:DCS 850" !Sets traffic channel to 850 for DCS band.
60                                !The default traffic channel for the DCS
70                                !band is 30.
80  OUTPUT 714;"CALL:MS:TXL:DCS 5" !Sets the mobile station uplink power control
90                                  !level to 5 for the EGSM band. The default level is
100                                 !15.
110 ! Now change the traffic channel band to DCS. The TCH and uplink power control level
120 ! parameters are set to the values you specified above, not the default values.
130 OUTPUT 714;"CALL:TCH:BAND DCS"
140 ! Now query the traffic channel and uplink power control level.
150 OUTPUT 714;"CALL:TCH?"
160 ENTER 714;Channel
170 OUTPUT 714;"CALL:MS:TXL?"
180 ENTER 714;Tx_lev
190 ! Print the current values.
200 PRINT "The default TCH for the DCS band is 30. The current TCH is: ";Channel
210 PRINT "The default Tx Level is 15. The current Tx Level is: ";Tx_lev
220 END
```

## GPRS Frequency Banded Parameters

| Parameter | GPIB Command |
|---|---|
| Broadcast Channel (ARFCN) | " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370 |
| BA Table | "CALL[:CELL]:BA:TABLe[:SELected][:SELected]" on page 343 |
| Packet Data Traffic Channel (ARFCN) | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Uplink Burst TX Level | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |

### Programming Example

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See “Step 4: Make a connection” on page 159.

```
10  OUTPUT 714;"CALL:PDTCH:PGSM 124" !Sets packet data traffic channel to 124 for PGSM
20                                    !band.
30  OUTPUT 714;"CALL:MS:TXL:PGSM 7" !Sets the mobile station uplink power control
40                                   !level to 7 for PGSM band.
50  ! Now set up frequency banded parameters for DCS band.
60  OUTPUT 714;"CALL:PDTCH:DCS 850" !Sets packet data traffic channel to 850 for DCS band.
70                                   !The default packet data traffic channel for the DCS
80                                   !band is 30.
90  OUTPUT 714;"CALL:MS:TXL:DCS 5" !Sets the mobile station uplink power control
100                                 !level to 5 for the EGSM band. The default level is
110                                 !15.
120 ! Now change the packet data traffic channel band to DCS. The PDTCH and uplink power
130 ! control level parameters are set to the values you specified above, not the
140 ! default values.
150 OUTPUT 714;"CALL:PDTCH:BAND DCS"
160 ! Now query the packet data traffic channel and uplink power control level.
170 OUTPUT 714;"CALL:PDTCH?"
180 ENTER 714;Channel
190 OUTPUT 714;"CALL:MS:TXL?"
200 ENTER 714;Tx_lev
210 ! Print the current values.
220 PRINT "The default PDTCH for the DCS band is 30. The current PDTCH is: ";Channel
230 PRINT "The default Tx Level is 15. The current Tx Level is: ";Tx_lev
240 END
```

## Related Topics

“Band Selection Parameters” on page 118

“How the Test Set Performs a Dualband Handover” on page 123

“Configuring the Broadcast Channel (BCH)” on page 110

“Configuring the Traffic Channel (TCH)” on page 113

“Configuring the Packet Data Traffic Channel (PDTCH)” on page 126

“Receiver Control” on page 235

# Band Selection Parameters

Band selection parameters allow you to choose the frequency band for different channel types in GSM or GPRS:

- "GSM Band Selection Parameters" on page 118
- "GPRS Band Selection Parameters" on page 119

## GSM Band Selection Parameters

| Parameter | GPIB Command |
|---|---|
| Cell Band | "CALL[:CELL]:BAND[:SELected]" on page 364 |
| Traffic Band | "CALL:TCHannel:BAND" on page 513 |
| Manual Band | "RFANalyzer:MANual:BAND" on page 628 |
| RF Generator Band | "CALL[:CELL]:RFGenerator:BAND" on page 478 |

## Operating Considerations for GSM

### Cell Band Parameter

- When the operating mode is active cell and the call connected state is idle, changes to the cell band parameter will be reflected in the traffic band and manual band parameters as well.
- When the operating mode is active cell and the call connected state is connected, changes to the cell band parameter will disconnect any call in progress.
- When the operating mode is test mode and the test function is set to BCH, the cell band parameter should be used. See "CALL:FUNCtion:DOWNlink" on page 409.
- When the operating mode is test mode and the test function is set to CW, the cell band parameter should be used.

### Traffic Band Parameter

- When the operating mode is active cell and the call connected state is connected, changes to the traffic band parameter cause an inter-band channel assignment. See "How the Test Set Performs a Dualband Handover" on page 123.
- When the operating mode is active cell and the call connected state is connected, changes to the traffic band parameter are not reflected in the cell band or the manual band parameters.
- When the operating mode is test mode and the test function is set to BCH + TCH, the traffic band parameter should be used. See "CALL:FUNCtion:DOWNlink" on page 409.

### Manual Band Parameter

- When the receiver control parameter is set to manual, changes to the manual band parameter are not reflected in the traffic band or cell band parameters.
- Setting the manual band parameter changes the receiver control parameter to manual.
- When the receiver control parameter is set to manual, changes to the cell band parameter set the receiver control parameter to auto; however, the manual band parameter changes to match the cell band setting. You do not need to set receiver control back to manual.

### RF Generator Band Parameter

- When the operating mode is test mode and the downlink function is set to CW, the test set operates like a signal generator with level and frequency controls. See "CW Test Function Behavior" on page 107.

## GPRS Band Selection Parameters

| Parameter | GPIB Command |
|---|---|
| Cell Band | "CALL[:CELL]:BAND[:SELected]" on page 364 |
| Packet Data Traffic Channel Band | "CALL:PDTCH:BAND" on page 458 |

## Operating Considerations for GPRS

### Cell Band Parameter

- When the data connection status is *not* transferring (see "Data Connection Processing State Synchronization" on page 317), changing the cell band parameter to a new band changes the packet data traffic channel band to the new band as well.
- When the data connection status is transferring (see "Data Connection Processing State Synchronization" on page 317), changing the cell band parameter will disconnect any data connection in progress.

### Packet Data Traffic Channel Band Parameter

- When the data connection status is transferring (see "Data Connection Processing State Synchronization" on page 317), changing the packet data traffic band parameter selects the PDTCH ARFCN and uplink burst TX level parameters. However, the setting will not be applied until you re-start the data connection using "CALL:FUNCtion:DATA:STARt" on page 407.

## Related Topics

GSM:

“Configuring the Broadcast Channel (BCH)” on page 110

“Configuring the Traffic Channel (TCH)” on page 113

“Receiver Control” on page 235

“CALL:CONNected[:STATe]?” on page 383

“Programming: Getting Started Guide for E1960A GSM Mobile Test Application Revision A.08” on page 134

GPRS:

“Configuring the Broadcast Channel (BCH)” on page 110

“Configuring the Packet Data Traffic Channel (PDTCH)” on page 126

“CALL:STATus[:STATe]:DATA?” on page 504

“Programming: Getting Started Guide for E1964A GPRS Mobile Test Application Rev. A.02 E6701A GPRS Lab Application Rev. A.01” on page 150

# Establishing an Active GSM Link with the Mobile Station

## Making a Base Station Originated Call

The process for making a base station originated call is to:

1. If necessary, configure the traffic channel parameters for the call assignment. See “CALL:TCHannel” on page 508.
2. If necessary, set the IMSI state. See “CALL:PAGing:IMSI” on page 450.

   **Example 6.**

   ```
   OUTPUT 714;"CALL:PAGING:IMSI ““01012345678901””"
   ```

   would set the paging IMSI to 01012345678901.

3. If necessary, set the repeat paging state. See “CALL:PAGing:REPeat[:STATe][:SELected]” on page 451.

   **Example 7.**

   ```
   OUTPUT 714;"CALL:PAGING:REPEAT ON"
   ```

   would turn on repeat paging.

4. Configure the necessary call processing connect/disconnect synchronization conditions. See “Call Processing State Synchronization” on page 305.
5. Page the mobile station by sending the call originate command to the test set.

   **Example 8.**

   ```
   OUTPUT 714;"CALL:ORIGINATE"
   ```

   would start the process of making a base station originated call.

**IMPORTANT** To verify that the origination is successfully completed, see “Call Processing State Synchronization” on page 305.

## Making a Mobile Station Originated Call

The process for making a mobile station originated call is to:

1. If necessary, configure the necessary traffic channel parameters for the call assignment. See "CALL:TCHannel" on page 508.
2. Configure the necessary call processing connect/disconnect synchronization conditions. See "Call Processing State Synchronization" on page 305.
3. 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.

**IMPORTANT** To verify that the origination is successfully completed, see "Call Processing State Synchronization" on page 305.

## Operating Considerations

The test set must be in active cell operating mode. The correct frequency band must be selected.

# How the Test Set Performs a Dualband Handover

The dualband handover function has been implemented as an interband channel assignment for GSM and a packet timeslot reconfigure for GPRS, rather than an interband handover, since the test set currently has one BCH (cell).

The test set has the ability to switch traffic channels from:

- EGSM/PGSM to DCS/PCS/GSM850
- GSM850 to EGSM/PGSM/DCS/PCS
- DCS/PCS to EGSM/PGSM/GSM850

No other combinations of traffic channel band handovers are supported. Also, the traffic channel band can only be changed when an active link exists between the test set and a mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121 or for GPRS see, "Step 4: Make a connection" on page 159.

There are parameters that can be set up to take on different values depending on the broadcast band currently selected. These are called "Frequency Banded Parameters" on page 115. After a handover, the frequency banded parameters for the new band are active. Only one set of frequency banded parameters is active at any one time. However, you can set up any of the traffic channel parameters for bands involved in the handover because the test set remembers the settings and switches to them when the handover occurs.

## Related Topics

For GSM:

"Step 6: Reconfigure Test Set and Mobile Station Connection Parameters" on page 147
"CALL:TCHannel" on page 508

For GPRS:

"Step 6: Reconfigure Test Set and Mobile Station Connection Parameters" on page 165

# Programming a Channel Mode Change

Channel Mode Change is *not* applicable to GPRS.

This section provides an example of how to change a mobile station's channel mode to enhanced full rate speech via GPIB while a call is connected and a measurement is running.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Ensure the mobile is initially in full rate speech channel mode.
2. Configure the parameters for the measurement(s) you want to run using the SETup subsystem.
3. Start the measurement(s) using the INITiate subsystem.
4. Change the mobile's channel mode to enhanced full rate speech.
5. Use the INITiate:DONE? command to find out if the measurement results are available.
6. Use the FETCh? command to obtain the measurement results.

## Programming Example

The following program uses the TX Power measurement to show how to change the channel mode to enhanced full rate speech while a measurement is running. The TX Power measurement is chosen because it is one of the measurements that is supported in enhanced full rate speech mode.

```
10    OUTPUT 714;"CALL:TCHANNEL:CMODE FRSPEECH" !Ensure mobile is in
20                       !full rate speech channel mode initially.
30    OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Configures trigger
40                       !mode to single for a TX Power measurement.
50    OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 100" !Configures a
60                       !multi measurement of 100.
70    OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Configures the
80                       !trigger source to auto.
90    OUTPUT 714;"INITIATE:TXPOWER" !Start TX Power measurement.
100   OUTPUT 714;"CALL:TCHANNEL:CMODE EFRSPEECH" !Sets the channel
110                      !mode to enhanced full rate speech while
120                      !the TX Power measurement is running.
130   REPEAT
140   OUTPUT 714;"INITIATE:DONE?" !Check to see if TX Power
150                      !measurement is complete.
160   ENTER 714;Meas_complete$
170   UNTIL Meas_complete$="TXP"
180   OUTPUT 714;"FETCH:TXPOWER:ALL?" !Fetch TX Power results.
190   ENTER 714;Integrity,Avg_tx_pwr
200   PRINT "TX Power Measurement Results"
210   PRINT "Integrity=";Integrity
220   PRINT "TX Power=";Avg_tx_pwr
230   END
```

## Returned Values

The measurements returned by this program are:

- Integrity returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- Avg_tx_pwr returns the average transmit power in dBm.

## Related Topics

"Testing a Mobile for Enhanced Full Rate Speech Channel Mode" on page 96

"CALL:TCHannel:CMODe" on page 514

# Configuring the Packet Data Traffic Channel (PDTCH)

This section is *not* applicable to GSM.

The packet data traffic channel parameters are configured using the following call processing subsystem commands.

For a complete list of GPIB commands in the call processing subsystem, refer to "CALL Subsystem" on page 337.

## Packet Data Traffic Channel Parameters

| Parameter | GPIB Command |
|---|---|
| Packet Data Traffic Channel Band | "CALL:PDTCH:BAND" on page 458 |
| Packet Data Traffic Channel (ARFCN) - Selected band | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Packet Data Traffic Channel (ARFCN) DCS band | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Packet Data Traffic Channel (ARFCN) EGSM band | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Packet Data Traffic Channel (ARFCN) GSM850 band | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Packet Data Traffic Channel (ARFCN) PCS band | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Packet Data Traffic Channel (ARFCN) PGSM band | "CALL:PDTCH[:ARFCn][:SELected]" on page 457 |
| Downlink Burst Power Reduction Selection | "CALL:PDTCH:PREDuction:BURSt[1\|2\|3\|4]" on page 463 |
| Downlink Power Reduction Level (dB) | "CALL:PDTCH:PREDuction:LEVel[1\|2]" on page 464 |
| Data Connection Type | "CALL:FUNCtion:DATA:TYPE" on page 408 |
| Data Connection Frame Number Type | "CALL:FUNCtion:DATA:FRAMe:STARt" on page 407 |
| Data Connection LLC Frame Check Sequence | "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405 |
| BLER Block Polling Interval | "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406 |
| Downlink Burst Current Absolute Power Level | "CALL:PDTCH:POWer[:AMPLitude]:BURSt[1\|2\|3\|4]?" on page 463 |
| PDTCH Coding Scheme | "CALL:PDTCH:CSCHeme" on page 458 |
| Multislot Configuration | "CALL:PDTCH:MSLot:CONFiguration" on page 460 |
| P0 for Downlink PDTCH | "CALL:PDTCH:PZERo:LEVel" on page 465 |
| First Downlink Burst to Loop | "CALL:PDTCH:MSLot[:FIRSt]:DOWNlink:LOOPback[:BURSt]" on page 461 |
| Packet Power Timing Advance State | "CALL:PDTCH:PMESsage:PPTadvance" on page 461 |
| Packet Timeslot Reconfigure State | "CALL:PDTCH:PMESsage:PTReconfig" on page 462 |
| **Deferred Parameters** | |
| Deferred Packet Data Traffic Channel Band | "CALL:SETup:PDTCH:BAND" on page 493 |

| Parameter | GPIB Command |
|---|---|
| Deferred Packet Data Traffic Channel (ARFCN) | “CALL:SETup:PDTCH[:ARFCn][:SELected]” on page 488 |
| Deferred Packet Data Traffic Channel (ARFCN) DCS band | “CALL:SETup:PDTCH[:ARFCn]:DCS” on page 489 |
| Deferred Packet Data Traffic Channel (ARFCN) EGSM band | “CALL:SETup:PDTCH[:ARFCn]:EGSM” on page 490 |
| Deferred Packet Data Traffic Channel (ARFCN) GSM850 band | “CALL:SETup:PDTCH[:ARFCn]:GSM850” on page 491 |
| Deferred Packet Data Traffic Channel (ARFCN) PCS band | “CALL:SETup:PDTCH[:ARFCn]:PCS” on page 492 |
| Deferred Packet Data Traffic Channel (ARFCN) PGSM band | “CALL:SETup:PDTCH[:ARFCn]:PGSM” on page 493 |
| Deferred PDTCH Coding Scheme | “CALL:SETup:PDTCH:CSCHeme” on page 494 |
| Deferred Multislot Configuration | “CALL:SETup:PDTCH:MSLot:CONFiguration” on page 500 |
| Deferred P0 for Downlink PDTCH | “CALL:SETup:PDTCH:PZERo:LEVel” on page 501 |

### Using Deferred Parameters

Deferred parameters allow you to set up multiple parameters without implicit over-the-air signalling taking place. Using deferred parameters offers the following benefits:

- Code construction is more succinct.
- Only one signaling exchange between the test set and the mobile station sets up multiple parameters rather than a separate exchange for each parameter.
- Once the current data connection has been established, you can set up the next set of deferred parameters.

## Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see “CALL:BCHannel” on page 369) and the packet data traffic channel (PDTCH). There are a number of parameters for the BCH and the PDTCH that can be configured; however, the test set's default parameters should allow a properly functioning GPRS mobile station to successfully establish a data connection under most circumstances.

PDTCH (ARFCN) is a frequency banded parameter (see “Frequency Banded Parameters” on page 115).

## Related Topics

"Configuring the Broadcast Channel (BCH)" on page 110

"Configuring Mobile Station Operating Parameters" on page 97

"Packet Data Traffic Channel Band Parameter" on page 119

"CALL:PDTCH | PDTChannel" on page 454

# Bursted Parameters

This section is *not* applicable to GSM.

The majority of the test set's base station emulator parameters allow you to set or query a single value which is applied to all allowed burst (or timeslot) locations. However, there are a number of parameters for GPRS that have a :BURSt suffix. The :BURSt suffix indicates that the parameter name refers to a set of parameters, one for each of the possible bursts. These are called bursted parameters.

Bursted parameters use the concept of an active burst. An active burst is a timeslot that is expected to contain RF power relating to a traffic channel based on the multislot configuration. Bursted parameters are activated when the burst you have set a value for becomes active.

Bursted parameters are useful when changing the multislot configuration. For example, they allow you to specify the uplink burst TX level for a burst that is not currently active.

The GPIB command for each bursted parameter lets you specify one of the allowable bursts. If you do not specify a burst number, then burst one is assumed. The burst numbers you specify are relative from the first active uplink or downlink burst.

### GPRS Bursted Parameters

| Parameter | GPIB Command |
|---|---|
| Downlink Burst Absolute Power Level | "CALL:PDTCH:POWer[:AMPLitude]:BURSt[1\|2\|3\|4]?" on page 463 |
| Downlink Burst Power Reduction Selection | "CALL:PDTCH:PREDuction:BURSt[1\|2\|3\|4]" on page 463 |
| Manual Receiver Power Level | "RFANalyzer:MANual:POWer[:SELected][:SELected]:BURSt[1\|2]" on page 634 |
| Uplink Burst TX Level | "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 459 |

## Operating Considerations

The following bursted parameters are also frequency banded parameters (see "Frequency Banded Parameters" on page 115):

- Uplink Burst TX Level
- Manual Receiver Power Level

## Related Topics

"Configuring the Packet Data Traffic Channel (PDTCH)" on page 126

"CALL:PDTCH|PDTChannel" on page 454

# Establishing a Data Connection with the Mobile Station

For instructions and a programming example on how to make a data connection, see “Step 4: Make a connection” on page 159.

## Related Topics

“CALL:PDTCH | PDTChannel” on page 454

“CALL:FUNCtion:DATA:STARt” on page 407

“Data Connection Processing State Synchronization” on page 317

# 3 Programming

# Programming: Getting Started Guide for E1960A GSM Mobile Test Application Revision A.08

# 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 E1960A GSM mobile test application installed.

The variable `Test_set` used in the steps of the Getting Started Guide refers to the test set’s GPIB address.

## How to use this Getting Started Guide

The most effective way to use this Getting Started Guide is with the Programming Flowchart included inside 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/

Navigate to the Programming page for this test application. The illustrations on the back of the Programming Flowchart show you how to navigate to this page.

The following links are under the heading Getting Started on the Programming page:

- Programming: Getting Started Guide
  - — This online version of this guide contains links to more detailed information about each step which may be useful as you develop your control program.
- Control Program Examples
  - — These examples are for you to download. You may want to use these as templates for your own control program or to execute.
  - — The control program explained in the Getting Started Guide is also available here for you to download. It is a fully functional control program.

## 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.

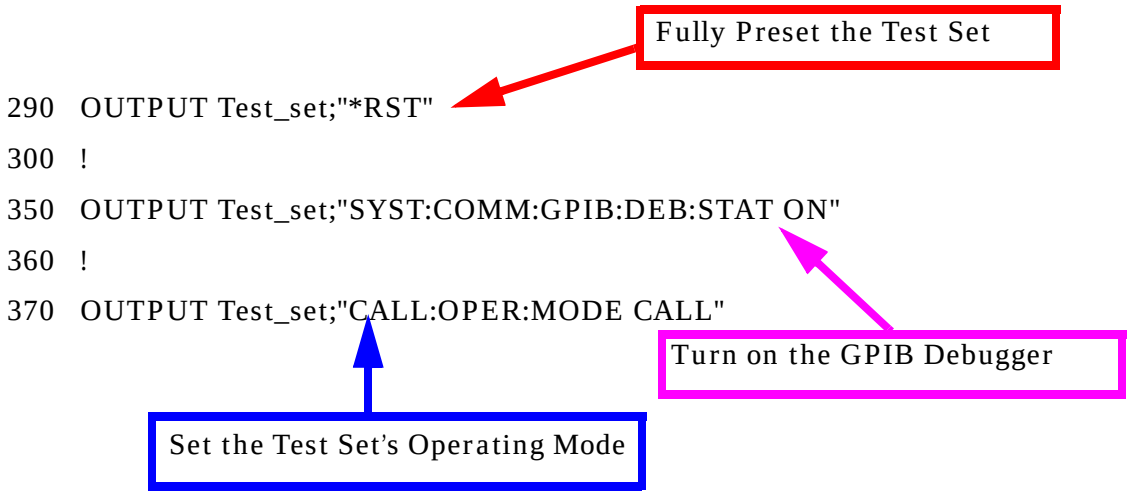
  ```
  OUTPUT Test_set;"SET:DTXP:TIM 10 S"
  ```

  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 the Test Set's Operating Mode"




## Fully Preset the Test Set

To set up the test set, you begin by sending the *RST command. The *RST is used to perform a full preset of the test set, returning it to a known state. *RST also sets all measurements to single trigger.

## 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 the 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 test modes are useful when you are operating the mobile station in test mode.

# Step 2: Configure Test Set and Mobile Station Parameters

This step explains how to:

- "Configure the Broadcast Channel Parameters"
- "Configure the Traffic Channel Parameters"
- "Configure the Mobile Station Operating 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 Broadcast Channel Parameters

The example below illustrates how to set up the broadcast channel parameters.

You must deactivate the cell, as shown in line 530 below, before setting the network parameters in line 550. If you do not deactivate the cell, the test set generates the following error:

```
GSM operation rejected; Attempting to set <MCC|MNC|LAC|NCC|BCC> while generating a BCH.
```

```
500   ! Set the broadcast channel parameters
510   OUTPUT Test_set;"CALL:BAND PGSM" ! Set active broadcast band.
520   ! Deactivate cell to set network parameters.
530   OUTPUT Test_set;"CALL:ACT OFF"
540   ! Set network parameters
550   OUTPUT Test_set;"CALL:MCC 1;LAC 1;MNC 1;NCC 1;BCC 5"
560   !
570   OUTPUT Test_set;"CALL:ACT ON"   ! Reactivate the cell.
580   OUTPUT Test_set;"CALL:BCH 20"   ! Set broadcast channel to 20.
590   OUTPUT Test_set;"CALL:POW -85"  ! Set cell power to -85 dBm and
600                                   ! cell power state to ON with
610                                   ! a complex command.
```

## Configure the Traffic Channel Parameters

The following example illustrates setting the traffic channel ARFCN and timeslot. 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.

```
640   OUTPUT Test_set;"CALL:TCH 45"         ! Set traffic channel to 45.
650   OUTPUT Test_set;"CALL:TCH:TSL 4"      ! Set timeslot to 4
```

## Configure the Mobile Station Operating Parameters

The example below illustrates how to configure the mobile station's parameters. In this example, you can see how to set the discontinuous transmission state and how to set the mobile station's transmit level.

```
680   OUTPUT Test_set;"CALL:MS:DTX OFF"! Turn DTX off for all MS tests.
690   OUTPUT Test_set;"CALL:MS:TXL 5"  ! Set the MS Transmit Level
```

# Step 3: Set the Measurement Parameters

This step gives an example of how you can configure measurement parameters. For more information about measurement parameters, refer to the additional details about this step available on the Internet.

```
750   ! Configure ORFS Measurement:
760   !
770   ! The lines below are examples of using complex commands to set
780   ! multi-meas state and count at the same time.
790   OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5"
800   OUTPUT Test_set;"SET:ORFS:MOD:COUN 10"
810   !
820   OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO"! Set trig source to AUTO.
830   OUTPUT Test_set;"SET:ORFS:CONT OFF"      ! Set trig mode to single.
840   OUTPUT Test_set;"SET:ORFS:TIM 60"        ! Set timeout time.
850   ! Put switching and modulation offsets to be tested into string
860   ! variables.  Swit$ contains switching offsets.  Mod$ contains
870   ! modulation offsets.
880   Swit$=".4MHZ,-.4MHZ,.6MHZ,-.6MHZ,1.2MHZ,-1.2MHZ,1.8MHZ,-1.8MHZ"
890   Mod$=".4MHZ,-.4MHZ,.6MHZ,-.6MHZ,1.2MHZ,-1.2MHZ,1.8MHZ,-1.8MHZ"
900   OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit$
910   OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod$
920   !
930   ! Configure TX Power Measurement:
940   !
950   OUTPUT Test_set;"SET:TXP:COUN 3"
960   OUTPUT Test_set;"SET:TXP:TRIG:SOUR RISE;QUAL ON"
970   OUTPUT Test_set;"SET:TXP:CONT OFF"
980   OUTPUT Test_set;"SET:TXP:TIM 20"
990   !
1000  ! Configure Phase & Frequency Error Measurement:
1010  !
1020  OUTPUT Test_set;"SET:PFER:COUN 8"
1030  OUTPUT Test_set;"SET:PFER:TRIG:SOUR PROT;QUAL ON"
1040  OUTPUT Test_set;"SET:PFER:CONT OFF"
1050  OUTPUT Test_set;"SET:PFER:TIM 30"
1060  OUTPUT Test_set;"SET:PFER:BSYN MID"
```

# Step 4: Make a Connection

There are two possible ways to make a connection with the mobile station.

- “Originating a Call from the Test Set”
- “Originating a Call from the Mobile Station”

## 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. However, as a programming convenience the test set automatically arms the state change detector with a fixed timeout value of 60 seconds for test set initiated events. Therefore, there is no need for you to specify a timeout value or arm the change detector when originating a call from the test set.

```
1120  ! Set the paging IMSI
1130  OUTPUT Test_set;"CALL:PAG:IMSI '001012345678901'"
1140  OUTPUT Test_set;"CALL:PAG:REP OFF" ! Set the paging repeat state.
1150  !
1280  Tries=1
1290  LOOP
1300    OUTPUT Test_set;"CALL:ORIG"       ! Originate a call.
1310    OUTPUT Test_set;"CALL:CONN:STAT?" ! CALL:CONN hanging query.
1320    ENTER Test_set;Call_connected
1330  ! Program will hang here until origination process completes.  If
1340  ! successful and the call is connected the query will return a 1.
1350  ! If unsuccessful and the call is not connected, the query
1360  ! returns 0.
1370  !
1380  EXIT IF Call_connected
1390    OUTPUT Test_set;"CALL:END"
1400    IF Tries=50 THEN
1410      BEEP
1420      DISP ""
1430      PRINT "Call did not connect after";Tries;"."
1440      PRINT "Program terminated."
1450      STOP
1460    END IF
1470    DISP "Call has not connected after";Tries;"attempts."
1480    Tries=Tries+1
1490  END LOOP
```

## Originating a Call from the Mobile Station

The code below illustrates how to make a connection by originating a call with the mobile station. This code is not included in the control program available on-line for you to download. That example originates the connection from the test set.

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 Internet.

```
OUTPUT Test_set;”CALL:CONN:TIM 15”   ! Set timeout time to 15 seconds
OUTPUT Test_set;”CALL:CONN:ARM”      ! Arm the change detector
OUTPUT Test_set;”CALL:CONN:STAT?”    ! Initiate call connect state query
DISP “Originate call from mobile station.”
ENTER Test_set;Call_connected        ! Program will hang here until
                                     ! origination passes or fails
IF NOT Call_connected THEN           ! Check if connection successful
  OUTPUT Test_set;”CALL:END”
  PRINT “Origination failed.  Program terminated.”
  STOP
END IF
```

# Step 5: INITiate and FETCh Measurements

This step explains how to:

- "INITiate a set of measurements"
- "FETCh measurement results using a subroutine"

## INITiate a set of measurements

The example below illustrates how to start three measurements running concurrently.

```
1560  ! Start a set of concurrent measurements:
1570  !
1580  OUTPUT Test_set;"INIT:TXP;PFER;ORFS"
```

## FETCh measurement results using a subroutine

In a typical control program, measurements are repeated on various frequencies and power levels. Therefore, it is desirable to have a subroutine capable of fetching multiple measurement results. The example code below demonstrates how you might create a subroutine for fetching the measurement results. The variable `Tch` contains the ARFCN the measurement is being made on. The variable `Ms_pwr_lvl` refers to the current power level assigned to the phone. Refer to the additional details on the Internet for more information about the different measurement results that are available and how to fetch them.

```
2470  SUB Global_fetch
2480    OPTION BASE 1
2490    COM /Address/Test_set
2500    OUTPUT Test_set;"CALL:TCH?;MS:TXL?"
2510    ENTER Test_set;Tch,Ms_pwr_lvl
2520  !
2530  !  Determine if a measurement is done:
2540  !
2550    LOOP
2560      OUTPUT Test_set;"INIT:DONE?"
2570      ENTER Test_set;Meas_done$
2580  !
2590  ! Obtain measurement results: Each measurement illustrates a
2600  ! different way of reading in results. There is no one right way.
2610  ! The method used is application dependent. Note that the examples
2620  ! do not show all possible ways.
2630  !
2640      SELECT Meas_done$
2650  !
2660      CASE "TXP"  ! TX Power measurement done.
2670        ALLOCATE Txpower(4)
2680        OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
2690        ENTER Test_set;Integrity,Txpower(*)
2700        IF (Integrity=0) THEN  ! Always check integrity value.
2710          PRINT "TX Power results: TCH=";Tch;"and TXL=";Ms_pwr_lvl
2720          PRINT USING "5X,""Minimum:"",M2D.2D,"" dBm""";Txpower(1)
```

```
2730          PRINT USING “5X,””Maximum:””,M2D.2D,”” dBm””””;Txpower(2)
2740          PRINT USING “5X,””Average:””,M2D.2D,”” dBm””””;Txpower(3)
2750          PRINT USING “5X,””Std Dev:””,M2D.2D,”” dB””””;Txpower(4)
2760          DEALLOCATE Txpower(*)
2770        ELSE
2780          GOSUB Bad_measurement
2790        END IF
2800  !
2810      CASE “PFER”  ! Phase & Frequency Error measurement done.
2820        OUTPUT Test_set;”FETC:PFER:ALL?”
2830        ENTER Test_set;Integrity,Rms_ph_er,Peak_ph_er,Worst_frq_er
2840        IF (Integrity=0) THEN
2850          PRINT “PFERror results: TCH=”;Tch;”and TXL=”;Ms_pwr_lvl
2860          PRINT “RMS Phase Error: “;Rms_ph_er;” deg”
2870          PRINT “Peak Phase Error: “;Peak_ph_er;” deg”
2880          PRINT “Worst Freq Error: “;Worst_frq_er;” Hz”
2890        ELSE
2900          GOSUB Bad_measurement
2910        END IF
2920  !
2930      CASE “ORFS”  ! ORFS measurement done.
2940  !
2950  ! This code illustrates a more ‘generic’ approach to reading
2960  ! measurement results. By using the capabilities designed into
2970  ! high-level measurements, routines that access measurement
2980  ! results do not have to explicitly know what the measurement
2990  ! execution conditions were.  That information can be determined
3000  ! at the time the measurement results are queried.
3010  !
3020        OUTPUT Test_set;”FETC:ORFS:INT?”        ! Check integrity.
3030        ENTER Test_set;Integrity
3040        IF (Integrity=0) THEN
3050          ! Get the number of offsets tested.
3060          OUTPUT Test_set;”SET:ORFS:SWIT:FREQ:POIN?”
3070          ENTER Test_set;Points
3080          IF Points THEN  ! Only query if one or more offsets tested.
3090            ALLOCATE Swit_res(Points),Swit_offs(Points)
3100            ! Get measurement offsets.
3110            OUTPUT Test_set;”SET:ORFS:SWIT:FREQ?”
3120            ENTER Test_set;Swit_offs(*)
3130            ! Get results
3140            OUTPUT Test_set;”FETC:ORFS:POW?;:FETC:ORFS:SWIT?”
3150            ENTER Test_set;Tx_power,Swit_res(*)
3160            PRINT “ORFS Swit Results: TCH=”;Tch;”and TXL=”;Ms_pwr_lvl
3170            PRINT USING “19X,””TX Power =””,M2D.2D,”” dBm””””;Tx_power
3180            PRINT “     Offset(kHz)          Level(dBm)”
3190            PRINT “     -----------          ----------”
3200 Orfs_image:  IMAGE 6X,M4D.2D,12X,M4D.2D
3210            FOR J=1 TO Points
3220              PRINT USING Orfs_image;(Swit_offs(J)/1.E+3),Swit_res(J)
3230            NEXT J
3240            DEALLOCATE Swit_res(*),Swit_offs(*)
3250          END IF
```

```
3260          ! Get the number of offsets tested.
3270          OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?"
3280          ENTER Test_set;Points
3290          IF Points THEN ! Only query if one or more offsets tested.
3300            ALLOCATE Mod_res(Points),Mod_offs(Points)
3310            ! Get measurement offsets
3320            OUTPUT Test_set;"SET:ORFS:MOD:FREQ?"
3330            ENTER Test_set;Mod_offs(*)
3340            ! Get results
3350            OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:MOD?"
3360            ENTER Test_set;Tx_power,Pwr_30khz,Mod_res(*)
3370            PRINT "ORFS Mod Results: TCH=";Tch;"and TXL=";Ms_pwr_lvl
3380            PRINT "30 KHz BW Power =";Pwr_30khz;" dBm"
3390            PRINT "     Offset(kHz)          Level(dB)"
3400            PRINT "     -----------          ---------"
3410            FOR J=1 TO Points
3420              PRINT USING Orfs_image;(Mod_offs(J)/1.E+3),Mod_res(J)
3430            NEXT J
3440            DEALLOCATE Mod_res(*),Mod_offs(*)
3450          END IF
3460        ELSE
3470          GOSUB Bad_measurement
3480        END IF
3490      END SELECT
3500    EXIT IF Meas_done$="NONE"
3510    END LOOP  ! If 'WAIT' is returned from 'INIT:DONE?' query, it
3520              ! just falls through the loop.
3530    SUBEXIT
3540 Bad_measurement: !
3550  PRINT "Measurement error: "&Meas_done$
3560  PRINT "Measurement Integrity value =";Integrity
3570  RETURN
3580  !
3590  SUBEND
```

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

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

- "Reconfigure the Mobile Station Parameters"
- "Reconfigure the Connection to a New ARFCN"
- "Reconfigure the Connection to a New ARFCN in a Different Band"

## Reconfigure the Mobile Station Parameters

The example below illustrates how to change the mobile station's transmit level. The :SEQuential synchronization command appended to the end of the command ensures that the command has executed before the test set accepts any other commands. This is important because the mobile station needs to have received the command to be on the new power level before transmitter measurements can be made accurately.

```
1650  ! Assign a new power level to the Mobile Station
1660  OUTPUT Test_set;"CALL:MS:TXL:SEQ 10"
```

## Reconfigure the Connection to a New ARFCN

The example below illustrates how to reconfigure the connection to a new ARFCN. You may also want to change the mobile station transmit level at this time as well. The recommended process for reconfiguring the mobile station transmit level and the ARFCN at the same is shown in the example below.

The example below also shows you how to use the CALL:STAT:STAT? query to determine if the connection was maintained. The CALL:STAT:STAT? query returns the current state of the connection. In this case, "CONN" is returned if the connection is still in the connected state, indicating the handover succeeded. This query can be used in this instance because the :SEQuential command forced the CALL:TCH command to operate sequentially.

```
1810  OUTPUT Test_set;"CALL:MS:TXL 5"
1820  OUTPUT Test_set;"CALL:TCH:SEQ 120" ! Use :SEQ to force sequential
1830                                     ! execution of the TCH command.
1840  OUTPUT Test_set;"CALL:STAT:STAT?"  ! Verify that the call is still
1850  ENTER Test_set;Call_status$        ! in the connected state after
1860                                     ! handover.
1870  IF Call_status$<>"CONN" THEN
1880    PRINT "Call handover failed. New channel assignment =";Tch
1890    PRINT "Program terminated."
1900    STOP
1910  END IF
```

## Reconfigure the Connection to a New ARFCN in a Different Band

The recommended process for reconfiguring the connection to a new band is illustrated in the example below. DCS is added to the commands for reconfiguring the mobile station transmit level parameter and the TCH ARFCN. This results in the new parameter values being stored until the DCS band is made active by the CALL:TCH:BAND command. If they are not specified as DCS band parameters, they become active immediately

Note that reconfiguring the connection to a new band uses the same synchronization method as changing to a new TCH ARFCN.

```
2060  OUTPUT Test_set;"CALL:MS:TXL:DCS 5"
2070  OUTPUT Test_set;"CALL:TCH:DCS 600"
2080  OUTPUT Test_set;"CALL:TCH:BAND DCS"
2090  !
2100  OUTPUT Test_set;"CALL:STAT:STAT?" ! Verify that the call is still
2110  ENTER Test_set;Call_status$       ! in the connected state after
2120                                    ! handover.
2130  IF Call_status$<>"CONN" THEN
2140    PRINT "Call handover failed. New channel assignment =";Tch
2150    PRINT "Program terminated."
2160    STOP
2170  END IF
```

# 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

When you are ending the connection from the test set use the CALL:END command. The example below illustrates how you use the CALL:CONN:STAT? query for call synchronization. This query returns a "0" if the call ended successfully and a "1" if the call is not ended. It is not necessary for you to arm the change detector or set a change detector timeout when using the test set to terminate a call. The test set automatically arms the change detector and uses a default timeout in this situation.

```
2320  OUTPUT Test_set;"CALL:END"
2330  OUTPUT Test_set;"CALL:CONN:STAT?"
2340  ENTER Test_set;Call_connected
2350  IF Call_connected THEN
2360    BEEP
2370    PRINT "Unable to complete BS termination. Program terminated."
2380    STOP
2390  END IF
```

## Ending the Connection from the Mobile Station

When 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 found on the Internet.

This code is not included in the control program available on-line for you to download. That example ends the connection from the test set.

```
OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Test_set;"CALL:CONN:ARM"   !Arm the change detector.
OUTPUT Test_set;"CALL:CONN:STAT?" !Initiate call connect state query.
DISP "Terminate the call from the mobile station."
ENTER Test_set;Call_connected     !Program will hang here until state
                                  !change or timer expires.
IF Call_connected THEN            !Check if disconnect successful.
  OUTPUT Test_set;"CALL:END"
  PRINT "Call failed to end correctly.  Program terminated."
  STOP
END IF
```

# Programming: Getting Started Guide for E1964A GPRS Mobile Test Application Rev. A.02 E6701A GPRS Lab Application Rev. A.01

# 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 either the E1964A GPRS mobile test application or the E6701A GPRS lab application installed or both.

The variable `Test_set` used in the steps of the Getting Started Guide refers to the test set’s GPIB address.

## How to use this Getting Started Guide

The most effective way to use this Getting Started Guide is with the Programming Flowchart included inside 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:

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 on-line version of this guide contains links to more detailed information about each step which may be useful as you develop your control program.
- Control Program Examples
  - — These examples are for you to download. You may want to use these as templates for your own control program or to execute.
  - — The control program explained in the Getting Started Guide is also available here for you to download. It is a fully functional control program.

## 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.

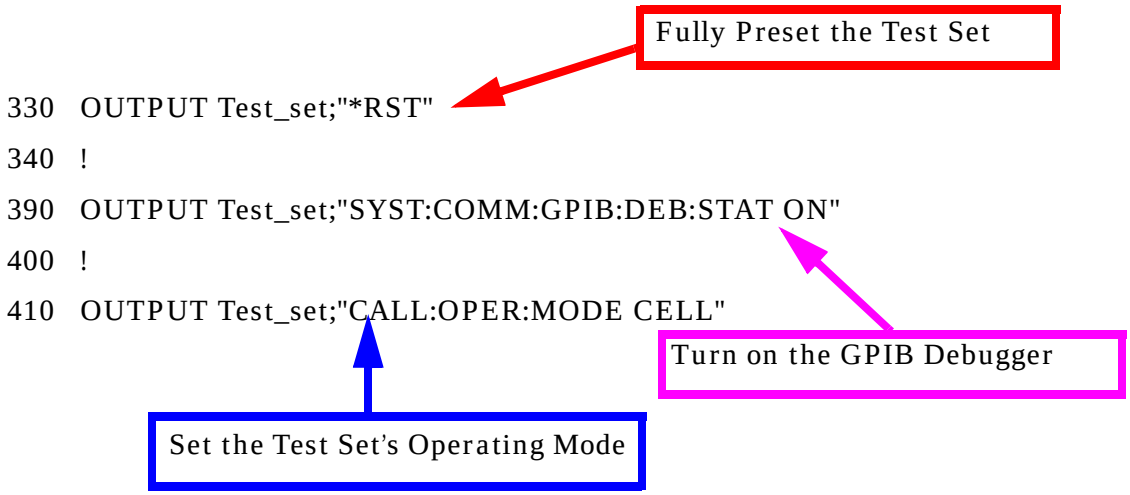
  ```
  OUTPUT Test_set;"SET:DTXP:TIM 10 S"
  ```

  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"




## Fully Preset the Test Set

To set up the test set, you begin by sending the *RST command. The *RST is used to perform a full preset of the test set, returning it to a known state. *RST also sets all measurements to single trigger.

## 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 test modes are useful when you are operating the mobile station in test mode. See the 8960 Family Support Site on the Internet for more information on test modes.

# Step 2: Configure Test Set and Mobile Station Parameters

This step explains how to:

- "Set up data connection synchronization parameters"
- "Configure the Broadcast Channel Parameters"
- "Configure the Packet Data Traffic Channel Parameters"
- "Configure the Mobile Station Operating Conditions"

## Set up data connection synchronization parameters

You may choose to set the data connection synchronization timeout parameter at this point in the program. The data connection synchronization command associated with this timeout parameter is used in "Step 4: Make a connection" on page 159 and "Step 7: End the Connection" on page 167.

```
490   OUTPUT Test_set;"CALL:DCON:TIM 10"
```

**NOTE** Many of the parameters 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 Broadcast Channel Parameters

The programming example below illustrates configuring the active band to PGSM and setting the cell power to -80 dBm.

```
520   OUTPUT Test_set;"CALL:BAND PGSM"! Set active broadcast band
530   OUTPUT Test_set;"CALL:POW -80"  ! Set cell power to -80 dBm.
```

## Configure the Packet Data Traffic Channel Parameters

In the next example, several packet data traffic channel parameters are specified. Note that the PDTCH ARFCN is set to 45. This is on a different ARFCN than the broadcast channel (20 is the default broadcast channel ARFCN for PGSM), allowing the use of the power reduction levels specified and assigned to the downlink bursts.

```
560   OUTPUT Test_set;"CALL:PDTCH 45" ! Set packet data traffic channel
570   !  Set Data Connection Type to BLER
580   OUTPUT Test_set;"CALL:FUNC:DATA:TYPE BLER"
590   !
600   !  The following commands are helpful in enabling the test set to
610   !  establish a data connection with mobiles which cannot establish
620   !  a BLER data connection under normal conditions.
630   !
640   !  Set the test set to send an invalid FCS to the mobile
650   OUTPUT Test_set;"CALL:FUNC:DATA:BLER:LLC:FCS CORR"!
660   !  Set the block polling interval used during BLER connection
```

```
670   OUTPUT Test_set;"CALL:FUNC:DATA:BLER:POLL:INT 4"! Set polling rate
680   !  Set the type of frame numbering scheme used during attach.
690   OUTPUT Test_set;"CALL:FUNC:DATA:FRAM:STAR ABS"! Absolute attach
700   !
710   ! Set Multi-slot Configuration to two downlinks and one uplinks.
720   OUTPUT Test_set;"CALL:PDTCH:MSL:CONF D2U1"
730   OUTPUT Test_set;"CALL:PDTCH:CSCH CS4"! Set Coding Scheme to CS4
740   !
750   ! Assign values to the power reduction levels
760   OUTPUT Test_set;"CALL:PDTCH:PZER:LEV 30"   ! Assign a value to P0
770   OUTPUT Test_set;"CALL:PDTCH:PRED:LEV1 11"! Set PRL1 to 11 dB
780   OUTPUT Test_set;"CALL:PDTCH:PRED:LEV2 0"   ! Set PRL2 to 0 dB
790   !
800   ! Assign power levels to the downlink bursts
810   ! Assign Burst 1 a PRL of 0 dB
820   OUTPUT Test_set;"CALL:PDTCH:PRED:BURS1 PRL2"
830   ! Assign Burst 2 a PRL of 11 dB
840   OUTPUT Test_set;"CALL:PDTCH:PRED:BURS2 PRL1"
```

## Configure the Mobile Station Operating Conditions

The example below illustrates how to assign mobile station transmit levels to two uplink bursts.

```
870   OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS 5"
880   OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS2 3"
```

# Step 3: Set Measurement Parameters

This step gives an example of how you can configure measurement parameters. For more information about measurement parameters, refer to the additional details about this step available on the Internet.

```
940   ! Configure ORFS Measurement:
950   !
960   ! The lines below are examples of using complex commands to set
970   ! multi-meas state and count at the same time.
980   OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5"
990   OUTPUT Test_set;"SET:ORFS:MOD:COUN 10"
1000  !
1010  OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO"! Set trig source to AUTO.
1020  OUTPUT Test_set;"SET:ORFS:CONT OFF"      ! Set trig mode to single.
1030  OUTPUT Test_set;"SET:ORFS:TIM 60"        ! Set timeout time.
1040  ! Put switching and modulation offsets to be tested into string
1050  ! variables.  Swit$ contains switching offsets.  Mod$ contains
1060  ! modulation offsets.
1070  Swit$=".4MHZ,-.4MHZ,.6MHZ,-.6MHZ,1.2MHZ,-1.2MHZ,1.8MHZ,-1.8MHZ"
1080  Mod$=".4MHZ,-.4MHZ,.6MHZ,-.6MHZ,1.2MHZ,-1.2MHZ,1.8MHZ,-1.8MHZ"
1090  OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit$
1100  OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod$
1110  !
1120  ! Configure TX Power Measurement:
1130  !
1140  OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20"
1150  OUTPUT Test_set;"SET:TXP:TRIG:SOUR AUTO;QUAL ON"
1160  !
1170  ! Configure Phase & Frequency Error Measurement:
1180  !
1190  OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;SYNC MID"
1200  OUTPUT Test_set;"SET:PFER:TRIG:SOUR AUTO"
1210  !
1220  ! Configure multislot measurements to be made on burst 1
1230  OUTPUT Test_set;"RFAN:MSL:MEAS:BURS 1"
```

# Step 4: Make a connection

This step explains how to make a connection with the mobile station. The two actions you must perform to accomplish this are:

- "Mobile Station performs a GPRS Attach"
- "Start a Data Connection"

## Mobile Station performs a GPRS Attach

The mobile station must initiate a GPRS attach. It is assumed the phone is turned on and is attempting a GPRS attach. The following code queries the test set for the connection status and then stops the program if an attached state is not reached within one minute. This gives adequate time for the mobile station to attach.

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 GPRS Attach is being performed, the CALL:ATT? hanging query is the appropriate query to use. It will return a "1" when the mobile station is attached 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 "ATTached" is able to begin. Finally, to prevent the query from hanging indefinitely, which could occur if the mobile station is not turned on or not sent the correct commands, a timeout is set for this query. In this example, 10 seconds is the value assigned to the timeout. After 10 seconds, the change detector is disarmed and the query returns either a "1" or "0".

```
1350  DISP "Turn the phone on now.  Make the phone perform a GPRS attach."
1360  Start_time=TIMEDATE
1370  LOOP
1380    OUTPUT Test_set;"CALL:DCON:ARM"
1390    OUTPUT Test_set;"CALL:ATT?"
1400    ENTER Test_set;Att_state
1410   EXIT IF Att_state
1420    Current_time=TIMEDATE-Start_time
1430    IF Current_time>=Timer THEN       ! Timer value is 1 minute
1440      BEEP
1450      DISP ""
1460      PRINT "GPRS attach did not complete. Program terminated."
1470      STOP
1480    END IF
1490  END LOOP
```

## Start a Data Connection

Once the mobile station has successfully attached, you can start the data connection using the CALL:FUNC:DATA:STAR command. The CALL:FUNC:DATA:STAR command is a overlapped command, meaning the test set accepts other commands before completely processing this command. Because this is an overlapped command, synchronization is maintained by using the CALL:TRAN? hanging query. It allows the test set to initiate the data connection and then returns a "1" if the data connection starts successfully and a "0" if the state of the connection returns to either "IDLE" or "ATTached". Because the test set originated the data connection, it is not necessary to assign a timeout value or arm the change detector for this query. Instead, there is a default timer associated with this query and the change detector is armed automatically.

**Step 4: Make a connection**

```
1520  OUTPUT Test_set;”CALL:FUNC:DATA:STAR”
1530  OUTPUT Test_set;”CALL:TRAN?”
1540  ENTER Test_set;Tran_state
1550  IF NOT Tran_state THEN
1560    BEEP
1570    DISP “”
1580    PRINT “Data connection failed.  Program terminated.”
1590    STOP
1600  END IF
```

# Step 5: INITiate and FETCh Measurements

This step explains how to:


- "INITiate a set of measurements"
- "FETCh measurement results"
- "Making the BLER Measurement"


## INITiate a set of measurements

The example below demonstrates how to start three measurements running concurrently. The SYST:MEAS:RES command resets the Block Error Rate measurement results. This is done to ensure BLER reports are collected during a known good connection between the test set and the mobile station.

```
1680  OUTPUT Test_set;"SYST:MEAS:RES" ! Reset the BLER results
1690  OUTPUT Test_set;"INIT:ORFS;TXP;PFER"
```

## FETCh measurement results

In a typical control program, measurements are repeated on various frequencies and power levels. Therefore, it is desirable to have a subroutine capable of fetching multiple measurement results. The example code below demonstrates how you might create a subroutine for fetching the measurement results. The variable Pdtch contains the ARFCN the measurement is being made on. The variables Ms_pwr_bs1 and Ms_pwr_bs2 refer to the current power level assigned to the uplink bursts. Refer to the additional details about this step available on the Internet for more information about the different measurement results that are available and how to fetch them.

```
1730  CALL Global_fetch
```

```
3160  SUB Global_fetch
3170    OPTION BASE 1
3180    COM /Address/Test_set
3190    OUTPUT Test_set;"CALL:PDTCH?"
3200    ENTER Test_set;Pdtch
3210    OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS?;BURS2?"
3220    ENTER Test_set;Ms_pwr_bs1;Ms_pwr_bs2
3230  !
3240  !  Determine if a measurement is done:
3250  !
3260    LOOP
3270      OUTPUT Test_set;"INIT:DONE?"
3280      ENTER Test_set;Meas_done$
3290  !
3300  ! Obtain measurement results: Each measurement illustrates a
3310  ! different way of reading in results. There is no one right way.
3320  ! The method used is application dependent. Note that the examples
3330  ! do not show all possible ways.
3340  !
3350      SELECT Meas_done$
3360  !
```

```
3370      CASE “TXP”  ! TX Power measurement done.
3380        ALLOCATE Txpower(4)
3390        OUTPUT Test_set;”FETC:TXP:INT?;POW:ALL?”
3400        ENTER Test_set;Integrity,Txpower(*)
3410        IF (Integrity=0) THEN  ! Always check integrity value.
3420          PRINT “TX Power results: PDTCH=”;Pdtch
3430          PRINT “                  Burst1 TXL=”;Ms_pwr_bs1
3440          PRINT “                  Burst2 TXL=”;Ms_pwr_bs2
3450          PRINT USING “5X,””Minimum:””,M2D.2D,”” dBm”””;Txpower(1)
3460          PRINT USING “5X,””Maximum:””,M2D.2D,”” dBm”””;Txpower(2)
3470          PRINT USING “5X,””Average:””,M2D.2D,”” dBm”””;Txpower(3)
3480          PRINT USING “5X,””Std Dev:””,M2D.2D,”” dB”””;Txpower(4)
3490          DEALLOCATE Txpower(*)
3500        ELSE
3510          GOSUB Bad_measurement
3520        END IF
3530  !
3540      CASE “PFER”  ! Phase & Frequency Error measurement done.
3550        OUTPUT Test_set;”FETC:PFER:ALL?”
3560        ENTER Test_set;Integrity,Rms_ph_er,Peak_ph_er,Worst_frq_er
3570        IF (Integrity=0) THEN
3580          PRINT “PFERror results: PDTCH=”;Pdtch
3590          PRINT “                 Burst1 TXL=”;Ms_pwr_bs1
3600          PRINT “                 Burst2 TXL=”;Ms_pwr_bs2
3610          PRINT “RMS Phase Error: “;Rms_ph_er;” deg”
3620          PRINT “Peak Phase Error: “;Peak_ph_er;” deg”
3630          PRINT “Worst Freq Error: “;Worst_frq_er;” Hz”
3640        ELSE
3650          GOSUB Bad_measurement
3660        END IF
3670  !
3680      CASE “ORFS”  ! ORFS measurement done.
3690  !
3700  ! This code illustrates a more ‘generic’ approach to reading
3710  ! measurement results. By using the capabilities designed into
3720  ! high-level measurements, routines that access measurement
3730  ! results do not have to explicitly know what the measurement
3740  ! execution conditions were.  That information can be determined
3750  ! at the time the measurement results are queried.
3760  !
3770        OUTPUT Test_set;”FETC:ORFS:INT?”        ! Check integrity.
3780        ENTER Test_set;Integrity
3790        IF (Integrity=0) THEN
3800          ! Get the number of offsets tested.
3810          OUTPUT Test_set;”SET:ORFS:SWIT:FREQ:POIN?”
3820          ENTER Test_set;Points
3830          IF Points THEN  ! Only query if one or more offsets tested.
3840            ALLOCATE Swit_res(Points),Swit_offs(Points)
3850            ! Get measurement offsets.
3860            OUTPUT Test_set;”SET:ORFS:SWIT:FREQ?”
3870            ENTER Test_set;Swit_offs(*)
3880            ! Get results
3890            OUTPUT Test_set;”FETC:ORFS:POW?;:FETC:ORFS:SWIT?”
```

```
3900            ENTER Test_set;Tx_power,Swit_res(*)
3910            PRINT “ORFS Swit Results: PDTCH=”;Pdtch
3920            PRINT “                   Burst1 TXL=”;Ms_pwr_bs1
3930            PRINT “                   Burst2 TXL=”;Ms_pwr_bs2
3940            PRINT USING “19X,””TX Power =””,M2D.2D,”” dBm””””;Tx_power
3950            PRINT “     Offset(kHz)          Level(dBm)”
3960            PRINT “     -----------          ----------”
3970 Orfs_image:  IMAGE 6X,M4D.2D,12X,M4D.2D
3980            FOR J=1 TO Points
3990              PRINT USING Orfs_image;(Swit_offs(J)/1.E+3),Swit_res(J)
4000            NEXT J
4010            DEALLOCATE Swit_res(*),Swit_offs(*)
4020          END IF
4030          ! Get the number of offsets tested.
4040          OUTPUT Test_set;”SET:ORFS:MOD:FREQ:POIN?”
4050          ENTER Test_set;Points
4060          IF Points THEN ! Only query if one or more offsets tested.
4070            ALLOCATE Mod_res(Points),Mod_offs(Points)
4080            ! Get measurement offsets
4090            OUTPUT Test_set;”SET:ORFS:MOD:FREQ?”
4100            ENTER Test_set;Mod_offs(*)
4110            ! Get results
4120            OUTPUT Test_set;”FETC:ORFS:POW?;:FETC:ORFS:MOD?”
4130            ENTER Test_set;Tx_power,Pwr_30khz,Mod_res(*)
4140            PRINT “ORFS Mod Results: TCH=”;Tch;”and TXL=”;Ms_pwr_lvl
4150            PRINT “30 KHz BW Power =”;Pwr_30khz;” dBm”
4160            PRINT “     Offset(kHz)          Level(dB)”
4170            PRINT “     -----------          ---------”
4180            FOR J=1 TO Points
4190              PRINT USING Orfs_image;(Mod_offs(J)/1.E+3),Mod_res(J)
4200            NEXT J
4210            DEALLOCATE Mod_res(*),Mod_offs(*)
4220          END IF
4230        ELSE
4240          GOSUB Bad_measurement
4250        END IF
4260      END SELECT
4270    EXIT IF Meas_done$=”NONE”
4280    END LOOP  ! If ‘WAIT’ is returned from ‘INIT:DONE?’ query, it
4290              ! just falls through the loop.
4300    SUBEXIT
```

## Making the BLER Measurement

After initiating and fetching measurement results, the phone has been able to make several BLER measurements. In the example below, the range for the number of blocks tested is between 2000 and 2300. Test time has been saved by resetting the BLER reports before making any other measurements. This allows the BLER results for a number of blocks to be obtained concurrent to the transmitter measurements being performed. The example below illustrates how to finally retrieve the BLER measurement results and the number of blocks tested.

```
1740  REPEAT
1750    OUTPUT Test_set;"CALL:STAT:PDTCH:BLER?"
1760    ENTER Test_set;Bler,Blocks
1770  UNTIL (Blocks>=2000 AND Blocks<=2300)
1780  PRINT
1790  PRINT "Blocks tested at -101 dBm = ";Blocks
1800  PRINT "BLER Result at downlink PDTCH power of -101 dBm = ";Bler
```

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

There are several ways you may want to reconfigure the connection parameters when you reach this step. Some examples are:

- "Reconfigure the Mobile Station Parameters"
- "Reconfigure the connection to a new PDTCH ARFCN"
- "Reconfigure the connection to a new PDTCH ARFCN in a different band"

## Reconfigure the Mobile Station Parameters

The example below illustrates how to change the mobile station's transmit level for burst 1 to level 10. The default burst for this command is burst 1.

```
2030  OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS 10"
```

## Reconfigure the connection to a new PDTCH ARFCN

When reconfiguring the connection to a new packet data traffic channel ARFCN, you may also want to change the mobile station TX Level as well. In this case, using deferred parameter commands would create the most efficient code. The code below shows how to set a new mobile station TX level and PDTCH ARFCN with deferred parameter commands, and then use the CALL:HAND command to apply the new parameters. The code also shows you how to use the CALL:STAT:DATA? synchronization command to make sure the connection was maintained. The CALL:STAT:DATA? query returns the current state of the connection. In this case, "TRAN" should be returned, indicating the connection is still in the transferring state and the handover was successful. This query can be used because the CALL:HAND command is sequential, meaning its operation completes before the test set accepts a new command.

```
2250  OUTPUT Test_set;"CALL:SET:PDTCH:MS:TXL:BURS 5"
2260  OUTPUT Test_set;"CALL:SET:PDTCH 120"
2270  OUTPUT Test_set;"CALL:HAND"
2280  ! Use a call synchronization command to ensure the
2290  ! reconfiguration succeeded.
2300  OUTPUT Test_set;"CALL:STAT:DATA?"
2310  ENTER Conn_status$
2320  IF Conn_status$<>"TRAN" THEN
2330     PRINT "Data connection failed to reconfigure properly."
2340     PRINT "Program terminated."
2350     STOP
2360  END IF
```

## Reconfigure the connection to a new PDTCH ARFCN in a different band

When configuring the connection to a new band, remember to specify the band for the new mobile station TX level and PDTCH ARFCN. In the code below, DCS has been added to the commands for reconfiguring both these parameters. The result is that those parameters are stored until the DCS band is made active by the CALL:HAND command. If they are not specified as DCS band parameters, they become active immediately.

Note that reconfiguring the connection to a new band uses the same synchronization method as changing to a new PDTCH.

```
2520  OUTPUT Test_set;"CALL:PDTCH:MS:TXL:DCS:BURS 15"
2530  OUTPUT Test_set;"CALL:PDTCH:DCS 665"
2540  OUTPUT Test_set;"CALL:PDTCH:BAND DCS"
2550  ! Use a call syncrhonization command to ensure the
2560  ! reconfiguration succeeded.
2570  OUTPUT Test_set;"CALL:STAT:DATA?"
2580  ENTER Conn_status$
2590  IF Conn_status$<>"TRAN" THEN
2600     PRINT "Data connection failed to reconfigure properly."
2610     PRINT "Program terminated."
2620     STOP
2630  END IF
```

# Step 7: End the Connection

This step explains how to end the connection with the mobile station. The two actions you perform to accomplish this are:

- "End the Data Connection"
- "GPRS Detach"

## End the Data Connection

The CALL:FUNC:DATA:STOP command ends the data connection. As in "Step 4: Make a connection" on page 159, synchronization with the control program is important. The CALL:FUNC:DATA:STOP command is a sequential command, meaning its operation is completed before the test set accepts another command. Therefore, it is only necessary to use the CALL:STAT:DATA? query to ensure the data connection has ended and the connection is in the "ATTached" state.

```
2790  OUTPUT Test_set;"CALL:FUNC:DATA:STOP"
2800  OUTPUT Test_set;"CALL:STAT:DATA?"
2810  ENTER Test_set;Conn_status$
2820  IF Conn_status$<>"ATT" THEN
2830    PRINT "Unable to terminate data connection correctly."
2840    PRINT "PROGRAM TERMINATED."
2850    STOP
2860  END IF
```

## GPRS Detach

The test set does not require you to perform a GPRS detach. No errors are generated if a GPRS detach is not performed. Therefore, you may choose to remove the tested phone after the data connection has ended.

There are two ways to initiate a GPRS Detach.

- "Initiating the GPRS Detach from the Test Set"
- "Mobile Station initiated GPRS Detach"

### Initiating the GPRS Detach from the Test Set

The example below illustrates initiating a GPRS Detach from the Test Set.

```
2920  OUTPUT Test_set;"CALL:FUNC:DATA:DET"
2930  !
2940  Start_time=TIMEDATE
2950  LOOP
2960    OUTPUT Test_set;"CALL:DCON:ARM"
2970    OUTPUT Test_set;"CALL:ATT?"
2980    ENTER Test_set;Att_state
2990   EXIT IF NOT Att_state
3000    Current_time=TIMEDATE-Start_time
3010    IF Current_time>=Timer THEN
3020      DISP ""
3030      PRINT "GPRS detach did not occur.  Program terminated"
3040      STOP
3050    END IF
3060    IF Conn_state$="DET" THEN
3070      DISP "GPRS detach is in process."
3080    END IF
3090  END LOOP
```

### Mobile Station initiated GPRS Detach

The example below illustrates initiating a GPRS Detach from the mobile station.

```
DISP "Initiate a GPRS Detach"
Start_time=TIMEDATE
LOOP
  OUTPUT Test_set;"CALL:STAT:DATA?"
  ENTER Test_set;Conn_state$
 EXIT IF Conn_state$="IDLE"
  Current_time=TIMEDATE-Start_time
  IF Current_time>=Timer THEN
    DISP ""
    PRINT "GPRS detach did not occur.  Program terminated"
    STOP
  END IF
  IF Conn_state$="DET" THEN
    DISP "GPRS detach is in process."
  END IF
END LOOP
```

# Step 1: Set Up the Test Set

The following information provides additional details on Step 1 of the Programming Flowchart. This information is applicable to all test applications.

## Description

In this step you initialize the test set and set up the general operating conditions.

### Contents


- "Initialize the Test Set"
- "Set Up General Operating Conditions"


### Initialize the Test Set

- Fully Preset the Test Set

  It is important to get the test set to a known state before each production session.

  Sending the *RST command fully presets the test set, which ends all call processing and measurement processes and restores all values to defaults.

- Clear the Error Queue

  Before each production session, it is useful to clear the error queue of any old messages. That way, you know that any messages logged are relevant to the current production session.

  Sending the *CLS command clears the error queue.

### Set Up General Operating Conditions

- Turn Debugger On

  While developing your code, it is very useful to enable the GPIB debugger using the SYST:COMM:GPIB:DEB ON command. When the debugger is on, the test set alerts you when you send an incorrect command, and it also tells you which symbol or letter in the command is incorrect.

**NOTE** You should turn the debugger off once you have finished development and your code is stable.

- Set Operating Mode

  The test set contains a base station emulator (BSE), whose primary purpose is to provide enough call processing to allow parametric measurements of a mobile station's RF signal.

  An important characteristic of the test set's base station emulator is its operating mode. The operating mode sets the way in which the base station emulator interacts with the mobile station.

  Active cell mode is used when emulating a normal cell. Active cell mode allows active signaling between the mobile station and BSE. The mobile station camps to the BSE signal, and an actual call is established.

  In test mode, the mobile station synchronizes to the BSE signal and transmits an appropriate signal which the test set analyzes.

The test set's operating mode is set using the following command:

**Command to Set the Test Set's Operating Mode**

| Command | Example |
|---|---|
| CALL:OPER:MODE <operating mode> | CALL:OPER:MODE 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):

**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 is if you move to a new channel within the same band and channel type.

- Set Active Band and Mode

  Once you have specified the channel information for each band and channel type, you must set the active band using one of the following commands (depending upon which test application you are using):

**Commands to Set the Active Band**

| Command | Example |
|---|---|
| CALL:<channel mnemonic>:BAND <band mnemonic> | CALL:TCH:BAND EGSM |
| CALL:SET:<channel type mnemonic>:BAND <band mnemonic> | CALL:SET:DTC:BAND PCS |
| CALL:BAND:<channel mnemonic> <band mnemonic> | CALL:BAND:DIG2000 KPCS |

If the test application you are using supports testing of both analog and digital channel types, then you must also set the channel type using the following command:

**Command to Set the Active Channel Type**

| Command | Example |
|---|---|
| CALL:<channel mnemonic>:TYPE <channel type mnemonic> | CALL:TCH:TYPE DTC |

- Active Cell and Test Mode Considerations

  The function of the CALL commands differ depending upon whether you are in active cell or test mode.

  In active cell mode, when you use the CALL commands to set the channel numbers, the test set's output frequency and receiver frequency are set. A message is also sent to the mobile station to set its frequency.

  However, in test mode, since the BSE does not send call processing information to the mobile station, the CALL commands only configure the test set's output frequency and receiver frequency. You need to also send the appropriate test mode commands to the mobile station to set it to the correct frequency.

  In test mode, instead of using the CALL commands to configure the test set's frequencies, you may prefer to manually control the RF generator and RF analyzer using the CALL:RFG and RFAN commands, respectively. In either case, you must still send the appropriate test mode commands to the mobile station to move it to the proper frequency.

### Set Cell Power

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

**Command to Set Cell Power**

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

- Active Cell and Test Mode Considerations

  You can use the CALL:POW command to set the cell power in both active cell and test mode. However, in test mode you may prefer to manually control the output power of the test set using the CALL:RFG commands.

### Set Mobile Station Transmit Power

In active cell mode, use one of the following commands to set the mobile station transmit power level (depending upon which test application you are using):

**Commands to Set Mobile Station Transmit Power**

| Command | Example |
|---|---|
| CALL:MS:TXL:<band mnemonic> <num value> | CALL:MS:TXL:DCS <num value> |
| CALL:SET:MS:<channel type mnemonic>:TXL:<band mnemonic> <num value> | CALL:SET:MS:DIG:TXL:PCS <num value> |
| CALL:<channel mnemonic>:MS:TXL:<band mnemonic>:BURS <num value> | CALL:PDTCH:MS:TXL:DCS: BURS <num value> |

In addition to setting the mobile station transmit level, these commands also automatically configure the test set's receiver at the expected input level, whether in active cell or test mode. However, in test mode, you must also send the appropriate test mode commands to the mobile station to command it to output at the correct level. This is due to the fact that the BSE is not transmitting call processing commands to the mobile station.

- Manually Setting Expected Power

  Sending the CALL commands in Table , "Commands to Set Mobile Station Transmit Power," automatically sets the expected input level of the test set's receiver. However, there is another option for setting the receiver's input level in both active cell and test mode. It is often beneficial to manually set the expected input power level using the RFAN commands, rather than using the CALL commands.

  When you set the expected power manually, you tell the test set exactly what power level to expect. Whereas the CALL commands simply tell the test set the range of input level to expect, based on the definition of the mobile station power level (for example, an AMPS/136 mobile station transmitting at power level 3 has an output level in the range of +20 dBm to +26 dBm).

### Set Up Additional Connection Parameters

Depending upon the test application you are using, there may be other connection parameters to specify, such as timeslot, timing advance, vocoder, or data rates and types.

In active cell mode, you may also choose to set up network parameters, such as base station identifier numbers (for example, SID) and color codes.

All of these parameters are configured using the CALL subsystem.

# Step 3: Set Measurement Parameters

The following information provides additional details on Step 3 of the Programming Flowchart. This information is applicable to all test applications.

## Description

In this step you set up the conditions under which the measurements operate. You do this by configuring measurement parameters.

### Contents


- "Measurement Parameters Overview"
- "Generic Measurement Parameters"
- "Measurement-Specific Measurement Parameters"


### Measurement Parameters Overview

There are two different types of measurement parameters:

- Generic Measurement Parameters
- Measurement-Specific Measurement Parameters

The SETup subsystem is used to configure measurement parameters. Each individual measurement parameter can be set and queried using the associated SETup subsystem command. The general hierarchy of the SETup subsystem command structure is as follows:

```
SETup:<measurement mnemonic>:<measurement parameter> <parameter setting/value>
```

**NOTE** Not all measurements use all measurement parameters. Refer to the GPIB syntax listing for the detailed list of measurement parameters for individual measurements.

#### Generic Measurement Parameters

There are three types of generic measurement parameters:

- Measurement Count (used by most measurements)
  Measurement Count State
  Measurement Count Number
- Measurement Timeout (used by all measurements)
  Measurement Timeout State
  Measurement Timeout Time

- Measurement Trigger (used by most measurements)
  Trigger Arm (used by all measurements)
  Trigger Source (not applicable to analog measurements)
  Trigger Delay (not applicable to analog measurements)

### Measurement Count Parameters

The measurement count parameters control measurement averaging. The STATe command turns averaging on or off, and the NUMBer command determines the number of averages. The SNUMber command is a complex command which allows you to turn averaging on and set the number of averages in one command.

**Statistical Measurement Results Parameters**

| Parameter | Command Syntax |
|---|---|
| Measurement Count State | `SETup:<meas-mnemonic>:COUNt:STATe <ON\|1\|OFF\|0>` |
| Measurement Count Number | `SETup:<meas-mnemonic>:COUNt:NUMBer <numeric value>` |
| Measurement Count Number and State | `SETup:<meas-mnemonic>:COUNt[:SNUMber] <numeric value>` |

### Example 9. Programming Example:

```
OUTPUT Test_set;”SET:DTXP:COUN 10”
```

sets the multi-measurement count state to ON and set the number of averages to 10 for the digital transmit power measurement.

**Measurement Timeout Parameters** Measurement timeout parameters control the maximum time that a measurement executes. TIMe sets the amount of time and STATe determines if the timeout is in use. The STIMe command is a complex command which enables you to set both parameters in one command.

**Measurement Timeout Parameters**

| Parameters | Command Syntax |
|---|---|
| Measurement Timeout Time and State | `SETup:<meas-mnemonic>:TIMeout[:STIMe] <numeric value>[<suffix>]` |
| Measurement Timeout State | `SETup:<meas-mnemonic>:TIMeout:STATe <ON\|1\|OFF\|0>` |
| Measurement Timeout Time | `SETup:<meas-mnemonic>:TIMeout:TIME <numeric value>[<suffix>]` |

### Example 10. 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).
- The trigger source parameter selects the source of the measurement trigger signal. The recommended Trigger Source setting when writing a control program is AUTO.

**NOTE** Trigger source is always IMMediate for analog measurements and cannot be changed by the user.

- The trigger delay parameter controls the delay between the trigger event (the point in time at which the trigger signal is received) and the start of sampling. Negative values indicate that the sampling should occur prior to the trigger event.

**NOTE** Trigger delay is not applicable to analog measurements.

**Measurement Trigger Parameters**

| Parameter | Command Syntax |
|---|---|
| Trigger Arm | SETup:<meas-mnemonic>:CONTinuous <ON\|1\|OFF\|0> |
| Trigger Source | SETup:<meas-mnemonic>:TRIGger:SOURce <AUTO\|IMMediate\|PROTocol\|RISE> |
| Trigger Delay | SETup:<meas-mnemonic>:TRIGger:DELay <numeric value>[<suffix>] |

**NOTE** You can set the Trigger Arm for all measurements to single (CONTinuous OFF) using the following command syntax:

```
SETup[:ALL]:CONTinuous:OFF
```

**Example 11. Programming Example:**

```
OUTPUT Test_set;"SET:CONT:OFF"
```

sets the trigger arm to single for all measurements.

**Example 12. Programming Example:**

```
OUTPUT Test_set;"SET:DTXP:TRIG:SOUR AUTO"
```

sets the trigger source to AUTO for the digital transmit power measurement.

**Example 13. 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 14. Programming Example:**

```
OUTPUT Test_set;"SET:CPOW:MSP FAST"
```

sets the IS-2000 channel power measurement speed to fast.

**Example 15. Programming Example:**

```
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ 400 KHZ"
```

sets the first ORFS offset to 400 kHz.

**Example 16. Programming Example:**

```
OUTPUT Test_set;"SET:FBER:COUN 10000"
```

sets the number of fast BER bits to test to 10,000 bits.

**Example 17. 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:
!
OUTPUT Test_set;”SET:FST:COUN 3”
OUTPUT Test_set;”SET:FST:TIM 10”
!
! ************************************************
! Configure Analog TX Power Measurement:
!
OUTPUT Test_set;”SET:ATXP:COUN 5”
OUTPUT Test_set;”SET:ATXP:TRIG:SOUR AUTO”
OUTPUT Test_set;”SET:ATXP:TIM 15”
```

# Step 4: Make Connection

The following information provides additional details on Step 4 of the Programming Flowchart. This information is applicable to all test applications.

## Description

In this step you make a connection between the mobile station and test set. How you do this depends upon whether you are in active cell or test mode. In active cell mode you establish a phone call between the test set and mobile station. In test mode, you command the mobile station to synchronize to the test set's signal and begin transmitting back an appropriate signal.

### Contents


- "Establish a Call in Active Cell Mode"
- "Make a Test Mode Connection"


### Establish a Call in Active Cell Mode

To test a mobile station in active cell mode, you must first establish a call between the test set and mobile station. Your control program must issue the commands necessary to initiate the call connection process, either to the test set (for a base station originated call) or to the mobile station (for a mobile station originated call). Your control program must then determine when the call has successfully connected so that it can proceed to testing. The control program must also determine if the call has not been successfully connected so that it can take appropriate action.

**Call States** At any instant in time a call can be in a stable state such as the idle or the connected state, or in one of many transitory states such as alerting, handoff, registering, releasing or paging. These are referred to as transitory states because the amount of time which the call can spend in any of these states is limited by the mobile station's protocol. The call is not allowed to stay in a transitory state indefinitely.

**NOTE** If repeat paging or repeat registration are on, it is possible for the call process to stay in one of the transitory states beyond the time specified by the mobile station's protocol timers.

**Call Connection Synchronization Commands** The test set has a set of commands designed specifically for call connection and release synchronization.

**Call Connection Synchronization Commands**

| Synchronization Command | Command Syntax |
|---|---|
| Call-Connected-State Query | CALL:CONNected[:STATe]? |
| Call-State-Change Detector Arm | CALL:CONNected:ARM[:IMMediate] |
| Call-State-Change Detector Timeout | CALL:CONNected:TIMeout |

- Call-Connected-State Query

  The CALL:CONN? query allows the control program to determine if a call is in the connected state or in the idle state.

  **Responses Returned by the CALL:CONN? Query**

| Response | Meaning |
|---|---|
| 1 | The call is in the connected state. |
| 0 | The call is in the idle state. |

  If the call is in one of the transitory states, the query waits until the call reaches the idle state or connected state before returning a value.

- Call-State-Change Detector Arm Command

  The test set has a call-state-change detector which can be used to temporarily hold the response to a CALL:CONN? query until the call state has moved from idle to connected or vice versa.

  Without the call-state-change detector, the CALL:CONN? query only hangs if the call is in a transitory state. Otherwise, it immediately returns a 1 or 0. Therefore, if a call connection process is started and the CALL:CONN? query is sent before the call state has transitioned from idle to one of the transitory states, the query immediately returns a 0. This indicates that the call is in the idle state (and therefore that the connection attempt failed). In reality, the call likely connected, but not until after the CALL:CONN? query immediately returned a 0.

  When the call-state-change detector is armed during a connection attempt, if the CALL:CONN? query is sent while the call state is still idle, the query waits until the state changes to connected, and then returns a 1.

  The CALL:CONNected:ARM[:IMMediate] command is used to arm this call-state-change detector.

- Call-State-Change Detector Timeout Command

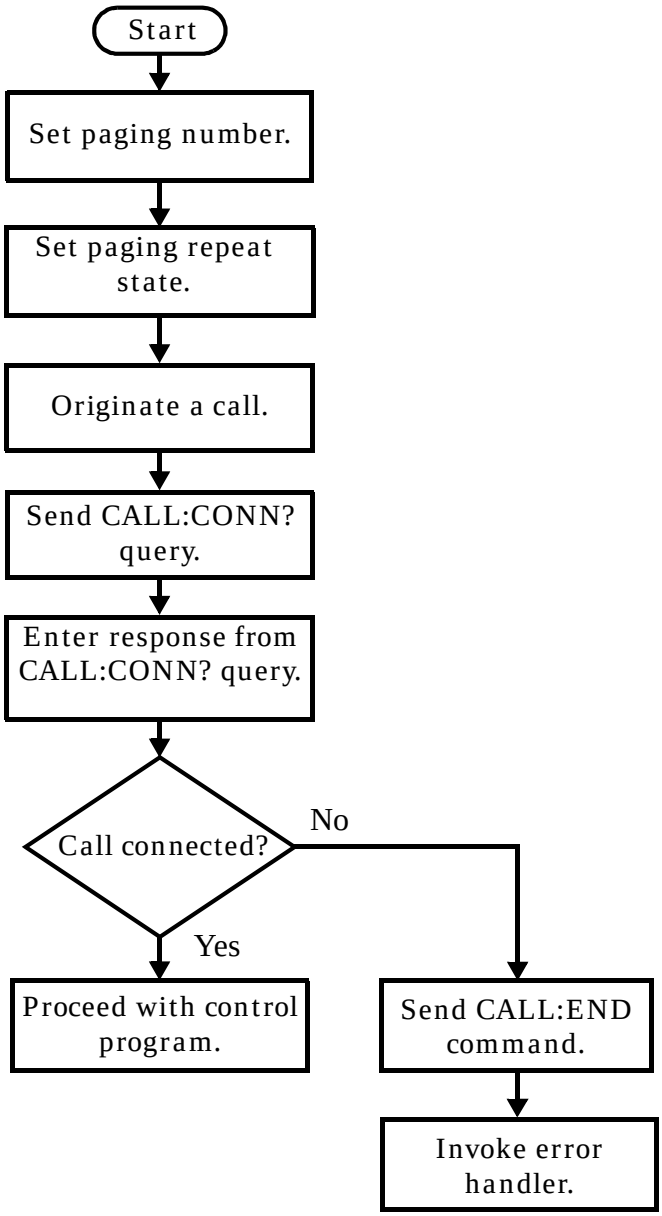
  If the call-state-change detector is armed and a call connection is attempted but the call state never changes from the idle state, the CALL:CONN? query hangs the bus. This easily happens if the mobile is badly broken, the mobile is not connected to the test set, or no one pushes the send button on the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

  The CALL:CONNected:TIMeout command is used to set the timeout value for the call-state-change detector.

  The timeout timer is started whenever the call-state-change detector is armed, and should be set to the maximum amount of time the control program should wait between arming the detector and the beginning of the connection process (when the call state moves from the idle state). If the timer expires before the call state has moved from the idle or connected state, the call-state-change detector is disarmed, which releases the CALL:CONN? query if it is currently hanging.

**Process for Making a Base Station Originated Call**

**Figure 9. Process for Making a Base Station Originated Call**

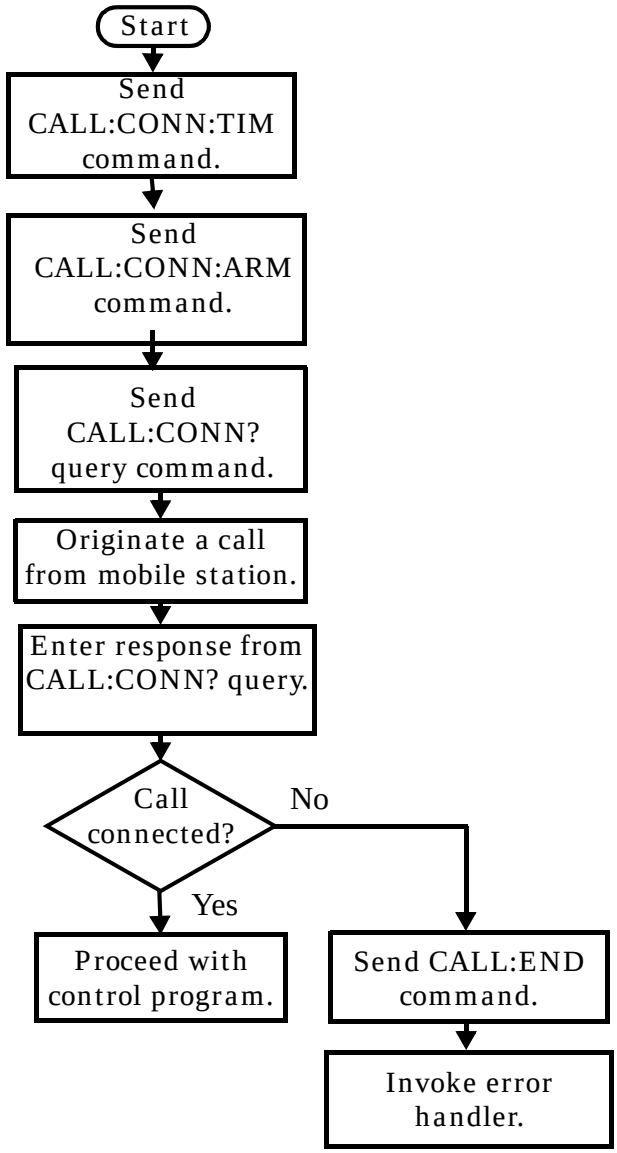



**NOTE** It is not necessary for you to send the CALL:CONN:TIM and CALL:CONN:ARM commands as they are automatically sent by the test set during a base station originated call or base station release.

**Example 18. Programming Example**

```
OUTPUT Test_set;"CALL:PAG:PNUM '0000574016'"! Set paging number
OUTPUT Test_set;"CALL:PAG:REP ON" ! Set paging repeat state
OUTPUT Test_set;"CALL:ORIG" ! Start a base station originated call
OUTPUT Test_set;"CALL:CONN?"  ! Hanging GPIB query
ENTER Test_set;Call_connected      ! Program hangs here until
                                   ! origination passes or fails
IF NOT Call_connected THEN
   OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

**Process for Making a Mobile Station Originated Call** **Figure 10. 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 19. 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.

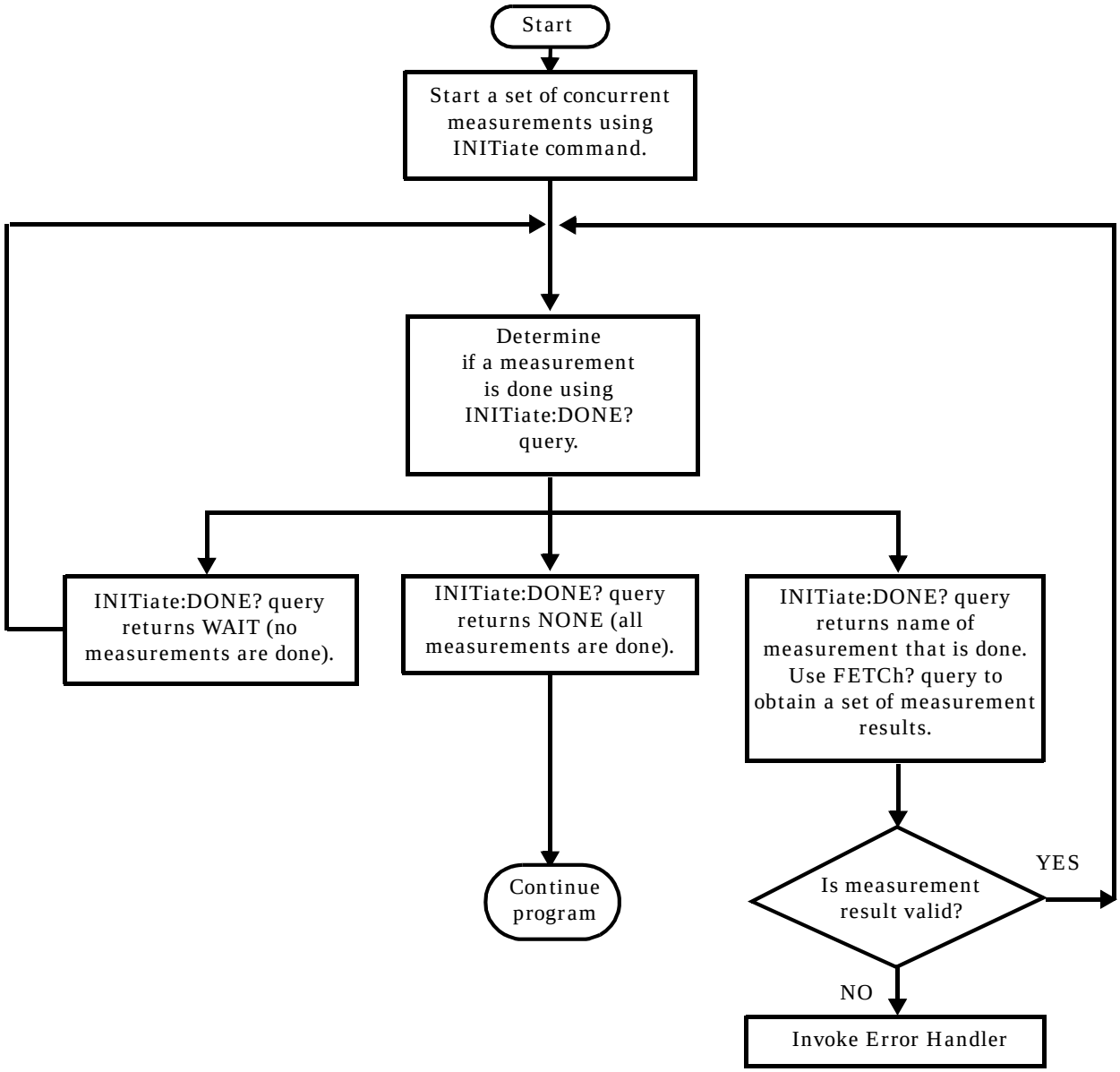
The test set has multiple signal paths and processors, which means you can make measurements concurrently and reduce test time. Making concurrent measurements involves starting a group of measurements, fetching the results of the measurements as they complete, and then verifying that the results are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

### Contents


- "Concurrent Measurement Process"
- "Alternative Measurement Process"

## Concurrent Measurement Process

### Figure 11. 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:

```
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 9. Responses Returned from INITiate:DONE? Query**

| Response String | Meaning |
|---|---|
| <MEASUREMENT1 mnemonic> | MEASUREMENT1 is done. |
| <MEASUREMENT2 mnemonic> | MEASUREMENT2 is done. |
| WAIT | There are one or more measurements that are in progress, but none of those measurements are done yet. |
| NONE | No measurements are in progress. |

Once a measurement is reported as being complete via the INITiate:DONE? query it is removed from the done list (it is not reported again). To use the INITiate:DONE? query properly, your control program should immediately fetch a measurement's results once it is reported as being complete.

**Obtain a Set of Measurement Results** In order to minimize bus traffic and reduce test time, the test set's measurements are designed to return multiple measured values in response to a single measurement request.

For example, if a transmit power measurement with averaging is initiated there are five measurement results available. These are:

1. Measurement integrity value
2. Average value
3. Minimum value
4. Maximum value
5. Standard deviation value

The test set can return the measurement results in a variety of formats to suit your needs using the FETCh? subsystem. The general structure of the FETCh? command is as follows:

```
FETCh:<measurement mnemonic>:<result format>?
```

For example, the transmitter power measurement results can be returned as:

**Example FETCh? Result Formats**

| Command | Results Returned |
|---|---|
| FETC:TXP? | Measurement integrity and average value |
| 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 20. Concurrent Measurement Process Programming Example

```
! Start a Set of Concurrent Measurements:
!
OUTPUT Test_set;”INIT:TXP;PFER”
!
! Determine if a Measurement Is Done:
!
LOOP
  OUTPUT Test_set;”INIT:DONE?”
  ENTER Test_set;Meas_done$
!
! Obtain a Set of Measurement Results:
!
  SELECT Meas_done$
    CASE “TXP”
      OUTPUT Test_set;”FETC:TXP:POW?”
      ENTER Test_set;Avg_tx_power
    CASE “PFER”
      OUTPUT Test_set;”FETC:PFER:RMS?”
      ENTER Test_set;Max_rms_phas_er
  END SELECT
EXIT IF Meas_done$=“NONE”
END LOOP
```

**Validate Measurement Results** Validating measurement results is extremely important. The test set returns a result if it is capable of making a measurement, even if this result is obtained under adverse conditions.

The measurement integrity indicator is a measurement result and therefore is queried using the FETCh subsystem. A value of 0 indicates that the measurement is valid. A value other than 0 indicates that an error occurred during the measurement process.

**Example Integrity Indicators**

| Value Returned | Description (message also appears on test set) |
|---|---|
| 0 | Normal |
| 1 | No Result Available |
| 2 | Measurement Timeout |
| 5 | Over Range |
| 6 | Under Range |

### Example 21. 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 22. Programming Example

```
OUTPUT Test_set; "INIT:DTXP;MACC"
OUTPUT Test_set; "FETC:DTXP:POW?"
ENTER Test_set;Avg_dig_pow
OUTPUT Test_set; "FETC:MACC:EVM[1]?"
ENTER Test_set;Max_EVM1
```

In this example, the test set starts both measurements at the same time. However, if the MACC measurement finishes first, the results are not fetched until the DTXP measurement finishes. Therefore, this process requires that you understand the order in which measurements will complete in order to optimize your testing speed.

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

The following information provides additional details on Step 6 of the Programming Flowchart. This information is applicable to all test applications.

## Description

After performing a set of measurements on the mobile station using the configuration established in step 2, you may want to change this configuration and test the mobile station again. This step involves changing testing conditions such as channel, mobile station transmit power level, or cell power.

### Contents


- "Change Channels"
- "Change Other Connection Parameters"


## Change Channels

In a manufacturing environment it is common to test a mobile station on more than one channel. Some or all of the tests may be performed on multiple channels, to verify the mobile station's performance in a range of operating frequencies.

### Perform a Handoff (Handover) in Active Cell Mode

If you are operating in active cell mode, to change channels you perform a handoff (handover) to the new channel. The control program sends the commands to initiate the handoff (handover), and then determines whether the transition was successfully completed. This is accomplished using the CALL:STATus? query.

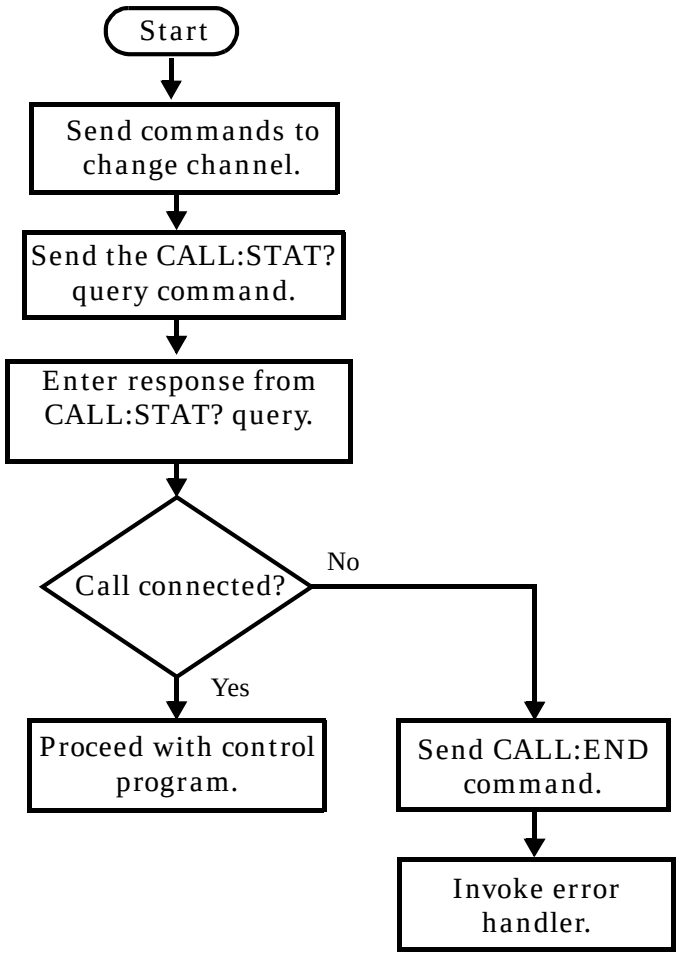
The CALL:STATus? query immediately returns the state of the call at the time the query is received.

**Example Responses Returned from the CALL:STAT? Query**

| Response | Meaning |
|---|---|
| IDLE | The call is in the Idle state |
| ALER | The call is in the Alerting transitory state. |
| HAND | The call is in the Handoff transitory state. |
| PAG | The call is in the Paging transitory state. |
| CONN | The call is in the Connected state. |

After issuing the commands to perform a handoff (handover), you should send the CALL:STAT? query to verify that the call is still connected before resuming testing.

**Figure 12. 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"

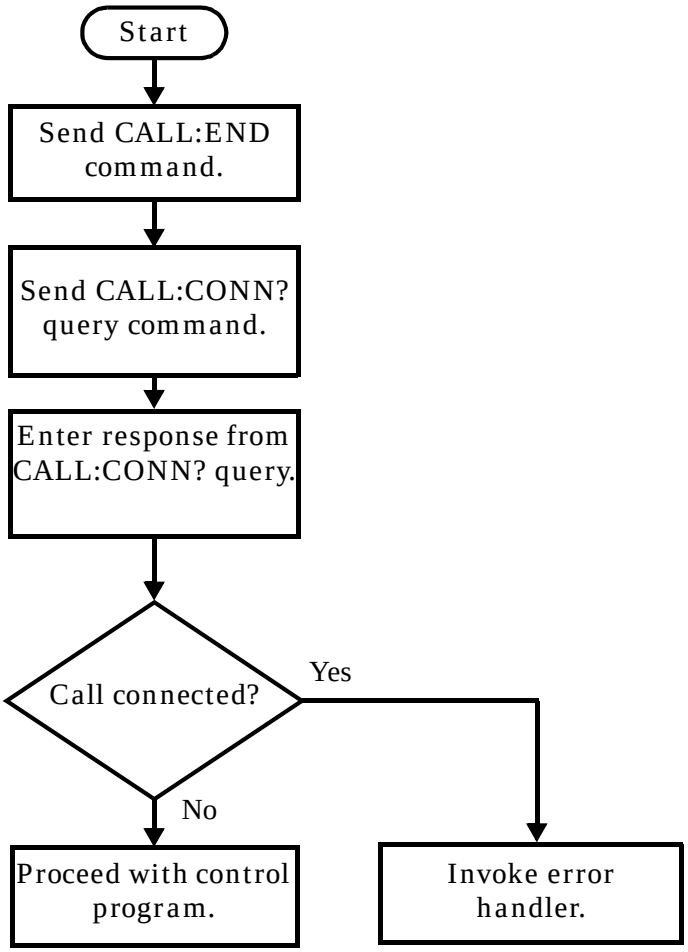

### Release the Call in Active Cell Mode

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 13. Process for Releasing an Active Call from the Base Station**

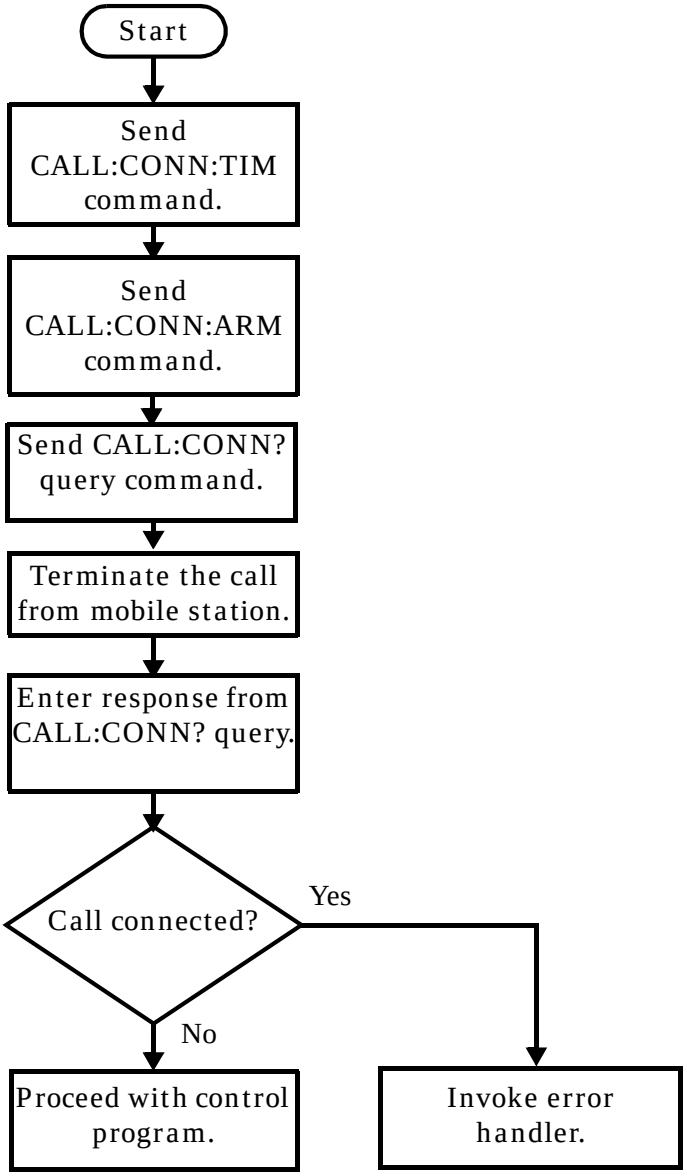



**Example 23. Programming Example**

```
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 14. 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 24. Programming Example**

```
OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Test_set;"CALL:CONN:ARM"   !Arm the change detector.
DISP "Terminate the call from the mobile station."
OUTPUT Test_set;"CALL:CONN?" !Initiate call connected state query.
ENTER Test_set;Call_connected     !Program hangs here until state
                                  !change or timer expires.
IF Call_connected THEN            !Check if disconnection successful.
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

## End the Mobile Station Test Mode Transmission

In test mode, you must send the necessary test mode commands to end the mobile station transmission.

## Partially Preset the Test Set

At this point, it is good practice to partially preset the test set by sending the SYST:PRES3 command. This command stops all measurement and call processing processes, but does not reset all values to default.

# Programming an Audio Level Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make an audio level measurement via the GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connectors. See "Analog Audio Measurement Description" on page 36.

1. Configure analog audio measurement parameters using the SETup subsystem. Even though default settings exist for each parameter, it is preferable to deliberately set each parameter to make sure the setting is correct for the specific audio analyzer measurement you are making.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

## Programming Example

```
10  OUTPUT 714;"SETup:AAUDio:CONTinuous OFF" !Set the analog audio
20                                           !measurements to single trigger mode.
30  OUTPUT 714;"SETup:AAUDio:EXPECTED:VOLTage 3V" !Set the Expected Amplitude level for
40                                                !audio input voltage in Vpeak.
50  OUTPUT 714;"SETup:AAUDio:SDIStortion:STATe OFF" !Turn off the SINAD and
60                                                  !distortion measurements since
70                                                  !they are not being used.
80  OUTPUT 714;"SETup:AAUDio:FILTer:TYPE NONE" !Bypass all audio filters.
90  OUTPUT 714;"SETup:AAUDio:DEMPhasis:STATe OFF" !Turn off de-emphasis.
100 OUTPUT 714;"SETup:AAUDio:EXPANDOR:STATe OFF" !Turn off the expandor.
110 OUTPUT 714;"SETup:AAUDio:DETector RMS" !Specify the RMS detector for the
120                                          !audio measurement.
130 OUTPUT 714;"SETup:AAUDio:TIMeout 3S" !Set a timeout value of 3 seconds
140                                      !in case the measurement cannot be made.
150 OUTPUT 714;"INITiate:AAUDio" !Start the Analog Audio measurement.
120 OUTPUT 714;"FETCh:AAUDio:INTegrity?" !Query the integrity indicator to
130                           !verify that a reliable measurement was made.
140 ENTER 714;Integrity  !Enter the returned value into a variable for comparison
150                      !with possible integrity indicator values (not shown here).
160 IF Integrity=0 THEN  !Only fetch measurement result if integrity indicator is 0.
170  OUTPUT 714;"FETCh:AAUDio:VOLTage?" !Fetch the Audio Level result.
180  ENTER 714;Audio_level  !Enter the result into a variable.
190 END IF
200 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 283.
- `Audio_level` returns the audio level in volts rms.

## Related Topics

"Analog Audio Measurement Description" on page 36

"Analog Audio Troubleshooting" on page 958

"INITiate" on page 603

"SETup:AAUDio" on page 639

"FETCh:AAUDio" on page 521

# Programming an Audio Frequency Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make an Audio Frequency measurement via the GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connectors. See "Analog Audio Measurement Description" on page 36.

1. Configure the analog audio 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 to measure (see the Programming Example below).
2. Start the audio frequency measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

## Programming Example

```
10  OUTPUT 714;"SETup:AAUDio:CONTinuous OFF" !Set the audio
20                                           !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AAUDio:EXPected:VOLTage 3V" !Set the Expected peak voltage
40                                                !for the audio input level in Vpeak.
50  OUTPUT 714;"SETup:AAUDio:FREQuency:STATe ON" !Enable audio frequency measurement.
60  OUTPUT 714;"SETup:AAUDio:FILTer:STATe ON" !Enable the bandpass filter.
70  OUTPUT 714;"SETup:AAUDio:FILTer:FREQuency 8000 Hz" !Set the filter's center
80     !frequency to 8 kHz.
90  OUTPUT 714;"SETup:AAUDio:TIMeout 3S" !Set a timeout value of 3 seconds
100                                      !in case the measurement cannot be made.
110 OUTPUT 714;"INITiate:AAUDio" !Start the Analog Audio measurement.
120 OUTPUT 714;"FETCh:AAUDio:INTegrity?" !Query the integrity indicator to
130                          !verify that a reliable measurement was made.
140 ENTER 714;Integrity  !Enter the returned value into a variable for comparison
150                      !with possible integrity indicator values (not shown here).
160 IF Integrity=0 THEN  !Only fetch measurement result if integrity indicator is 0.
170  OUTPUT 714;"FETCh:AAUDio:FREQuency?" !Fetch the analog audio frequency result.
180  ENTER 714;Audio_frequency !Enter the result into a variable.
190 END IF
200 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 283.
- `Audio_frequency` returns the average audio frequency in hertz.

## Related Topics

"Audio Frequency Measurement Description" on page 39

"Analog Audio Troubleshooting" on page 958

"Analog Audio Measurement Description" on page 36

"INITiate" on page 603

"SETup:AAUDio" on page 639

"FETCh:AAUDio" on page 521

# Programming a Bit Error Measurement

This section contains two programming examples:


- "Programming a Bit Error Measurement for GSM" on page 200
- "Programming a Bit Error Measurement for GPRS" on page 202


## Programming a Bit Error Measurement for GSM

This section provides an example of how to make the bit error (BER) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Set the cell power to a good level.
2. Configure BER measurement parameters using the SETup subsystem.
3. Set the measurement type (either residual Type IA, Type IB, Type II, or non-residual Type IA, Type IB, Type II).
4. Set the cell power to a low level for BER measurement.
5. Use the INITiate command to begin a BER measurement.
6. Use the FETCh? command to obtain BER measurement results.
7. Set the cell power to a good level.

## Programming Example

```
10    OUTPUT 714;"SETUP:BERROR:TIMEOUT:TIME 5" ! BER measurement times out after
20                                              ! 5 seconds.
30   OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -102 DBM" ! Sets the cell power level
40                                                   ! to a "low" level for the
50                                                   ! BER measurement.
60    OUTPUT 714;"SETUP:BERROR:CONTINUOUS OFF" ! Configures a BER measurement to
70                                             ! Single Trigger.
80    OUTPUT 714;"SETUP:BERROR:COUNT 10000" ! Sets the number of bits to measure
90                                          ! at 10,000.
100    OUTPUT 714;"SETUP:BERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay
110                                                     ! to 500 ms.
120   OUTPUT 714;"SETUP:BERROR:SLCONTROL ON" ! Sets the Signal Loop Control state to on.
130   OUTPUT 714;"SETUP:BERROR:TYPE TYPEIA" ! Sets the Measurement Type to IA.
140   OUTPUT 714;"SETUP:BERROR:LDCONTROL:AUTO OFF" ! Configure loopback delay
150                                                ! control to manual.
160   OUTPUT 714;"SETUP:BERROR:MANUAL:DELAY 6" ! Set frame delay to 6 frames in order
170                                            ! to correlate uplink and downlink bits.
180   OUTPUT 714;"INITIATE:BERROR"  ! Start a BER measurement.
190   OUTPUT 714;"FETCH:BERROR?" ! BERR results.
200   ENTER 714;Integrity,Bits_tested,Bit_err_ratio,Bit_err_count
210   OUTPUT 714;"FETCH:BERROR:COUNT:CRC?" ! Query CRC Count results.
220   ENTER 714;Crc_count
230   OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -85 DBM" ! Sets the cell power level
240                                                  ! to a good level.
250   END
```

Alternatively, you could use the "FETCh:BERRor:FULL?" query to return the same results but for all bit types simultaneously.

## Returned values

The measurements returned by this program are:

- `Integrity` returns the "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Bits_tested` returns the number of bits tested.
- `Bit_err_ratio` returns the ratio of bit errors to total bits tested.
- `Bit_err_count` returns the number of bit errors.
- `Crc_count` returns the CRC count (cyclic redundancy check).

### Related Topics

"Bit Error Measurement Description" on page 41

"SETup:BERRor" on page 648

"INITiate" on page 603

"FETCh:BERRor" on page 530

"Programming: Getting Started Guide for E1960A GSM Mobile Test Application Revision A.08" on page 134

"Bit Error Troubleshooting" on page 959

## Programming a Bit Error Measurement for GPRS

This section provides an example of how to make the GPRS bit error (BER) measurement via GPIB.

The following procedure assumes that the Operating Mode has been set to Active Cell (using "CALL:OPERating:MODE" on page 442) and the data connection type has been set to ETSI Type B (using "CALL:FUNCtion:DATA:TYPE" on page 408). In addition, it is assumed that a data connection has been established between the test set and the mobile station (that is, the connection status is Transferring). See "Step 4: Make a connection" on page 159. Note that you can also make BER measurements when the test set's operating mode is set to GPRS BCH+PDTCH test mode (see "CALL:OPERating:MODE" on page 442).

1. Configure the BCH and PDTCH parameters using the CALL subsystem.
2. Configure the Bit Error measurement parameters using the SETup subsystem.
3. Configure the downlink PDTCH parameters using the CALL subsystem.
4. Start the Bit Error measurement using the INITiate subsystem.
5. Use the FETCh? command to obtain Bit Error measurement results.

## Programming Example

```
10   ! This code assumes that the current data connection state is Transferring.
20   !
30   ! Configure BCH and PDTCH parameters.
40   OUTPUT 714;"CALL:POW -60 DBM" ! Set the BCH power.
50   OUTPUT 714;"CALL:PDTCH:PZER:LEV 30" ! Set the P0 reference level to 30 dB.
60   OUTPUT 714;"CALL:PDTCH:CSCH CS4" ! Set the channel coding scheme to CS4.
70   ! Configure the measurement parameters
80   OUTPUT 714;"SET:GBER:TIM:TIME 5" ! BER measurement times out after
90                                    ! 5 seconds.
100  OUTPUT 714;"SET:GBER:CONT OFF" ! Configures a BER measurement to
110                                 ! Single Trigger.
120  OUTPUT 714;"SET:GBER:COUN 10000" ! Sets the number of bits to measure
130                                   ! at 10,000.
140  OUTPUT 714;"SET:GBER:LDC:AUTO ON" ! Sets the Loopback Delay
150                                    ! Control mode to ON. This
160                                    ! commands the test set to
170                                    ! determine the Block Delay.
180  ! Set up and select the downlink PDTCH power reduction levels.
190  OUTPUT 714;"CALL:PDTCH:PRED:LEV1 12db"
200  OUTPUT 714;"CALL:PDTCH:PRED:LEV2 0dB"
210  OUTPUT 714;"CALL:PDTCH:PRED:BURS1 PRL1"
220  OUTPUT 714;"CALL:PDTCH:PRED:BURS2 PRL1"
230  OUTPUT 714;"INIT:GBER"  ! Start a BER measurement.
240  OUTPUT 714;"FETC:GBER?"
250  ENTER 714;Integrity,Bits_tested,Bit_ratio,Bit_err_cnt
260  END
```

### Returned values

The measurements returned by this program are:

- `Integrity` returns the "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Bits_tested` returns the number of bits tested.
- `Bit_ratio` returns the ratio of bit errors to total bits tested.
- `Bit_err_cnt` returns the number of bit errors.

### Related Topics

"Bit Error Measurement Description" on page 41

"SETup:GBERror" on page 675

"INITiate" on page 603

"FETCh:GBERror" on page 548

"Bit Error Troubleshooting" on page 959

# Programming a Decoded Audio Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a Decoded Audio (DAUDio) measurement. The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Configure decoded audio measurement parameters using the SETup subsystem.
2. Setup the audio source to stimulate the mobile station with a pulsed audio signal.
3. Start the decoded audio measurement using the INITiate subsystem.
4. Use the FETCh? command to obtain decoded audio measurement results.

## Programming Example

```
10    OUTPUT 714;"SETUP:DAUDIO:CONTINUOUS OFF"         ! Configures the decoded audio
20                                                     ! measurement to single trigger mode.
30    OUTPUT 714;"AFGENERATOR:PULSE:STATE ON"          ! Audio signal must be pulsed.
40    OUTPUT 714;"AFGENERATOR:VOLTAGE:SAMPLITUDE 100MV"
50    OUTPUT 714;"AFGENERATOR:FREQUENCY 2.1KHZ"
60    OUTPUT 714;"SETUP:DAUDIO:FILTER:SFREQUENCY 2.1KHZ"! Specifies the tunable
70                                                      ! bandpass filter frequency
80                                                      ! and set the filter state to on.
90    OUTPUT 714;"INITIATE:DAUDIO"
100   OUTPUT 714;"FETCH:DAUDIO?"                        ! Fetch the decoded audio results.
110   ENTER 714;Ingerity,Decoded_audio
120   END
```

## Returned Values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Decoded_audio` returns the decoded audio measurement results in percent (%).

## Related Topics

"Decoded Audio Measurement Description" on page 50

"SETup:DAUDio" on page 655

"INITiate" on page 603

"FETCh:DAUDio" on page 538

# Programming a Distortion Measurement

Last updated: November 14, 2001

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a distortion measurement via the GPIB. Distortion measurements are not typically made when testing GSM mobiles but are more common when testing AMPS or other analog mobiles. The programming example below is typical for a 136 mobile.

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 "Analog Audio Measurement Description" on page 36.

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 +/–8 kHz peak deviation, and a 6000 Hz supervisory audio tone (SAT) at +/–2 kHz peak deviation. It is also assumed that the Cell Power from the test set is set to -50 dBm.

1. Configure analog audio measurement parameters using the SETup subsystem.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

## Programming Example

```
10  OUTPUT 714;"SETup:AAUDio:CONTinuous OFF" !Set the analog audio
20                                           !measurements to single trigger mode.
30  OUTPUT 714;"SETup:AAUDio:EXPected:VOLTage 3V" !Set the Expected Amplitude level for
40                                               !audio input voltage in Vpeak.
50  OUTPUT 714;"SETup:AAUDio:SDIStortion:STATe ON" !Turn on the SINAD and
60                                                  !distortion measurements.
70  OUTPUT 714;"SETup:AAUDio:SDIStortion:FREQuency 1004 HZ" !Specify the audio
80                                        !frequency to use for the measurements.
90  OUTPUT 714;"SETup:AAUDio:FILTer:TYPE CMESsage" !Select the c-message filter.
100 OUTPUT 714;"SETup:AAUDio:DEMPhasis:STATe OFF" !Turn off de-emphasis.
110 OUTPUT 714;"SETup:AAUDio:EXPANDOR:STATe OFF" !Turn off the expandor.
120 OUTPUT 714;"SETup:AAUDio:TIMeout 3S" !Set a timeout value of 3 seconds
130                                      !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:AAUDio" !Start the Analog Audio measurement.
150 OUTPUT 714;"FETCh:AAUDio: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:AAUDio: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 283.
- `Distortion` returns the Distortion measurement value in percent (%).

## Related Topics

"Analog Audio Measurement Description" on page 36

"Analog Audio Troubleshooting" on page 958

"Distortion Measurement Description" on page 52

"INITiate" on page 603

"SETup:AAUDio" on page 639

"FETCh:AAUDio" on page 521

# Programming a Dynamic Power Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a Dynamic Power measurement via the GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Configure the Dynamic Power measurement parameters using the SETup subsystem.
2. Start the Dynamic Power measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to determine if Dynamic Power measurement results are available.
4. Use the FETCh? commands to obtain Dynamic Power measurement results.

## Programming Example

The following program shows how to use the Dynamic Power measurement to measure a GSM mobile station's power control level capability when using SACCH (Slow Associated Control Channel) TX Level Signaling. This technique is based upon the RF power control characteristics specified in GSM 05.08 section 6.3.0 Release 1997.

```
10    ! INITIALIZE VARIABLES IN THE TEST
20    !
30    Sacch_time=TIMEDATE  ! Set up a variable to capture test time
40    OPTION BASE 1  ! Set default lower bound of array subscripts to 1
50    REAL Integ1(100),Txp1(100),Power(300)
60    REAL Integ2(100),Txp2(100),Integ3(100),Txp3(100)
70    REAL Start_power,Stop_power
80    INTEGER Test_set,I,Start_level,Stop_level
90    Test_set=714
100   Start_level=5
110   Start_power=33.0
120   Stop_level=15
130   Stop_power=13.0
140   !
150   OUTPUT Test_set;"RFAN:EXP:POW 33"  ! Set expected power
160   OUTPUT Test_set;"SYST:CORR -1.2"   ! Set value to compensate for cable loss
170   !
180   ! SETUP DPOW PARAMETERS
190   OUTPUT Test_set;"SET:DPOW:CONT OFF;EMD 2"
200   OUTPUT Test_set;"SET:DPOW:COUN:NUMBER 300"  ! Set the number of bursts high enough
210                                               ! to capture all 10 power level changes
220   OUTPUT Test_set;"CALL:SIGN:MS:TXL:FACCH 1" ! Switch on FACCH mode
230   !
240   ! CHANGE POWER LEVEL FROM 5 TO 15
250   OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Start_level
260   OUTPUT Test_set;"CALL:SIGN:MS:TXL:FACCH 0"  ! Switch off FACCH signaling - only
270                                               ! SACCH header is used
280   OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Stop_level
```

```
290   !
300 ! A SHORT WAIT MIGHT BE NEEDED HERE TO ENSURE 100 PERCENT RELIABILITY OF MEASUREMENT
310 ! THIS MAY BE DEPENDENT ON THE PHONE AND IS TO ENSURE THAT VERY LAST POWER STEP IS
320 ! ALWAYS CAPTURED
330 ! WAIT .1
340   !
350   ! INITIATE DPOW MEASUREMENT AND FETCH RESULTS
360   OUTPUT Test_set;"INIT:DPOW"
370   REPEAT
380     OUTPUT 714;"INIT:DONE?"
390     ENTER 714;Meas_complete$
400   UNTIL Meas_complete$="DPOW"
410   OUTPUT Test_set;"FETC:DPOW?"
420   ENTER Test_set;Integ1(*),Txp1(*)
430   OUTPUT Test_set;"FETC:DPOW:RANG2?"
440   ENTER Test_set;Integ2(*),Txp2(*)
450   OUTPUT Test_set;"FETC:DPOW:RANG3?"
460   ENTER Test_set;Integ3(*),Txp3(*)
470   !
480   ! LOAD TXP RESULTS WHICH HAVE VALID INTEGRITY INTO ARRAY
490   !
500   ! PROCESS BURSTS 1 TO 100
510   K=1
520     FOR J=1 TO 100
530       IF Integ1(J)=0 THEN
540         Power(K)=Txp1(J)
550         K=K+1
560       END IF
570     NEXT J
580   ! PROCESS BURSTS 101 TO 200
590     FOR J=1 TO 100
600       IF Integ2(J)=0 THEN
610         Power(K)=Txp2(J)
620         K=K+1
630       END IF
640     NEXT J
650   ! PROCESS BURSTS 201 TO 300
660     FOR J=1 TO 100
670       IF Integ3(J)=0 THEN
680         Power(K)=Txp3(J)
690         K=K+1
700       END IF
710     NEXT J
720   !
730   PRINT
740   !
750   ! PRINT MEASUREMENT RESULTS
760   PRINT "Measured TX Levels from 5 to 15 using SACCH Method"
770   PRINT
780   I=1
790   FOR J=Start_level TO Stop_level
800     LOOP
810       IF I=(K-1) THEN
```

```
820         PRINT "MS TX LEVEL=";J,"MEASURED POWER=";PROUND(Power(I),-2)
830         GOTO 920
840       END IF
850     EXIT IF (PROUND(Power(I),-2)-PROUND(Power(I+1),-2))>=.8
860       I=I+1
870     END LOOP
880     PRINT "MS TX LEVEL=";J,"MEASURED POWER=";Power(I)
890     I=I+1
900   NEXT J
910   !
920   ! PRINT TOTAL TIME FOR PROGRAM TO COMPLETE
930   PRINT "Total Test Time=";PROUND(TIMEDATE-Sacch_time,-2);"Seconds"
940   END
```

## Returned Values

The measurements returned by this program are:

- `Integ1`, `Integ2`, and `Integ3` return the measurement integrity indicators for each of the ranges used when the Dynamic Power measurement is made over 300 bursts (0 means a successful measurement with no errors). If you require more details, see "Integrity Indicator" on page 283.
- `Txp1()`, `Txp2()`, and `Txp3()` return the average TX power results for each of the ranges used over 300 bursts. For example, `Txp1()` returns average TX power results for bursts 1 to 100.
- `Power()` returns average TX power results for all bursts which have been successfully measured with no errors. That is, only results with an integrity indicator of 0 are contained in `Power()`. This program does not display the entire contents of the `Power()` array. It only displays the results which correlate with power level changes 5 to 15.
- `Sacch_time` returns the total test time.

## Related Topics

"Dynamic Power Measurement Description" on page 53

"SETup:DPOWer" on page 661

"INITiate" on page 603

"FETCh:DPOWer" on page 542

# Programming a Fast Bit Error Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make the fast bit error (FBER) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Set the cell power to a good level.
2. Configure FBER measurement parameters using the SETup subsystem.
3. Set the cell power to a low level for a FBER measurement.
4. Start the FBER measurement using the INITiate subsystem.
5. Use the FETCh? command to obtain FBER measurement results.
6. Set the cell power to a good level.

## Programming Example

```
10    OUTPUT 714;"SETUP:FBERROR:TIMEOUT:TIME 5" ! BER measurement times out after
20                                              ! 5 seconds.
30    OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -85 DBM" ! Sets the cell power level to
40                                                   ! a good level.
50    OUTPUT 714;"SETUP:FBERROR:CONTINUOUS OFF" ! Configures a BER measurement to
60                                              ! Single Trigger.
70    OUTPUT 714;"SETUP:FBERROR:COUNT 10000" ! Sets the number of bits to measure
80                                           ! at 10,000.
90    OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay
100                                                    ! to 500 ms.
110   OUTPUT 714;"SETUP:FBERROR:SLCONTROL ON" ! Sets the Signal Loop Control state to on.
120   OUTPUT 714;"SETUP:FBERROR:LDCONTROL:AUTO OFF" ! Configure loopback delay
130                                                 ! control to manual.
140   OUTPUT 714;"SETUP:FBERROR:MANUAL:DELAY 6" ! Set frame delay to 6 frames in order
150                                             ! to correlate uplink and downlink bits.
160   OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -102 DBM" ! Sets the cell power level
170                                                   ! to a "low" level for the
180                                                   ! BER measurement.
190   OUTPUT 714;"INITIATE:FBERROR"  ! Start a FBER measurement.
200   OUTPUT 714;"FETCH:FBERROR?"
210   ENTER 714;Integrity,Bits_tested,Fas_bit_ratio,Fas_bit_err_cnt
220   OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -85 DBM" ! Sets the cell power level
230                                                  ! to a good level.
240   END
```

## Returned values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Bits_tested` returns the number of bits tested.
- `Bit_error_ratio` retuns the ratio of bit errors to total bits tested, in percent (%).
- `Bit_error_count` returns the number of bit errors.

## Related Topics

"Fast Bit Error Measurement Description" on page 55

"SETup:FBERror" on page 668

"INITiate" on page 603

"FETCh:FBERror" on page 545

"GSM Control Program Example" on page 1

# Programming an I/Q Tuning Measurement

This measurement is *not* applicable to GPRS.

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 1s or all 0s.
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.

## Programming Example

The following program shows how to make an I/Q Tuning measurement on a normal GSM TCH 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    PRINT “Ensure your mobile is transmitting:” !On-screen prompts.
20    PRINT “-all 1s or all 0s.”
30    PRINT “-on ARFCN 30.”
40    PRINT “-a power level of 10 dBm.”
50    PRINT “                          “
60    PRINT “Press any key to continue.”
70    LOOP
80      ON KBD GOTO Key_exit
90    END LOOP
100 Key_exit: !
110   OUTPUT 714;”RFANALYZER:MANUAL:CHANNEL:SELECTED 30” !Configures the
120                      !test set to expect a transmission on ARFCN 30.
130   OUTPUT 714;”RFANALYZER:EXPECTED:POWER:SELECTED 10 DBM” !Configures
140                     !the test set to expect a power level of 10 dBm.
150   OUTPUT 714;”SETUP:IQTUNING:CONTINUOUS OFF”  !Configures trigger
160                       !mode to single for an I/Q Tuning measurement.
170   OUTPUT 714;”SETUP:IQTUNING:COUNT:SNUMBER 50”  !Configures the
180   OUTPUT 714;”SETUP:IQTUNING:SPUR:STATE ON”  !Configures spur on.
190   OUTPUT 714;”SETUP:IQTUNING:SPUR:FREQUENCY 10MHZ” !Configures a
200   !power measurement at 10MHz from the carrier.
210   !multi_measurement state to ON with a measurement count value
220   !of 50.
230   OUTPUT 714;”SETUP:IQTUNING:TRIGGER:SOURCE RISE” !Configures the
240                                          !trigger source to RF RISE.
250   OUTPUT 714;”SETUP:IQTUNING:REFERENCE:FREQUENCY AUTO” !Sets the
260   !set to choose which offset frequency is to be used as the ref.
270   OUTPUT 714;”INITIATE:IQTUNING” !Start I/Q Tuning measurement.
280   OUTPUT 714;”FETCH:IQTUNING:ALL?”!Fetches the measurement integrity
290   !value and the relative power levels at the offset frequencies.
300   ENTER 714;Integrity,N270,N203,N135,N67,Carrier,P67,P135,P203,P270,Sr
```

```
310   PRINT “I/Q Tuning Measurement Results”
320   PRINT “Integrity = “;Integrity
330   PRINT “Spur Power = “;Sr
340   PRINT “Offset (kHz)       Level (dB)”
350   PRINT “------------       ----------”
360   PRINT “-270.334          “;N270
370   PRINT “-203.125          “;N203
380   PRINT “-135.417          “;N135
390   PRINT “-67.708           “;N67
400   PRINT “0.000             “;Carrier
410   PRINT “+67.708           “;P67
420   PRINT “+135.417          “;P135
430   PRINT “+203.125          “;P203
440   PRINT “+270.334          “;P270
450   END
```

## Returned Values

The measurements returned by this program are:

- Integrity returns the measurement “Integrity Indicator” on page 283 (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 Fc + 67.7083 kHz for all 0s or Fc -67.7083 kHz for all 1s). Note, if the TX I/Q Tuning measurement multi-measurement command is set to ON the average of all the individual results at each offset are returned.

  — -270.833 kHz

  — -203.125 kHz

  — -135.417 kHz

  — -67.7083 kHz

  — Carrier Frequency

  — +67.7083 kHz

  — +135.417 kHz

  — +203.125 kHz

  — +270.833 kHz

## Related Topics

“I/Q Tuning Measurement Description” on page 58

“SETup:IQTuning” on page 679

“INITiate” on page 603

“FETCh:IQTuning” on page 551

# Programming an Output RF Spectrum Measurement

This section contains two programming examples:


- "Programming an Output RF Spectrum Measurement for GSM" on page 215
- "Programming an Output RF Spectrum Measurement for GPRS" on page 216


## Programming an Output RF Spectrum Measurement for GSM

This section provides an example of how to make the output RF spectrum (ORFS) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Configure the ORFS measurement parameters using the SETup subsystem.
2. Start the ORFS measurement using the INITiate subsystem.
3. Use the FETCh? command to obtain ORFS Power measurement results.

### Programming Example

```
10  OUTPUT 714;"SETUP:ORFSPECTRUM:CONTINUOUS OFF" !Configures a ORFS measurement
20                                                !to single trigger mode.
30  OUTPUT 714;"SETUP:ORFSPECTRUM:COUNT:STATE ON" !Configures a multi-measurement
40                                                !state to on.
50  OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO" !Configure trigger source
60                                                     !to auto.
70  OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:NUMBER 50" !Configures ORFS due
80                                                           !to switching
90                                                           !multi-measurement
100                                                          !count.
110 OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY 200KHZ,400KHZ" !Configure
120                                                                  !switching
130                                                                  !offsets.
140 OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:COUNT:NUMBER 100" !Configure ORFS
150                                                            !due to modulation
160                                                            !multi-measurement
170                                                            !count.
180 OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY 200KHZ" !Configure
190                                                            !modulation offset.
200 OUTPUT 714;"INITIATE:ORFSPECTRUM" !Start ORFS measurement.
210 OUTPUT 714;"FETCH:ORFSPECTRUM:ALL?" !Fetch ORFS results.
220 ENTER 714;Integrity,Tx_pwr,Max_swit_200,Max_swit_400,Bw_pwr,Avg_mod_200
230 END
```

### Returned values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Tx_pwr` returns the transmit power in dBm.
- `Max_swit_200,Max_swit_400` returns maximum ORFS power due to switching in dBm (one maximum power level at a 200 kHz offset and one maximum power level at a 400 kHz offset).
- `Bw_pwr` returns the power level in a 30 kHz bandwidth at zero offset in dBm (this is the reference level for ORFS power due to switching and ORFS power due to modulation).
- `Avg_mod_200` returns the average ORFS power due to modulation in dBm (one average power level at a 200 kHz offset).

#### Related Topics

"Output RF Spectrum Measurement Description" on page 60

"SETup:ORFSpectrum" on page 696

"INITiate" on page 603

"FETCh:ORFSpectrum" on page 555

"GSM Control Program Example" on page 1

## Programming an Output RF Spectrum Measurement for GPRS

This section provides an example of how to make the output RF spectrum (ORFS) measurement via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See "Step 4: Make a connection" on page 159.

1. Configure the ORFS measurement parameters using the SETup subsystem.
2. Start the ORFS measurement using the INITiate subsystem.
3. Use the FETCh? command to obtain ORFS Power measurement results.

#### Programming Example

```
10  OUTPUT 714;"SETUP:ORFSPECTRUM:CONTINUOUS OFF" !Configures a ORFS measurement
20                                                !to single trigger mode.
30  OUTPUT 714;"SETUP:ORFSPECTRUM:COUNT:STATE ON" !Configures a multi-measurement
40                                                !state to on.
50  OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO" !Configure trigger source
60                                                     !to auto.
70 OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:NUMBER 50" !Configures ORFS due
80                                                          !to switching
90                                                          !multi-measurement
100                                                         !count.
110 OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY 200KHZ,400KHZ" !Configure
120                                                                  !switching
130                                                                  !offsets.
```

```
140 OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:COUNT:NUMBER 100" !Configure ORFS
150                                                            !due to modulation
160                                                            !multi-measurement
170                                                            !count.
180 OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY 200KHZ" !Configure
190                                                            !modulation offset.
200 OUTPUT 714;"INITIATE:ORFSPECTRUM" !Start ORFS measurement.
210 OUTPUT 714;"FETCH:ORFSPECTRUM:ALL?" !Fetch ORFS results.
220 ENTER 714;Integrity,Tx_pwr,Max_swit_200,Max_swit_400,Bw_pwr,Avg_mod_200
230 END
```

### Returned values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Tx_pwr` returns the transmit power in dBm.
- `Max_swit_200,Max_swit_400` returns maximum ORFS power due to switching in dBm (one maximum power level at a 200 kHz offset and one maximum power level at a 400 kHz offset).
- `Bw_pwr` returns the power level in a 30 kHz bandwidth at zero offset in dBm (this is the reference level for ORFS power due to switching and ORFS power due to modulation).
- `Avg_mod_200` returns the average ORFS power due to modulation in dBm (one average power level at a 200 kHz offset).

### Related Topics

**********

"Output RF Spectrum Measurement Description" on page 60

"SETup:ORFSpectrum" on page 696

"INITiate" on page 603

"FETCh:ORFSpectrum" on page 555

"GPRS Control Program Example" on page 1

**********

# Programming a Phase and Frequency Error Measurement

This section contains two programming examples:


- "Programming a Phase and Frequency Error Measurement for GSM" on page 218
- "Programming a Phase and Frequency Error Measurement for GPRS" on page 219


## Programming a Phase and Frequency Error Measurement for GSM

This section provides an example of how to make the phase and frequency error (PFER) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Configure PFER measurement parameters using the SETup subsystem.
2. Start the PFER measurement using the INITiate subsystem.
3. Use the FETCh? command to obtain PFER measurement results.

### Programming Example

```
10  OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Configures a PFER measurement to
20                                            !single trigger mode.
30  OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 100" !Configures a multi-measurement
40                                             !of 100.
50  OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO"!Configure trigger source
60                                                !to auto.
70  OUTPUT 714;"SETUP:PFERROR:SYNC MIDAMBLE" !Configures a PFER measurement so
80                                           !that burst synchronization, which
90                                           !will synchronize the timing of the
100                                          !measurement algorithm relative to
110                                          !the data sample, will be set
120                                          !to midamble.
130 OUTPUT 714;"INITIATE:PFERROR" !Starts the PFER measurement.
140 OUTPUT 714;"FETCH:PFERROR:ALL?"
150 ENTER 714;Integrity, Max_phase_err, Max_peak_error, Worst_freq_err
160 END
```

## Returned values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Max_phase_err` returns the maximum rms phase error in degrees
- `Max_peak_phase_error` returns the maximum peak phase error in degrees
- `Worst_freq_err` returns the frequency, in Hz, that is the furthest from zero, if the most positive and the most negative frequency error are the same value, the most positive will be returned.

### Related Topics

"Phase and Frequency Error Measurement Description" on page 63

"SETup:PFERror" on page 722

"INITiate" on page 603

"FETCh:PFERror" on page 562

"GSM Control Program Example" on page 1

## Programming a Phase and Frequency Error Measurement for GPRS

This section provides an example of how to make the phase and frequency error (PFER) measurement via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See "Step 4: Make a connection" on page 159.

1. Set the multislot configuration to two downlinks, two uplinks (D2U2) and set the uplink power control level for each of the two bursts using the CALL subsystem.
2. Configure PFER measurement parameters using the SETup subsystem.
3. Use the RFANalyzer:MSLot:MEASurement:BURSt command to select burst 1 for the first PFER measurement.
4. Start the PFER measurement using the INITiate subsystem.
5. Use the FETCh? command to obtain PFER measurement results.
6. Use the RFANalyzer:MSLot:MEASurement:BURSt command to select burst 2 for the second PFER measurement.
7. Repeat steps 4 to 6 above to perform a PFER measurement on burst 2 of the multislot configuration.

### Programming Example

```
10  OUTPUT 714;"CALL:PDTCH:MSLOT:CONFIG D2U2" ! Configures the multi-
20                                            ! slot configuration to be
30                                            ! 2 downlink, 2 uplink.
40  OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST 9" ! Sets the uplink power for
50                                             ! burst 1 to 25 dBm.
60  OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST2 6" ! Sets the uplink power for
70                                              ! burst 2 to 31 dBm.
80  OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Configures a PFER measurement to
90                                            !single trigger mode.
100 OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 100" !Configures a multi-measurement
110                                             !of 100.
120 OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Configure trigger source
130                                                !to auto.
140 OUTPUT 714;"SETUP:PFERROR:SYNC MIDAMBLE" !Configures a PFER measurement so
150                                          !that burst synchronization, which
160                                          !will synchronize the timing of the
170                                          !measurement algorithm relative to
180                                          !the data sample, will be set
190                                          !to midamble.
200 OUTPUT 714;"RFANALYZER:MSLOT:MEASUREMENT:BURST 1" ! Perform first PFER
210                                                   ! measurement on burst 1.
220 OUTPUT 714;"INITIATE:PFERROR" !Starts the first PFER measurement.
230 OUTPUT 714;"FETCH:PFERROR:ALL?"
240 ENTER 714;Integrity1,Max_phase_err1,Max_peak_err1,Worst_freq_err1
250 OUTPUT 714;"RFANALYZER:MSLOT:MEASUREMENT:BURST 2" ! Perform next PFER
260                                                   ! measurement on burst 2.
270 OUTPUT 714;"INITIATE:PFERROR" !Starts the next PFER measurement.
280 REPEAT
290    OUTPUT 714;"INITIATE:DONE?"
300    ENTER 714;Meas_complete$
310 UNTIL Meas_complete$="PFER"
320 OUTPUT 714;"FETCH:PFERROR:ALL?"
330 ENTER 714;Integrity2,Max_phase_err2,Max_peak_err2,Worst_freq_err2
340 END
```

### Returned values

This program instructs the test set to make two sets of PFER measurements, the first on burst 1 in the multislot configuration and the second on burst 2. The results returned by this program are:

- `Integrity1` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors) for burst 1.
- `Max_phase_err1` returns the maximum rms phase error in degrees for burst 1.
- `Max_peak_err1` returns the maximum peak phase error in degrees for burst 1.
- `Worst_freq_err1` returns the frequency, in Hz, that is the furthest from zero for burst 1. If the most positive and the most negative frequency error are the same value, the most positive is returned.

- A similar set of results are returned for burst 2 (`Integrity2`, `Max_phase_err2`, `Max_peak_err2` and `Worst_freq_err2`).

**Related Topics**

“Phase and Frequency Error Measurement Description” on page 63

“SETup:PFERror” on page 722

“INITiate” on page 603

“FETCh:PFERror” on page 562

“GPRS Control Program Example” on page 1

“Confidence Levels” on page 1035

# Programming a Power versus Time Measurement

This section contains two programming examples:


- "Programming a Power versus Time Measurement for GSM" on page 222
- "Programming a Power versus Time Measurement for GPRS" on page 223


## Programming a Power versus Time Measurement for GSM

This section provides an example of how to make the power versus time (PvT) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Configure PvT measurement parameters using the SETup subsystem.
2. Start the PvT measurement using the INITiate subsystem.
3. Use the FETCh? command to obtain PvT measurement results.

### Programming Example

```
10  OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Configures a PvT measurement to
20                                           !single trigger mode.
30  OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 100 !Configures a multi-measurment
40                                            !of 100.
50  OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configure trigger source
60                                                !to auto.
70  OUTPUT 714;"SETUP:PVTIME:SYNC MIDAMBLE" !Configures a PvT measurement so
80                                           !that burst synchronization, which
90                                           !will synchronize the time of the
100                                          !measurement algorithm relative to
110                                          !the data sample, will be set
120                                          !to midamble.
130 OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28US,-18US" !Turns on time markers
140                                                   !-28 and -18 microseconds.
150 OUTPUT 714;"INITIATE:PVTIME" !Start PvT measurement.
160 OUTPUT 714;"FETCH:PVTIME:ALL?" !PvT results for time measurements.
170 ENTER 714;Integrity,Pvt_mask, Pvt_power, Max_offset1, Max_offset2
180 END
```

### Returned values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Pvt_mask` returns the mask pass/fail indicator. When the multi-measurement count is greater than 1, the PvT mask pass/fail result will return Fail (1) if any single measurement fails.
- `Pvt_power` returns the PvT carrier power in dBm.
- `Max_offset1` and `Max_offset2` return the maximum offset levels in dB, relative to the PvT carrier power at the two offsets.

### Related Topics for GSM

"GSM Power versus Time Measurement" on page 67

"SETup:PVTime" on page 745

"INITiate" on page 603

"FETCh:PVTime" on page 571

"GSM Control Program Example" on page 1

## Programming a Power versus Time Measurement for GPRS

This section provides an example of how to make the power versus time (PvT) measurement via GPIB.

The following procedure assumes that the Operating Mode has been set to Active Cell (using "CALL:OPERating:MODE" on page 442) and the data connection type has been set to ETSI Type B (using "CALL:FUNCtion:DATA:TYPE" on page 408). In addition, it is assumed that a data connection has been established between the test set and the mobile station (connection status is Transferring). See "Step 4: Make a connection" on page 159.

Note that you can also make power versus time measurements in active cell mode using the BLER and ETSI Type B data connection types (see "CALL:FUNCtion:DATA:TYPE" on page 408). Power versus time measurements can also be made when the test set's operating mode is set to GPRS BCH+PDTCH test mode (see "CALL:OPERating:MODE" on page 442).

1. Set the multislot configuration to two downlinks, two uplinks (D2U2) and set the uplink power control level for each of the two bursts using the CALL subsystem.
2. Configure PvT measurement parameters using the SETup subsystem.
3. Set the trigger type to single using the SETup subsystem.
4. Start the PvT measurement using the INITiate subsystem.
5. Use the FETCh? commands to obtain PvT measurement results.

## Programming Example

```
10  OUTPUT 714;"CALL:PDTCH:MSLOT:CONFIG D2U2" ! Configures the multislot
20                                             ! configuration to be
30                                             ! 2 downlink, 2 uplink.
40  OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST1 10" ! Sets the uplink power for
50                                                ! the first burst to 23 dBm.
60  OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST2 5" ! Sets the uplink power for
70                                               ! the second burst to 33 dBm.
80  OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Configures a PvT measurement to
90                                           !single trigger mode.
100 OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 100" !Configures a multi-measurement
110                                            !of 100.
120 OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configure trigger source
130                                               !to auto.
140 OUTPUT 714;"SETUP:PVTIME:SYNC MIDAMBLE" !Configures a PvT measurement so
150                                         !that burst synchronization, which
160                                         !will synchronize the time of the
170                                         !measurement algorithm relative to
180                                         !the data sample, will be set
190                                         !to midamble.
200 OUTPUT 714;"INITIATE:PVTIME" !Start PvT measurement.
210 ! Fetch all the required PvT results.
220 OUTPUT 714;"FETCH:PVTIME:BURST1:INTEGRITY?" ! Always check integrity values.
230 ENTER 714;Integ_burst1
240 OUTPUT 714;"FETCH:PVTIME:BURST2:INTEGRITY?"
250 ENTER 714;Integ_burst2
260 IF (Integ_burst1=0) AND (Integ_burst2=0) THEN
270    OUTPUT 714;"FETCH:PVTIME:MASK?" !PvT pass/fail result for entire mask
280    ENTER 714;Mask_result
290    OUTPUT 714;"FETCH:PVTIME:MASK:SEGMENT?" ! PvT mask error code. This will
300                                            ! tell us which parts of the
310                                            ! uplink has failed the mask.
320    ENTER 714;Mask_error_code
330    OUTPUT 714;"FETCH:PVTIME:BURST1:POWER:AVERAGE?" ! PvT Carrier Power result
340                                                    ! for the first burst.
350    ENTER 714;Pvt_pwr_burst1
360    OUTPUT 714;"FETCH:PVTIME:BURST2:POWER:AVERAGE?" ! PvT Carrier Power result
370                                                    ! for the second burst.
380    ENTER 714;Pvt_pwr_burst2
390  ELSE
400    PRINT "Measurement error: "&Meas_complete$
410    PRINT "Measurement Integrity value for burst 1 = ";Integ_burst1
420    PRINT "Measurement Integrity value for burst 2 = ";Integ_burst2
430  END IF
440 END
```

### Returned values

The measurements returned by this program are:

- `Integ_burst1` and `Integ_burst2` return the measurement integrity values for each of the two adjacent uplink bursts in the multislot configuration (0 means a successful measurement with no errors). See "Integrity Indicator" on page 283.
- `Mask_result` returns the mask pass/fail indicator for the entire mask, not an individual burst. When the multi-measurement count is greater than 1, the PvT mask pass/fail result will return Fail (1) if any single measurement fails.
- `Mask_error_code` returns the mask error code for the entire multislot configuration. For more details on how to interpret the value returned by this result, see "FETCh:PVTime:MASK[:FAIL]:SEGment?" on page 579.
- `Pvt_pwr_burst1` and `Pvt_pwr_burst2` return the PvT carrier power results in dBm for each of the bursts in the multislot configuration.

### Related Topics for GPRS

"GPRS Power versus Time Measurement" on page 71

"SETup:PVTime" on page 745

"INITiate" on page 603

"FETCh:PVTime" on page 571

"GPRS Control Program Example" on page 1

# Programming a RACH Measurement

This section provides an example of how to make a power versus time measurement on a RACH. The same principles as used in this example can also be used for transmit power and phase and frequency error measurements.

## Overview of Measurement Procedure

1. Ensure that the mobile is switched off.
2. Set the test set's measurement receiver to the frequency the RACH will arrive on. The simplest way to do this is to set the manual channel (that is, the expected ARFCN) to the ARFCN of the BCH. Alternatively you could set the expected frequency to the uplink frequency of the BCH ARFCN.
3. Set triggering to single.
4. Set trigger mode to Auto.

Once the RACH measurement is completed, in order to make further measurements on the TCH, ensure you reset the receiver control to Auto.

**NOTE** Only one measurement at a time can be made on the RACH even if two measurements are initiated.

## Programming Example

The following example details how to make a power versus time RACH measurement on a mobile originated call in Active Cell mode.

Alternatively, the same measurement could be made on a base station originated call by replacing lines 160 and 170 with the CALL:ORIGinate command.

```
10    INTEGER Int
20    DIM Results(11)
30    REAL Mask,Power
40    OUTPUT 714;"*RST"
50    OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:SELECTED 20" !Configures the
60                        !test set to expect a transmission on ARFCN 20.
70    OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10 DBM" !Configures
80                       !the test set to expect a power level of 10 dBm.
90    OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF"  !Configures trigger
100                        !mode to single for a pvt measurement.
110   OUTPUT 714;"SETUP:PVTIME:COUNT:STATE OFF"  !Configures the
120   !multi_measurement state to OFF.
130   OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configures the
140                                              !trigger source to AUTO.
150   OUTPUT 714;"INITIATE:PVTIME" !Start a pvt measurement.
160   PRINT "Connect your mobile to the Test Set and initiate a call"
170   PRINT "from the mobile."
180   OUTPUT 714;"FETCH:PVTIME:ALL?"!Fetches the measurement integrity
```

```
190   !value, mask indicator, tx power, and pvt offsets.
200   ENTER 714;Int,Mask,Power,Results(*)
210   PRINT "*************************************"
220   PRINT "*Power vs Time RACH Measurement Results*"
230   PRINT "*************************************"
240   PRINT "Integrity = ";Integrity
250   PRINT "Mask = ";Mask
260   PRINT "Carrier Power =";Power
270   PRINT "Offset        Level (dB)"
280   PRINT "(micro sec)   (dB)"
290   PRINT "-------       ----------"
300   PRINT "-28            ";Results(0)
310   PRINT "-18            ";Results(1)
320   PRINT "-10            ";Results(2)
330   PRINT "0              ";Results(3)
340   PRINT "321.2          ";Results(4)
350   PRINT "331.2          ";Results(5)
360   PRINT "339.2          ";Results(6)
370   PRINT "349.2          ";Results(7)
380   PRINT "542.8          ";Results(8)
390   PRINT "552.8          ";Results(9)
400   PRINT "560.8          ";Results(10)
410   PRINT "570.8          ";Results(11)
420   EN
```

## Related Topics

"RACH Measurement Description" on page 77

"RACH Troubleshooting" on page 969

# Programming a SINAD Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a SINAD measurement via the GPIB. SINAD measurements are not typically made when testing GSM mobiles but are more common when testing AMPS or other analog mobiles. The programming example below is typical for a 136 mobile.

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 "Analog Audio Measurement Description" on page 36.

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 +/–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 analog audio measurement parameters using the SETup subsystem.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

## Programming Example

```
10  OUTPUT 714;"SETup:AAUDio:CONTinuous OFF" !Set the analog audio
20                                           !measurements to single trigger mode.
30  OUTPUT 714;"SETup:AAUDio:EXPected:VOLTage 3V" !Set the Expected Amplitude level for
40                                               !audio input voltage in Vpeak.
50  OUTPUT 714;"SETup:AAUDio:SDIStortion:STATe ON" !Turn on the SINAD and
60                                                  !distortion measurements.
70  OUTPUT 714;"SETup:AAUDio:SDIStortion:FREQuency 1004 HZ" !Specify the audio
80                                      !frequency to use for the measurements.
90  OUTPUT 714;"SETup:AAUDio:FILTer:TYPE CMESsage" !Select the c-message filter.
100 OUTPUT 714;"SETup:AAUDio:DEMPhasis:STATe OFF" !Turn off de-emphasis.
110 OUTPUT 714;"SETup:AAUDio:EXPANDOR:STATe OFF" !Turn off the expandor.
120 OUTPUT 714;"SETup:AAUDio:TIMeout 3S" !Set a timeout value of 3 seconds
130                                       !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:AAUDio" !Start the Analog Audio measurement.
150 OUTPUT 714;"FETCh:AAUDio: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:AAUDio: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 283.
- `SINAD` returns the SINAD value in dB.

## Related Topics

"Analog Audio Measurement Description" on page 36

"Analog Audio Troubleshooting" on page 958

"INITiate" on page 603

"SETup:AAUDio" on page 639

"FETCh:AAUDio" on page 521

# Programming a Transmit Power Measurement

This section contains two programming examples:


- "Programming a Transmit Power Measurement for GSM" on page 230
- "Programming a Transmit Power Measurement for GPRS" on page 231


## Programming a Transmit Power Measurement for GSM

This section provides an example of how to make the transmit power (TXP) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See "Establishing an Active GSM Link with the Mobile Station" on page 121.

1. Configure the TXP measurement parameters using the SETup subsystem.
2. Start the TXP measurement using the INITiate subsystem.
3. Use the FETCh? command to obtain TXP measurement results.

### Programming Example

```
10  OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Configures a TXP measurement to
20                                            !single trigger mode.
30  OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 100" !Configures a multi-measurement
40                                             !of 100.
50  OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Configure trigger source
60                                                 !to auto.
70  OUTPUT 714;"INITIATE:TXPOWER" !Start TXP measurement.
80  OUTPUT 714;"FETCH:TXPOWER:ALL?" !Fetch TXP results.
90  ENTER 714;Integrity, Avg_tx_power
100 END
```

### Returned Values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Avg_tx_power` returns the average transmit power in dBm.

### Related Topics

"Transmit Power Measurement Description" on page 83

"SETup:TXPower" on page 767

"INITiate" on page 603

"FETCh:TXPower" on page 598

"GSM Control Program Example" on page 1

## Programming a Transmit Power Measurement for GPRS

This section provides an example of how to make the transmit power (TXP) measurement via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See "Step 4: Make a connection" on page 159.

1. Set the multislot configuration to two downlinks, two uplinks (D2U2) using the CALL subsystem.
2. Configure the TXP measurement parameters using the SETup subsystem.
3. Use the RFANalyzer:MSLot:MEASurement:BURSt command to select burst 2 of the multislot configuration for the TXP measurement.
4. Start the TXP measurement using the INITiate subsystem.
5. Use the FETCh? command to obtain TXP measurement results.

### Programming Example

```
10  OUTPUT 714;"CALL:PDTCH:MSLOT:CONFIG D2U2" ! Configures the multi-
20                                            ! slot configuration to be
30                                            ! 2 downlink, 2 uplink.
40  OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Configures a TXP measurement to
50                                            !single trigger mode.
60  OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 100" !Configures a multi-measurement
70                                             !of 100.
80  OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Configure trigger source
90                                                 !to auto.
100 OUTPUT 714;"RFANALYZER:MSLOT:MEASUREMENT:BURST 2" ! Perform the TXP
110                                                    ! measurement on burst 2.
120 OUTPUT 714;"INITIATE:TXPOWER" !Start TXP measurement.
130 OUTPUT 714;"FETCH:TXPOWER:ALL?" !Fetch TXP results.
140 ENTER 714;Integrity, Avg_tx_power
150 END
```

### Returned Values

The measurements returned by this program are:

- `Integrity` returns the measurement "Integrity Indicator" on page 283 (0 means a successful measurement with no errors).
- `Avg_tx_power` returns the average transmit power in dBm for burst 2 of the multislot configuration.

### Related Topics

"Transmit Power Measurement Description" on page 83

"SETup:TXPower" on page 767

"INITiate" on page 603

"FETCh:TXPower" on page 598

"GPRS 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 10. 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 10. Partial Preset Behavior (Continued)**

| 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 11. Full Preset Behavior**

| Function | Full Preset Result |
|---|---|
| Trigger Arm | Continuous (manual operation full preset or SYSTEM:PRESET2 command) |
| Trigger Arm | Single (remote operation full preset, *RST command) |
| Measurement Parameters | all set to defaults |
| Maskable Message Display State | On (manual operation full preset) |
| Maskable Message Display State | Off (remote operation full preset) |

### Status Preset

The STATUS:PRESET command sets the status system as defined in “SCPI 1995 Volume 2: Command Reference” section 20.7. All of the enable registers are set to 0, all PTR registers are set to 1, and all NTR registers are set to 0.

Example

```
OUTPUT 714;”STATUS:PRESET” !Presets the STATus subsystem.
```

## Related Topics

“SYSTem:PRESet” on page 865

“*RST” on page 874

# Receiver Control

Receiver Control is applicable to both GSM and GPRS. This topic contains the following sections:


- "GSM Receiver Control" on page 235
- "GPRS Receiver Control" on page 237


## GSM Receiver Control

You may want to control the internal receiver parameters rather than allow the test set to control them. You can do this by using the receiver control parameters.

### Selecting Manual or Automatic Receiver Control

Receiver control defines whether the test set (auto) or you (manual) are in control of the receiver's band, channel, frequency and power.

- Setting a manual band, manual frequency, or manual channel causes receiver control to be set to manual control mode.
- Setting the broadcast band, or any reset operation causes the receiver control to be set to auto control mode.
- Setting the RFANALYZER:CONTROL:AUTO to ON or OFF.

**Example**
```
OUTPUT 714;"RFANALYZER:CONTROL:AUTO OFF" !Allows manual control of
                                         !receiver parameters.
```

### Operating Mode and Receiver Control

The test set's receiver control parameter is set using, "RFANalyzer:CONTrol:AUTO" on page 625.

**Manual Receiver Control Parameters** When receiver control is set to auto, the test set's protocol controls the parameters. When receiver control is set to manual, the following three parameters are under user control.

- Manual Band
- Manual Freq
- Manual Channel

**Manual Band** The frequency bands available for the test set are PGSM, EGSM, GSM850, DCS and PCS. Only one band can be active at a time. The frequency band must be selected in order to define the frequencies where measurements are to be made. See "Frequency Banded Parameters" on page 115 for details on these parameters.

```
OUTPUT 714;"RFANALYZER:MANUAL:BAND PCS"!Sets the frequency band to PCS.
```

**Manual Freq** Manual frequency is used to tune the test set's measuring receiver. None of the "Manual Channel" on page 236 parameters are affected by changes to manual frequency.

```
OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 942.6MHZ" !Sets the input frequency to 942.6 MHz.
```

**Manual Channel** Manual channel is used to tune the test set's measuring receiver. "Manual Freq" on page 235 is affected by changes to manual channel.

```
OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:EGSM 24" !Sets the EGSM channel to 24.
```

**Manual Receiver Control** If the receiver control parameter is set to manual, the test set's receiver frequency is set using the parameters in the following table. See "RFANalyzer:MANual:BAND" on page 628 for manual band or manual frequency details.

**Table 3. Test Set Receiver Frequencies (Manual)**

| Operating Mode | Cell Activated State | Measurement Band | Measurement Frequency | Measurement Channel |
|---|---|---|---|---|
| Active Cell | ON or OFF | Manual Band | Manual Frequency | Manual Channel |
| Test Mode | ON or OFF | Manual Band | Manual Frequency | Manual Channel |

**Auto Receiver Control** If the receiver control parameter is set to auto, the test set's receiver frequency is set using the parameters in the following table. See "CALL:TCHannel[:ARFCn][:SELected]" on page 510 traffic channel details and "CALL:TCHannel:BAND" on page 513 for traffic band details. See "CALL[:CELL]:BAND[:SELected]" on page 364 for cell band details. See "CALL:BCHannel" on page 369 for broadcast channel details.

**Table 4. Test Set Receiver Frequencies (Auto)**

| Operating Mode | Cell Activated State | Measurement Band | Measurement Frequency |
|---|---|---|---|
| Active Cell | ON | Traffic Band | Traffic Channel |
| Active Cell | OFF | Cell Band | Broadcast Channel |

**Table 5. Test Set Receiver Frequencies (Auto)**

| Operating Mode | Test Function | Measurement Band | Measurement Frequency |
|---|---|---|---|
| Test Mode | BCH (1) | Cell Band | Broadcast Channel |
| Test Mode | BCH +TCH (2) | Traffic Band | Traffic Channel |
| Test Mode | CW | Cell Band | Broadcast Channel |

**Table Footnotes**

1 Actual frequency depends on current broadcast band (PGSM, EGSM, GSM850, PCS, or DCS) and is defined in GSM as the uplink frequency.

2 Actual frequency depends on current traffic channel band (PGSM, EGSM, GSM850, PCS, or DCS) and is defined in GSM as the uplink frequency.

## Expected Power

You can use the expected power parameter regardless of the receiver control setting. The MS TX level parameter sets the mobile station uplink power control level ranges while expected power sets the mobile station uplink power in dBm.

Expected power defines the expected input power at the RF IN /OUT connector on the front panel of the test set. The range of expected power is beyond the capability of the test set's hardware. This is 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 "Amplitude Offset" on page 90 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 the user sets 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.

Expected power is always overwritten by settings made to the MS TX Level parameter.

Setting the expected power will not set receiver control to manual.

```
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PGSM -15DBM" !Set input power to –15 dbm.
```

See "RFANalyzer:EXPected:POWer:PGSM" on page 628 or "CALL:MS:TXLevel[:SELected]" on page 434.

### Related Topics

"Active Cell Operating Mode" on page 99

"Test Mode Operating Modes" on page 101

"Frequency Banded Parameters" on page 115

## GPRS Receiver Control

The test set normally sets all receiver parameters automatically using data connection 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. The receiver's expected power and measurement frequency settings are set automatically according to the data connection control settings you specify (Packet Data Traffic Channel, Packet Data Traffic 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 623 for a listing of all receiver control syntax. (Note that some of the commands described in "RFANalyzer" on page 623 are GSM only.)

```
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 used to control the receiver manually:

- Expected Power Control
- Measurement Frequency
- Uplink Frequency
- Measurement Burst

**Expected Power Control** The expected power from the mobile is set manually using the following settings (see "Expected Power" on page 237):

- To set the test set receiver's expected power setting to manual use "RFANalyzer:CONTrol:POWer:AUTO" on page 633.

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

- To set the power level that the test set's receiver is expecting the mobile station uplink burst to transmit at for the GPRS system type, use "RFANalyzer:MANual:POWer:GPRS[:SELected]:BURSt[1|2]" on page 635. Each burst is set individually.

  ```
  OUTPUT 714;"RFANalyzer:MANual:POWer:GPRS:BURSt1 15 DBM"

  OUTPUT 714;"RFANalyzer:MANual:POWer:GPRS:BURSt2 19 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 measure a CW signal while in active cell mode will likely result in an error. This 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.

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 bands:

- To set the receiver to manual mode and change the measurement frequency use "RFANalyzer:MANual:MEASurement[:MFRequency]" on page 633.

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

**Uplink Frequency** Uplink Frequency sets the test set's demodulation receiver frequency, used to demodulate information from the mobile's uplink transmission:

- To set the receiver to manual mode and set the demodulation receiver frequency use "RFANalyzer:MANual:UPLink[:MFRequency]" on page 635.

```
OUTPUT 714;"RFANalyzer:MANual:UPLink 942.6 MHZ" !Enables manual demodulation
!receiver control and sets the test set's demodulation 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. Automatic control is always used when the cell operating mode is active cell.

**Measurement Burst** Measurement Burst sets the mobile uplink burst number on which the measurement is performed (not the absolute timeslot number, but the burst number relative to the first uplink burst in the TDMA frame):

- To set the measurement burst use "RFANalyzer:MSLot:MEASurement:BURSt" on page 636.

```
OUTPUT 714;"RFANalyzer:MSLot:MEASurement:BURSt 2" !Sets the receiver to measure the second uplink
!burst.
```

  The Measurement Burst parameter is always controlled manually. The choice of bursts available is based on the selection table shown under the multislot selection command, "CALL:PDTCH:MSLot:CONFiguration" on page 460.

**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 command:

  — "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1 | 2]" on page 459

- Measurement Frequency and Link Frequency - derived from the PDTCH Band and PDTCH (ARFCN) settings, queried/set using the following command:

  — "CALL:PDTCH[:ARFCn][:SELected]" on page 457

### 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 238 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 "Amplitude Offset" on page 90 for details about amplitude offset.

The upper and lower limits of expected power provide boundaries for the combination of amplitude offset and expected power. If you set expected power to +52 dBm and the amplitude offset to –3 dB, the calculated receiver power will be 49 dBm, but the test set shall be set to +43 dBm, the upper limit of the hardware. If the calculated value of receiver power goes below –25 dB, the lower limit of the hardware, the test set shall be set to –25 dB.

### Effects on Receiver Control When Changing Operating Mode

After selecting the operating mode 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 all receiver parameters to return to automatic control.

### Related Topics

"Test Mode Operating Modes" on page 101

"Active Cell Operating Mode" on page 99

"RFANalyzer" on page 623

# Testing a GPRS Mobile Station

This section is *not* applicable to GSM.

This section provides a description of how you may want to use the test set to test a GPRS mobile station which supports a single uplink timeslot or two adjacent uplink timeslots. The section contains:


- "Test Overview" on page 241
- "Procedure" on page 241
- "Operating Considerations" on page 244


If you want a detailed description of how to write a basic control program that performs fundamental manufacturing tests on a GPRS mobile station, see "Programming: Getting Started Guide for E1964A GPRS Mobile Test Application Rev. A.02 E6701A GPRS Lab Application Rev. A.01" on page 150.

## Test Overview

To test a GPRS mobile station, you need to perform the following steps:


"1. Configure the base station emulator, mobile station, and measurement execution parameters" on page 241

"2. Switch on the GPRS mobile station, perform an attach and establish a data connection" on page 243

"3. Make measurements and obtain results" on page 243

"4. Reconfigure the data connection and make more measurements (if required)" on page 244

"5. Disconnect the Mobile Station from the base station emulator" on page 244


These steps are described in more detail in the next section.

## Procedure

### 1. Configure the base station emulator, mobile station, and measurement execution parameters

Before starting to transfer data and make measurements on a GPRS mobile station, you may need to configure some, or all of the following parameters:

- Broadcast channel (BCH) parameters:
  - — Cell Band (see "CALL[:CELL]:BAND[:SELected]" on page 364)
  - — Broadcast Channel (ARFCN) (see " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370)
  - — Cell Power (see "CALL[:CELL]:POWer:AMPLitude[:SELected]" on page 474)
- Packet data traffic channel (PDTCH) parameters:
  - — Packet Data Traffic Channel Band (see "CALL:PDTCH:BAND" on page 458)
  - — Packet Data Traffic Channel (ARFCN) (see "CALL:PDTCH[:ARFCn][:SELected]" on page 457)
  - — Packet Data Traffic Channel Coding Scheme (see "CALL:PDTCH:CSCHeme" on page 458)

— Downlink Packet Data Traffic Channel Power Control:

— Downlink Power Reference Level (dB) (see "CALL:PDTCH:PZERo:LEVel" on page 465)

— Downlink Power Reduction Level (dB) (see "CALL:PDTCH:PREDuction:LEVel[1|2]" on page 464)

— Downlink Burst Power Reduction Selection (see "CALL:PDTCH:PREDuction:BURSt[1|2|3|4]" on page 463)

Note: In order to make use of power reduction levels, you must set the downlink PDTCHs to be on a different ARFCN from the broadcast channel. This is because the power level across all timeslots on the BCH must remain constant. Therefore, power reduction levels are ignored.

— Packet Data Traffic Channel Protocol Control:

— Packet Timeslot Reconfigure (see "CALL:PDTCH:PMESsage:PTReconfig" on page 462)

— Packet Power Timing Advance (see "CALL:PDTCH:PMESsage:PPTadvance" on page 461)

— Data Connection Parameters:

— Data Connection Type (see "CALL:FUNCtion:DATA:TYPE" on page 408)

— Data Connection Frame Number Type (see "CALL:FUNCtion:DATA:FRAMe:STARt" on page 407)

— Data Connection LLC Frame Check Sequence (see "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405)

— BLER Block Polling Interval (see "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406)

— Multislot Configuration (see "CALL:PDTCH:MSLot:CONFiguration" on page 460)

— First Downlink Burst to Loop (see "CALL:PDTCH:MSLot[:FIRSt]:DOWNlink:LOOPback[:BURSt]" on page 461)

Note that some BCH and PDTCH parameters are fixed parameters. This means that their values cannot be changed (see "Fixed Parameters" on page 246).

- Mobile station operating parameters:

— PDTCH MS TX Level (see "CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1|2]" on page 459)

— Guard Band Period Length (see "CALL:MS:TX:BURSt:GPLength" on page 434)

- Measurement execution parameters:

— The SETup subsystem is used to configure measurement parameters. For a brief description of this subsystem and links to the GPIB commands, see "SETup Subsystem" on page 637. For a more detailed description of measurement execution parameters along with programming examples, see "Step 3: Set Measurement Parameters" on page 158.

- Deferred parameters (if required):

— Deferred parameters allow you to set up a new data connection ahead of time.This is useful if you plan to reconfigure the data connection after your first set of measurements to make more measurements on the new channel. The settings you make are only applied when a channel change is executed using the "CALL:HANDover | HANDoff[:IMMediate]" on page 411. For a list of the deferred parameters see "Configuring the Packet Data Traffic Channel (PDTCH)" on page 126. For more details on using deferred parameters see "Using Deferred Parameters" on page 128.

### 2. Switch on the GPRS mobile station, perform an attach and establish a data connection

Ensure the GPRS mobile station you want to test has either a GSM Test SIM card, or a standard GSM SIM card installed. When you connect your mobile station to the test set and switch the mobile station on, it should automatically perform a GPRS attach. (For those mobile stations which do not automatically perform a GPRS attach, you may have to instruct the mobile station to go into a data mode. The method for doing this will vary from one mobile station to another. For example, you may have to press a key on the mobile station's keypad, or make a selection from the mobile station's on-screen menu system.)

The mobile station must be GPRS attached before you can use the command "CALL:FUNCtion:DATA:STARt" on page 407 to start the data connection. You can verify that a data connection has been successfully established, by checking that the connection status is "transferring". (If you require more details on connection states see "Data Connection Processing State Synchronization" on page 317).

If you have problems starting the data connection with your mobile station under normal conditions, you may want to try changing the frame numbering scheme using the command "CALL:FUNCtion:DATA:FRAMe:STARt" on page 407.

If you have problems establishing a data connection using the BLER Data Connection Type specifically, you may want to change the setting of the Data Connection LLC Frame Check Sequence (see "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405) or the BLER Block Polling Interval (see "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406).

### 3. Make measurements and obtain results

Now that the data connection is successfully established, you can start making concurrent transmitter measurements and gathering results. Output RF Spectrum, Transmit Power, Phase and Frequency Error, and Power versus Time are all available for GPRS. In addition, you can make Receiver Bit Error Rate measurements in parallel with your transmitter measurements if you set the Data Connection Type to ETSI Type B.

A receiver BLock Error Rate (BLER) result is also available when you set the Data Connection Type to BLER.

The FETch subsystem is used to obtain transmitter and receiver measurement results. For a description of this subsystem along with links to the GPIB commands, see "FETCh? Subsystem" on page 520.

The query "CALL:STATus:PDTCH | PDTChannel:BLERror?" on page 505 is used to obtain BLER results. You may want to vary the downlink power to stress the mobile's receiver during your testing (see "Downlink PDTCH Power Control" on page 244). If you require more details on BLER, see "Block Error Rate (BLER) Report Measurement Description" on page 47.

When you want to use the Transmit Power, and Phase and Frequency Error measurements to measure each burst in a multislot configuration featuring two adjacent uplink timeslots, you have to select only one burst at a time to measure (using "RFANalyzer:MSLot:MEASurement:BURSt" on page 636). In order to optimize your test code, the recommended method is to select the first burst you want to measure, perform the first set of Transmit Power, and Phase and Frequency Error measurements and then repeat these measurements after you've selected the second burst. To select a multislot configuration with two adjacent uplink timeslots (that is, D2U2 or D3U2) use "CALL:PDTCH:MSLot:CONFiguration" on page 460. Note that the Power versus Time measurement can measure over both bursts in a multislot configuration with two adjacent uplink timeslots. If you require more details on the Power versus Time measurement, see "GPRS Power versus Time Measurement" on page 71.

For more details on the process of making measurements and gathering results, see "Step 5: INITiate and FETCh Measurements" on page 161.

#### 4. Reconfigure the data connection and make more measurements (if required)

In order to test the mobile station using different parameters, such as channel number, channel band, or mobile station transmit level, you have to reconfigure the data connection. To do this, you can execute a channel change using the "CALL:HANDover | HANDoff[:IMMediate]" on page 411. This applies the deferred parameters that you set earlier (see Deferred Parameters above). If you require more details on the process of reconfiguring the data connection, see "Step 6: Reconfigure Test Set and Mobile Station Connection Parameters" on page 165.

Note that additional PDTCH protocol control parameters are available in case your mobile station does not support the Packet Timeslot Reconfigure (PTR) message. (If you require details on these parameters, see "CALL:PDTCH:PMESsage:PPTadvance" on page 461 and "CALL:PDTCH:PMESsage:PTReconfig" on page 462).

#### 5. Disconnect the Mobile Station from the base station emulator

When your testing is complete, you need to end the data connection (using "CALL:FUNCtion:DATA:STOP" on page 408) and then initiate the GPRS detach procedure from the mobile station. If you require more details, see "Step 7: End the Connection" on page 167. You should note that the GPRS detach procedure is optional in a testing environment. The test set can be left in the Attached data connection state and will recognize if a different mobile station performs a GPRS attach.

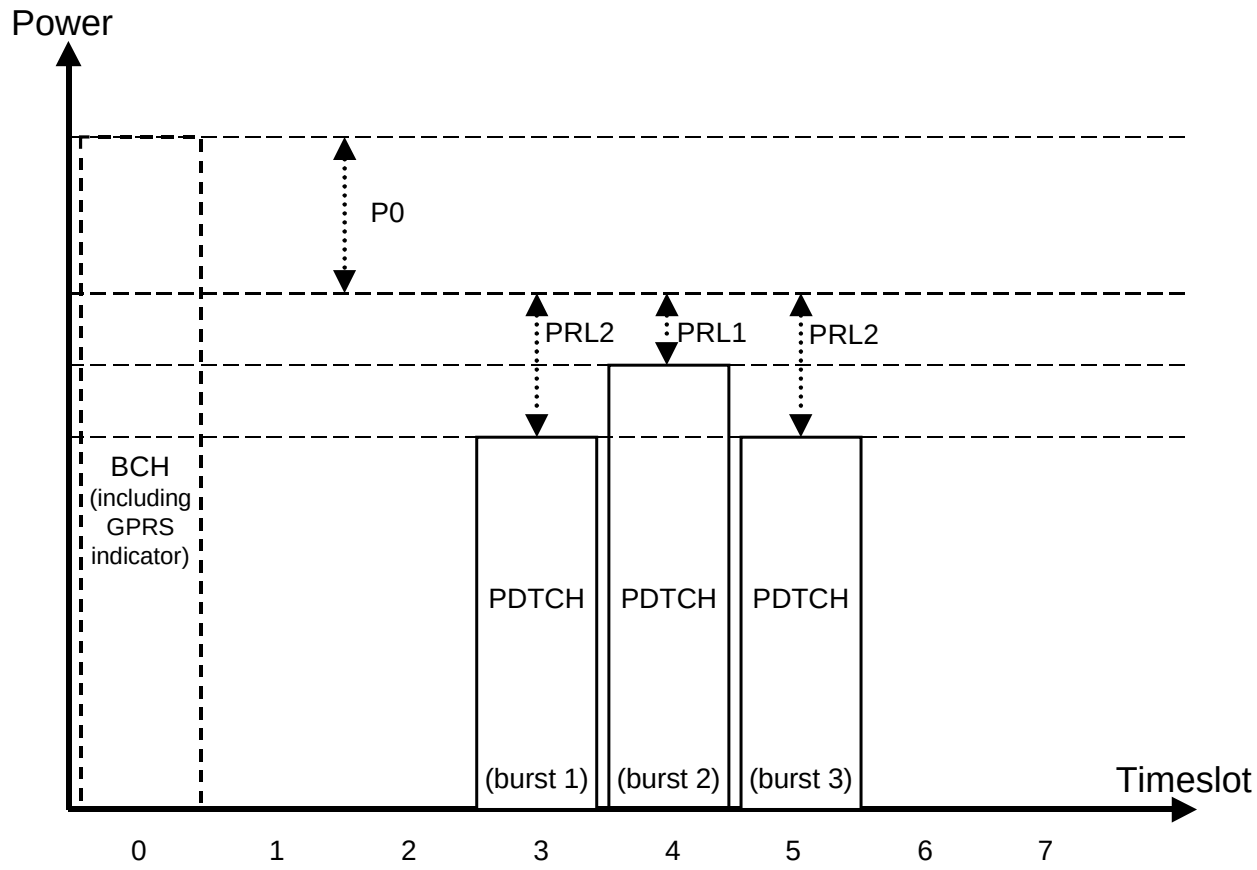
## Operating Considerations

### Downlink PDTCH Power Control

For GPRS-specific testing of mobile stations, you must take into consideration the multislot mode of operation (where a single packet data connection uses multiple timeslots on the same ARFCN possibly at different power levels). In GPRS, downlink power levels are referenced to the power reduction reference level (which in turn is referenced to the BCCH). ETSI refers to these power reduction levels as PR values, and the reference level is known as P0. In the test set, the power reduction levels are implemented as two values (PRL1 and PRL2) which can be mapped to any downlink burst.

P0, PRL1, and PRL2 are shown in the figure below. Note that the BCH (including GPRS indicator) is shown on the same ARFCN in the figure only to illustrate the BCH level. To make use of power reduction levels, you must set the downlink PDTCHs to be on a different ARFCN from the BCH.

**Figure 15. GPRS Power Reduction Levels**




Use the following commands to set the BCH power, P0 reference level, and PDTCH power reduction levels:

- To set the Cell Power (BCH power level), use "CALL[:CELL]:POWer:AMPLitude[:SELected]" on page 474.
- To set the P0 Reference Level, use "CALL:PDTCH:PZERo:LEVel" on page 465.
- To set the Downlink Power Reduction Level (dB) for PRL1 and PRL2, use "CALL:PDTCH:PREDuction:LEVel[1|2]" on page 464.
- To make the Downlink Burst Power Reduction Selection (either PRL1 or PRL2) for each PDTCH burst, use "CALL:PDTCH:PREDuction:BURSt[1|2|3|4]" on page 463.

### Fixed Parameters

A number of GPRS parameters currently have fixed values. These fixed parameters are shown in the following table.

**Table 12. GPRS Fixed Parameters**

| Fixed Parameter | Value |
|---|---|
| Base Station Colour Code (BCC) | 5 |
| Location Area Code (LAC) | 1 |
| Mobile Country Code (MCC) | 1 |
| Mobile Network Code (MNC) | 1 |
| Network Colour Code (NCC) | 1 |
| Routing Area Code (RAC) | 1 |

## Related Topics

“Programming: Getting Started Guide for E1964A GPRS Mobile Test Application Rev. A.02 E6701A GPRS Lab Application Rev. A.01” on page 150

“Active Cell For GPRS” on page 100

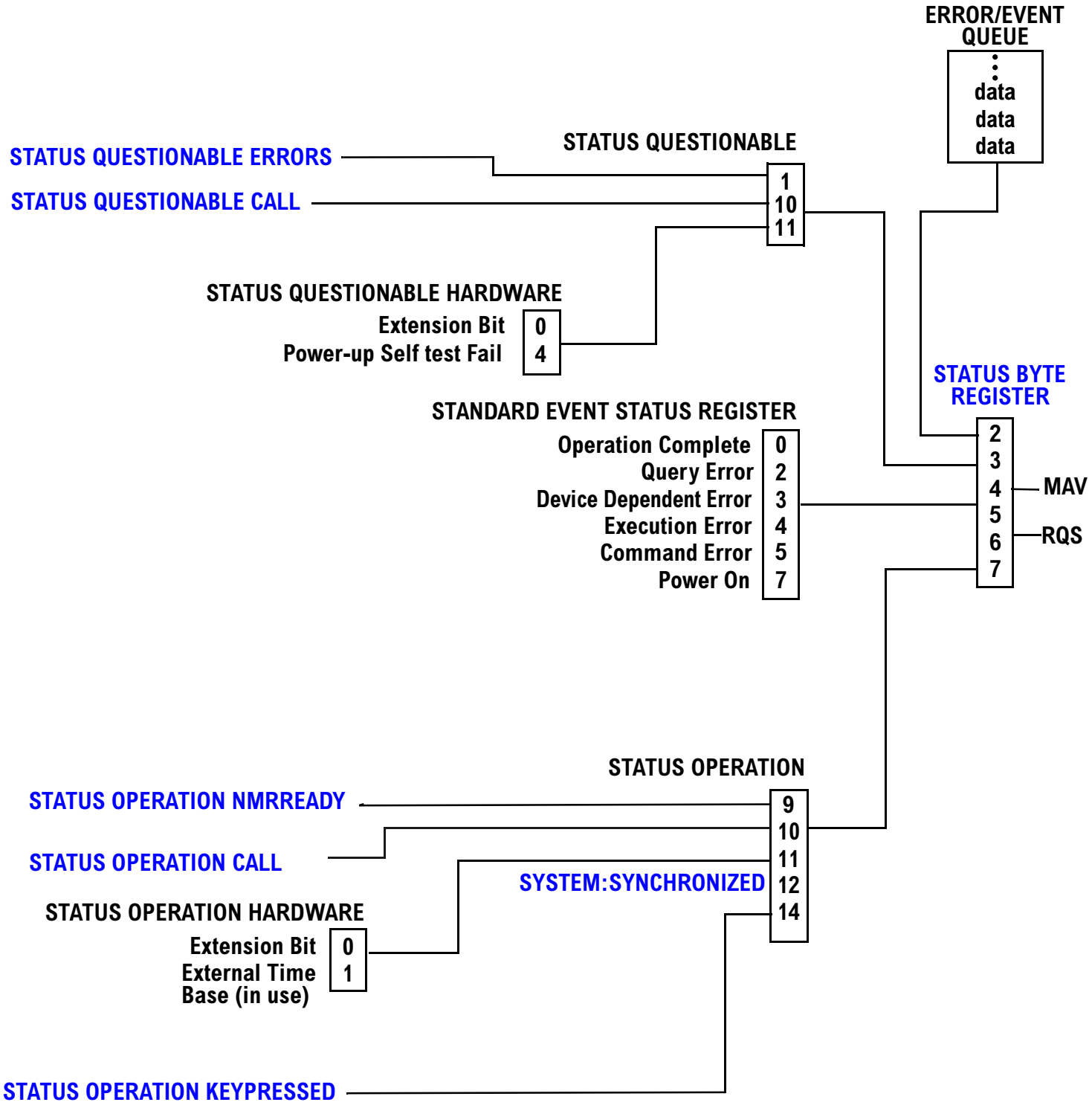
“GPRS Broadcast Channel Parameters” on page 111

“Configuring the Packet Data Traffic Channel (PDTCH)” on page 126

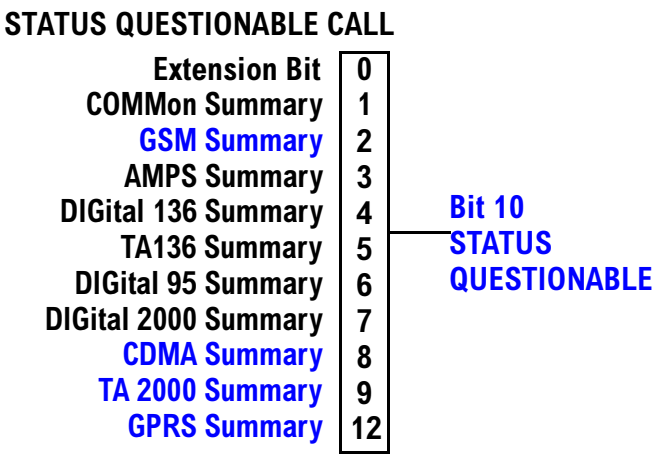
# Status Subsystem Overview

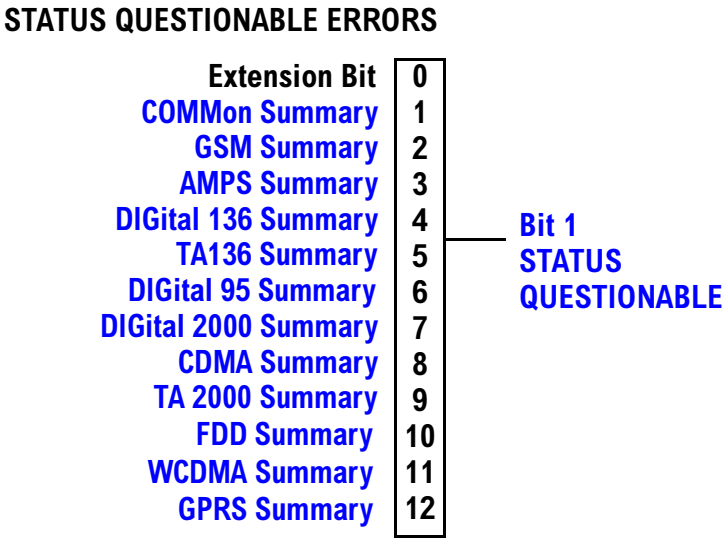
## Description

## Overview of STATus Reporting Structure

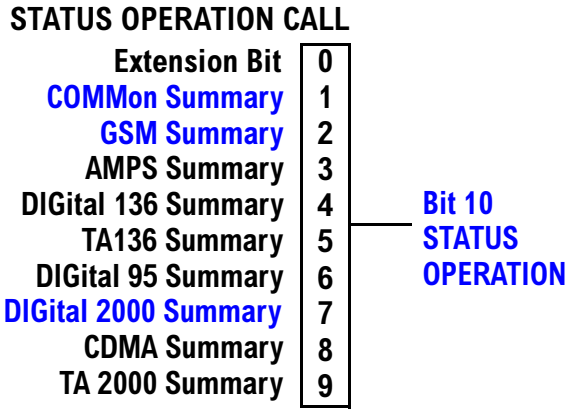


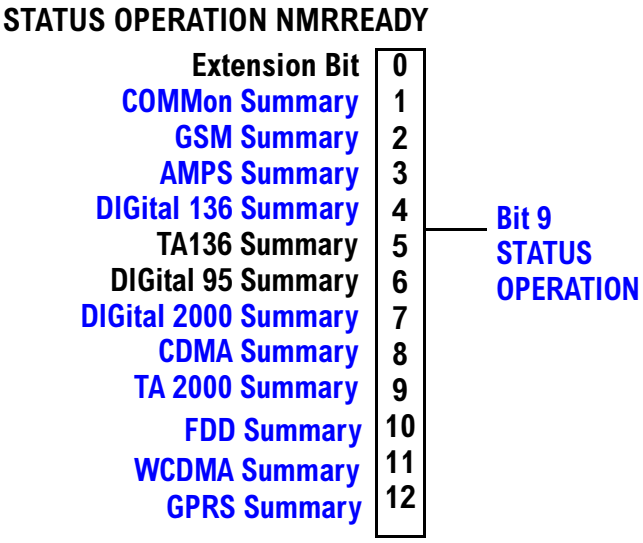
## Status Reporting Structure For STATus QUEStionable and STATus OPERation



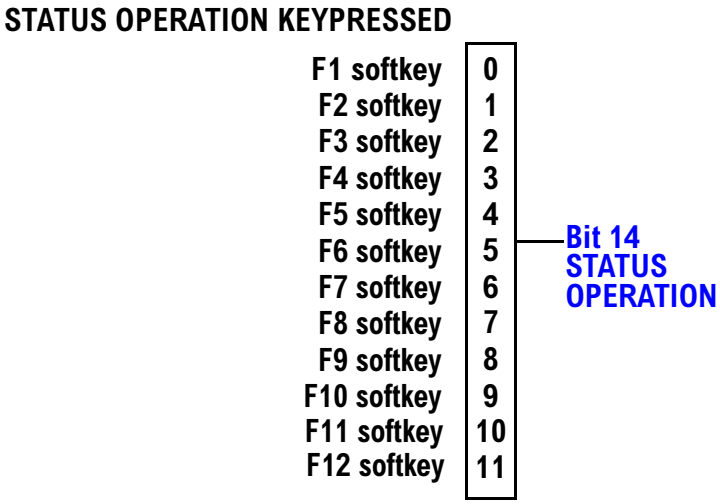




Some status registers are not functional at this time.

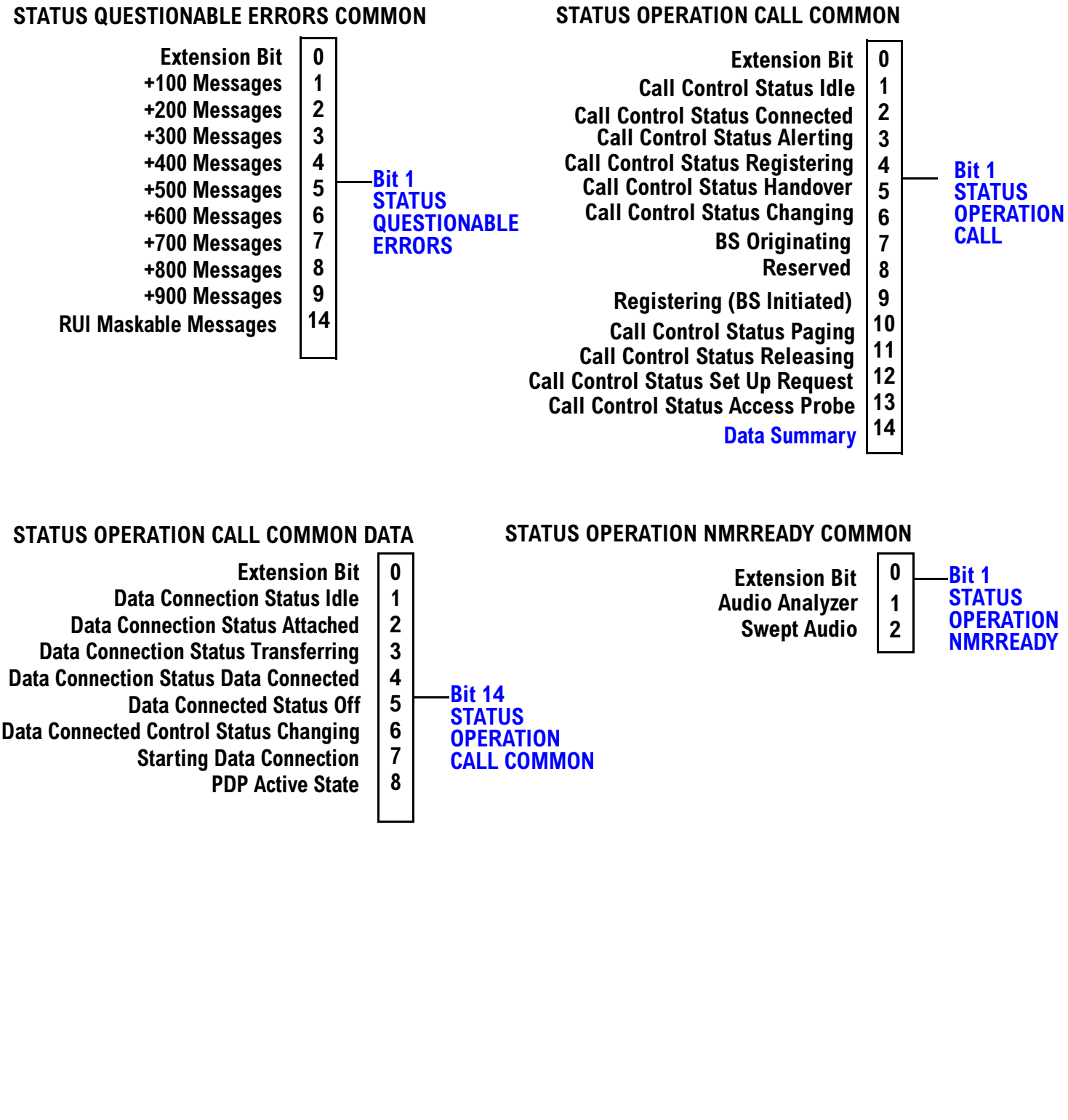


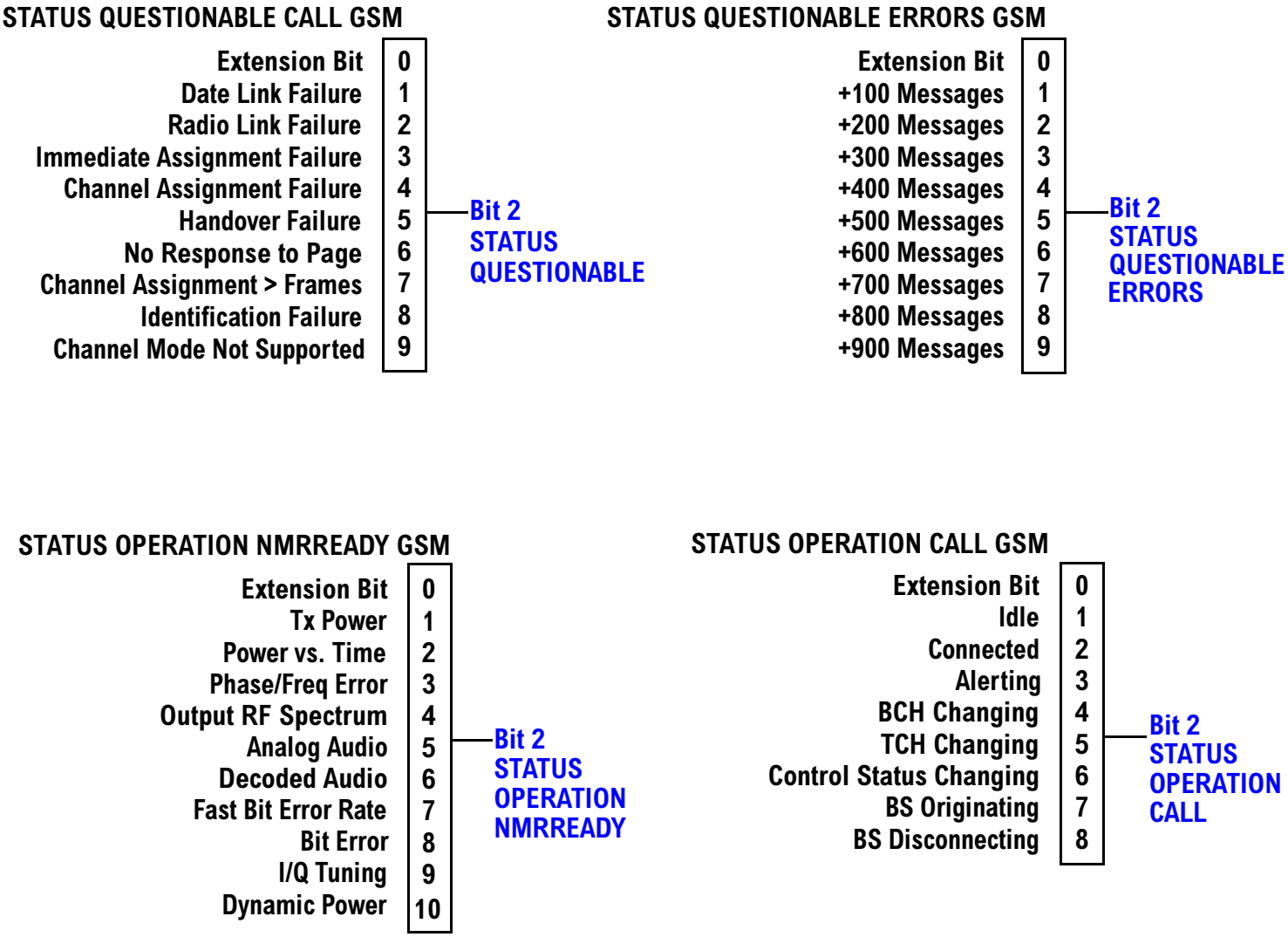
## Status Reporting Structure For STATus OPERation KEYPressed Register



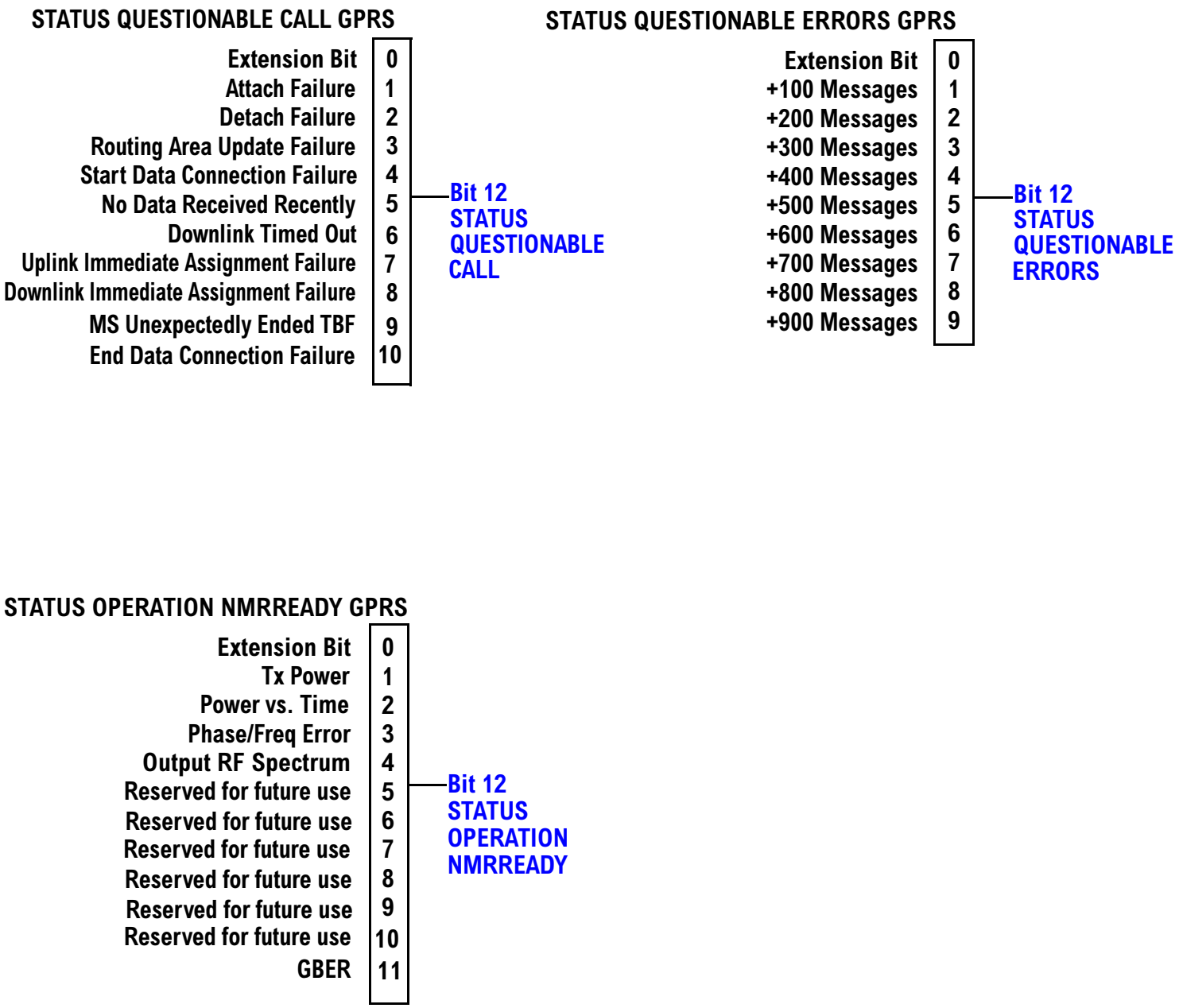
## Status Reporting Structures for the COMMon Registers



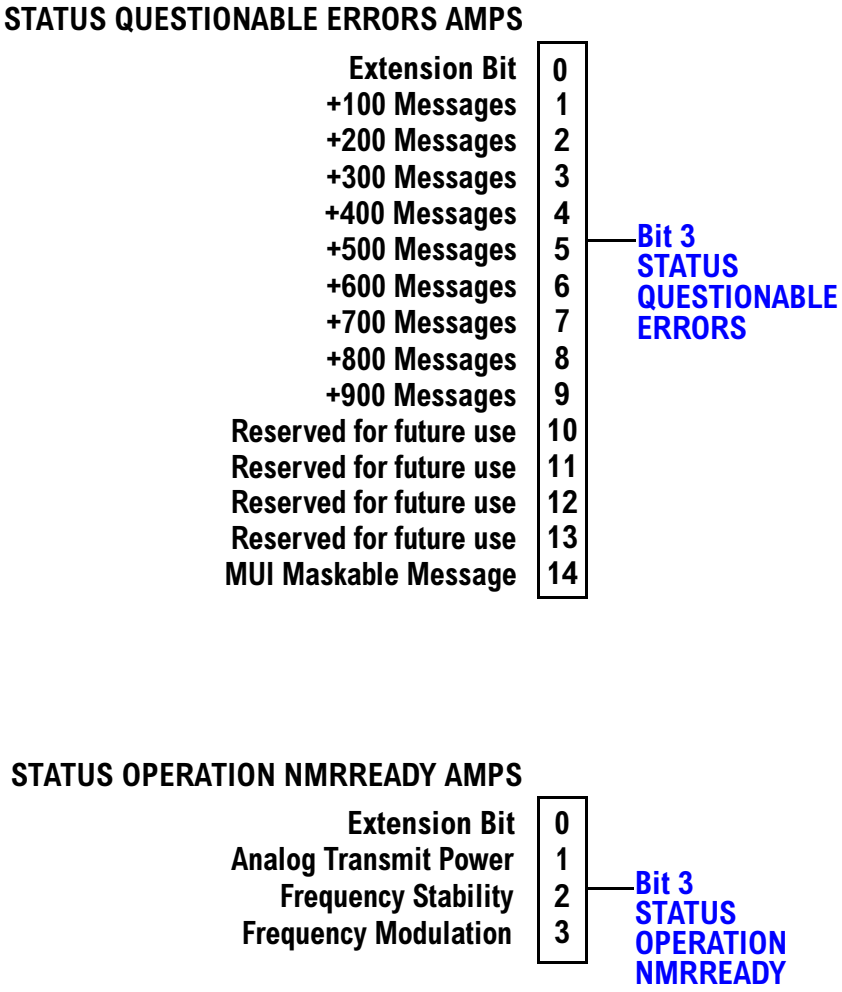
## Status Reporting Structure for the GSM Registers



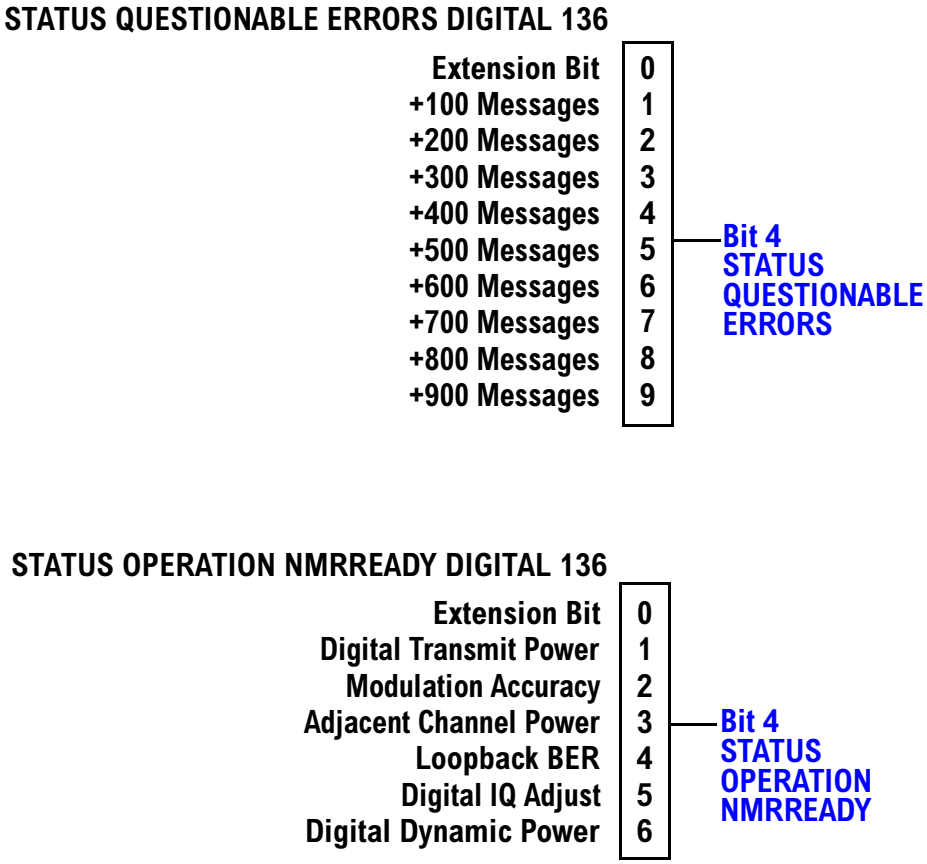
## Status Reporting Structure For the GPRS Registers



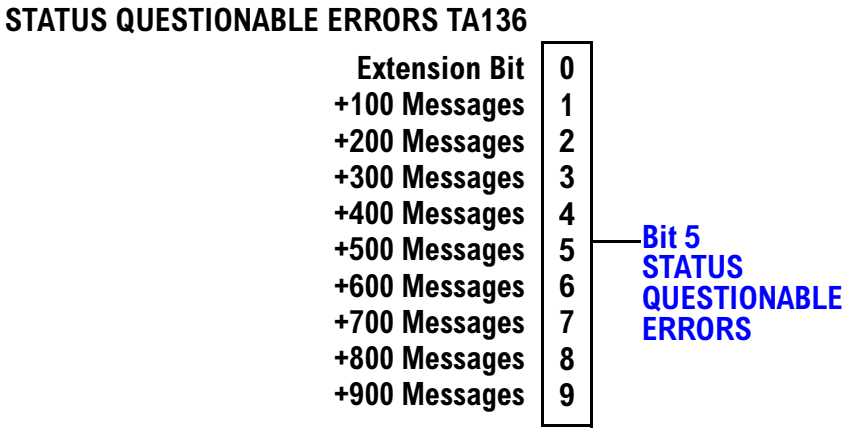
## Status Reporting Structure for the AMPS Registers



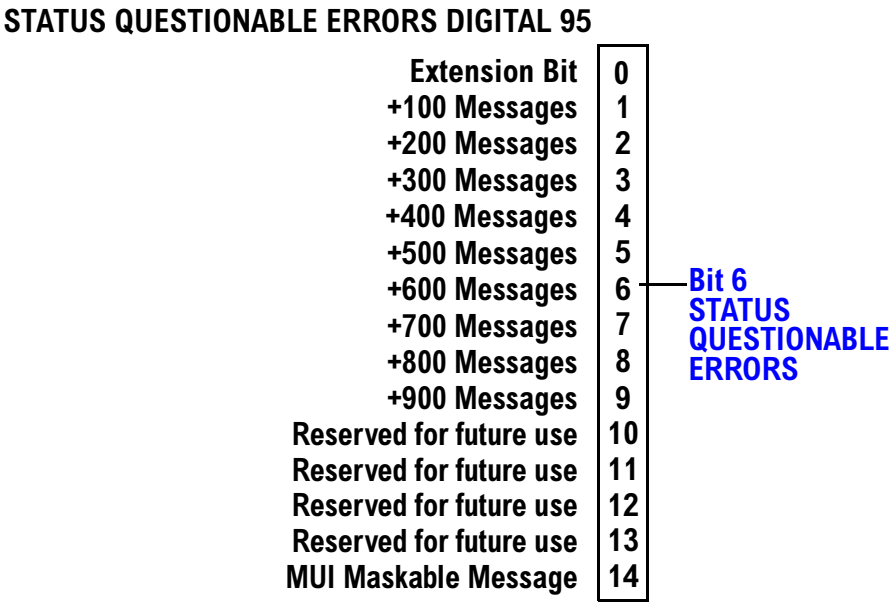
## Status Reporting Structure for the DIGital136 Registers



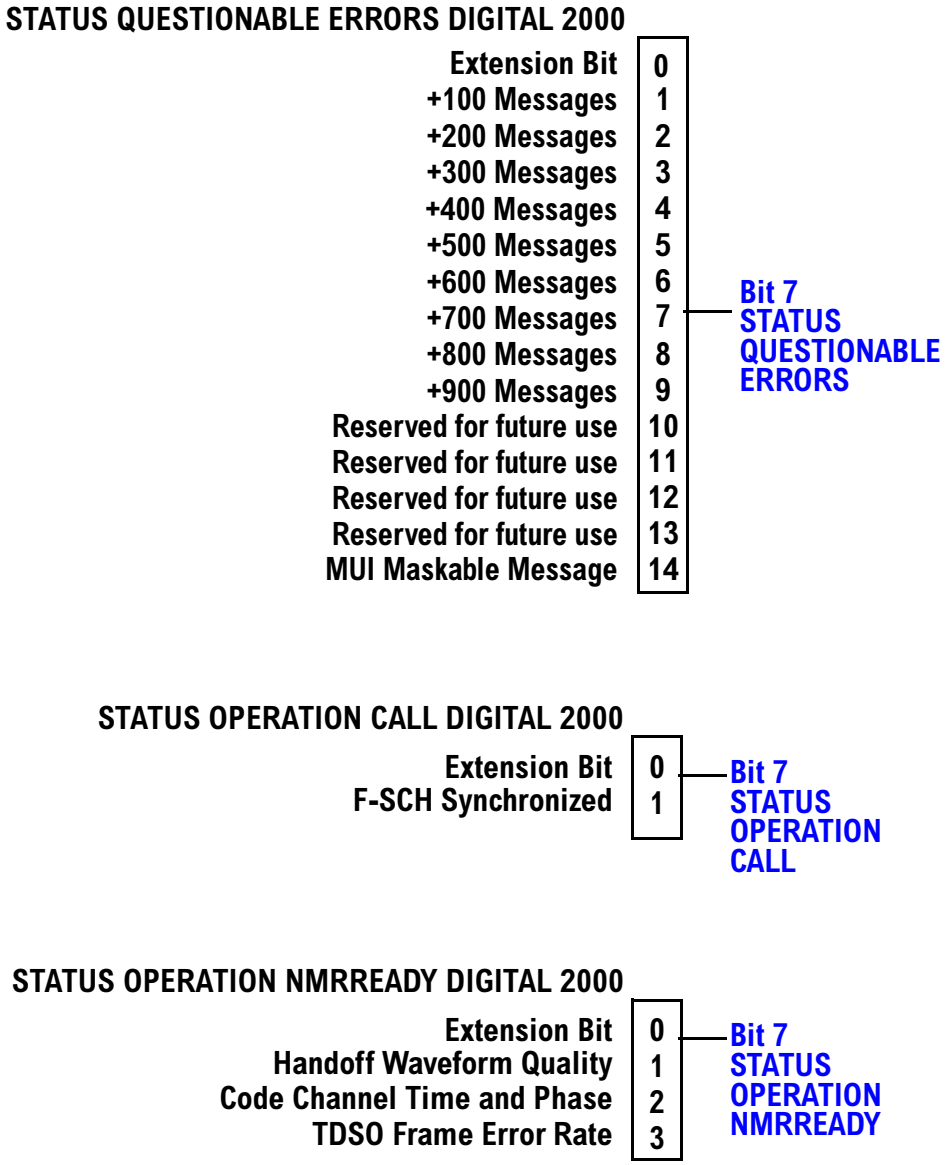
## Status Reporting Structures for the TA136 Registers



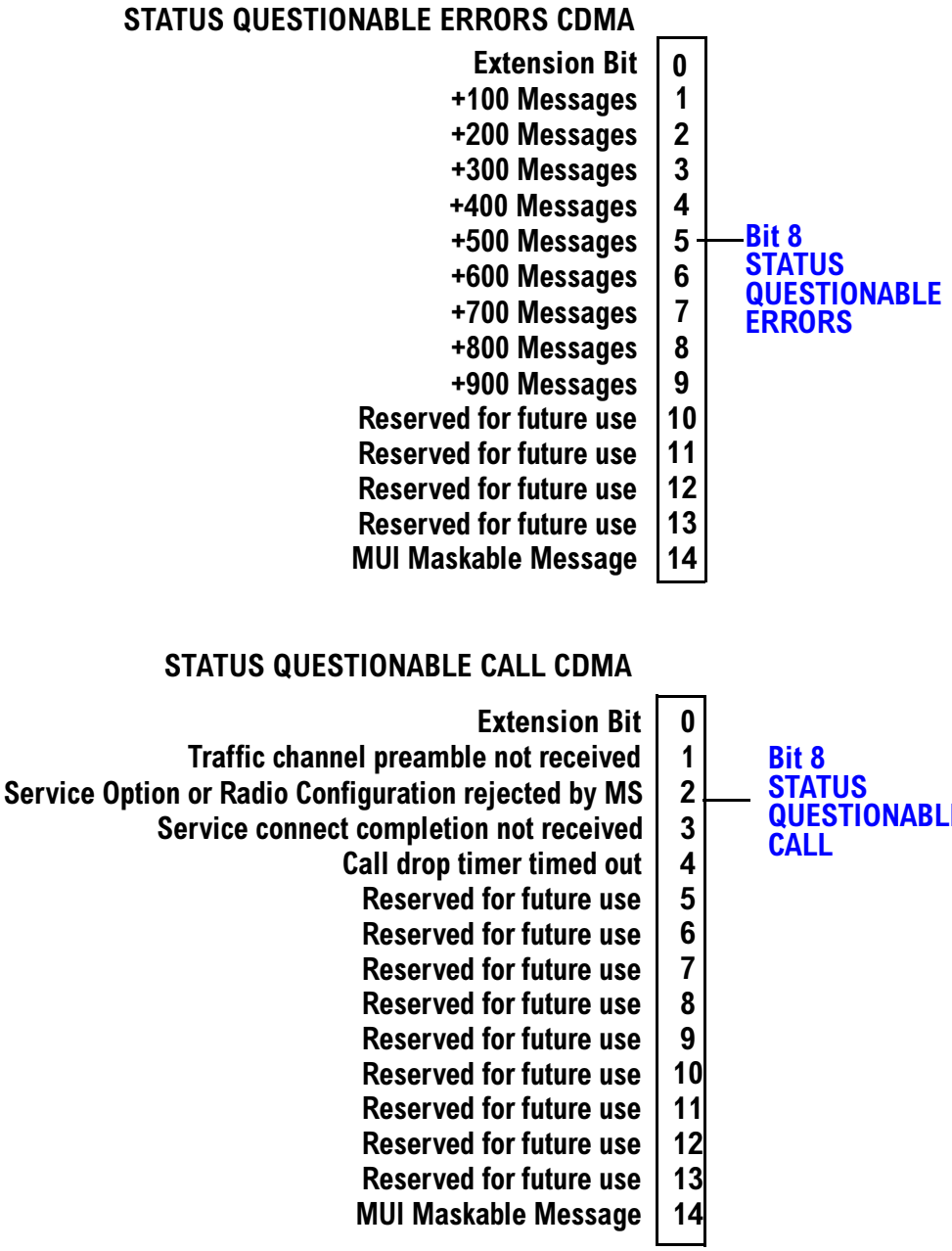

## Status Reporting Structure for the DIGital95 Registers



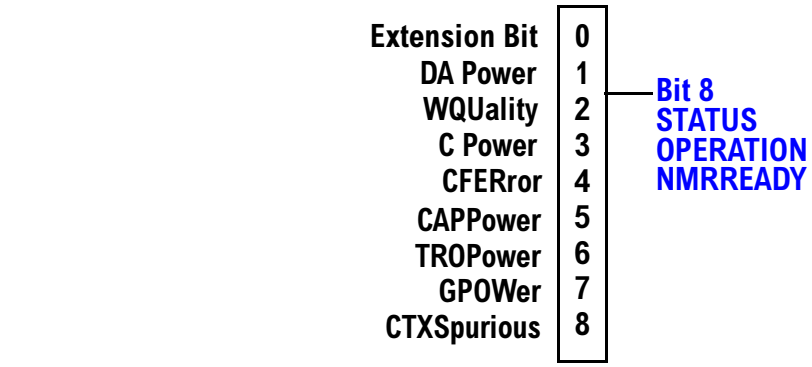
## Status Reporting Structure for the DIGital 2000 Registers



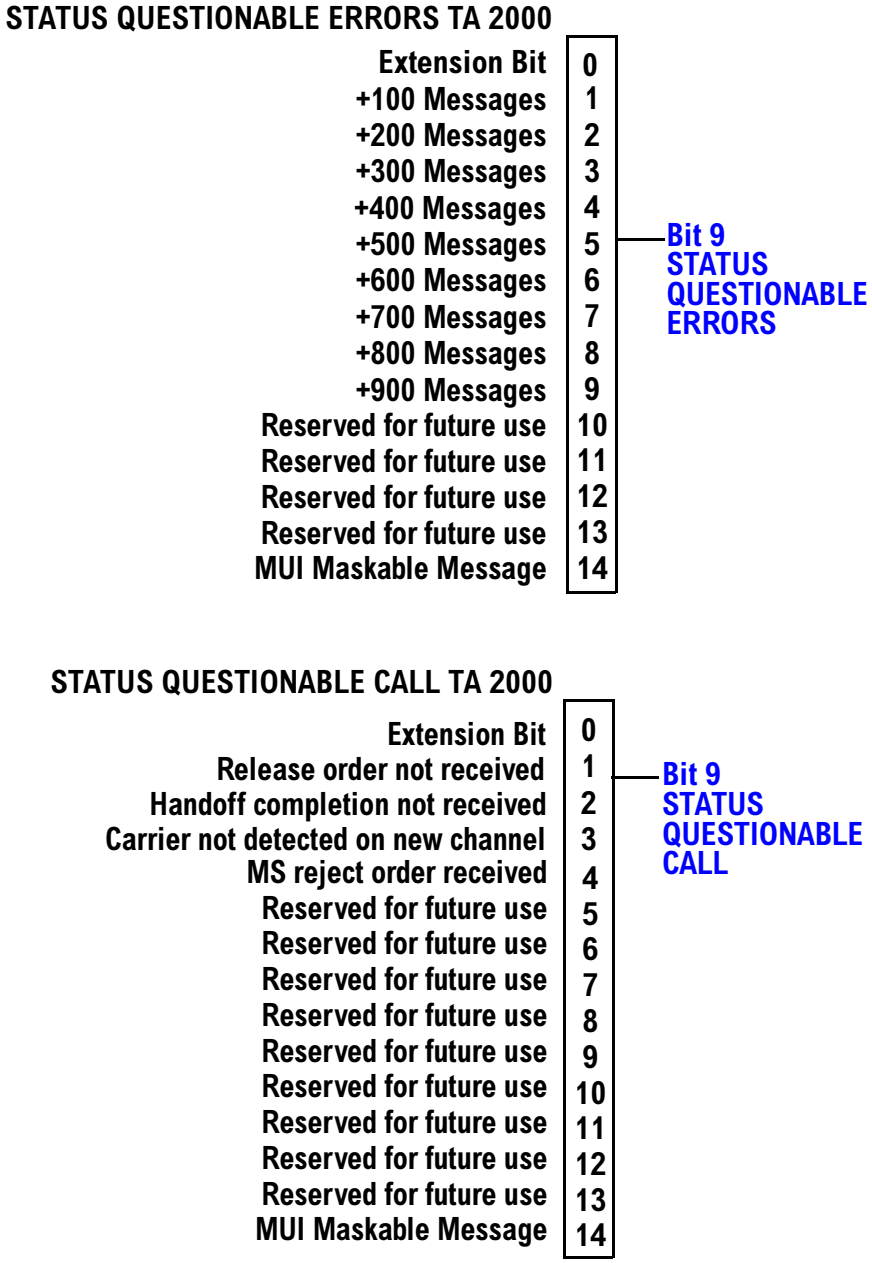
## Status Reporting Structure for the CDMA Registers



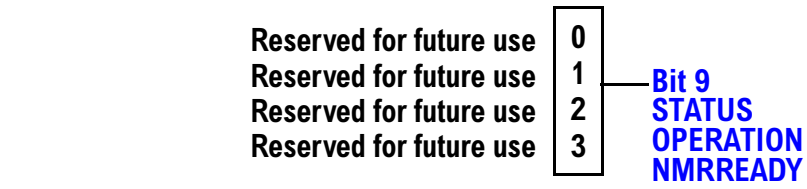
### STATUS OPERATION NMRREADY CDMA



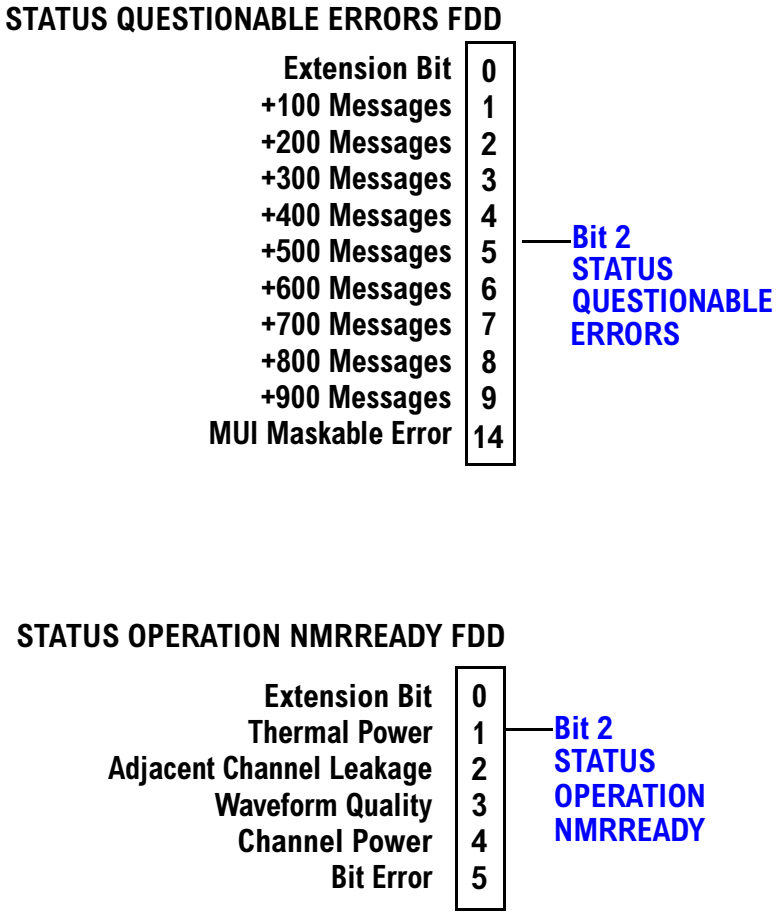
## Status Reporting Structure for the TA 2000 Registers



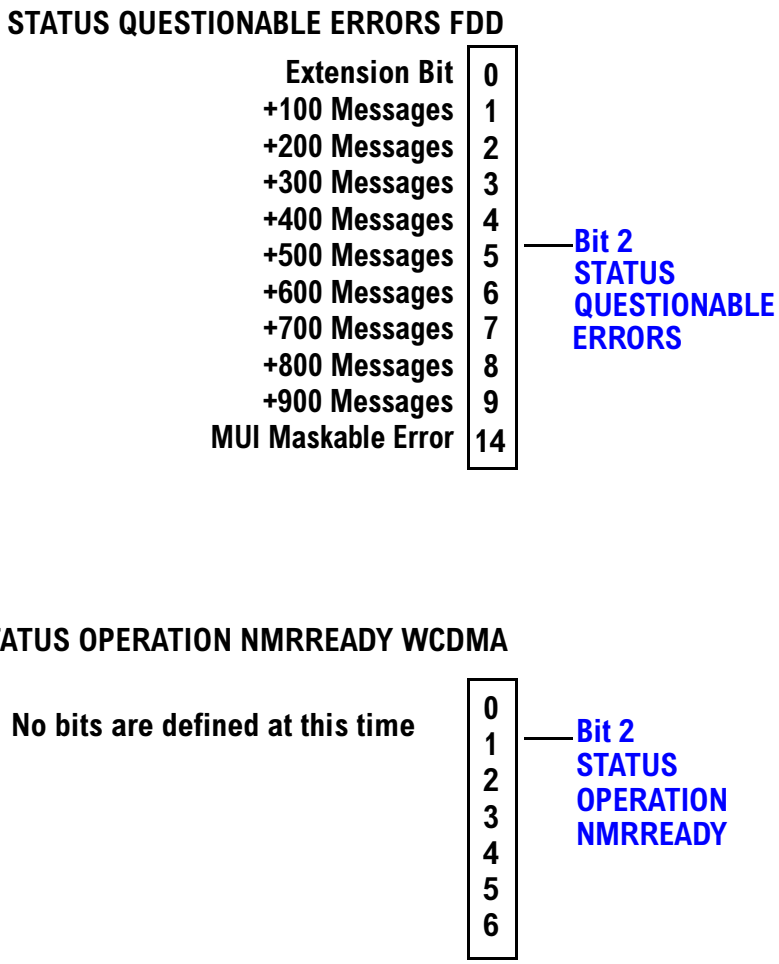
**STATUS OPERATION NMRREADY TA 2000**



## Status Reporting Structure for the FDD Registers



## Status Reporting Structure for the WCDMA Registers



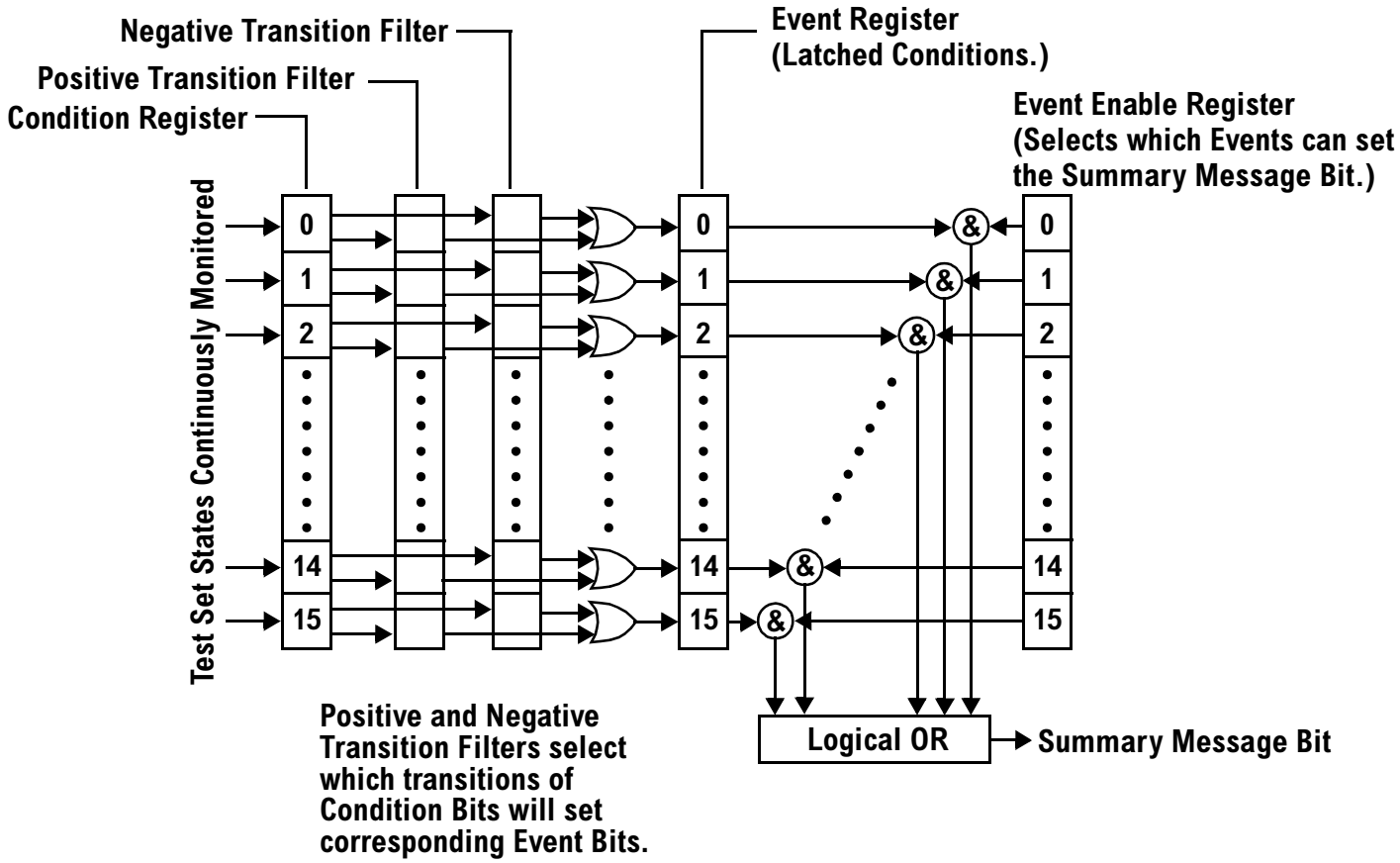




## Status Data Structure - Register Model

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

an Enable Register, and a Summary Message Bit.



### Condition Register

A condition is a test set state that is either TRUE or FALSE (a GPIB command error has occurred or a GPIB command error has not occurred). Each bit in a Condition Register is assigned to a particular test set state. A Condition Register continuously monitors the hardware and firmware states assigned to it. There is no latching or buffering of any bits in a Condition Register; it is updated in real time. Condition Registers are read-only. Condition Registers in the test set are 16 bits long and may contain unused bits. All unused bits return a zero value when read.

**Transition Filters** In the test set, the Transition Filters are implemented as two registers: a 16-bit positive transition (PTR) register and a 16-bit negative transition (NTR) register.

For each bit in the Condition Register, a Transition Filter bit determines the state transitions which will set a corresponding bit in the Event Register. Transition Filters may be set to pass positive transitions (PTR), negative transitions (NTR) or either (PTR or NTR). A positive transition refers to a condition bit which has changed from 0 to 1. A negative transition refers to a condition bit which has changed from 1 to 0.

A positive transition of a bit in the Condition register will be latched in the Event Register if the corresponding bit in the positive transition filter is set to 1. A positive transition of a bit in the Condition register will not be latched in the Event Register if the corresponding bit in the positive transition filter is set to 0.

A negative transition of a bit in the Condition register will be latched in the Event Register if the corresponding bit in the negative transition filter is set to 1. A negative transition of a bit in the Condition register will not be latched in the Event Register if the corresponding bit in the negative transition filter is set to 0. Either transition (PTR or NTR) of a bit in the Condition Register will be latched in the Event Register if the corresponding bit in both transition filters is set to 1. No transitions (PTR or NTR) of a bit in the Condition Register will be latched in the Event Register if the corresponding bit in both transition filters is set to 0.

Transition Filters are read-write.

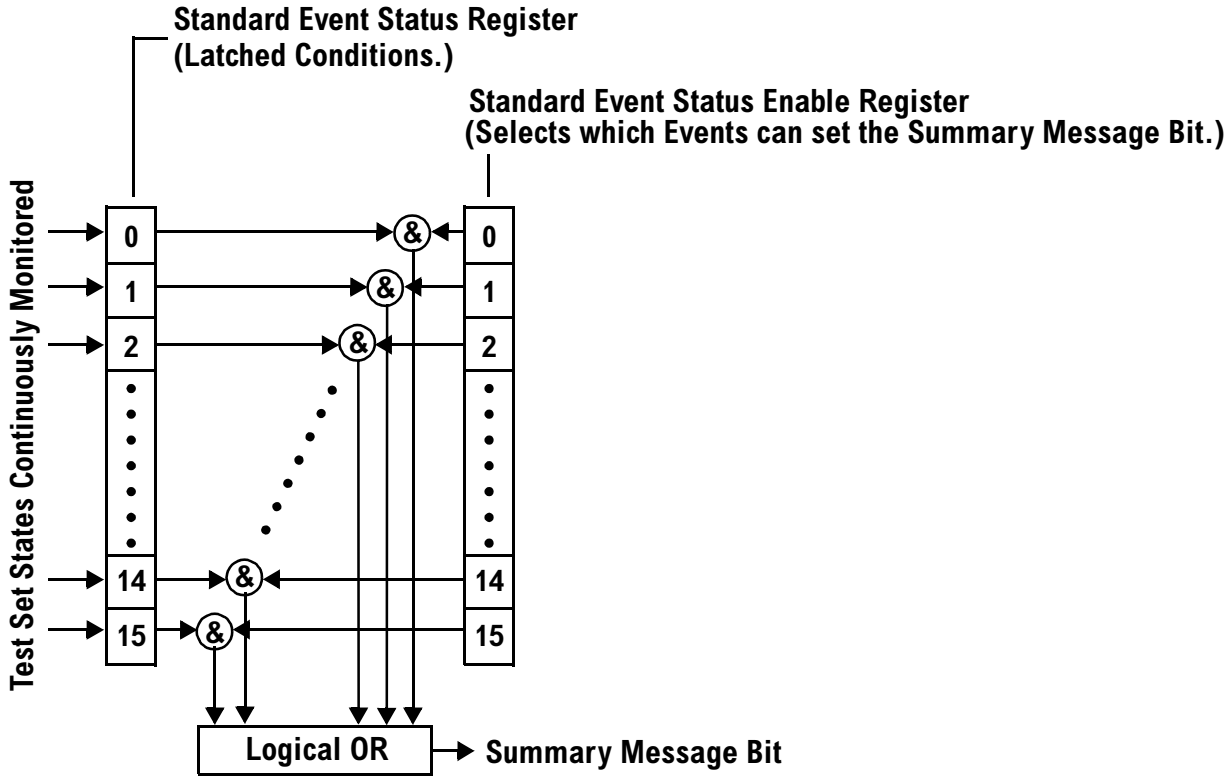
Transition Filters are unaffected by a *CLS (clear status) command.

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

**Event Register** The Event Register captures bit-state transitions in the Condition Register as defined by the Transition Filters. Each bit in the Event Register corresponds to a bit in the Condition Register. Bits in the Event Register are latched, and, once set, they remain set until cleared by a query of the Event Register or a *CLS (clear status) command. This guarantees that the application can't miss a bit-state transition in the Condition Register. There is no buffering; so while an event bit is set, subsequent transitions in the Condition Register corresponding to that bit are ignored. Event Registers are read-only. Event Registers in the test set are 16 bits long and may contain unused bits. All unused bits return a zero value when read.

**Event Enable Register** The Event Enable Register defines which bits in the Event Register will be used to generate the Summary Message. Each bit in the Enable Register has a corresponding bit in the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By using the enable bits the application program can direct the test set to set the Summary Message to the 1 or TRUE state for a single event or an inclusive OR of any group of events. Enable Registers are read-write. Enable Registers in the test set are 16 bits long and may contain unused bits which correspond to unused bits in the associated Event Register. All unused bits return a zero value when read and are ignored when written to. Enable Registers are unaffected by a *CLS (clear status) command or queries.

### Standard Event Status Register Model

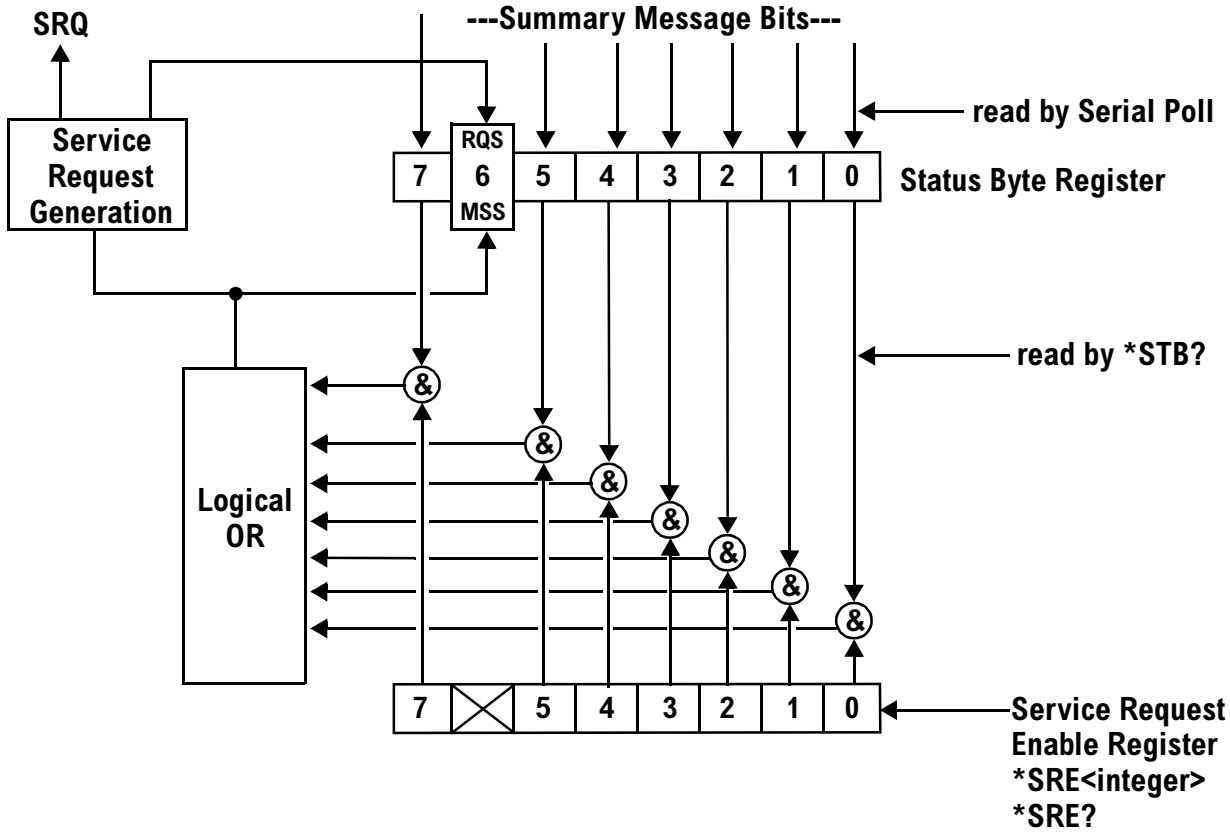



**Summary Message Bit** The Summary Message is a single-bit message which indicates whether or not one or more of the enabled events have occurred since the last reading or clearing of the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By use of the enable bits, the application program can direct the test set to set the Summary Message to the 1, or TRUE, state for a single event or an inclusive OR of any group of events.

The Summary Message is TRUE, logic 1, if the register contains some information and an enabled event in the Event Register is set TRUE.

The Summary Message is FALSE, logic 0, if the queue is empty and no enabled events are TRUE. Registers can be cleared by reading all the information from the queue. Registers can also be cleared using the *CLS (clear status) command.

### Service Request Enabling Register Model




**Status Bye 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 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 Description” on page 783

“Standard Event Status Register” on page 834

# 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 GSM and GPRS Test Applications

This table shows the concurrency considerations for the GSM Mobile Test Application. Refer to the “Table Key” on page 271 if you require an explanation of the codes used in the table.

**Table 1. GSM Concurrency Considerations**

| | Bite Error Rate | Dynamic Power | TCH assignment/handover | Transmit Power Level change | Mobile SACCH info | Audio Level Meas | Audio Source | Downlink Speech Source | Decoded Audio | Fast Bit Error Rate | I/Q Tuning | Output RF Spectrum | Phase & Frequency Error | Power vs. Time | Transmit Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Uplink Path Demodulation | | | | | | | | | | | | | | | |
| Transmit Power | | D | C | C | | | | | | | | B | | B | |
| Power vs. Time | | D | C | | | B | | | | | B | B | B | | |
| Phase & Frequency Error | | D | C | | | B | | | | | B | B | | | |
| Output RF Spectrum | | D | C | | | B | | | | | B | | | | |
| I/Q Tuning | | D | C | | | B | | | | | | | | | |
| Fast Bit Error Rate | A | D | C | C | | | | A | A | | | | | | |
| Decoded Audio | A | D | C | | | | | | | | | | | | |
| Downlink Speech Source | A | D | | | | | | | | | | | | | |
| Audio Source | | D | | | | | | | | | | | | | |
| Analog Audio Meas | | D | | | | | | | | | | | | | |
| Mobile SACCH info | | D | | | | | | | | | | | | | |
| Transmit Power Level change | C | C | | | | | | | | | | | | | |
| TCH assignment/handover | C | C | | | | | | | | | | | | | |
| Dynamic Power | D | | | | | | | | | | | | | | |

**Table 2. GPRS Concurrency Considerations**

| | PDTCH Reconfigure | Transmit Power Level Change | Bit Error Rate | Output RF Spectrum | Phase & Frequency Error | Power vs. Time | Transmit Power |
|---|---|---|---|---|---|---|---|
| Uplink Path Demodulation | | | | | | | |
| Transmit Power | C | | | B | | B | |
| Power vs. Time | C | | | B | B | | |
| Phase & Frequency Error | C | | | B | | | |
| Output RF Spectrum | C | | | | | | |
| Bit Error Rate | C | | | | | | |
| Transmit Power Level Change | C | | | | | | |

## Table Key

Empty cell: These measurements can operate concurrently with no conflicts.

A: Cannot operate concurrently. The measurement which is initiated most recently will cause all other conflicting measurements to be closed.

B: These measurements share a sampler path. If multiple measurements are initiated at the same time, they will execute sequentially. However, if multiple measurements are configured to operate off the same trigger event and only a single occurrence of that event happens, only the first initiated measurement will complete.

C: The traffic channel ARFCN or transmit power level can be changed while the measurement is in progress. However, this causes the measurement to re-start, obviously increasing test time.

D: When this measurement is initiated, all other measurements are closed.

**NOTE** This note is applicable to GSM only.

The downlink speech source cannot be used when the FBER or BER measurements are running. These measurements take absolute control of the downlink speech source and use it to generate the pseudo-random data.

## Related Topics

“Measurement Event Synchronization” on page 296

“Block Diagram” on page 1004

# 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, it's 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 3. List of Timeouts and Default Values**

| Measurement Function | Default Timeout Time | Default Timeout State | Integrity Indicator Value |
|---|---|---|---|
| Analog Audio Measurements* | 10 seconds | OFF | 2 |
| Bit Error Rate | 10 seconds | OFF | 2 |
| Decoded Audio *<br>also know as Uplink Speech Level | 10 seconds | OFF | 2 |
| Dynamic Power * | 10 seconds | OFF | 2 |
| Fast Bit Error Rate * | 10 seconds | OFF | 2 |
| I/Q Tuning * | 10 seconds | OFF | 2 |
| Output RF Spectrum | 10 seconds | OFF | 2 |
| Phase and Frequency Error | 10 seconds | OFF | 2 |
| Power versus Time | 10 seconds | OFF | 2 |
| Transmit Power | 10 seconds | OFF | 2 |

**NOTE** The measurements in the table marked with an * apply to GSM only.

## Programming Example

The following program causes a timeout to occur on an attempted transmit power measurement. The integrity indicator should return a 2 (the measurement timeout indicator).

```
10  !Existing conditions: A call is not connected.
20  OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME 5;STATE ON" !Sets a timeout value
30                                                     !of 5 seconds
40  OUTPUT 714;"INITIATE:TXPOWER" !Initiates a single TX power measurement.
50  OUTPUT 714;"FETCH:TXPOWER?" !Queries the TX Power measurement result.
60  ENTER 714;Integrity,Tx_pwr_result
70  PRINT "Integrity indicator was ";Integrity
80  IF Integrity=2 THEN   !Integrity Indicator 2 indicates TX power timed-out.
90  PRINT "Measurement timed out"
100 ELSE
110 PRINT "Measurement did not time out, TX power measurement result was ";Tx_pwr_result
120 END IF
130 END
```

In this example, if the transmit power measurement takes longer than 5 seconds to complete, the FETCh command retrieves an integrity value of 2. The test set's GPIB is then available to accept more commands.

## Related Topics

"Integrity Indicator" on page 283

"SETup Subsystem" on page 637

# 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.

### Programming Example

```
OUTPUT 714;"FETCH:PVTIME:ICOUNT?" !Returns the approximate number of
                                  !multi-measurement cycles completed during a
                                  !multi-measurement count cycle
```

### Related Topics

"Statistical Measurement Results" on page 282

# Triggering of Measurements

## GSM and GPRS Operating Considerations

When the operating mode is active cell mode, Auto triggering sets the trigger source to Protocol. When the operating mode is test mode, auto triggering sets the trigger source to RF Rise.

# Description


- "Trigger Source Description"
- "Triggering Process Description"
- "Trigger Arm (Single or Continuous) Description"
- "Trigger Delay Description"
- "Trigger Qualifier Description"


### Trigger Source Description

A measurement trigger causes hardware (for example, a sampler) to capture data which is used by a measurement algorithm to produce a measurement result. Not all of the trigger source choices are available in every measurement, or every test application.

**RF Rise Trigger Source:** When RF rise triggering is selected, a measurement dependent threshold is used to define the trigger point on the envelope of the signal being measured. The envelope amplitude must fall below this threshold and remain there for a measurement-dependent period of time before the trigger is armed. After the trigger is armed, a trigger will occur as the envelope amplitude increases and passes through the threshold.

**Protocol Trigger Source:** When protocol triggering is selected, a data capture is triggered by a protocol generated signal. The test set's protocol engine knows when the DUT's signal should be present and generates a trigger signal for use by the measurement to trigger the data capture.

**External Trigger Source:** When external triggering is selected, the user supplies an external trigger signal via the rear panel TRIG IN connector in order to trigger data capture. The trigger will occur on the rising edge of this signal.

**Immediate Trigger Source:** When immediate triggering selected, the trigger occurs as soon as any pre-trigger samples required by the measurement algorithm are taken. Data capture is triggered when the measurement is initiated.

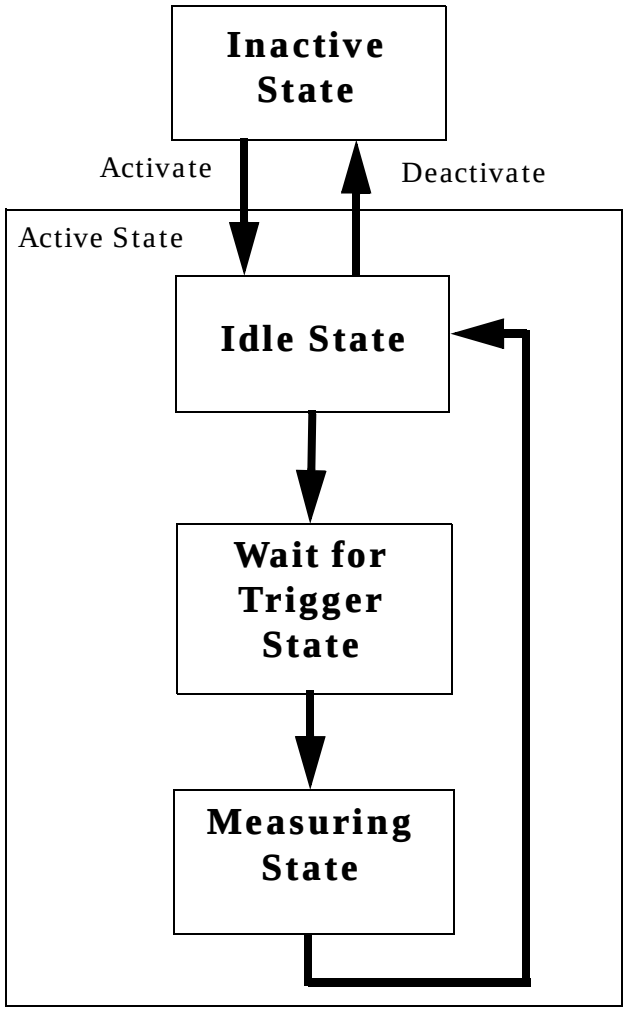
**Auto Trigger Source:** When auto triggering is selected, the test set automatically chooses the best trigger source for that measurement. This trigger source setting is convenient because the measurement trigger doesn't need to be changed when switching parameters. Auto trigger source is the best choice for most users.

## Triggering Process Description

The triggering process controls the present and future states of the test set during the measurement cycle. Triggers are set up using the SETup commands and can be set up when a measurement is in the inactive state. A measurement is activated (selected) with an INITiate command. If a measurement is initiated while in its measurement cycle, it will terminate that measurement and restart it. The active state is not a single state but a collection of any state other than the inactive state. Deactivating (de-selecting) the measurement is accomplished through an INITiate:<MEAS>:OFF command.

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

**Figure 1. The Test Set's Measurement States**



## Measurement States

The following examples describe states of the test set under various conditions. Refer to Figure 1. on page 277.

### Example 1. 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 2. Wait for Trigger State

If a measurement has been initiated with the INITiate command but has not been triggered, or a measurement has been selected from the Measurement Selection menu but has not been triggered, then the measurement state is wait for trigger.

### Example 3. Measuring and Idle States (Trigger Arm Single)

If the trigger arm is set to single, the trigger source is available, and the trigger qualifier (optional) is satisfied, the measurement state transitions to measuring and measurement results are now available to the user. The state then transitions to idle (awaiting another INITiate).

### Example 4. Measuring State (Trigger Arm Continuous)

If the trigger arm is set to continuous, the trigger source is available, and the trigger qualifier (optional) is satisfied, the measurement state transitions to measuring and measurement results are now available to the user. The measurement is continually triggered until the measurement is deactivated. Measurement results are only available after the measurement completes and before it rearms. The measurement is deactivated using the INITiate:<MEAS>:OFF. or `Close Measurement`.

### Trigger Arm (Single or Continuous) Description

Trigger arm determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).

**NOTE** When operating the test set remotely, the recommended setting for the trigger arm parameter is single. This ensures proper operation of the INIT:DONE? query which is used to control the retrieval of measurement results when measurements are initiated concurrently.

When a continuously armed measurement gets a result, it is available to any currently pending (waiting, hanging) FETCh? query. Then another measurement cycle is started immediately. At this point the results are no longer valid. The INIT:DONE? query is used to determine when there is a completed measurement with valid results that can be fetched. If you look for a continuously armed measurement with valid results that can be fetched using INIT:DONE? then you are unlikely to get anything but WAIT. Each time the Test Set is queried, it is 99% likely to be making another measurement. Even if it did return a measurement name, by the time the control program determines which FETCh? query to send, it is too late to fetch the results and the FETCh? query just hangs until the next measurement cycle is done, nullifying the efficiency provided by the INIT:DONE? query.

Pressing the `Start Single` key on the front panel will cause all currently active measurements with trigger arm set to single to arm and make the measurement.

Pressing `Shift, Start Single (Stop)` causes all measurements with trigger arm set to single to abort the

measurement.

It is unnecessary for you to arm a measurement if the trigger arm is set to continuous. When in continuous mode, the measurement is automatically rearmed after completing a measurement.

**Table 4. Trigger Arm Default Settings**

| Action | Trigger Arm Default Setting |
|---|---|
| Power up of test set | Continuous |
| Manual Full Preset | Continuous |
| *RST (Remote) Full Preset | Single |
| Partial Preset | No change |

### Trigger Delay Description

Trigger delay controls the delay time between the trigger and the start of sampling. Resolution is 1 nanosecond per measurement and the units are in seconds. A negative value indicates the sampling should occur prior to the trigger. The default is zero seconds which is preferred for most measurements.

### Trigger Qualifier Description

When the trigger qualifier is on, the test set samples the input signal when a trigger is received. It then determines if the input signal was valid by looking at its power level. If the power level during sampling did not meet the requirements of a valid signal, the state returns to wait for trigger without processing the samples. Trigger qualifier is available for GSM/GPRS TX Power and Phase Frequency Error measurements only.

If a valid signal is present, then it is qualified, and the samples are processed.

## Related Topics

“Integrity Indicator” on page 283

“SETup:ORFSpectrum:TRIGger:SOURce[:SELected]” on page 720

“SETup:PFERror:TRIGer:SOURce[:SELected]” on page 743

“SETup:PVTime:TRIGger:SOURce[:SELected]” on page 765

“SETup:IQTuning:TRIGger:SOURce[:SELected]” on page 695

“SETup:TXPower:TRIGger:SOURce[:SELected]” on page 780

# Burst Synchronization of Measurements

## Measurement Synchronization

### Measurement Synchronization Description

Measurement synchronization determines how a measurement's time reference is determined from the measurement data (a sampled time record). Measurement synchronization occurs after the measurement data is captured.

For the transmit power and ORFS (switching and modulation) measurements, the RF amplitude of the input signal is used for measurement synchronization. For Phase and Frequency Error Measurement and the Power versus Time Measurement (see "Phase and Frequency Error Measurement Description" on page 63 and "Power versus Time Measurement Description" on page 67.) there are three possible settings for measurement synchronization:

- Midamble
- RF Amplitude
- None

Selecting midamble causes the test set to use the input signal's midamble data to determine the measurement's time reference. A measurement is capable of midamble synchronization if the test set is able to determine transmitted data from measurement samples (i.e. perform demodulation). Midamble synchronization is not available for Transmit Power measurements. However, the Power vs. Time measurement can perform an average power measurement using midamble synchronization.

**NOTE** When the test set's operating mode is "test mode" or when the cell activated state is "off", the burst type may need to be specified before the test set can synchronize to the input signal's midamble. See "Expected Burst" on page 102.

Selecting RF amplitude causes the test set to use the input signal's rising and falling edges (if edges are detected within the sampled time record) to determine the measurement's time reference. If a non-bursted signal was sampled, the measurement's time reference will be developed using the beginning and end of the sampled time record, and the samples used for making the measurement will be taken from the middle of the time record.

Selecting None causes the test set to perform measurements exactly as if RF amplitude was chosen.

An integrity indicator is returned for each completed measurement. Integrity errors are prioritized so that when multiple errors occur, the highest priority error is returned first, as the root error. The integrity indicator returns a number from 0 to 16, where 0 indicates normal. The following integrity indicators reveal problems with measurement synchronization:

- (7) Burst Short
- (8) Trigger Early
- (8) Fall Early
- (9) Trigger Late
- (9) Rise Late
- (11) Sync Not Found

Refer to "Integrity Indicator" on page 283 for descriptions of integrity indicators.

Programming Example:

```
OUTPUT 714;"SETUP:PVTIME:SYNC MIDAMBLE"!selects midamble synchronization for PVT measurements
```

## Related Topics

"Integrity Indicator" on page 283

"INITiate" on page 603

"SETup Subsystem" on page 637

# 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:TXPower:COUNt:SNUMber 10" !Enters a TX Power multi-measurement count
                                            !value of 10, and turns the TX Power
                                            !multi-measurement state on.
```

## Related Topics

"Measurement Progress Report" on page 275

# 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 5.**

| 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 5. (Continued)**

| Integrity Indicator Number | Integrity Indicator Message |
|---|---|
| 6 | Under Range: Indicates that the input signal is under range. The amplitude of the DUT's signal is not high enough for the DSP sampler to produce accurate results with the measurement algorithm. |
| 7 | Burst Short: Indicates that the burst duration is too short, or part of the burst was not sampled due to improper triggering. |
| 8 | Trigger Early or Fall Early: Indicates that the DUT's burst amplitude fell prematurely or, due to an early trigger (early relative to a transmitted burst) the measurement sampling operation terminated before the falling edge of the burst. |
| 9 | Trigger Late or Rise Late: Indicates that either the rising edge of the DUT's burst was late or, due to a late trigger (late relative to a transmitted burst) the measurement sampling operation didn't start until after the rising edge of the transmitted burst. |
| 10 | Signal Too Noisy: Indicates that the measurement algorithm has found the signal measured to be too noisy to provide accurate results. |
| 11 | Sync Not Found: Indicates that the midamble was not found therefore the measurement was not synchronized. |
| 12 | Oven Out of Range: Indicates that a temperature controlled oven (other than the internal timebase oven) is outside of its operating range. The power meter's oven is checked and its condition reported with this value. (The internal timebase generates a temporary error message (out of lock) that is sent to the system error queue and the display. This is not an integrity indicator value, it is an error message.) |
| 13 | Unidentified Error: Indicates errors which are not covered by the other integrity values. Examples include: parameter errors, algorithm memory errors (too many measurements), measurements unavailable (unable to control), autorange unable to converge, default calibration data used. |
| 14 | PCM Full Scale Warning: Indicates that the PCM signal has reached plus or minus full scale. The measurement made will be accurate on the PCM signal but would typically indicate an overdriven or oscillating element in the DUT. |
| 15 | Questionable Result for PGSM: Indicates that the user attempted to make an FBER measurement in a phase 1 system. FBER is only possible in a phase 2 GSM system. This indicator is available only when the selected broadcast band is PGSM. |
| 16 | Questionable Result Due To Channel Mode: Indicates that the channel mode was set to Enhanced Full Rate Speech while a Decoded Audio measurement was active. Decoded Audio is not supported for EFR Speech. |

**Table 5. (Continued)**

| Integrity Indicator Number | Integrity Indicator Message |
|---|---|
| 17 | Can not Correlate: Indicates that the test sets internally generated reference signal does not correlate with the received signal.<br>Some conditions that could cause this integrity indicator result include the following:<br>• an input signal that is corrupted<br>• the input signal is extremely distorted<br>• the input signal is off by more than 10 ms.<br>• the frequency of the input signal deviates more than allowed<br>• something is wrong with the long-code mask coming from the mobile ID |
| 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 ±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. |

## Programming Example

```
10  OUTPUT 714;”INITIATE:TXPOWER” !Start TXP measurement
20  OUTPUT 714;”FETCH:TXPOWER?” !Request measurement results.
30  ENTER 714;Integrity,Tx_power !Read measurement results.
40  IF Integrity = 0 THEN !Permits measurement to be printed if integrity
50                        !indicator indicates a successful measurement
60  PRINT “TX Power =”;Tx_power!if 0 then measurement was successful
70  ELSE
80  PRINT “Measurement integrity questionable, integrity value = “;Integrity
90                                      !If integrity not zero then print
100                                     !integrity value.
110 END IF
120 END
```

## Related Topics

“Classes of Errors” on page 971

# Invalid Measurement Results

## Description

Invalid measurement results are returned by the test set when conditions such as signal level are not within the present measurement range. Three different invalid measurement results are provided in order to help you understand the condition that caused the invalid result.

- 9.9E+37 = INFinity (Infinity)
- -9.9E+37 = NINF (Negative Infinity)
- 9.91E+37 = NAN (Not A Number)

### 9.9E+37 (INFinity)

9.9E+37 is returned by the test set when the measurement is out of range and results are far above the present measurement range.

### -9.9E+37 (NINFinity)

-9.91E+37 is returned by the test set when the measurement is out of range and results are far below the present measurement range.

### 9.91E+37 (NAN)

9.91E+37 is returned by the test set when the measurement is out of range but it can not be determined if measurement results are far above, or far below the measurement range.

If a measurement exceeds its measurement timeout value before a valid result is determined, 9.91E+37 is returned.

### FETCH? and READ? Invalid Results

When a FETCH? or READ? query is performed on a measurement with invalid results, the integrity indicator returns a value of 1, indicating No Result Available.

### Manual Users Invalid Results

Manual users will generally see four dashes , “----” on the test set display. When the measurement timeout value has been exceeded, “Measurement Timeout” is displayed as well as the four dashes.

# Setting Frame Trigger Parameters

## Frame Trigger Parameters

The frame trigger is a positive-going TTL compatible pulse that is one GSM bit wide, it is aligned to the downlink TDMA frame timing. The test set provides a frame trigger for synchronizing other test equipment to a measurement it is available at the rear-panel TRIG OUT connector.

The frame trigger has 3 parameters that the user must set. See "SYSTem:FTRigger" on page 859.

- "External Trigger State (on or off)" on page 288
- "External Trigger Timeslot (0 to 7)" on page 288
- "External Trigger Bit (0 to 1250)" on page 288

## Programming Examples

### External Trigger State (on or off)

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

would set the external frame trigger ON.

### External Trigger Timeslot (0 to 7)

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

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

### External Trigger Bit (0 to 1250)

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

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

## Operating Considerations

Each frame is made up of 8 time slots. Time slots are defined in "ETSI GSM 05.10 Ver. 4.9.0 Section 5. Time slots 0 and 4 are 157 bit periods long, time slots 1, 2, 3, 5, 6, 7 are 156 bit periods long, the average time slot is 156.25 bits in duration. The external trigger timeslot can be set to any time slot 0 through 7, the external trigger bit position can be set from 0 through 1250. If the trigger bit position is set to 1250, that is one full frame beyond the setting of the external trigger timeslot, (156.25 * 8 = 1250).

When the cell activated state is OFF, the frame trigger output is disabled (set to 0 volts) since there is no reference downlink TDMA frame structure available. However, the frame trigger state command ("SYSTem:FTRigger:STATe[:SELected]" on page 861) is not affected when there are changes to cell activated state.

The frame trigger state command is not coupled to the setting of the cell activated state therefore

The frame trigger can be set manually from the system configuration screen by pressing the External Trigger Setup soft key.

## Related Topics

"SYSTem:FTRigger" on page 859

# 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:

```
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
```

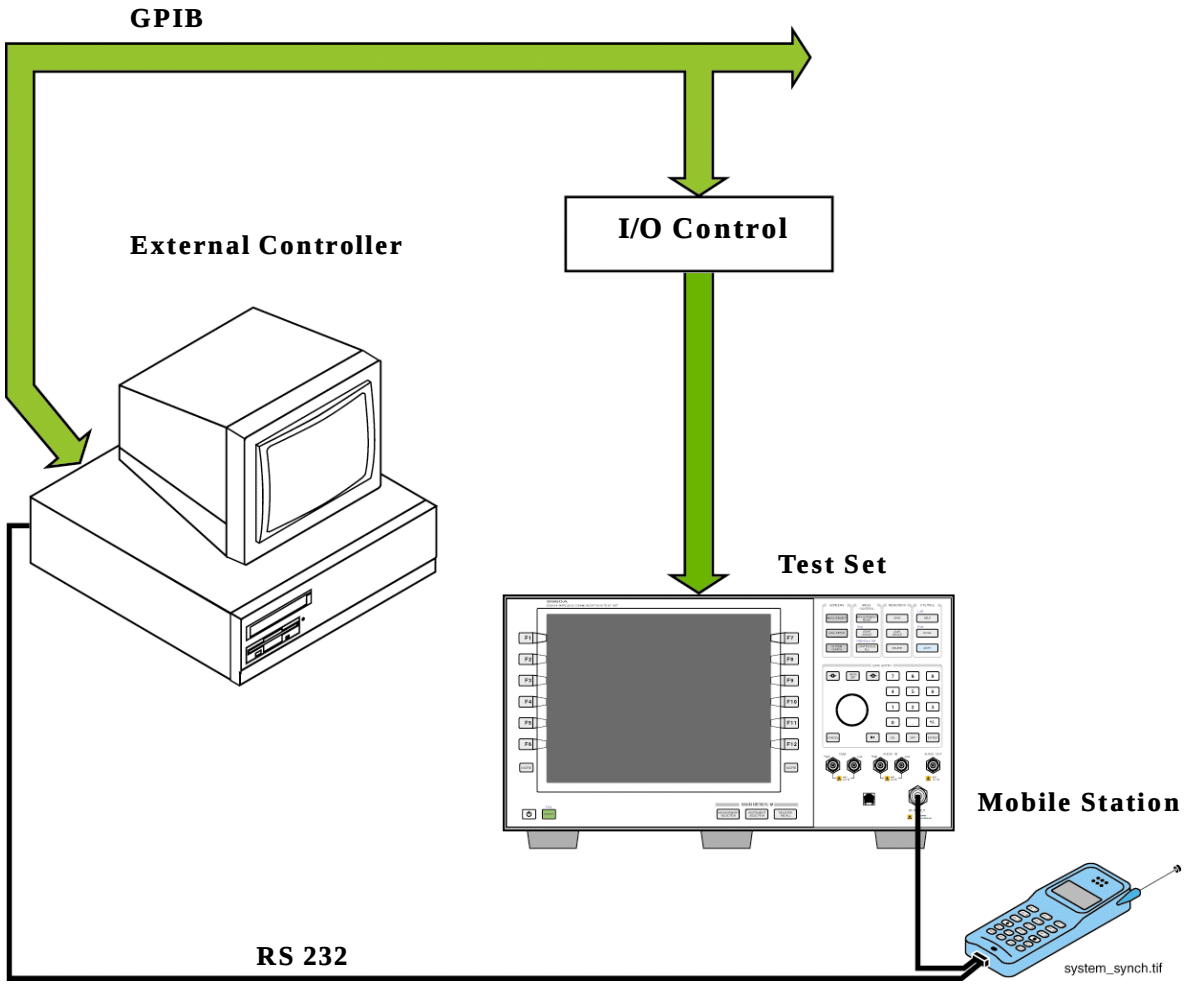
# Test System Synchronization Overview

## 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 2. Test System**



## Sequential versus overlapped commands

The test set uses both sequential and overlapped commands:

- Sequential commands must finish executing before the next command starts to execute.
- Overlapped commands do not finish executing before the next command starts to execute.

Overlapped commands are more difficult to synchronize because an overlapped operation that started several commands earlier may still be executing as subsequent commands are being parsed out from the input buffer and executed. This can present a problem unless the external controller is properly synchronized to the test set's execution of commands. Overlapped commands allow the test set to use its internal resources as efficiently as possible.

### Methods for synchronization

The test set's GPIB command set supports the following methods to achieve synchronization for overlapped commands. In some cases, combinations of these methods will provide the best results:

Methods one and two do not require the external controller to query the test set, nor to perform any branching or decision-making associated with information acquired from the test set.

Methods three through six rely on responses from the test set to an external controller, indicating that some event has occurred. The external controller can then make decisions based on these responses to control the flow of commands to the test set and other devices in the test system.

1. Force the test set to execute overlapped commands sequentially.
2. Force the test set to wait until an overlapped command is done executing before executing any more commands.
3. Query the test set to determine when a command has finished executing.
4. Query the test set to determine when all commands sent to it have at least begun executing.
5. Query the test set to determine the current call or data connection processing state.
6. Program the test set to generate a service request when an operation has completed or the test set is in a certain state.

## Commands used for synchronization:

- "CALL:STATus[:STATe][:VOICe]?" on page 504

  This command queries the test set's current call processing state. This command supports synchronization method five. (See "Call Processing State Query" on page 305).

- "CALL:CONNected[:STATe]?" on page 383

  This command determines the connected/idle state of a call. A feature called the change detector provides the user with a way to hold off the response to this query until a call processing state transition has taken place. (See "Connected/Idle Query" on page 306). This command supports synchronization method five.

- :DONE? and :OPC?
  These specialized commands can be appended to call processing overlapped commands to support synchronization method three. (See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301.)

- :WAIT
  This specialized command can be appended to call processing overlapped commands to support synchronization method two.
  (See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 301.)

- :SEQ
  This specialized command can be appended to call processing overlapped commands to support synchronization method one.
  (See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 301.)

- “INITiate:DONE?” on page 605
  This specialized command causes the test set to return a mnemonic indicating if a measurement is done. If not, the returned mnemonic will indicate if the measurement is still executing. This command supports synchronization method three.
  (See “INITiate:DONE?” on page 296.)

- STATUS:<register>
  Status bits in the “STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 796 register are provided to indicate the test set’s call processing state. These bits support synchronization methods five and six.

  Status bits in the “STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 806 register are provided to indicate when a measurement is ready to be fetched. These bits support synchronization method three and six.
  Many other status bits are provided in the GPIB status subsystem that are useful for synchronization. See“STATus Subsystem Description” on page 783.
- “SYSTem:SYNChronized” on page 868
  This specialized command causes a condition bit to be set then cleared when all prior sequential commands have completed and all prior overlapped commands have started indicating that the input buffer is synchronized. (See “STATus:OPERation Condition Register Bit Assignment” on page 790). This command supports synchronization method four and six.
- “*OPC” on page 873, “*OPC?” on page 873, and “*WAI” on page 874 (not recommended)

  Note: These commands look at all of the test set’s operations collectively. Because multiple processes are likely to be executing at the same time, it is recommended that the other commands above be used instead.

## Related Topics

“Call Processing State Synchronization” on page 305

“Measurement Event Synchronization” on page 296

“Call Processing Event Synchronization” on page 300

“SYSTem:SYNChronized” on page 868

# 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 605 for more details about this query.

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

- "TXP" - The transmit power measurement results are available.
- "PVT" - The power versus time measurement results are available.
- "PFER" - The phase and frequency error measurement results are available.
- "FBER" - The fast bit error measurement results are available.
- "BERR" - The bit error measurement results are available.
- "AAUD" - The analog audio measurement results are available.*
- "DAUD" - The decoded audio measurement results are available.*
- "ORFS" - The output RF spectrum measurement results are available.
- "DPOW" - The dynamic power measurement results are available.
- "IQT" - The I/Q Tuning 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 606. 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 606. This indicates that all measurements results are available or none have been initiated.

**NOTE** The indicators marked with a * are not returned for GPRS as those measurements are not available in that test application.

## Programming Example

The following example assumes that a call is currently connected and that no measurements other than TX power (TXP) and phase and frequency error (PFER) are currently being triggered. See "Establishing an Active GSM Link with the Mobile Station" on page 121 and "Triggering Process Description" on page 277.

```
10  OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Sets TX power trigger mode
20                                            !to single.
30  OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Sets PFER trigger mode
40                                            !to single.
50  OUTPUT 714;"INITiate:TXPower;PFERror" !Begins a TX power and
60                                        !PFER measurement.
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 "TXP" !Characters must be upper case.
150 OUTPUT 714;"FETCH:TXPOWER:POWER?" !If this case is selected, Tx power
160                                   !(no integrity indicator) is FETCHed.
170 ENTER 714;Tx_power
180 PRINT "TX_Power is ";Tx_power
190 CASE "PFER" !Characters must be uppercase.
200 OUTPUT 714;"FETCH:PFERROR:RMS?" !If this case is selected, rms phase error
210                                 !measurement is FETCHed.
220 ENTER 714;Phs_error
230 PRINT "Max RMS Phase Error is ";Phs_error
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:GSM

The STATus:OPERation:NMRReady:GSM 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:GSM Condition Register Bit Assignment" on page 806 for more details about this command.

You must enable the following so that as soon as the enabled NMRReady bit is true the program moves on.

- Positive or negative transition filter. See"Transition Filters" on page 265.
- STATus:OPERation:NMRReady:GSM bit for the measurement desired.
- STATus:OPERation:NMRReady bit (4 for GSM) for the required system. See "STATus Subsystem Description" on page 783 or "Status Subsystem Overview" on page 247.
- STATus:OPERation bit (512 for NMRReady).
- Service Request Enabling (*SRE 128 for NMRReady).

The "STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment" on page 806 status register provides status reporting on the following measurement completions:

- TX Power
- Power vs. Time
- Phase/Frequency Error
- Output RF Spectrum
- Analog Audio
- Decoded Audio
- Fast Bit Error Rate
- Bit Error Rate
- I/Q Tuning
- Dynamic Power
- GPRS Bit Error Rate

### Example 5. 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 completes. This example 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:GSM:PTR 256" !Enable positive transition
20                                                    !filter on fast BER bit.
30  OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:ENABLE 256" !Enable the fast BER Bit to
40                                                      !generate a summary message.
45  OUTPUT 714;"STATUS:OPERATION:NMRREADY:ENABLE 4" !Enable the GSM summary bit.
50  OUTPUT 714;"STATUS:OPERATION:ENABLE 512" !Enable the Operation summary bit to
60                                           !generate a summary message.
70  OUTPUT 714;"*SRE 128" !Enable the service request enable register to generate SRQ.
80  OUTPUT 714;"*CLS" !Clear all status data structures.
90  ON INTR 7,15 CALL Meas_complete !Define interrupt-initiated branch with a priority
100                                 !of 15 (highest)
110 ENABLE INTR 7;2 !Enable interrupt on interface card 7 with a bit mask
120                 !(for interface's interrupt-enable register) of 2.
130 OUTPUT 714;"SETUP:FBER:CONTINUOUS OFF;:INITIATE:FBERROR" !Initiate a single
140                                                         !fast BER test.
150 LOOP
160 DISP "Waiting for BERR test to complete"
170 WAIT .1 !"Dummy" loop
180 END LOOP
190 !Instead of a "dummy" loop, controlling application could be performing setups,
200 !making measurements, etc.
210 END
220 SUB Meas_complete
230 DISP "BER test complete, OK to FETCh results now"
240 Clear_interrupt=SPOLL(714) !Clear the RQS message in the status byte register.
250 STOP
260 SUBEND
```

## Operating Considerations

Only one indicator is returned per query.

All active measurements must be set to single trigger mode. This ensures that when a measurement completes it remains in the "DONE" state rather than restarting. Sending the "*RST" command at the beginning of the test code or using the "SETup:CONTinous:OFF" command during measurement setups are ways to set the trigger to single for all measurements.

## Related Topics

"INITiate Command Functions" on page 601

"What Happens When a Measurement is INITiated?" on page 601

"Concurrent Measurements" on page 269

# 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 Subsystem Overlapped Command Synchronization Commands

### Table 6. 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. | `10 OUTPUT 714;"CALL:TCH 65"`<br>`20 OUTPUT 714;"SETUP:TXP:CONT OFF"`<br>`30 OUTPUT 714;"SETUP:PFER:CONT OFF"`<br>`40 REPEAT`<br>`50 OUTPUT 714;"CALL:TCH:DONE?"`<br>`60 ENTER 714;Process_done`<br>`70 UNTIL Process_done`<br>`80 OUTPUT 714;INIT:TXP;PFER"`<br>`90 END`<br>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 |
| :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. | `OUTPUT 714;"CALL:TCH:SEQ 65"`<br>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. |
| :WAIT | Forces the test set to wait until the associated command's pending operation flag is false before executing any more commands. | `10 OUTPUT 714;"CALL:TCH 65"`<br>`20 OUTPUT 714;"SETUP:TXP:CONT OFF"`<br>`30 OUTPUT 714;"SETUP:PFER:CONT OFF"`<br>`40 OUTPUT 714;"CALL:TCH:WAIT"`<br>`50 OUTPUT 714;"INIT:TXP;PFER"`<br>`60 END`<br>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. |

**Table 6. Overlapped Commands (Continued)**

| 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. | `10 OUTPUT 714;"CALL:TCH 65"`<br>`20 OUTPUT 714;"SETUP:TXP:CONT OFF"`<br>`30 OUTPUT 714;"SETUP:PFER:CONT OFF"`<br>`40 OUTPUT 714;"CALL:TCH:OPC?"`<br>`50 ENTER 714;Op_complete`<br>`60 OUTPUT 714;"INIT:TXP;PFER"`<br>`70 END`<br>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. |

## Operating Considerations

When using the call processing subsystem overlapped command synchronization commands, check the conditions that set the operation's pending operation flag (POF) false to avoid unexpected results.

## Call Processing Subsystem Overlapped Commands

| Call Processing Command | Purpose Of Command | Pending Operation Flag (POF) is false when |
|---|---|---|
| CALL:ORIGinate<br>See "CALL:ORIGinate" on page 443. | Performs a base station call origination. | The call processing state leaves the Idle state (when the operating mode is active cell), or<br>The test set has noted this parameter change (when the operating mode is test mode). |
| CALL:END<br>See "CALL:END" on page 402. | Performs a base station call termination. | The call processing state reaches the Idle state (when the operating mode is active cell), or<br>The test set has noted this parameter change (when the operating mode is test mode). |
| CALL[:CELL[1]]:BCHannel[:ARFCn][:SELected]<br>See " CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]" on page 370. | Sets the BCH ARFCN for currently selected broadcast band. | The downlink signal is transmitting on the new broadcast channel. |
| CALL[:CELL[1]]:BCHannel[:ARFCn]:<broadcast band><br>See "CALL:BCHannel" on page 369. | Sets the BCH ARFCN for a broadcast band not currently selected. | The test set has noted this parameter change. |

| Call Processing Command | Purpose Of Command | Pending Operation Flag (POF) is false when |
|---|---|---|
| CALL:TCHannel[:ARFCn][:SELected]<br>See "CALL:TCHannel[:ARFCn][:SELected]" on page 510. | Sets the TCH ARFCN for currently selected traffic band. | At least one of the following conditions has been met for all occurrences of these call processing commands that have begun execution:<br>The channel assignment has been successfully completed (when a call is established), or<br>The test set has noted this parameter change (no call established), or<br>The test set has noted this parameter change (not currently selected band), or<br>An error message was generated. |
| CALL:TCHannel[:ARFCn]:<traffic band><br>See "CALL:TCHannel" on page 508. | Sets the TCH ARFCN for a traffic band not currently selected. | |
| CALL:TCHannel:TSLot<br>See "CALL:TCHannel:TSLot" on page 515. | Sets the TCH timeslot. | |
| CALL:MS:TADVance<br>See "CALL:MS:TADVance" on page 433. | Sets the mobile station timing advance. | |
| CALL:MS:TXLevel[:SELected]<br>See "CALL:MS:TXLevel[:SELected]" on page 434. | Sets the mobile station transmit level for currently selected band. | |
| CALL:MS:TXLevel:<traffic band>. | Sets the mobile station transmit level for a traffic band not currently selected. | |
| CALL:CONNected:ARM[:IMMediate]<br>See "CALL:CONNected:ARM[:IMMediate]" on page 384. | Arms the call control status change detector. | The call control status change detector has been disarmed.<br>See "Connected/Idle Query" on page 306. |

## Related Topics

"Call Processing State Synchronization" on page 305

"Measurement Event Synchronization" on page 296

"Test System Synchronization Overview" on page 292

# Call Processing State Synchronization

## Call Processing State Query

The CALL:STATus[:STATe]? query returns a string indicating the current call processing state.

There are six possible call processing states for GSM.

The query returns one of the following strings:

- “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 mobile station.

- “SREQ”

  Set Up Request is returned when the test set is in the process of assigning a channel to a mobile station as part of a Page or a mobile station originated call setup.

- “PROC”

  Proceeding is returned when the test set is in the process of connecting a call from a mobile station.

- “ALER”

  Alerting is returned when the mobile station is about to receive an Alert message as part of a call setup due to a page.

- “CONN”

  Connected is returned when the test set and the mobile station are connected on a call.

- “DISC”

  Disconnected is returned when the test set is in the process of ending a call.

The following command returns the current state of a data connection:

```
OUTPUT 714;”CALL:STATus:STATe:DATA?”
```

# 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 6. 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 7. 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:GSM 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:GSM to generate interrupts to the external controller. Refer to "STATus:OPERation:CALL:GSM Condition Register Bit Assignment" on page 796 for status bit definitions and GPIB command syntax. See "Call State STATus:OPERation:CALL:GSM Program Example" on page 308.

## Call State STATus:OPERation:CALL:GSM Program Example

### Example 8. 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.

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

## Related Topics

"Call Processing Event Synchronization" on page 300

"CALL:STATus[:STATe][:VOICe]?" on page 504

"CALL:CONNected:ARM[:IMMediate]" on page 384

"CALL:CONNected:TIMeout" on page 385

"Instrument Status Area" on page 955

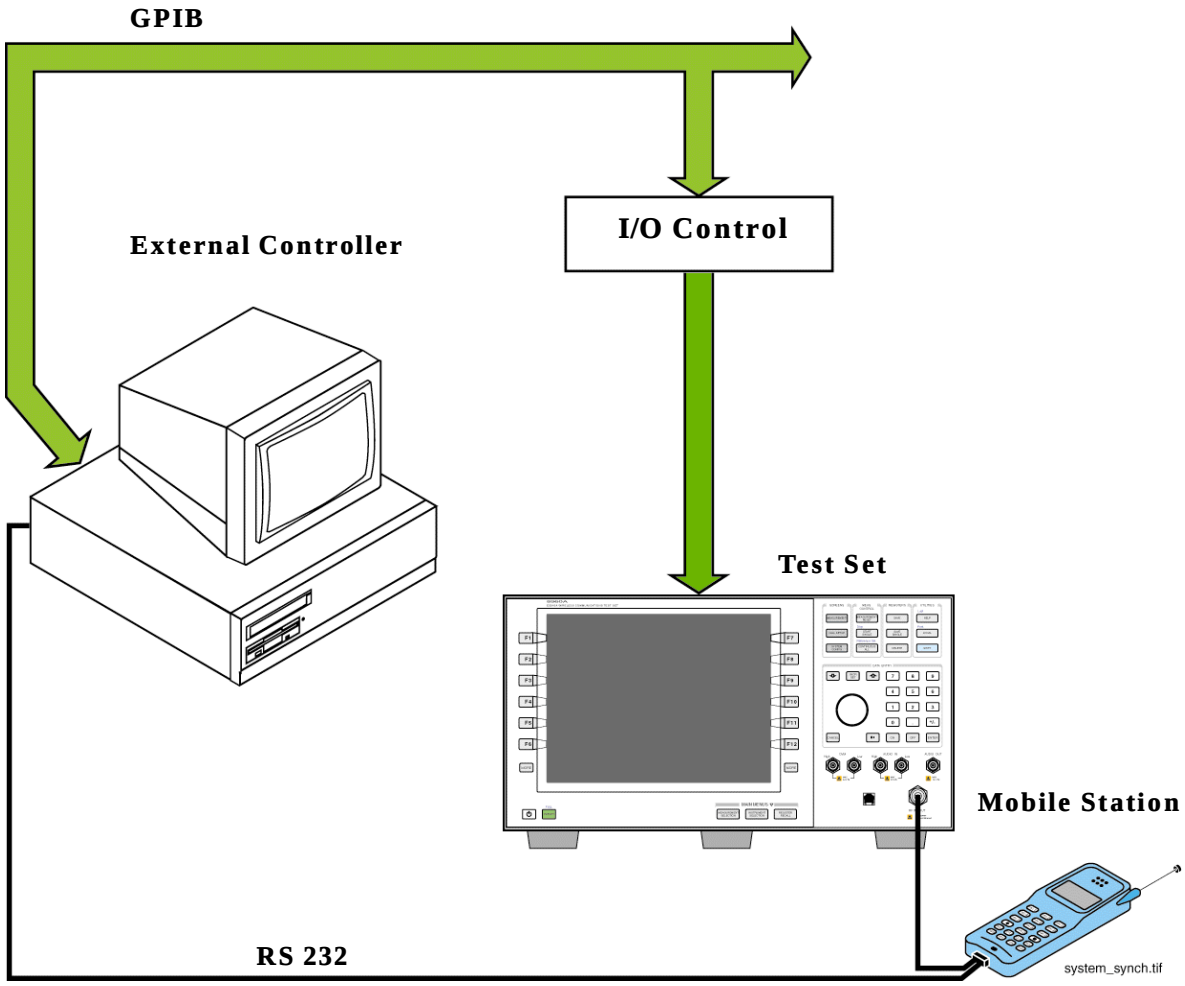
# Test System Synchronization Overview

## 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 3. Test System**



## Sequential versus overlapped commands

The test set uses both sequential and overlapped commands:

- Sequential commands must finish executing before the next command starts to execute.
- Overlapped commands do not finish executing before the next command starts to execute.

Overlapped commands are more difficult to synchronize because an overlapped operation that started several commands earlier may still be executing as subsequent commands are being parsed out from the input buffer and executed. This can present a problem unless the external controller is properly synchronized to the test set's execution of commands. Overlapped commands allow the test set to use its internal resources as efficiently as possible.

### Methods for synchronization

The test set's GPIB command set supports the following methods to achieve synchronization for overlapped commands. In some cases, combinations of these methods will provide the best results:

Methods one and two do not require the external controller to query the test set, nor to perform any branching or decision-making associated with information acquired from the test set.

Methods three through six rely on responses from the test set to an external controller, indicating that some event has occurred. The external controller can then make decisions based on these responses to control the flow of commands to the test set and other devices in the test system.

1. Force the test set to execute overlapped commands sequentially.
2. Force the test set to wait until an overlapped command is done executing before executing any more commands.
3. Query the test set to determine when a command has finished executing.
4. Query the test set to determine when all commands sent to it have at least begun executing.
5. Query the test set to determine the current call or data connection processing state.
6. Program the test set to generate a service request when an operation has completed or the test set is in a certain state.

## Commands used for synchronization:

- "CALL:STATus[:STATe]:DATA?" on page 504
  This command queries the test set's current GPRS data connection processing state. This command supports synchronization method five. See "Data Connection Processing State Query" on page 317.
- "CALL:ATTached[:STATe]?" on page 339
  This command determines if the current data connection is in the attached state. This command supports synchronization method 5.
- "CALL:TRANsferring[:STATe]?" on page 516
  This command determines if the current data connection is in the transferring state. This command supports synchronization method 5.
- :DONE? and :OPC?
  These specialized commands can be appended to GPRS data connection processing overlapped commands to support synchronization method three. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 315.

- :WAIT
  This specialized command can be appended to GPRS data connection processing overlapped commands to support synchronization method two.

See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 315.

- :SEQ
  This specialized command can be appended to GPRS data connection processing overlapped commands to support synchronization method one.
  See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 315.
- “INITiate:DONE?” on page 605
  This specialized command causes the test set to return a mnemonic indicating if a measurement is done. If not, the returned mnemonic will indicate if the measurement is still executing. This command supports synchronization method three.
  See “INITiate:DONE?” on page 296.
- “SYSTem:SYNChronized” on page 868
  This specialized command causes a condition bit to be set then cleared when all prior sequential commands have completed and all prior overlapped commands have started indicating that the input buffer is synchronized. (See “STATus:OPERation Condition Register Bit Assignment” on page 790). This command supports synchronization method four and six.
- “*OPC” on page 873, “*OPC?” on page 873, and “*WAI” on page 874 (not recommended)

  Note: These commands look at all of the test set's operations collectively. Because multiple processes are likely to be executing at the same time, it is recommended that you use the other commands above instead.

## Related Topics

“Data Connection Processing State Synchronization” on page 317

“Measurement Event Synchronization” on page 296

“Data Connection Processing Event Synchronization” on page 314

“SYSTem:SYNChronized” on page 868

# Data Connection Processing Event Synchronization

## Description

Using the call processing subsystem overlapped command synchronization commands, you can query the test set to find out when an overlapped command operation is done (:DONE?, :OPC?), force the test set to not execute any more commands until an overlapped command operation has completed (:WAIT), or simply force an overlapped command to behave as a sequential command (:SEQ).

## Pending Operation Flags

Associated with each overlapped command, the test set maintains a binary indicator known as a pending operation flag. A pending operation flag is set true when the operation started by the overlapped command is executing, and is set false when the operation is no longer executing.

**NOTE** In addition to the call processing subsystem overlapped commands, the test set also provides the measurement-related INITiate overlapped commands. For more details on these commands see "INITiate" on page 603.

## Call Processing Subsystem Overlapped Command Synchronization Commands

### Table 7. 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. | `OUTPUT 714;"CALL:DCON:ARM:DONE?"`<br>This example queries whether the data connection state change detector has been successfully armed. |
| :SEQuential | Forces an overlapped command to execute in a sequential manner. No subsequent commands are executed until the pending operation flag for this operation is false. | `OUTPUT 714;"CALL:FUNC:DATA:STAR:SEQ"`<br>This example commands the test set to start a data connection. A data connection must be established before any GPRS measurements can be made. :SEQ ensures that no other commands are executed until the pending operation flag associated with the CALL:FUNCtion:DATA:STARt command is false. |
| :WAIT | Forces the test set to wait until the associated command's pending operation flag is false before executing any more commands. | `OUTPUT 714;"CALL:DCON:ARM:WAIT?"`<br>This example prevents the test set from executing the next command until the data connection state change detector has been armed. |
| :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. | `OUTPUT 714;"CALL:FUNC:DATA:STAR:OPC?"`<br>This example hangs program execution until the :OPC query's until a 1 is placed in the test set's output queue. |

## Data Connection Processing Subsystem Overlapped Commands

| Data Connection Processing Command | Purpose Of Command | Pending Operation Flag (POF) is false when |
|---|---|---|
| CALL:FUNCtion:DATA:STARt<br>See "CALL:FUNCtion:DATA:STARt" on page 407. | Attempts to start the data connection. | The connection status is any non-transitory state (that is Idle, Attached or Transferring). |
| CALL:DCONnected:ARM[:IMMediate]<br>See "CALL:DCONnected:ARM[:IMMediate]" on page 399. | Arms the data connection state change detector. | The data connection state change detector has been disarmed. |

## Related Topics

“Data Connection Processing State Synchronization” on page 317

“Measurement Event Synchronization” on page 296

“Test System Synchronization Overview” on page 310

# Data Connection Processing State Synchronization

## Description

### Data Connection Processing State Query

The CALL:STATus[:STATe]:DATA? query returns a string indicating the current data connection processing state.

There are seven possible data connection processing states.

The query returns one of the following strings:

- “IDLE”

  Idle is returned when the mobile station is not GPRS attached.

- “ATTG”

  Attaching is returned when the mobile station has sent an attach request. This is a transitory state (which means that the mobile station can only remain in this state until the protocol timer expires). At the end of the signalling exchange, the new state will either be Attached or Idle, depending on whether or not the attach procedure completes without error.

- “DET”

  Detaching is returned when the attached mobile station has sent a detach request. This is a transitory state (which means that the mobile station can only remain in this state until it successfully moves to another state, or the protocol timer expires). At the end of the signalling exchange, the new state will be Idle, even if the procedure encounters an error.

- “ATT”

  Attached is returned when the mobile station has performed a successful GPRS attach.

- “STAR”

  Starting is returned when you have performed the “Start Data Connection” action (using “CALL:FUNCtion:DATA:STARt” on page 407). This is a transitory state (which means that the mobile station can only remain in this state until it successfully moves to another state, or the protocol timer expires). At the end of the signalling exchange, the new state will be either Transferring, Attached or Idle, depending on whether or not the data connection is successfully established.

- “END”

  Ending is returned when you have performed the “End Data Connection” action (using “CALL:FUNCtion:DATA:STOP” on page 408). This is a transitory state (which means that the mobile station can only remain in this state until it successfully moves to another state, or the protocol timer expires). At the end of the signalling exchange, the new state will be Attached, even if the procedure encounters an error.

- “TRAN”

  Transferring is returned when a data connection has been established.

The following command returns the current state of a data connection:

```
OUTPUT 714;"CALL:STATus:STATe:DATA?"
ENTER 714;Inst_state$
```

**Attached State Query** This query determines if a data connection is in the Attached state by returning an integer value. The value indicates if the data connection state is Attached or any other non-transitory state, not if any data connection state change has occurred.

The query returns one of the following:

- 0 = Any non-transitory state other than Attached (that is, Idle or Transferring)
- 1 = Attached

If the data connection is in the Attaching, Detaching, Starting, or Ending state, this command does not return a value until the data connection state proceeds to Idle, Attached, or Transferring.

```
OUTPUT 714;"CALL:ATTached:STATe?"
```

**Transferring State Query** This query determines if a data connection is in the Transferring state by returning an integer value. The value indicates if the data connection state is Transferring or any other non-transitory state, not if any data connection state change has occurred.

The query returns one of the following:

- 0 = Any non-transitory state other than Transferring (that is, Idle or Attached)
- 1 = Transferring

If the data connection is in the Attaching, Detaching, Starting, or Ending state, this command will not return a value until the data connection state proceeds to Idle, Attached, or Transferring.

```
OUTPUT 714;"CALL:TRANsferring:STATe?"
```

**Data Connection State Change Detector** This method provides the advantage of indicating that a data connection state change has occurred. The change detector works in conjunction with the Attached State and Transferring State queries. Arming the CALL:DCONnected? query provides a way for the external controller to know when the data connection state change process is done.

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

- the data connection processing state has changed to either Idle, Attached or Transferring from one of the transitory states

  or,

- the attempt to establish a data connection failed and one of the test set's Fixed Timers has timed out

  or,

- no data connection processing state changes occurred within the time period specified by the timeout timer.

The following command arms the data connection state change detector, but does not cause any data connection processing function to start:

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

### Data Connection State Change Detector Timeout

If a state change does not occur, you need 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 state query that you have initiated (Attached state query or Transferring state query will return a 1 for connected or a 0 for idle. You can set the timeout value using "CALL:DCONnected:TIMeout" on page 400.

## Related Topics

"Test System Synchronization Overview" on page 310

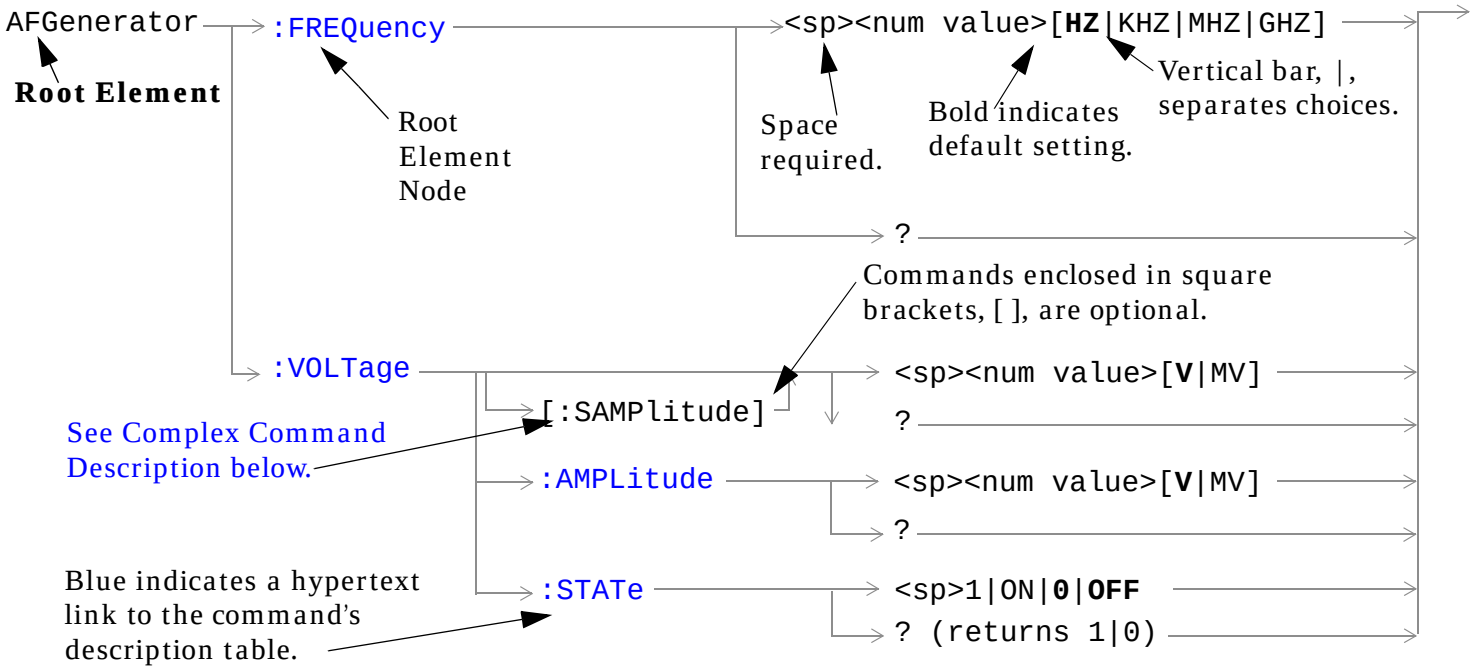
"Data Connection Processing Event Synchronization" on page 314

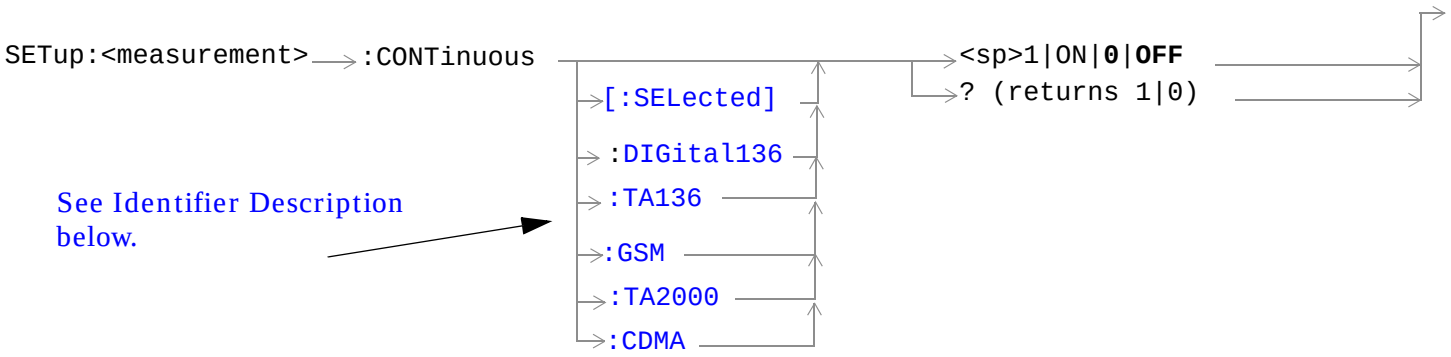
"CALL:STATus[:STATe]:DATA?" on page 504

# 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.

### 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

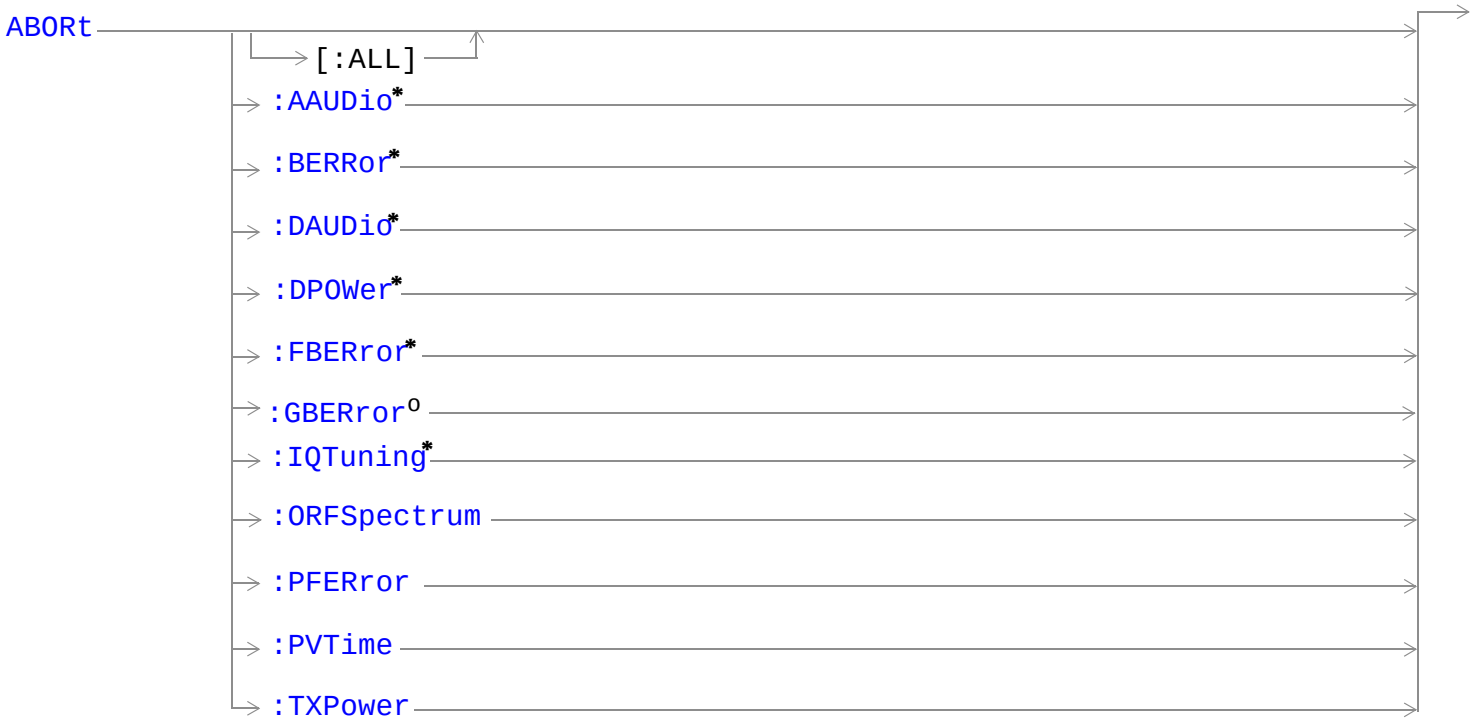
INITiate:<meas> will execute an ABORt:<meas> as part of the INITiate:<meas> command.

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




* Not applicable to GPRS.

° Not applicable to GSM.

"Diagram Conventions" on page 323

## ABORt[:ALL]

| | | |
|---|---|---|
| Function | GSM | Stops any and all measurements that are active. See "Measurement States" on page 278 |
| | GPRS | If the trigger arm is set to single, see "Trigger Arm (Single or Continuous) Description" on page 278 the measurements will go to the idle state.<br>If the trigger arm is set to continuous the measurements will re-arm and initiate again. |
| Setting | GSM | Range<br>• AAUDio<br>• BERRor<br>• DAUDio<br>• DPOWer<br>• FBERror<br>• IQTuning<br>• ORFSpectrum<br>• PFERror<br>• PVTime<br>• TXPower |
| | GPRS | Range<br>• GBERror<br>• ORFSpectrum<br>• PFERror<br>• PVTime<br>• TXPower |

Programming Example

```
OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.
```

## ABORt:<meas-mnemonic>

<table>
<tr><td rowspan="2">Function</td><td>GSM</td><td rowspan="2">Stops the selected measurement if it is active. See “Measurement States” on page 278<br>If the trigger arm is set to single, see “Trigger Arm (Single or Continuous) Description” on page 278 the measurements will go to the idle state.<br>If the trigger arm is set to continuous the measurements will re-arm and initiate again.</td></tr>
<tr><td>GPRS</td></tr>
<tr><td rowspan="2">Setting</td><td>GSM</td><td>Range<br>• AAUDio<br>• BERRor<br>• DAUDio<br>• DPOWer<br>• FBERror<br>• ORFSpectrum<br>• IQTuning<br>• PFERror<br>• PVTime<br>• TXPower</td></tr>
<tr><td>GPRS</td><td>Range<br>• GBERror<br>• ORFSpectrum<br>• PFERror<br>• PVTime<br>• TXPower</td></tr>
<tr><td colspan="3">Programming Example<br><code>OUTPUT 714;"ABORT:PVTIME" !Aborts a PvT measurement.</code></td></tr>
</table>

# AFGenerator Subsystem

This subsystem is *not* applicable to GPRS.

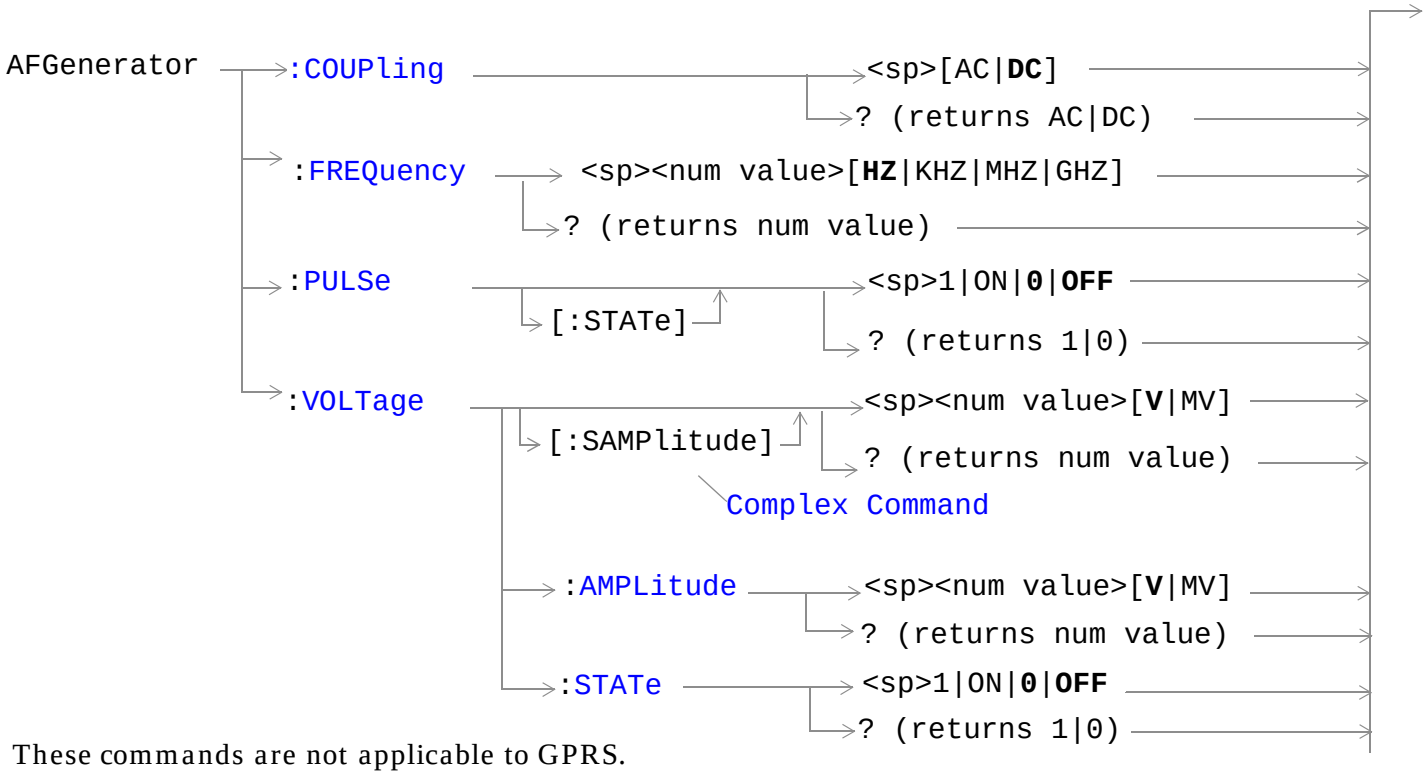
## Description

The AFGenerator subsystem is used to control the audio source that is available at the Audio Output connector.

### Syntax Diagram and Command Descriptions

"AFGenerator" *GSM Only*

# AFGenerator




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

### AFGenerator:COUPling

| | | |
|---|---|---|
| Function | GSM | Sets the output of the audio generator to be ac or dc coupled to the front-panel AUDIO OUT port. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: AC or DC |
| Query | | Range: AC or DC |
| *RST setting | | DC |
| Programming Example<br>`OUTPUT 714;"AFGENERATOR:COUPling AC" !Sets the audio generator coupling to AC.` | | |

### AFGenerator:FREQuency

| | | |
|---|---|---|
| Function | GSM | 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. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 Hz to 20 kHz<br>Resolution: .1 Hz |
| Query | | Range: 1 Hz to 20 kHz<br>Resolution: .1 Hz |
| *RST setting | | 1 kHz |
| Programming Example<br>`OUTPUT 714;"AFGENERATOR:FREQUENCY 1000" !Sets the audio generator frequency to 1000 Hz.` | | |

### AFGenerator:PULSe[:STATe]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the audio generator pulse state.<br>The pulse state must be on when the test set's audio generator is used for audio stimulation during a decoded audio measurement.<br>When the state is on, the audio signal from the test set is pulsed at a 10 Hz rate with a 50% duty cycle.<br>The amplitude and frequency of the pulse is set with afgenerator commands. See "AFGenerator" on page 330. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \|ON |
| Query | | Range: 0\|1 |
| *RST setting | | 0\|off |
| Programming Example<br>`OUTPUT 714;"AFGENERATOR:PULSE ON" !Sets the audio generator pulse to ON.` | | |

## AFGenerator:VOLTage[:SAMPlitude]

| | | |
|---|---|---|
| Function | GSM | 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. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 - 9 V pk.<br>Resolution:<br>• .5 mV pk. <= 1 V pk. output<br>• 5 mV pk. > 1 V pk. output |
| Query | | Range: 0 - 9 v peak<br>Resolution:<br>• .5 mV pk. <= 1 V pk. output<br>• 5 mV pk. > 1 V pk. output |
| *RST setting | | zero volts |

Programming Example

```
OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output
                                     !voltage to 2.1 volts.
```

### AFGenerator:VOLTage:AMPlitude

| | | |
|---|---|---|
| Function | GSM | 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. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 - 9 V pk.<br>Resolution:<br>• .5 mV pk. <= 1 V pk. output<br>• 5 mV pk. > 1 V pk. output |
| Query | | Range: 0 - 9 V pk.<br>Resolution:<br>• .5 mV pk. <= 1 V pk. output<br>• 5 mV pk. > 1 V pk. output |
| *RST setting | | zero volts |
| Programming Example<br>`OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output`<br>`!voltage to 1.414 volts peak.` | | |

### AFGenerator:VOLTage:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries the audio generator state |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | 0 \| OFF \| 1 \|ON |
| Query | | 0\|1 |
| *RST setting | | 0\|off |
| Programming Example<br>`OUTPUT 714;"AFGENERATOR:VOLTAGE:STATE ON" !Set the audio generator state to ON.` | | |

# CALibration Subsystem

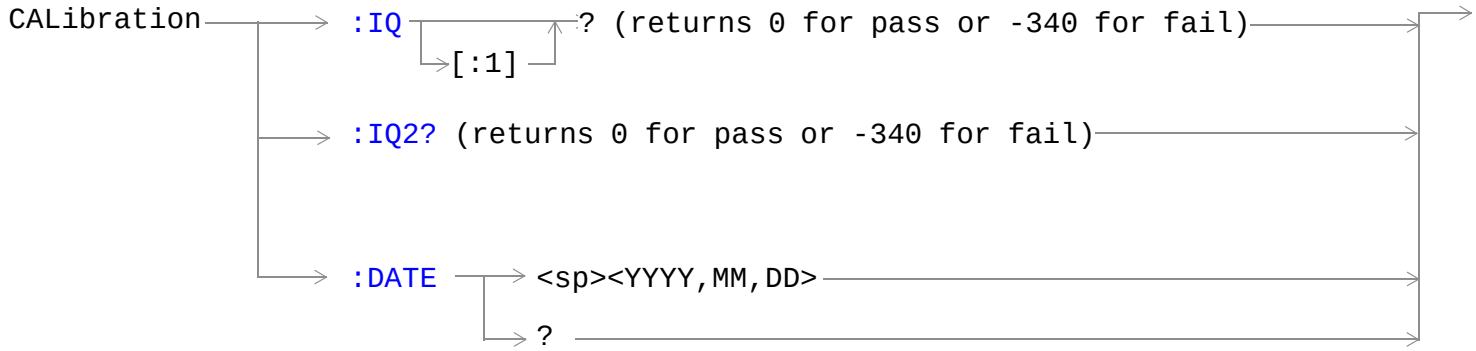
## Description

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




"Diagram Conventions" on page 323

### CALibration:IQ[:1]?

| | | |
|---|---|---|
| Function | GSM | Sets/queries the calibration of the IQ modulator for RF generator 1. It takes some time to complete calibration and can't be aborted except by cycling the power switch.<br>• Calibrates the IQ modulator for RF generator 1.<br>• Returns a value indicating success or failure of calibration. |
| | GPRS | |
| Query | | Range<br>• 0 = Pass<br>• –340 = Fail |
| Programming Example<br>`OUTPUT 714;"CALIBRATION:IQ1?" !Performs a calibration of the IQ modulator`<br>`!for RF generator 1 and returns 0 or -340` | | |

**NOTE** When the calibration is done the test set display will display:

IQ Calibration completed successfully for modulator 1.

### CALibration:IQ2?

| | | |
|---|---|---|
| Function | GSM | 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.<br>• Calibrates the IQ modulator for RF generator 2.<br>• Returns a value indicating success or failure of calibration. |
| | GPRS | |
| Query | | Range<br>• 0 = Pass<br>• –340 = Fail |
| Programming Example<br>`OUTPUT 714;"CALIBRATION:IQ2?" !Performs a calibration of the IQ modulator`<br>`!for RF generator 2 and returns 0 or -340` | | |

**NOTE** When the calibration is done the test set display will display:

IQ Calibration completed successfully for modulator 2.

### CALibration:DATE

| | | |
|---|---|---|
| Function | GSM | 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. |
| | GPRS | |
| Setting | | Sets the system calibration date.<br>Range<br>• Year = 0000 to 9999<br>• Month = 01 to 12<br>• Day = 01 to 31 |
| Query | | Returns the date when system calibration was performed.<br>Range<br>• Year = 0000 to 9999<br>• Month = 1 to 12<br>• Day = 1 to 31 |
| Programming Example<br>`OUTPUT 714;"CALIBRATION:DATE 1999,01,04" !Sets the date of the last system`<br>`!calibration year, month and day.` | | |

# 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:ACTivated" on page 338 *GSM Only*

"CALL:ATTached" on page 339 *GPRS Only*

"CALL:BA" on page 341

"CALL:BAND" on page 364

"CALL:BCCode" on page 366 *GSM Only*

"CALL:BCHannel" on page 369

"CALL:BURSt" on page 381

"CALL:CONNected" on page 383 *GSM Only*

"CALL:COUNt" on page 386

"CALL:DCONnected" on page 399 *GPRS Only*

"CALL:END" on page 401 *GSM Only*

"CALL:FUNCtion" on page 404

"CALL:HANDover | HANDoff" on page 410 *GPRS Only*

"CALL:IMEI" on page 412 *GSM Only*

"CALL:LACode" on page 413 *GSM Only*

"CALL:MCCode" on page 416 *GSM Only*

"CALL:MNCode" on page 418 *GSM Only*

"CALL:MS" on page 421

"CALL:NCCode" on page 438 *GSM Only*

"CALL:OPERating" on page 441

"CALL:ORIGinate" on page 443 *GSM Only*

"CALL:PAGing" on page 449 *GSM Only*

"CALL:PBPTest" on page 453 *GPRS Only*

"CALL:PDTCH | PDTChannel" on page 454 *GPRS Only*

"CALL:PMNCode" on page 466

"CALL:POWer" on page 471

"CALL:RFGenerator" on page 477 *GSM Only*

"CALL:SETup" on page 486 *GPRS Only*

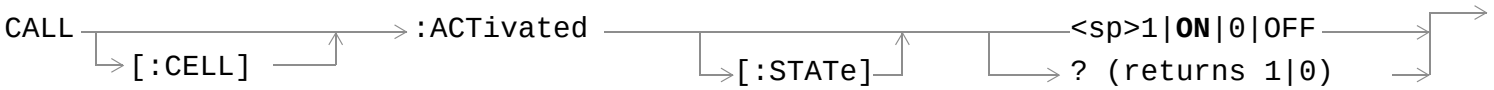
"CALL:SIGNaling" on page 502 *GSM Only*

"CALL:STATus" on page 503

"CALL:TCHannel" on page 508 *GSM Only*

"CALL:TRANsferring" on page 516 *GPRS Only*

# CALL:ACTivated




This command is not applicable to GPRS.

"Diagram Conventions" on page 323

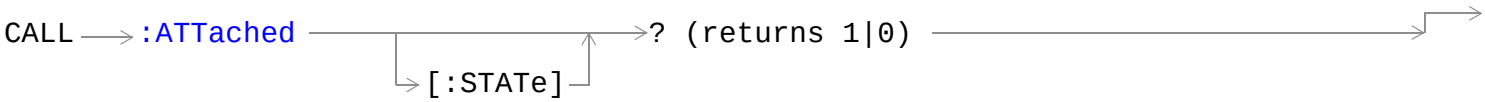
### CALL[:CELL]:ACTivated[:STATe]

| | | |
|---|---|---|
| Function | GSM | This command turns on or off, BS Emulator control of all signalling operations, uplink demodulation and downlink (BCH & TCH) generation. The query form returns a 1 (state = on) or a 0 (state = off).<br>When cell activated state is on and the test set is in active cell operating mode, burst type is determined by protocol. When the test set is in test mode operating mode, or when the cell activated state is off, the burst type may need to be specified before the test set can synchronize to the input signal's midamble. You specify the burst type using the command " CALL:BURSt:TYPE[:SELected]" on page 381. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 1 (state = ON) |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |

Programming Example

```
OUTPUT 714;"CALL:CELL:ACTIVATED:STATE OFF" !Turns all signalling operations,
                                           !uplink demodulation and downlink
                                           !(BCH & TCH) generation off.
```

# CALL:ATTached



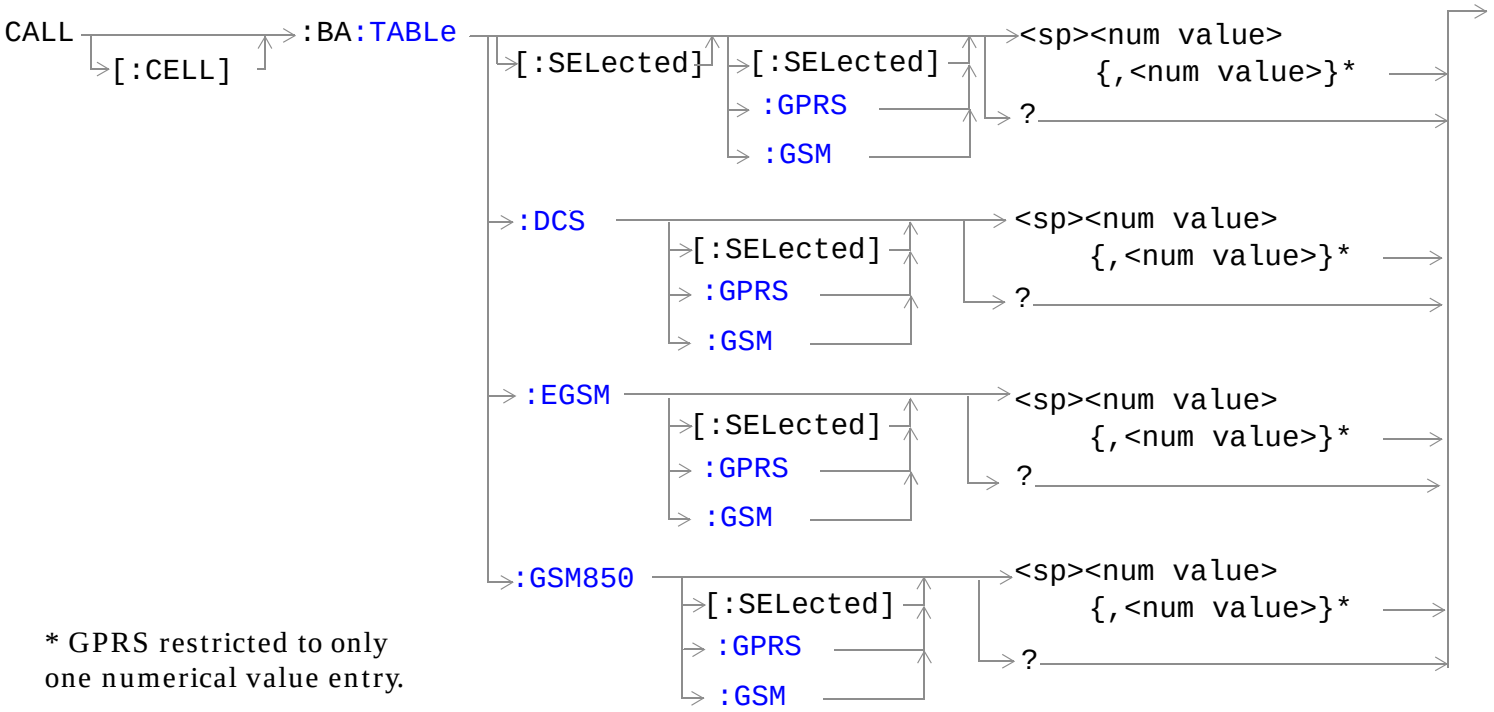

This diagram is not applicable to GSM.

"Diagram Conventions" on page 323

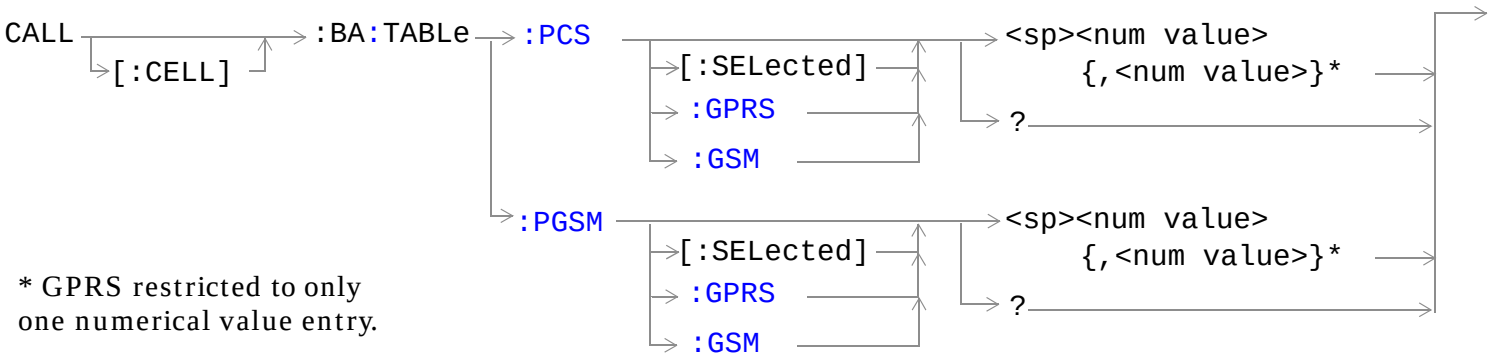
### CALL:ATTached[:STATe]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries whether or not the data connection is in the attached state. 1 is returned if the data connection is in the attached state. 0 is returned if the data connection is in any other non-transitory state. For more details on the Attached State query or the data connection states, see "Data Connection Processing State Synchronization" on page 317. |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 \| OFF |
| Programming Example<br>`OUTPUT 714;"CALL:ATTached:STATe?"` | | |

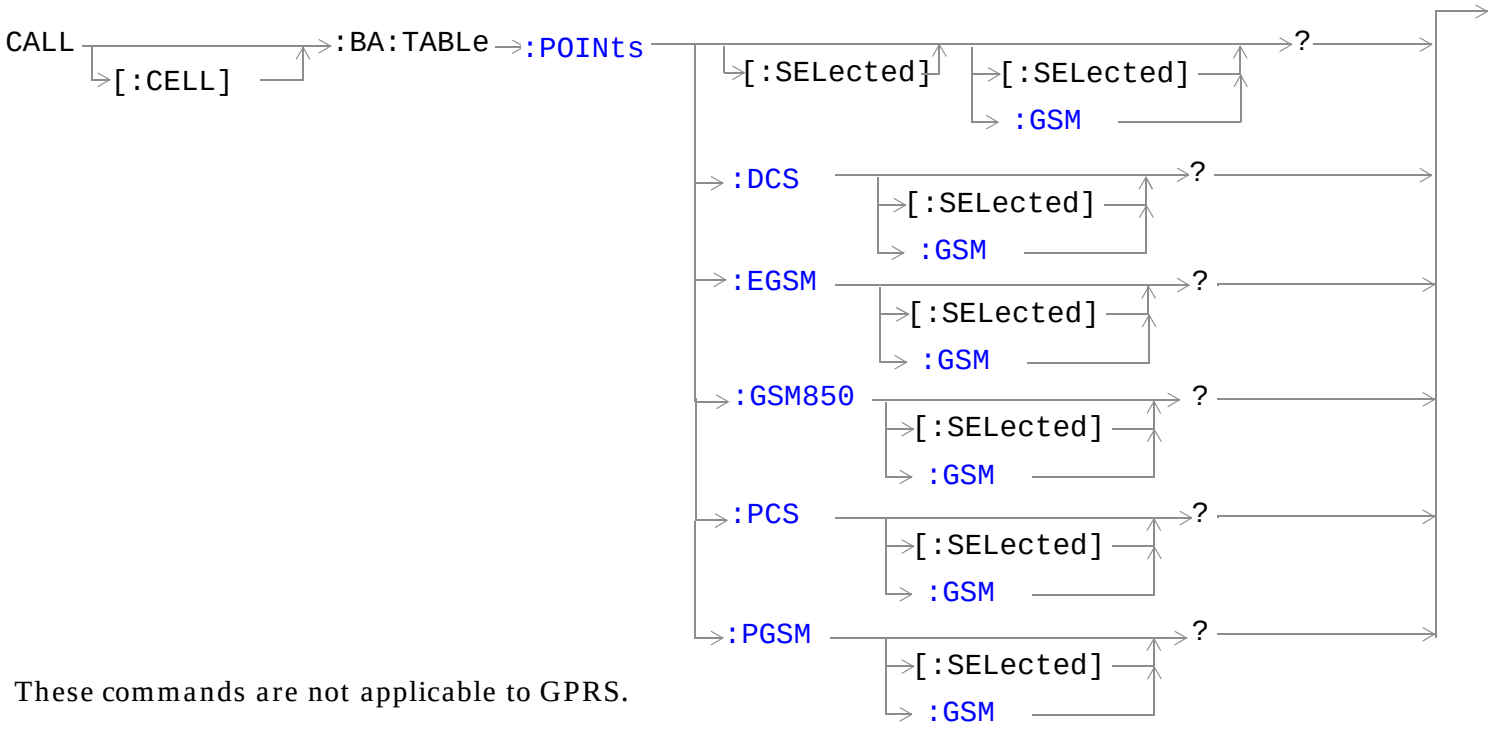
# CALL:BA




* GPRS restricted to only one numerical value entry.




* GPRS restricted to only one numerical value entry.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL[:CELL]:BA:TABLe[:SELected][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the selected broadcast band in the active (that is the selected) format. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns 9.91E+37 (NAN). |
| | GPRS | This command sets/queries the BA table entry for the selected broadcast band in the active (that is the selected) format. Only one entry is permitted within the band. |
| Setting | | Depends upon the selected broadcast band:<br>Range:<br>• DCS, EGSM, GSM850 and PGSM broadcast band range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• PCS broadcast band range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>Resolution: 1<br>default setting:<br>**GSM**<br>• DCS BA Table: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862<br>• EGSM BA Table: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110<br>• GSM850 BA Table: 150, 128, 190, 251, 138, 148, 158, 168, 178, 188, 198, 208, 218, 228,238, 248<br>• PCS BA Table: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790<br>• PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117<br>states:<br>• first entry = ON, all others = OFF<br>**GPRS**<br>• DCS BA Table: 512<br>• EGSM BA Table: 20<br>• GSM850 BA Table: 150<br>• PCS BA Table: 512<br>• PGSM BA Table: 20 |
| Query | | Range:<br>• DCS, EGSM, GSM850 and PGSM broadcast band range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• PCS broadcast band range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |

| | |
|---|---|
| *RST Setting | **GSM**<br>PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117<br>states:<br>First entry = ON, all others = OFF<br><br>**GPRS**<br>PGSM BA Table: 20 |

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512,689,885" !Sets 3 table entries for the
                                                     !selected broadcast band.
                                                     !States of the remaining 13
                                                     !entries are set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512" !Sets the table entry for the selected
                                              !broadcast band.
```

## CALL[:CELL]:BA:TABLe[:SELected]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the BA table entry for the selected broadcast band in the GPRS format whether or not that format is active. Only one entry is permitted within the band. |
| Setting | | Depends upon the selected broadcast band:<br>Range:<br>• DCS, EGSM, GSM850 and PGSM broadcast band range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• PCS broadcast band range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>Depends upon the selected broadcast band:<br>Resolution: 1<br>default setting:<br>• DCS BA Table: 512<br>• EGSM BA Table: 20<br>• GSM850 BA Table: 150<br>• PCS BA Table: 512<br>• PGSM BA Table: 20 |

| | |
|---|---|
| Query | Range:<br>• DCS, EGSM, GSM850 and PGSM broadcast band range: 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>• PCS broadcast band range: 0 to 124 \| 128 to 251 \| 512 to 810 \| 975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |
| *RST Setting | PGSM BA Table: 20 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED:GPRS 512" !Sets the table entry for the selected
                                                  !broadcast band.
```

## CALL[:CELL]:BA:TABLe[:SELected]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the selected broadcast band in the GSM format whether or not that format is active. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns 9.91E+37 (NAN). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Depends upon the selected broadcast band:<br>Range:<br>• DCS, EGSM, GSM850 and PGSM broadcast band range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• PCS broadcast band range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>Resolution: 1<br>default setting:<br>• DCS BA Table: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862<br>• EGSM BA Table: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110<br>• GSM850 BA Table: 150, 128, 190, 251, 138, 148, 158, 168, 178, 188, 198, 208, 218, 228,238, 248<br>• PCS BA Table: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790<br>• PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117<br>states:<br>• first entry = ON, all others = OFF |
| Query | | Range:<br>• DCS, EGSM, GSM850 and PGSM broadcast band range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• PCS broadcast band range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>• 9.91E+37 (NAN) |
| *RST Setting | | PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117<br>states:<br>First entry = ON, all others = OFF |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED:GSM 512,689,885" !Sets 3 table entries for the
                                                         !selected broadcast band.
                                                         !States of the remaining 13
                                                         !entries are set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED:GSM" !Sets states of all table entries to OFF.
```

## CALL[:CELL]:BA:TABLe:DCS[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the DCS broadcast band in the active (that is the selected) format. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command sets/queries the BA table entry for the DCS broadcast band in the active (that is the selected) format. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |
| *RST Setting | | **GSM**<br>entries: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862<br>states: 512 = ON, all others = OFF<br>**GPRS**<br>entry: 512 |

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:DCS 512,612,787" !Sets three BA table entries for
                                                !the DCS broadcast band. States
                                                !of the remaining 13 entries are
                                                !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:DCS" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:DCS 637" !Sets the table entry for the DCS
                                         !broadcast band.
```

## CALL[:CELL]:BA:TABLe:DCS:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the BA table entry for the DCS broadcast band in the GPRS format whether or not that format is active. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023 |
| *RST Setting | | entry: 512 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:DCS:GPRS 637" !Sets the table entry for the DCS !broadcast band.` | | |

## CALL[:CELL]:BA:TABLe:DCS:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the DCS broadcast band in the GSM format whether or not that format is active. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• 9.91E+37 (NAN) |
| *RST Setting | | entries: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862<br>states: 512 = ON, all others = OFF |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:DCS:GSM 512,612,787" !Sets three BA table entries for !the DCS broadcast band. States !of the remaining 13 entries are !set to OFF.`<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:DCS:GSM" !Sets states of all table entries to OFF.` | | |

## CALL[:CELL]:BA:TABLe:EGSM[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the EGSM broadcast band in the active (that is the selected) format. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command sets/queries the BA table entry for the EGSM broadcast band in the active (that is the selected) format. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |
| *RST Setting | | **GSM**<br>entries: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110<br>states: 20 = ON, all others = OFF<br>**GPRS**<br>entry: 20 |

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120,975,1012" !Sets three BA table entries for
                                                  !the EGSM broadcast band. States
                                                  !of the remaining 13 entries are
                                                  !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120" !Sets the table entry for the EGSM
                                          !broadcast band.
```

### CALL[:CELL]:BA:TABLe:EGSM:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the BA table entry for the EGSM broadcast band in the GPRS format whether or not that format is active. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023 |
| *RST Setting | | entry: 20 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM:GPRS 120" !Sets the table entry for the EGSM
                                              !broadcast band.
```

### CALL[:CELL]:BA:TABLe:EGSM:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the EGSM broadcast band in the GSM format whether or not that format is active. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• 9.91E+37 (NAN) |
| *RST Setting | | entries: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110<br>states: 20 = ON, all others = OFF |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM:GSM 120,975,1012" !Sets three BA table entries for
                                                     !the EGSM broadcast band. States
                                                     !of the remaining 13 entries are
                                                     !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM:GSM" !Sets states of all table entries to OFF.
```

## CALL[:CELL]:BA:TABLe:GSM850[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the GSM850 broadcast band in the active (that is the selected) format. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command sets/queries the BA table entry for the GSM850 broadcast band in the active (that is the selected) format. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |
| *RST Setting | | **GSM**<br>entries: 150, 128, 190, 251, 138, 148, 158, 168, 178, 188, 198, 208, 218, 228, 238, 248<br>states: 150 = ON, all others = OFF<br>**GPRS**<br>entry: 20 |

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:GSM850 130,190,249" !Sets three BA table entries for
                                                   !the GSM850 broadcast band. States
                                                   !of the remaining 13 entries are
                                                   !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:GSM850" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:GSM850 190" !Sets the table entry for the GSM850
                                           !broadcast band.
```

### CALL[:CELL]:BA:TABLe:GSM850:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the BA table entry for the GSM850 broadcast band in the GPRS format whether or not that format is active. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023 |
| *RST Setting | | entry: 150 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:GSM850:GPRS 135" !Sets the table entry for the GSM850 !broadcast band.` | | |

### CALL[:CELL]:BA:TABLe:GSM850:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the GSM850 broadcast band in the GSM format whether or not that format is active. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• 9.91E+37 (NAN) |
| *RST Setting | | entries: 150, 128, 190, 251, 138, 148, 158, 168, 178, 188, 198, 208, 218, 228, 238, 248<br>states: 150 = ON, all others = OFF |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:GSM850 130,190,249" !Sets three BA table entries for !the GSM850 broadcast band. States !of the remaining 13 entries are !set to OFF.`<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:GSM850" !Sets states of all table entries to OFF.` | | |

## CALL[:CELL]:BA:TABLe:PCS[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the PCS broadcast band in the active (that is the selected) format. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command sets/queries the BA table entry for the PCS broadcast band in the active (that is the selected) format. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124 \| 128 to 251 \| 512 to 810 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124 \| 128 to 251 \| 512 to 810 \| 975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |
| *RST Setting | | **GSM**<br>entries: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790<br>states: 512 = ON, all others = OFF<br>**GPRS**<br>entry: 512 |

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660,710,790" !Sets three BA table entries for
                                                !the PCS broadcast band. States
                                                !of the remaining 13 entries are
                                                !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:PCS" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660" !Sets the table entry for the PCS
                                        !broadcast band.
```

### CALL[:CELL]:BA:TABLe:PCS:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the BA table entry for the PCS broadcast band in the GPRS format whether or not that format is active. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 810\|975 to 1023 |
| *RST Setting | | entry: 512 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:PCS:GSM 660" !Sets the table entry for the PCS !broadcast band.` | | |

### CALL[:CELL]:BA:TABLe:PCS:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the PCS broadcast band in the GSM format whether or not that format is active. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 810\|975 to 1023<br>• 9.91E+37 (NAN) |
| *RST Setting | | entries: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790<br>states: 512 = ON, all others = OFF |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:PCS:GSM 660,710,790" !Sets three BA table entries for !the PCS broadcast band. States !of the remaining 13 entries are !set to OFF.`<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:PCS:GSM" !Sets states of all table entries to OFF.` | | |

## CALL[:CELL]:BA:TABLe:PGSM[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the PGSM broadcast band in the active (that is the selected) format. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command sets/queries the BA table entry for the PGSM broadcast band in the active (that is the selected) format. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124 \| 128 to 251 \| 512 to 885 \| 975 to 1023<br>• 9.91E+37 (NAN) - for GSM only |
| *RST Setting | | **GSM**<br>entries: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117<br>states: 20 = ON, all others = OFF<br>**GPRS**<br>entry: 20 |

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 20,36,120" !Sets three BA Table entries for
                                               !the PGSM broadcast band. States
                                               !of the remaining 13 entries are
                                               !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM" !Sets states of all BA Table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 62" !Sets the table entry for the PGSM
                                        !Broadcast channel.
```

## CALL[:CELL]:BA:TABLe:PGSM:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the BA table entry for the PGSM broadcast band in the GPRS format whether or not that format is active. Only one entry is permitted within the band. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023 |
| *RST Setting | | entry: 20 |
| Programming Example | | |

```
OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM:GPRS 62" !Sets the table entry for the PGSM
                                              !Broadcast channel.
```

## CALL[:CELL]:BA:TABLe:PGSM:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the BA Table entries for the PGSM broadcast band in the GSM format whether or not that format is active. Entries are set (value entered into table and state set to ON) using a comma separated list of 1 to 16 values. States of table entries not included in setting list are set to OFF. Sending a null list (no values) sets states of all table entries to OFF. Query returns a comma separated list of the table entries that are in the ON state. If states of all table entries are set to OFF, query returns NAN (9.91E+37). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>Resolution: 1 |
| Query | | Range:<br>• 0 to 124\|128 to 251\|512 to 885\|975 to 1023<br>• 9.91E+37 (NAN) |
| *RST Setting | | entries: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117<br>states: 20 = ON, all others = OFF |
| Programming Example | | |

```
OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM:GSM 20,36,120" !Sets three BA Table entries for
                                                   !the PGSM broadcast band. States
                                                   !of the remaining 13 entries are
                                                   !set to OFF.
OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM:GSM" !Sets states of all BA Table entries to OFF.
```

### CALL[:CELL]:BA:TABLe:POINts[:SELected][:SELected]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the selected broadcast band's BA Table in the active (that is the selected) format. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe[:SELected]? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:SELECTED?" !Queries the number of entries
                                                 !that are in the ON state in the
                                                 !selected broadcast band's BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts[:SELected]:GSM?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the selected broadcast band's BA Table in the GSM format whether or not that format is active. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe[:SELected]? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:SELECTED:GSM?" !Queries the number of entries
                                                     !that are in the ON state in the
                                                     !selected broadcast band's BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:DCS[:SELected]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the DCS broadcast band BA Table in the active (that is the selected) format. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:DCS? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:DCS?" !Queries the number of entries that are
                                            !in the ON state in the DCS broadcast
                                            !band BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:DCS:GSM?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the DCS broadcast band BA Table in the GSM format whether or not that format is active. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:DCS? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:DCS:GSM?" !Queries the number of entries that are
                                                !in the ON state in the DCS broadcast
                                                !band BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:EGSM[:SELected]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the EGSM broadcast band BA Table in the active (that is the selected) format. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:EGSM? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:EGSM?" !Queries the number of entries that
                                             !are in the ON state in the EGSM
                                             !broadcast band BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:EGSM:GSM?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the EGSM broadcast band BA Table in the GSM format whether or not that format is active. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:EGSM? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:EGSM:GSM?" !Queries the number of entries that
                                                 !are in the ON state in the EGSM
                                                 !broadcast band BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:GSM850[:SELected]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the GSM850 broadcast band BA Table in the active (that is the selected) format. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:GSM850? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:GSM850?" !Queries the number of entries that`<br>`!are in the ON state in the GSM850`<br>`!broadcast band BA Table.` | | |

### CALL[:CELL]:BA:TABLe:POINts:GSM850:GSM?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the GSM850 broadcast band BA Table in the GSM format whether or not that format is active. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:GSM850? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:GSM850:GSM?" !Queries the number of entries that`<br>`!are in the ON state in the GSM850`<br>`!broadcast band BA Table.` | | |

## CALL[:CELL]:BA:TABLe:POINts:PCS[:SELected]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the PCS cellband BA Table in the active (that is the selected) format. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:PCS? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PCS?" !Queries the number of entries that
                                            !are in the ON state in the PCS
                                            !broadcast band BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:PCS:GSM?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the PCS cellband BA Table in the GSM format whether or not that format is active. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:PCS? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PCS:GSM?" !Queries the number of entries that
                                                !are in the ON state in the PCS
                                                !broadcast band BA Table.
```

### CALL[:CELL]:BA:TABLe:POINts:PGSM[:SELected]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the PGSM broadcast band BA Table in the active (that is the selected) format. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:PGSM? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | See "Configuring the Broadcast Channel (BCH)" on page 110 |

Programming Example

```
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PGSM?" !Queries the number of entries that
                                             !are in the ON state in the PGSM
                                             !broadcast band BA Table.
```

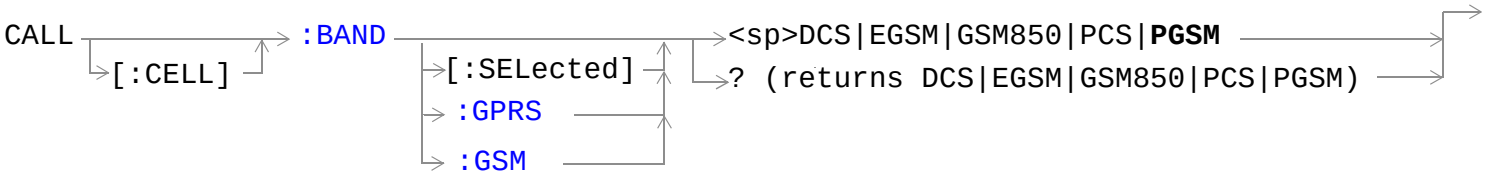
## CALL[:CELL]:BA:TABLe:POINts:PGSM:GSM?

| | | |
|---|---|---|
| Function | GSM | Queries the number of entries that are in the ON state in the PGSM broadcast band BA Table in the GSM format whether or not that format is active. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLe:PGSM? query. A return value of zero indicates that there are no table entries in the ON state. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 16<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | See “Configuring the Broadcast Channel (BCH)” on page 110 |

Programming Example

```
OUTPUT 714;”CALL:CELL:BA:TABLE:POINTS:PGSM:GSM?” !Queries the number of entries that
                                                 !are in the ON state in the PGSM
                                                 !broadcast band BA Table.
```

# CALL:BAND




"Diagram Conventions" on page 323

### CALL[:CELL]:BAND[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the band in the active (that is the selected) format in which the broadcast channel (BCH) is transmitted.<br>Setting the BCH will change the receiver control to auto (see "RFANalyzer:CONTrol:AUTO" on page 625). |
| | GPRS | This command sets/queries the band in which the broadcast channel (BCH) is transmitted. |
| Setting | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| Query | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Related Topics | GSM | See "Cell Band Parameter" on page 118. |
| | GPRS | See "Cell Band Parameter" on page 119 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BAND PGSM" !Sets the band for the BCH to PGSM.` | | |

## CALL[:CELL]:BAND:GPRS

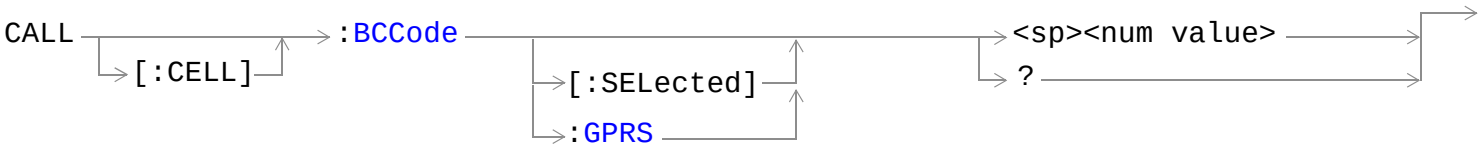
| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the band in which the broadcast channel (BCH) is transmitted in the GPRS format whether or not that format is active. |
| Setting | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| Query | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| *RST Setting | | PGSM |
| Related Topics | GSM | See "Cell Band Parameter" on page 118. |
| | GPRS | See "Cell Band Parameter" on page 119 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BAND:GPRS PGSM" !Sets the band for the GPRS BCH to PGSM.` | | |

## CALL[:CELL]:BAND:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the band in which the broadcast channel (BCH) is transmitted in the GSM format whether or not that format is active.<br>Setting the BCH will change the receiver control to auto (see "RFANalyzer:CONTrol:AUTO" on page 625). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| Query | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| *RST Setting | | PGSM |
| Related Topics | GSM | See "Cell Band Parameter" on page 118. |
| | GPRS | See "Cell Band Parameter" on page 119 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BAND:GSM PGSM" !Sets the band for the GSM BCH to PGSM.` | | |

# CALL:BCCode

This command is not applicable to GPRS.




This command is applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL[:CELL]:BCCode

| | | |
|---|---|---|
| Function | GSM | Sets/queries the value of the Base Station Colour Code (BCC). This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| | GPRS | This command is not applicable to the GPRS test application. |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 5 |
| Related Topics | | See "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCCODE 4" !Sets the cell's base station color code to 4.` | | |

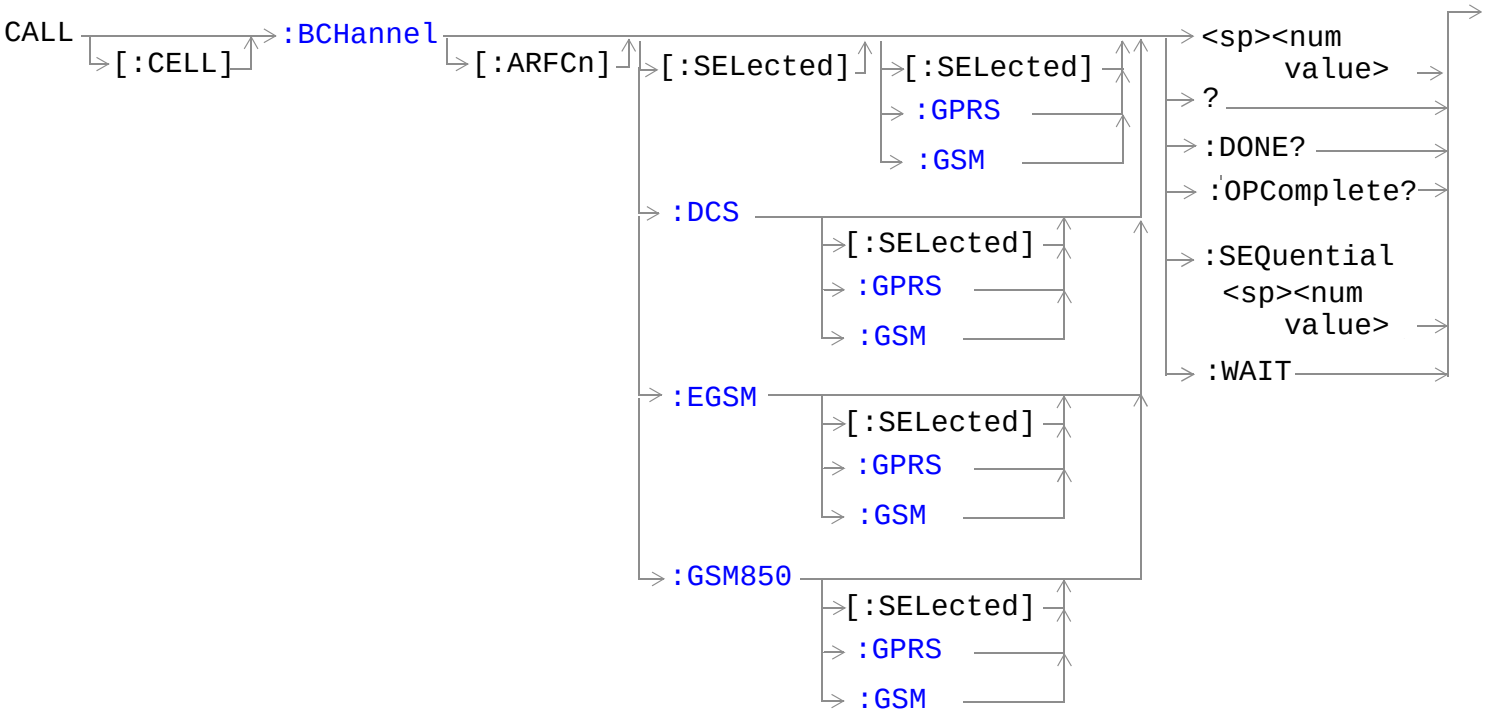
## CALL[:CELL]:BCCode[:SELected]

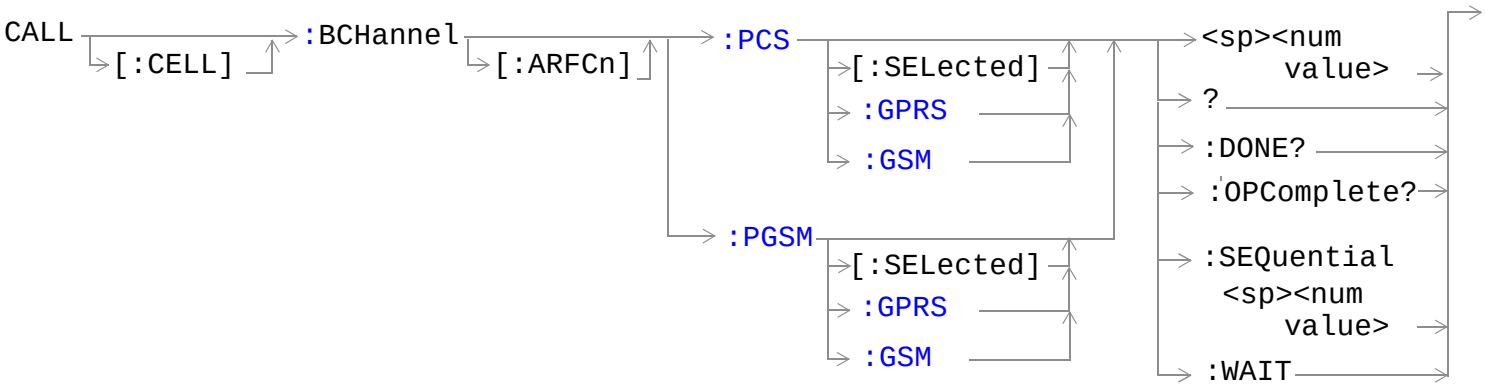
| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the Base Station Colour Code (BCC) for the active (that is the selected) format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 5 |
| Related Topics | | See "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCCODE:SELECTED 4" !Sets the cell's base station color code to 4.` | | |

## CALL[:CELL]:BCCode:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the Base Station Colour Code (BCC) for the GPRS format. This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 338). |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 5 |
| Related Topics | | See “Configuring the Broadcast Channel (BCH)” on page 110. |
| Programming Example<br>`OUTPUT 714;”CALL:CELL:BCCODE:GPRS 4” !Sets the cell’s base station color code to 4.` | | |

# CALL:BCHannel




"Diagram Conventions" on page 323

## CALL[:CELL]:BCHannel[:ARFCn][:SELected][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the broadcast channel ARFCN for the currently selected broadcast band in the active (that is the selected) format. |
| Setting | | Depends upon the selected broadcast band.<br>Range:<br>• PGSM broadcast band range: 1 to 124<br>• EGSM broadcast band range: 0 to 124 \| 975 to 1023<br>• GSM850 broadcast band range: 128 to 251<br>• DCS broadcast band range: 512 to 885<br>• PCS broadcast band range: 512 to 810<br>Resolution: 1 |
| Query | | Depends upon the selected broadcast band.<br>Range:<br>• PGSM broadcast band range: 1 to 124<br>• EGSM broadcast band range: 0 to 124 \| 975 to 1023<br>• GSM850 broadcast band range: 128 to 251<br>• DCS broadcast band range: 512 to 885<br>• PCS broadcast band range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | “Configuring the Broadcast Channel (BCH)” on page 110. |

Programming Example

```
OUTPUT 714;”CALL:CELL:BCHANNEL:ARFCN:SELECTED 512” !Sets BCH ARFCN for the selected
                                                   !broadcast band to channel 512.
```

## CALL[:CELL]:BCHannel[:ARFCn][:SELected]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the broadcast channel ARFCN for the currently selected broadcast band in the GPRS format whether or not that format is active. |
| Setting | | Depends upon the selected broadcast band.<br>Range:<br>• PGSM broadcast band range: 1 to 124<br>• EGSM broadcast band range: 0 to 124 \| 975 to 1023<br>• GSM850 broadcast band range: 128 to 251<br>• DCS broadcast band range: 512 to 885<br>• PCS broadcast band range: 512 to 810<br>Resolution: 1 |
| Query | | Depends upon the selected broadcast band.<br>Range:<br>• PGSM broadcast band range: 1 to 124<br>• EGSM broadcast band range: 0 to 124 \| 975 to 1023<br>• GSM850 broadcast band range: 128 to 251<br>• DCS broadcast band range: 512 to 885<br>• PCS broadcast band range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | “Configuring the Broadcast Channel (BCH)” on page 110. |

Programming Example

```
OUTPUT 714;”CALL:CELL:BCHANNEL:ARFCN:SELECTED:GPRS 512” !Sets GPRS BCH ARFCN for the
                                                       !selected broadcast band to channel 512.
```

## CALL[:CELL]:BCHannel[:ARFCn][:SELected]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the currently selected broadcast band in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Depends upon the selected broadcast band.<br>Range:<br>• PGSM broadcast band range: 1 to 124<br>• EGSM broadcast band range: 0 to 124 \| 975 to 1023<br>• GSM850 broadcast band range: 128 to 251<br>• DCS broadcast band range: 512 to 885<br>• PCS broadcast band range: 512 to 810<br>Resolution: 1 |
| Query | | Depends upon the selected broadcast band.<br>Range:<br>• PGSM broadcast band range: 1 to 124<br>• EGSM broadcast band range: 0 to 124 \| 975 to 1023<br>• GSM850 broadcast band range: 128 to 251<br>• DCS broadcast band range: 512 to 885<br>• PCS broadcast band range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | “Configuring the Broadcast Channel (BCH)” on page 110. |

Programming Example

```
OUTPUT 714;”CALL:CELL:BCHANNEL:ARFCN:SELECTED:GSM 512” !Sets GSM BCH ARFCN for the selected
                                                       !broadcast band to channel 512.
```

### CALL[:CELL]:BCHannel[:ARFCn]:DCS[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the DCS broadcast band in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 512 to 885<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST Setting | | 512 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:DCS 810" !Sets BCH ARFCN for DCS broadcast !band to 810.` | | |

### CALL[:CELL]:BCHannel[:ARFCn]:DCS:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the broadcast channel ARFCN for the DCS broadcast band in the GPRS format whether or not that format is active. |
| Setting | | Range: 512 to 885<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST Setting | | 512 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:DCS:GPRS 810" !Sets GPRS BCH ARFCN for DCS broadcast !band to 810.` | | |

## CALL[:CELL]:BCHannel[:ARFCn]:DCS:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the DCS broadcast band in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 885<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST Setting | | 512 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:DCS:GSM 810" !Sets GSM BCH ARFCN for DCS broadcast !band to 810.` | | |

## CALL[:CELL]:BCHannel[:ARFCn]:EGSM[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the EGSM broadcast band in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:EGSM 120" !Sets BCH ARFCN for EGSM broadcast !band to 120.` | | |

### CALL[:CELL]:BCHannel[:ARFCn]:EGSM:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the broadcast channel ARFCN for the EGSM broadcast band in the GPRS format whether or not that format is active. |
| Setting | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:EGSM:GPRS 120" !Sets GPRS BCH ARFCN for EGSM broadcast !band to 120.` | | |

### CALL[:CELL]:BCHannel[:ARFCn]:EGSM:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the EGSM broadcast band in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:EGSM:GSM 120" !Sets GSM BCH ARFCN for EGSM broadcast !band to 120.` | | |

## CALL[:CELL]:BCHannel[:ARFCn]:GSM850[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the GSM850 broadcast band in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 128 to 251<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST Setting | | 150 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:GSM850 230" !Sets BCH ARFCN for GSM850 broadcast !band to 230.` | | |

## CALL[:CELL]:BCHannel[:ARFCn]:GSM850:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the broadcast channel ARFCN for the GSM850 broadcast band in the GPRS format whether or not that format is active. |
| Setting | | Range: 128 to 251<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST Setting | | 150 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:GSM850:GPRS 230" !Sets GPRS BCH ARFCN for GSM850 !broadcast band to 230.` | | |

### CALL[:CELL]:BCHannel[:ARFCn]:GSM850:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the GSM850 broadcast band in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 128 to 251<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST Setting | | 150 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:GSM850:GSM 230" !Sets GSM BCH ARFCN for GSM850 !broadcast band to 230.` | | |

### CALL[:CELL]:BCHannel[:ARFCn]:PCS[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the PCS broadcast band in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 512 to 810<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 512 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PCS 800" !Sets BCH ARFCN for PCS broadcast !band to 800.` | | |

## CALL[:CELL]:BCHannel[:ARFCn]:PCS:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the broadcast channel ARFCN for the PCS broadcast band in the GPRS format whether or not that format is active. |
| Setting | | Range: 512 to 810<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 512 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |

Programming Example

```
OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PCS:GPRS 800" !Sets GPRS BCH ARFCN for PCS broadcast
                                                   !band to 800.
```

## CALL[:CELL]:BCHannel[:ARFCn]:PCS:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the PCS broadcast band in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 810<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 512 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |

Programming Example

```
OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PCS:GSM 750" !Sets GSM BCH ARFCN for PCS broadcast
                                                  !band to 750.
```

### CALL[:CELL]:BCHannel[:ARFCn]:PGSM[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the PGSM broadcast band in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 1 to 124<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PGSM 113" !Sets BCH ARFCN for PGSM broadcast !band to 113.` | | |

### CALL[:CELL]:BCHannel[:ARFCn]:PGSM:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the broadcast channel ARFCN for the PGSM broadcast band in the GPRS format whether or not that format is active. |
| Setting | | Range: 1 to 124<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PGSM:GPRS 113" !Sets GPRS BCH ARFCN for PGSM broadcast !band to 113.` | | |

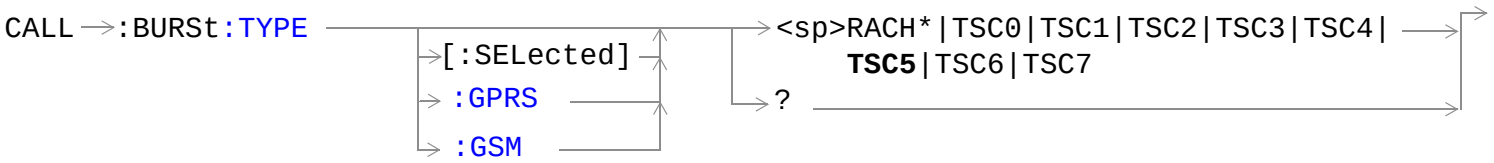
## CALL[:CELL]:BCHannel[:ARFCn]:PGSM:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the broadcast channel ARFCN for the PGSM broadcast band in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 124<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST Setting | | 20 |
| Related Topics | | “Configuring the Broadcast Channel (BCH)” on page 110. |

Programming Example

```
OUTPUT 714;”CALL:CELL:BCHANNEL:ARFCN:PGSM:GSM 113” !Sets GSM BCH ARFCN for PGSM broadcast
                                                   !band to 113.
```

# CALL:BURSt




* Not applicable to GPRS.

"Diagram Conventions" on page 323

### CALL:BURSt:TYPE[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the Expected Burst parameter in the active (that is the selected) format. This parameter is used for measurement synchronization when the test set's operating mode is set to one of the test modes, see "CALL:OPERating:MODE" on page 442 (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see "Expected Burst" on page 102. |
| | GPRS | |
| Setting | GSM | Range: RACH \| TSC0 \| TSC1 \| TSC2 \| TSC3 \| TSC4 \| TSC5 \| TSC6 \| TSC7 |
| | GPRS | Range: TSC0 \| TSC1 \| TSC2 \| TSC3 \| TSC4 \| TSC5 \| TSC6 \| TSC7 |
| Query | GSM | Range: RACH \| TSC0 \| TSC1 \| TSC2 \| TSC3 \| TSC4 \| TSC5 \| TSC6 \| TSC7 |
| | GPRS | Range: TSC0 \| TSC1 \| TSC2 \| TSC3 \| TSC4 \| TSC5 \| TSC6 \| TSC7 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Related Topics | | "Test Mode Operating Modes" on page 101. |

Programming Example

```
OUTPUT 714;"CALL:BURSt:TYPE TSC2" ! Sets the test set to expect Training Sequence Code 2 in
                                  !the midamble burst.
```

## CALL:BURSt:TYPE:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries the Expected Burst parameter in the GPRS format whether or not that format is active. This parameter is used for measurement synchronization when the test set's operating mode is set to one of the test modes, see "CALL:OPERating:MODE" on page 442 (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see "Expected Burst" on page 102. |
| Setting | GPRS | Range: TSC0\|TSC1\|TSC2\|TSC3\|TSC4\|TSC5\|TSC6\|TSC7 |
| Query | GPRS | Range: TSC0\|TSC1\|TSC2\|TSC3\|TSC4\|TSC5\|TSC6\|TSC7 |
| *RST Setting | | TSC5 |
| Related Topics | | "Test Mode Operating Modes" on page 101. |

Programming Example

```
OUTPUT 714;"CALL:BURSt:TYPE:GPRS TSC2" ! Sets the test set to expect Training Sequence Code
                                        !2 in the midamble burst.
```

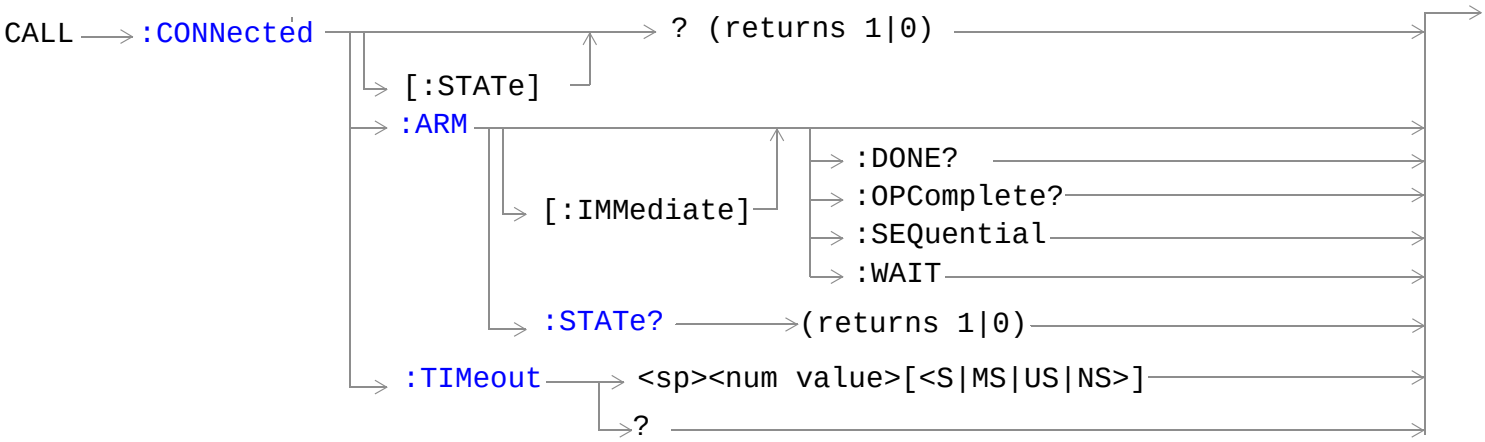
## CALL:BURSt:TYPE:GSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the Expected Burst parameter in the GSM format whether or not that format is active. This parameter is used for measurement synchronization when the test set's operating mode is set to Test Mode, see "CALL:OPERating:MODE" on page 442 (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see "Expected Burst" on page 102. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | GSM | Range: RACH\|TSC0\|TSC1\|TSC2\|TSC3\|TSC4\|TSC5\|TSC6\|TSC7 |
| Query | GSM | Range: RACH\|TSC0\|TSC1\|TSC2\|TSC3\|TSC4\|TSC5\|TSC6\|TSC7 |
| *RST Setting | | TSC5 |
| Related Topics | | "Test Mode Operating Modes" on page 101. |

Programming Example

```
OUTPUT 714;"CALL:BURSt:TYPE:GSM TSC2" ! Sets the test set to expect Training Sequence Code 2
                                      !in the midamble burst.
```

# CALL:CONNected




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

### CALL:CONNected[:STATe]?

| | | |
|---|---|---|
| Function | GSM | Queries the connected/disconnected state of the call. 1 is returned if the call is in the connected state. 0 is returned if the call is in the idle (that is, 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 305. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:CONNECTED:STATE?" !Returns 1 if call connected,`<br>`!0 if call disconnected.` | | |

### CALL:CONNected:ARM[:IMMediate]

| | | |
|---|---|---|
| Function | GSM | Sets (arms) the call-state-change detector. Arming the call-state-change detector allows the control program to tell the test set that it is expecting a change to the state of a call prior to initiating the state change.<br><br>Once armed, The detector remains armed until there is a call state change to Idle or Connected from one of the transitory states. The call-state-change-detector is not disarmed by a call state change to one of the transitory states, nor is it disarmed by any transitions from Idle to Idle, or Connected to Connected.<br><br>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 305. |
| | GPRS | This command is not applicable to GPRS. |
| Programming Example<br><br>`OUTPUT 714;"CALL:CONNECTED:ARM:IMMEDIATE" !Arms the call-state-change detector.` | | |

### CALL:CONNected:ARM:STATe?

| | | |
|---|---|---|
| Function | GSM | Queries the arm state of the call-state-change detector. This command never hangs and immediately returns a 1 if the call-state-change detector is armed and a 0 if it is not armed. See "Call Processing State Synchronization" on page 305. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 |
| Programming Example<br><br>`OUTPUT 714;"CALL:CONNECTED:ARM:STATE?" !Returns arm state of`<br>`!call-state-change detector.` | | |

## CALL:CONNected:TIMeout

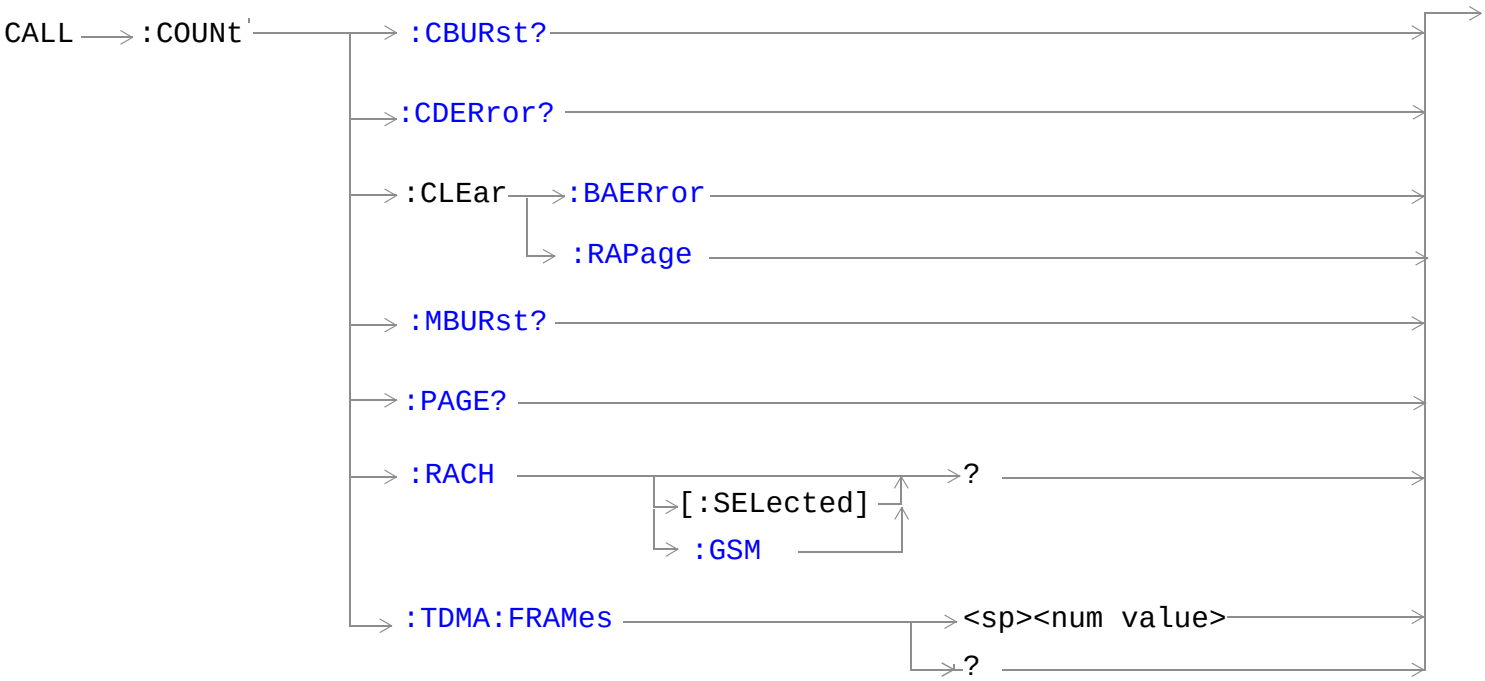
| | | |
|---|---|---|
| Function | GSM | Sets/queries the maximum time the test set will wait for a hanging CALL:CONNected:STATe? query to complete. Default setting units are seconds. To set timeout time in units other than seconds include optional unit specifier in command string.<br><br>A timeout timer is started whenever the call-state-change-detector becomes armed or gets rearmed when already armed. The duration of this timeout is a set using the CALL:CONNected:TIMeout command and should be greater than the maximum amount of time the control program needs/wants 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 into one of the transitory states the GSM defined protocol timers take over and prevent the call state from staying in a transitory state forever. See "Call Processing State Synchronization" on page 305. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 100 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0 to 100 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Related Topics | | "Call Processing State Synchronization" on page 305 |
| | | "Call Processing Event Synchronization" on page 300 |

Programming Example

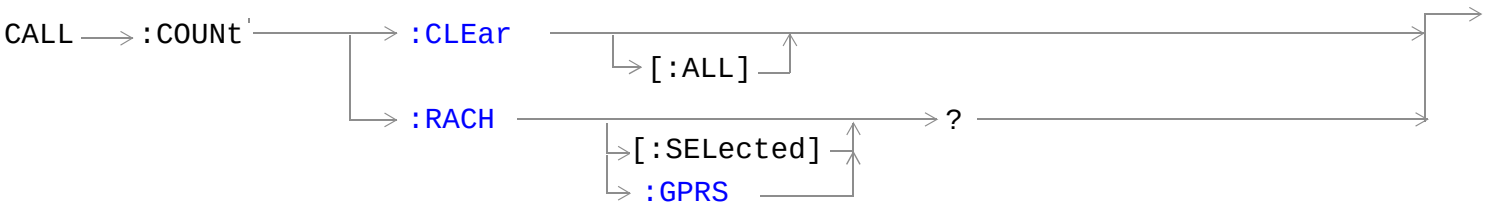
```
OUTPUT 714;"CALL:CONNECTED:TIMEOUT 3" !Sets the CALL:CONNected:STATe? query
                                      !timeout time to 3 seconds.

OUTPUT 714;"CALL:CONNECTED:TIMEOUT 500 MS" !Sets the CALL:CONNected:STATe? query
                                           !timeout time to 500 ms.
```

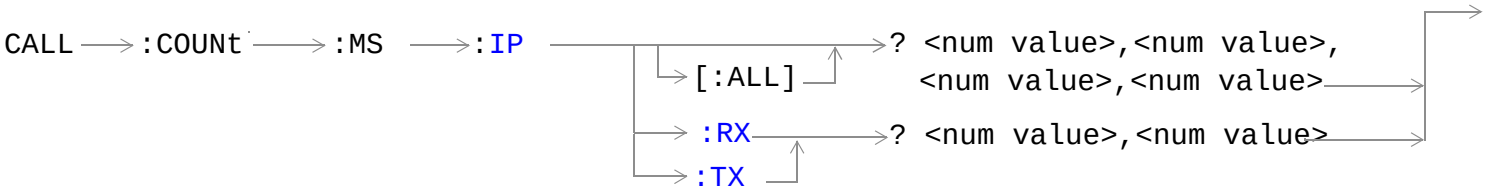
# CALL:COUNt




These commands are not applicable to GPRS.




These commands are not applicable to GSM.




These commands are applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

### CALL:COUNt:CBURst?

| | | |
|---|---|---|
| Function | GSM | Queries the corrupt burst counter. The corrupt burst counter keeps track of the number of uplink bursts where power was detected but the expected midamble could not be found. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99999<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNT:CBURST?" !Queries the corrupt burst counter.` | | |

### CALL:COUNt:CDERror?

| | | |
|---|---|---|
| Function | GSM | Queries the channel decode error counter. The channel decode error counter keeps track of how many channel decoder errors have occurred. Channel decode errors include convolutional, FIRE, and block errors, but not CRC errors. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99999<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNT:CDERROR?" !Queries the channel decode error counter.` | | |

### CALL:COUNt:CLEar[:ALL]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command resets the RACH count result counter to zero. |
| | GPRS LA | This command resets the RACH count result counter to zero. It also clears the reported results for the transmitted and received IP packets and bytes. The reported ping results are also cleared with this command. |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:CLEar" !Clears the RACH count result counter.` | | |

### CALL:COUNt:CLEar:BAERror

| | | |
|---|---|---|
| Function | GSM | This command sets the corrupt burst, missing burst, and decode error counters' count to zero. |
| | GPRS | This command is not applicable to GPRS. |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:CLEar:BAERror" !Clears the corrupt burst, missing burst, and`<br>`!decode error counters` | | |

### CALL:COUNt:CLEar:RAPage

| | | |
|---|---|---|
| Function | GSM | This command sets the RACH and page counters' count to zero. |
| | GPRS | This command is not applicable to GPRS. |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:CLEar:RAPage" !Clears the RACH and page counters.` | | |

### CALL:COUNt:MBURst?

| | | |
|---|---|---|
| Function | GSM | This command queries the missing burst counter. The missing burst counter keeps track of how many uplink bursts, that should have been there, were missing. The missing burst counter does not count idle frames as missing. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99999<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:MBURst?" !Returns the number of missing uplink bursts.` | | |

### CALL:COUNt:MS:IP[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Queries the data transmitted from and received by the device being tested. Data is returned in the following order: packets transmitted, bytes transmitted, packets received, bytes received.<br>The data connection type must be set to IP Data. See "CALL:FUNCtion:DATA:TYPE" . If the data type is not IP Data, this query will return 9.91 E+37. |
| Query | | Range: 0 to 9999999999, 9.91 E+37<br>Resolution: 1 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:MS:IP:ALL?"` | | |

### CALL:COUNt:MS:IP:RX?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Queries the data received by the device being tested. Data is returned in the following order: packets received, bytes received.<br>The data connection type must be set to IP Data. See "CALL:FUNCtion:DATA:TYPE" . If the data type is not IP Data, this query will return 9.91 E+37. |
| Query | | Range: 0 to 9999999999, 9.91 E+37<br>Resolution: 1 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:MS:IP:RX?"` | | |

## CALL:COUNt:MS:IP:TX?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Queries the data transmitted by the device being tested. Data is returned in the following order: packets transmitted, bytes transmitted.<br>The data connection type must be set to IP Data. See "CALL:FUNCtion:DATA:TYPE" . If the data type is not IP Data, this query will return 9.91 E+37. |
| Query | | Range: 0 to 9999999999, 9.91 E+37<br>Resolution: 1 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:MS:IP:TX?"` | | |

## CALL:COUNt:PAGE?

| | | |
|---|---|---|
| Function | GSM | This command queries the page counter. The page counter keeps track of the number of pages sent by the base station (BS) emulator during a BS originated call setup. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 9999<br>Resolution: 1 |
| *RST Setting | | 0 |

Programming Example

```
OUTPUT 714;"CALL:COUNt:PAGE?" !Returns the number of pages sent by the base station
                              !emulator.
```

## CALL:COUNt:RACH[:SELected]?

| | | |
|---|---|---|
| Function | GSM | This command queries the RACH counter in the active (that is the selected) format. The RACH counter keeps track of the number of RACH bursts received by the base station emulator during call setup attempts. |
| | GPRS | This command queries the RACH counter in the active (that is the selected) format. The RACH counter keeps track of the number of RACH bursts received by the base station emulator during data connection setup attempts. |
| Query | | Range: 0 to 9999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:RACH?" !Returns the number of RACH bursts received by the base !station emulator during call setup/data connection attempts.` | | |

## CALL:COUNt:RACH:GPRS?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command queries the RACH counter in the GPRS format whether or not that format is active. The RACH counter keeps track of the number of RACH bursts received by the base station emulator during data connection setup attempts. |
| Query | | Range: 0 to 9999<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:RACH:GPRS?" !Returns the number of RACH bursts received by the base !station emulator during call setup/data connection !attempts.` | | |

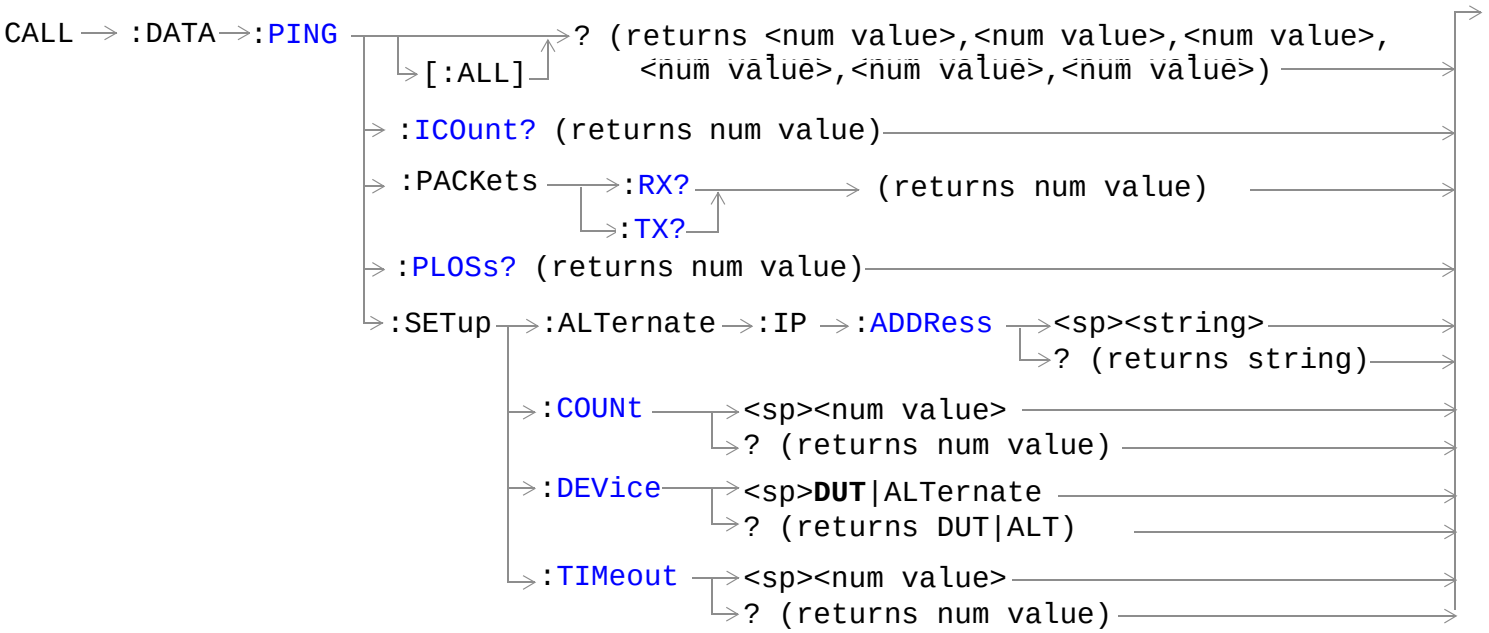
## CALL:COUNt:RACH:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the RACH counter in the GSM format whether or not that format is active. The RACH counter keeps track of the number of RACH bursts received by the base station emulator during call setup attempts. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 9999<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:RACH:GSM?" !Returns the number of RACH bursts received by the base !station emulator during call setup/data connection attempts.` | | |

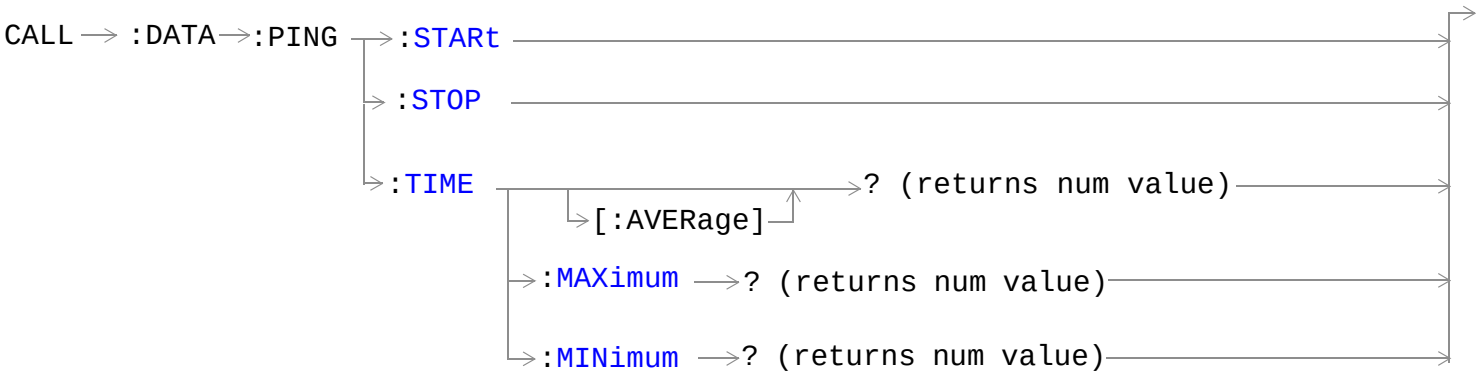
## CALL:COUNt:TDMA:FRAMes

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Max Frames Allowed for Assignment field. The Max Frames Allowed for Assignment field specifies the maximum number of TDMA frames the mobile station is allowed to take, from the start of the assignment or handover command, for a channel assignment. This is only applicable to changes in TCH band, TCH ARFCN or TCH timeslot. Changes to any other TCH parameter will not cause an error to be generated if the number of frames taken to perform the change exceeds the setting of the Max Frames Allowed for Assignment field. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 15 to 999<br>Resolution: 1 |
| Query | | Range: 15 to 999<br>Resolution: 1 |
| *RST Setting | | 28 |
| Programming Example<br>`OUTPUT 714;"CALL:COUNt:TDMA:FRAMes 15" !Sets the number of TDMA frames allowed !before transmitting the new TCH.` | | |

# CALL:DATA:PING




These commands are not applicable to GSM.
These commands apply only to the GPRS *lab* application; they are not applicable to the GPRS *test* application.




These commands are not applicable to GSM.
These commands apply only to the GPRS *lab* application; they are not applicable to the GPRS *test* application.

"Diagram Conventions" on page 323

## CALL:DATA:PING[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command returns the following results: packets transmitted, packets received, percent packets lost, minimum round trip time (in seconds), average round trip time (in seconds), maximum round trip time (in seconds).<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:ALL?"` | | |

## CALL:DATA:PING:ICOunt?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the value that is available when the query is received. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:ICOUNT?"` | | |

## CALL:DATA:PING:PACKets:RX?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the number of packets received from the device being tested.<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:PACKETS:RX?"`<br>`!Queries the number of packets received from the device being tested.` | | |

### CALL:DATA:PING:PACKets:TX?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This queries the number of packet transmitted from the test set.<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:PACKETS:TX?"`<br>`!Queries the number of packets transmitted from the test set.` | | |

### CALL:DATA:PING:PLOSs?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the percentage of packets lost during the ping session.<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:PLOSS?" !Queries the percentage of lost packets.` | | |

### CALL:DATA:PING:SETup:ALTernate:IP:ADDRess

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This sets/queries the alternate internet protocol (IP) address. This address will be used as the address to ping instead of the device under test if the "CALL:DATA:PING:SETup:DEVice" command is set to ALT. |
| Setting | | Range: IP v4 address in dotted decimal format. |
| Query | | Range: IP v4 address in dotted decimal format. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:SETUP:ALTERNATE:IP:ADDRESS '192.168.16.57'"` | | |

## CALL:DATA:PING:SETup:COUNt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command set/queries the number of ping IP messages sent for each uninterrupted invocation of the "CALL:DATA:PING:STARt" command. |
| Setting | | Range: 0 to 1000 |
| Query | | Range: 0 to 1000 |
| Requirements | | GPRS Lab Application |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:SETUP:COUNT 20"` | | |

## CALL:DATA:PING:SETup:DEVice

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries which device address is used in the ping IP packets, the address of the device under test, or the address of an alternate device. |
| Setting | | Range: DUT\|ALTernate |
| Query | | Range: DUT\|ALT |
| Requirements | | GPRS Lab Application |
| *RST Setting | | DUT |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:SETUP:DEVICE ALTERNATE"` | | |

### CALL:DATA:PING:SETup:TIMeout

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets queries the how long the test set will wait before ending a ping session.<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Setting | | Range: 1 to 100 seconds |
| Query | | Range: 1 to 100 seconds |
| Requirements | | GPRS Lab Application |
| *RST Setting | | 5 seconds |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:SETUP:TIMEOUT 10"` | | |

### CALL:DATA:PING:STARt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command starts a ping session. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:START"` | | |

### CALL:DATA:PING:STOP

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command immediately stops a ping session. The ping results will not include counts for any ping message that has not yet received a response or that has timed out. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:STOP"` | | |

### CALL:DATA:PING:TIME[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the average round trip time (in seconds).<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:TIME:AVERAGE?"` | | |

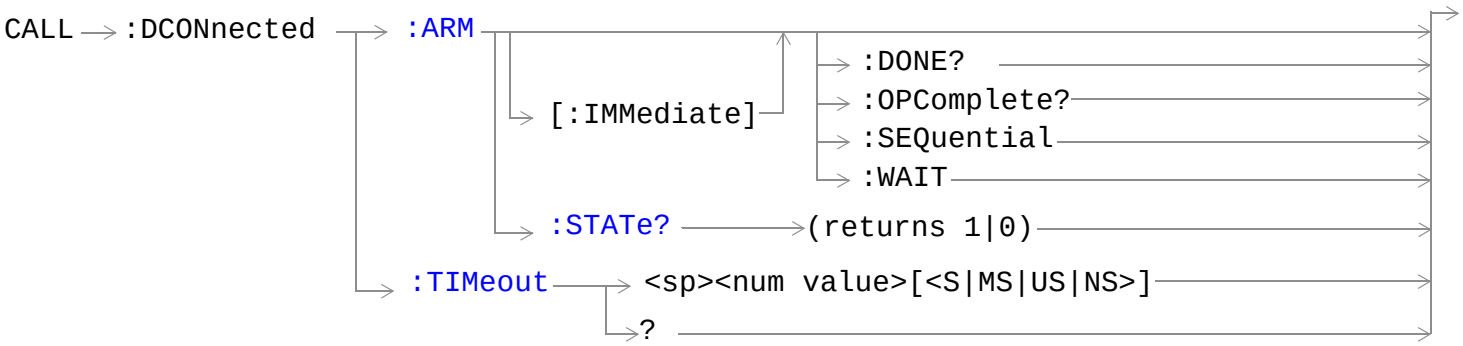
### CALL:DATA:PING:TIME:MAXimum?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the maximum round trip time (in seconds).<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:TIME:MAXIMUM?"` | | |

### CALL:DATA:PING:TIME:MINimum?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the minimum round trip time (in seconds).<br>This command will return 9.91 E+37 if the CALL:FUNCtion:DATA:TYPE command is not set to IPData, or if ping results are not available. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:DATA:PING:TIME:MINIMUM?"` | | |

# CALL:DCONnected




These commands are not applicable to GSM.

"Diagram Conventions" on page 323

### CALL:DCONnected:ARM[:IMMediate]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets (arms) the data connection state change detector. Arming the data connection state change detector allows the control program to tell the test set that it is expecting a change to the state of a data connection prior to initiating the state change.<br><br>Once armed, the detector remains armed until there is a data connection state change to Idle, Attached or Transferring, from one of the transitory states. The data connection state change detector is not disarmed by a connection state change to one of the transitory states, nor is it disarmed by any transitions from Idle to Idle, Attached to Attached or Transferring to Transferring.<br><br>When this command is used in conjunction with CALL:ATTached:STATe?, CALL:TRANsferring:STATe?, and CALL:DCONnected:TIMeout, it allows the control program to synchronize to data connection/disconnection. See "Data Connection Processing State Synchronization" on page 317.<br><br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Data Connection Processing Event Synchronization" on page 314. |
| Programming Example<br><br>`OUTPUT 714;"CALL:DCONnected:ARM:IMMediate" !Arms the data connection state change detector.` | | |

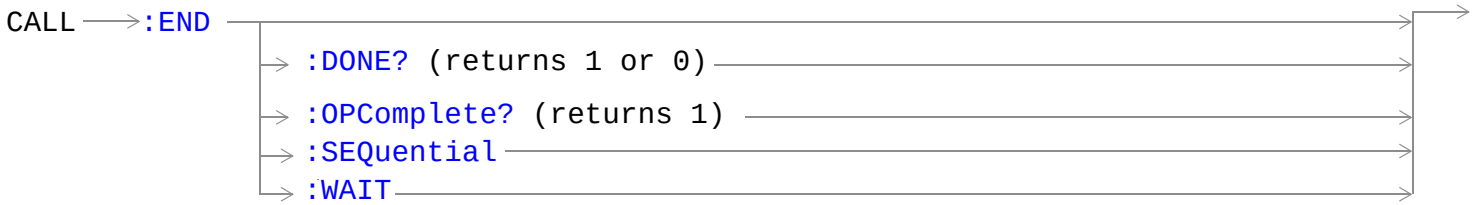
## CALL:DCONnected:ARM:STATe?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries whether the data connection state change detector is armed or not. This command immediately returns a 1 if the data connection state change detector is armed and a 0 if it is not armed. See "Data Connection Processing State Synchronization" on page 317. |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:DCONnected:ARM:STATe?" !Returns arm state of`<br>`!data connection state change detector` | | |

## CALL:DCONnected:TIMeout

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries the maximum time the test set will wait for a hanging CALL:ATTached[:STATe]? and CALL:TRANsferring[:STATe]? query to complete. The default setting units are seconds.<br>A timeout timer is started whenever the data connection state change detector becomes armed. You can set the duration of the timeout using this command. The timeout should be greater than the maximum amount of time the control program needs to wait between arming the data connection state change detector and the connect/disconnect operation starting. Once the process starts and the data connection state has moved into one of the transitory states the pre-defined GPRS timers prevent the data connection state from staying in a transitory state forever. See "Data Connection Processing State Synchronization" on page 317. |
| Setting | | Range: 0 to 100 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0 to 100 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Related Topics | | "Data Connection Processing State Synchronization" on page 317 |
| | | "Data Connection Processing Event Synchronization" on page 314 |
| Programming Example<br>`OUTPUT 714;"CALL:DCONnected:TIMeout 3" !Sets the CALL:DCONected: STSTe? query timeout time to 3`<br>`!seconds.` | | |

# CALL:END




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL:END

| | | |
|---|---|---|
| Function | GSM | Overlapped command used to terminate the active call. |
| | GPRS | This command is not applicable to GPRS. |

Programming Example

```
OUTPUT 714;"CALL:END" !Terminate the call.
```

## CALL:END:DONE?

| | | |
|---|---|---|
| Function | GSM | Query only command which returns a 1 if the previously issued overlapped CALL:END command is done, or a 0 if the previously issued overlapped CALL:END command is not done. This command does not terminate the active call. This command is used to determine if a previously issued overlapped command is done or not. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0\|1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:END" !Send command to terminate active call.
LOOP
OUTPUT 714;"CALL:END:DONE?" !Send query to see if CALL:END command is done.
                            !Returns 1 if CALL:END command is finished.
                            !Returns 0 if CALL:END command is not finished.
ENTER 714; Callend_is_done
EXIT IF Callend_is_done
END LOOP
```

## CALL:END:OPComplete?

| | | |
|---|---|---|
| Function | GSM | Query only command which places a 1 in the output queue when the previously issued overlapped CALL:END command is done. This command does not terminate the active call. This command is used to determine when a previously issued overlapped command is done. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 |
| *RST Setting | | 1 |

Programming Example

```
OUTPUT 714;"CALL:END" !Send command to terminate active call.
OUTPUT 714;"CALL:END:OPC?" !Send query to determine when CALL:END command is
                           !done.
ENTER 714; Callend_is_done !Program hangs here until CALL:END command
                           !is finished.
                           !When CALL:END is done a 1 is put in output queue, ENTER
                           !is satisfied and program continues execution.
```

### CALL:END:SEQuential

| | | |
|---|---|---|
| Function | GSM | Terminate the active call but force the overlapped CALL:END command to execute as a sequential command. This command does terminate the active call. The :SEQuential modifier forces an overlapped command to execute as a sequential command. |
| | GPRS | This command is not applicable to GPRS. |

Programming Example

```
OUTPUT 714;"CALL:END:SEQUENTIAL" !Terminate the active call with
                                 !sequential operation.
```

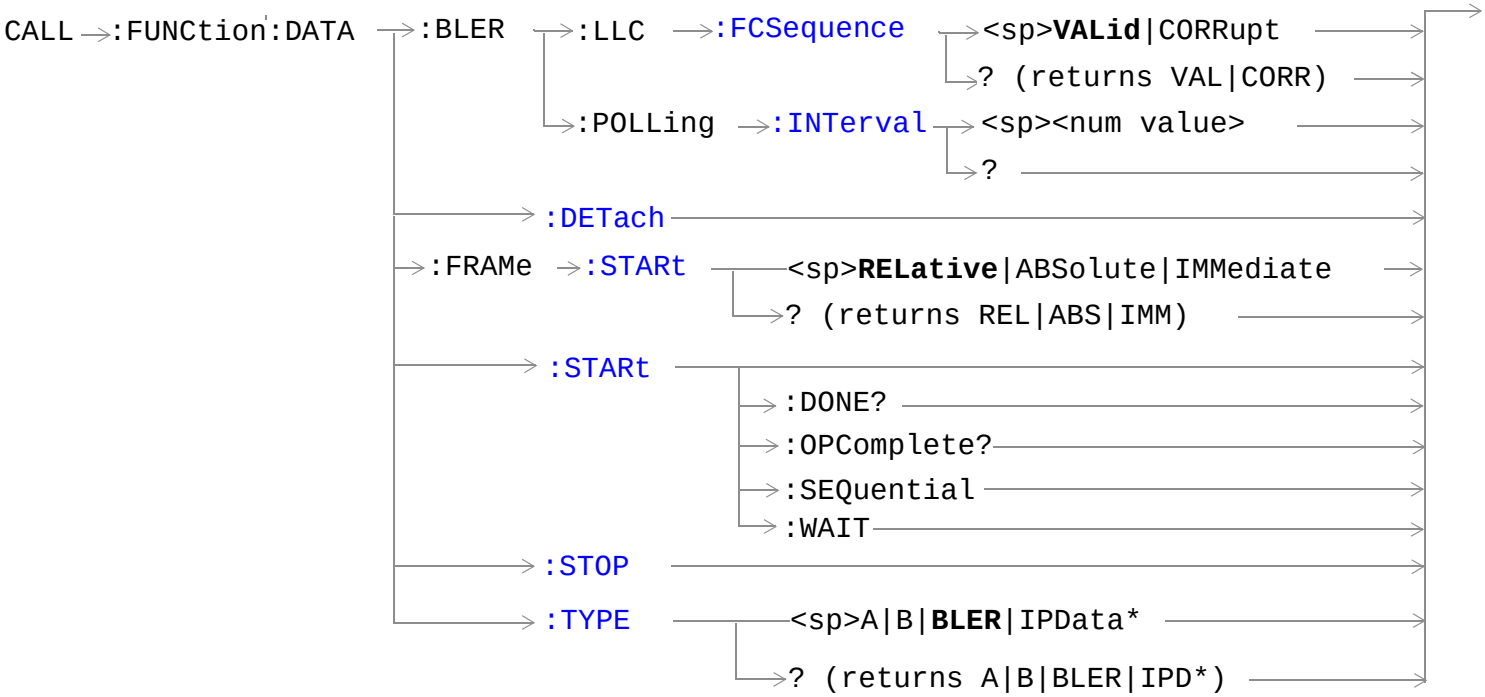
### CALL:END:WAIT

| | | |
|---|---|---|
| Function | GSM | Terminate the active call but force the test set to process no more GPIB commands until the previously issued overlapped CALL:END command is finished. This command does not terminate the active call. This command is used to halt processing of GPIB commands from the test set's GPIB input buffer until the previously issued overlapped command is finished. |
| | GPRS | This command is not applicable to GPRS. |
| Related Topics | | "Call Processing Event Synchronization" on page 300<br>"Call Processing State Synchronization" on page 305 |

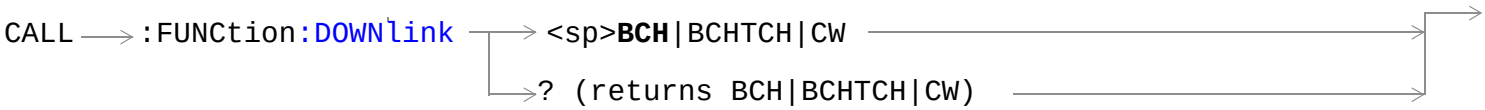
Programming Example

```
OUTPUT 714;"CALL:END" ! Terminate the active call.
OUTPUT 714;"CALL:COUNT:CLEAR:BAERROR" !Clear the burst and decode
                                      !error counters.
OUTPUT 714;"CALL:COUNT:CLEAR:RAPAGE" !Clear the RACH and Page counters.
OUTPUT 714;"CALL:END:WAIT" !Wait here until CALL:END is finsihed.
OUTPUT 714;"CALL:ORIGINATE" !Originate a new call.
```

# CALL:FUNCtion




These commands are not applicable to GSM.
*This data type is applicable only to the GPRS *lab* application.




This command is not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL:FUNCtion:DATA:BLER:LLC:FCSequence

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries whether or not the Logical Link Control (LLC) Frame Check Sequence (FCS) is corrupted in order to establish a BLER mode data connection.<br><br>Setting this parameter to VALid ensures that the cyclic redundancy check code within the FCS is valid.<br><br>Setting this parameter to CORRupt causes the test set to transmit an invalid FCS to the mobile. This setting may enable some mobiles to establish a BLER mode data connection which would not otherwise be possible with a valid FCS.<br><br>This parameter is only applicable when the data connection type is set to BLER using "CALL:FUNCtion:DATA:TYPE" on page 408.<br><br>If you change this parameter while the data connection type is any type other than BLER, the setting has no effect until a new BLER mode data connection is established.<br><br>This command along with "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406 provides you with additional control over BLER data connection type settings. This may enable the test set to establish a BLER mode data connection with mobiles which cannot connect under normal conditions. |
| Setting | | Range: VALid \| CORRupt |
| Query | | Range: VAL \| CORR |
| *RST Setting | | VALid |

Programming Example

```
OUTPUT 714;"CALL:FUNCTION:DATA:BLER:LLC:FCSEQUENCE CORRUPT" !Sets the test set to transmit
                                                            ! an invalid FCS to the mobile.
```

## CALL:FUNCtion:DATA:BLER:POLLing:INTerval

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the block polling interval during a BLER mode data connection. For example, if you set this parameter to a value of 4, polling is performed once in every four blocks.<br>This parameter is only applicable when the data connection type is set to BLER using "CALL:FUNCtion:DATA:TYPE" on page 408.<br>If you change this parameter while the data connection type is any type other than BLER, the setting has no effect until a new BLER mode data connection is established.<br>This command along with "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405 provides you with additional control over BLER data connection type settings. This may enable the test set to establish a BLER mode data connection with mobiles which cannot connect under normal conditions. |
| Setting | | Range: 1 to 32<br>Resolution: 1 |
| Query | | Range: 1 to 32<br>Resolution: 1 |
| *RST setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:FUNCTION:DATA:BLER:POLLING:INTERVAL 8" !Sets the block polling interval to !8.` | | |

## CALL:FUNCtion:DATA:DETach

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command performs a test set initiated GPRS Detach. |
| Programming Example<br>`OUTPUT 714;"CALL:FUNCTION:DATA:DETACH" !Detaches the mobile from the test set.` | | |

## CALL:FUNCtion:DATA:FRAMe:STARt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the type of frame numbering scheme to be used when establishing a data connection.<br><br>Changing the frame numbering scheme may enable the test set to establish a data connection with mobiles which cannot connect under normal conditions.<br><br>When you set this command to:<br><br>• RELative, the test set sends the starting frame number to the mobile as a relative offset from the current frame.<br><br>• ABSolute, the test set sends the starting frame number to the mobile as an absolute frame number.<br><br>• IMMediate, the test set sends the starting frame number as an immediate assignment.<br><br>It is recommended that you should not change this parameter while the data connection status is Starting, as there is no guarantee whether the new setting or the previous setting will be used for the current data connection.<br><br>If the type of data connection you want to establish is BLER, the commands "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405 and "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406 may also be helpful in enabling the test set to establish a data connection with mobiles which cannot establish a BLER data connection under normal conditions. |
| Setting | | Range: RELative \| ABSolute \| IMMediate |
| Query | | Range: REL \| ABS \| IMM |
| *RST Setting | | REL |
| Programming Example<br><br>`OUTPUT 714;"CALL:FUNCTION:DATA:FRAME:START ABSOLUTE" !Sets the frame number type to !Absolute.` | | |

## CALL:FUNCtion:DATA:STARt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command attempts to start the data connection. See "Data Connection Processing Event Synchronization" on page 314.<br><br>Additional commands can be appended to aid in controller/mobile station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 315 for examples. |
| Programming Example<br><br>`OUTPUT 714;"CALL:FUNCTION:DATA:START" !Starts data connection.` | | |

## CALL:FUNCtion:DATA:STOP

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command ends the data connection. |
| Programming Example<br>`OUTPUT 714;"CALL:FUNCTION:DATA:STOP" !Ends data connection.` | | |

## CALL:FUNCtion:DATA:TYPE

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command sets/queries the type of data connection that is used when you use the command "CALL:FUNCtion:DATA:STARt" on page 407 to start a data connection.<br><br>If you set this parameter to ETSI Type A, no packet data traffic channel (PDTCH) bursts will be transmitted on the downlink. Setting this parameter to ETSI Type B ensures that one or more downlink (PDTCH) bursts are present, which can be used to loopback data through the uplink. The number of downlink bursts is determined by the setting of the command "CALL:PDTCH:MSLot:CONFiguration" on page 460. ETSI Type B is required if you want to perform BER measurements in active cell mode.<br><br>Setting this parameter to BLER ensures that an Agilent proprietary data connection type is used which allows the test set to obtain BLock Error Rate (BLER) measurement reports from the mobile station (see "Block Error Rate (BLER) Report Measurement Description" on page 47). In addition, the BLER data connection type allows you to perform other GPRS measurements at the same time (except BER and ORFS due to Modulation).<br><br>It is recommended that you should always end the data connection (using "CALL:FUNCtion:DATA:STOP" on page 408) before changing the data connection type. If you change this parameter while the data connection status is transferring, the data connection will be dropped (changing the data connection status to attached), and an error message will be generated. |
| | GPRS LA | In addition to the functions of the GPRS TA (above), the lab application has the following effects:<br><br>• When the data connection type is IPData, BER measurements will not be accurate due to synchronization problems. However, BLER measurements are not affected.<br><br>• Logging is possible with all data types, but if the data type is not IPData, no log information will be generated for SNDCP and IP. |
| Setting | | Range:<br><br>• GPRS TA: A\|B\|BLER<br><br>• GPRS LA: A\|B\|BLER\|IPData |
| Query | | Range:<br><br>• GPRS TA: A\|B\|BLER<br><br>• GPRS LA: A\|B\|BLER\|IPD |
| *RST Setting | | BLER |

| Programming Example |
| --- |
| `OUTPUT 714;"CALL:FUNCTION:DATA:TYPE B" !Sets the data connection type to ETSI Type B.` |

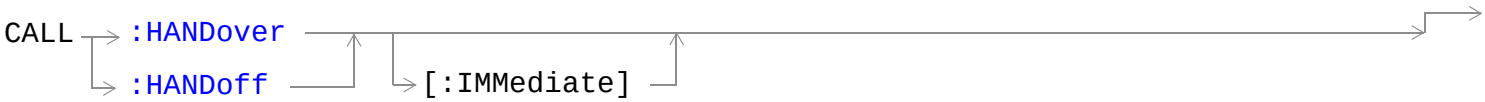
### CALL:FUNCtion:DOWNlink

| | | |
| --- | --- | --- |
| Function | GSM | This command sets/queries the downlink signal configuration when Operating Mode = Test mode. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: BCH \| BCHTCH \| CW |
| Query | | Range: BCH \| BCHTCH \| CW |
| *RST Setting | | BCH |
| Related Topics | | "Test Mode Operating Modes" on page 101 |

Programming Example

```
OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCHTCH" !Sets Test Mode downlink
                                           !configuration to generate a
                                           !broadcast channel (BCH) and a
                                           !traffic channel (TCH).
```

# CALL:HANDover|HANDoff



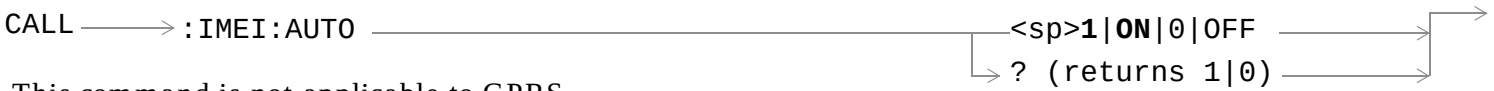

This command is not applicable to GSM.

"Diagram Conventions" on page 323

## CALL:HANDover | HANDoff[:IMMediate]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command applies the deferred PDTCH parameters to the active PDTCH. These parameters are:<br>• Deferred PDTCH Band<br>• Deferred PDTCH ARFCN [band]<br>• Deferred mobile station TX Level [burst][band]<br>• Deferred Multislot Configuration<br>• Deferred Coding Scheme<br>• Deferred P0<br>For more information on the use of deferred parameters see "Using Deferred Parameters" on page 128.<br>The action taken when this command is set depends on the setting of the cell operating mode and the data connection status:<br>• When the cell operating mode is set to Active Cell (see "CALL:OPERating" on page 441) and the data connection status is Transferring, this command causes any necessary over-the-air signaling to modify the PDTCH resources (frequency, power level, timeslot assignment and coding scheme). The immediate settings are updated with the deferred settings just applied and the current downlink PDTCH levels are updated.<br>• When the cell operating mode is set to Active Cell (see "CALL:OPERating" on page 441) and the data connection status is any state other than Transferring, this command does not cause any over -the-air signaling with the mobile station. The immediate settings are updated with the deferred settings just applied.<br>• When the cell operating mode is not set to Active Cell, this command replaces any active PDTCHs with new PDTCHs using the new parameters. If there are no active PDTCHs, the new values will be remembered until there is an active PDTCH. In either case, the immediate settings are updated with the deferred settings just applied and the current downlink PDTCH levels are updated. |
| Programming Example<br>`OUTPUT 714;"CALL:HANDover:IMMediate"` | | |

# CALL:IMEI



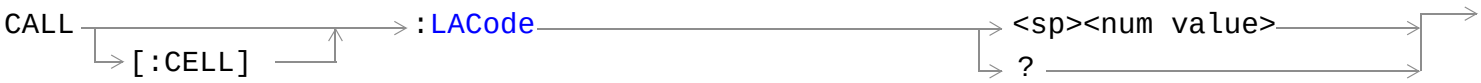

This command is not applicable to GPRS.

"Diagram Conventions" on page 323

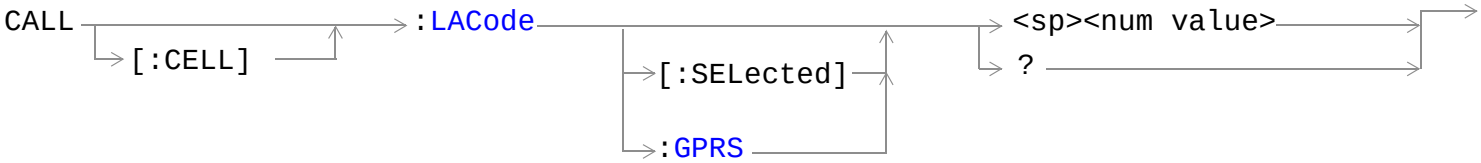
## CALL:IMEI:AUTO

| | | |
|---|---|---|
| Function | GSM | Sets/queries whether or not the base station emulator should request the international mobile equipment identity (IMEI) on call setup. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:IMEI:AUTO OFF" !Sets automatically get IMEI state to OFF.` | | |

# CALL:LACode




This command is not applicable to GPRS.




This command is applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL[:CELL]:LACode

| | | |
|---|---|---|
| Function | GSM | Sets/queries the value of the cell's Location Area Code (LAC). This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 65535<br>Resolution: 1 |
| Query | | Range: 0 to 65535<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:LACODE 456" !Sets the cell's location area code 456.` | | |

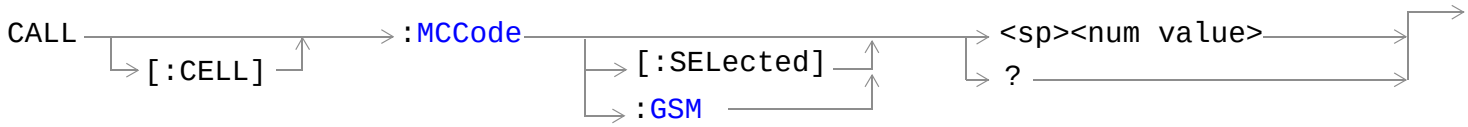
## CALL[:CELL]:LACode[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the cell's Location Area Code (LAC) for the active (that is the selected) format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 65535<br>Resolution: 1 |
| Query | | Range: 0 to 65535<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:LACODE:SELECTED 456" !Sets the cell's location area code 456.` | | |

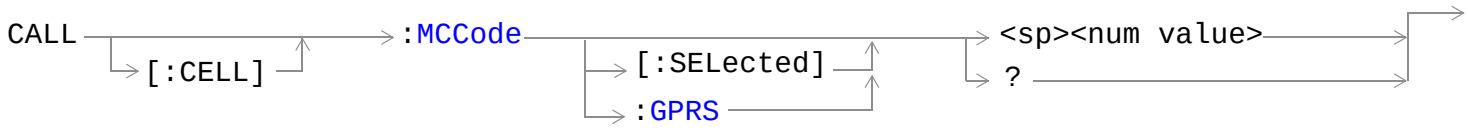
## CALL[:CELL]:LACode:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the cell's Location Area Code (LAC) for the GPRS format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 65535<br>Resolution: 1 |
| Query | | Range: 0 to 65535<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:LACODE:GPRS 456" !Sets the cell's location area code 456.` | | |

# CALL:MCCode




This command is not applicable to the GPRS.




This command is applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL[:CELL]:MCCode[:SELected]

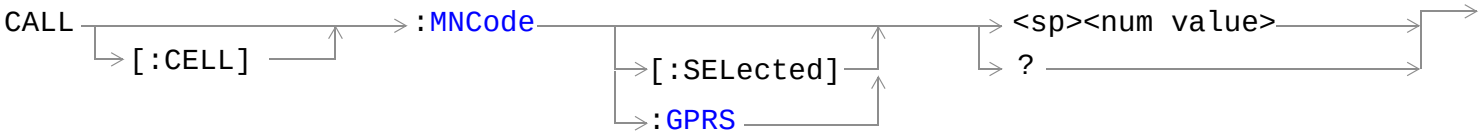
| | | |
|---|---|---|
| Function | GSM | Sets/queries the value of the Mobile Country Code (MCC) for the active (that is the selected) format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the Mobile Country Code (MCC) for the active (that is the selected) format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:MCCODE:SELECTED 4" !Sets the cell's mobile country code to 4.` | | |

## CALL[:CELL]:MCCode:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the Mobile Country Code (MCC) for the GPRS format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:MCCODE:GPRS 4" !Sets the cell's mobile country code to 4.` | | |

# CALL:MNCode

This command is not applicable to GPRS.




This command is applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL[:CELL]:MNCode

| | | |
|---|---|---|
| Function | GSM | Sets/queries the value of the Mobile Network Code (MNC). This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 99<br>Resolution: 1 |
| Query | | Range: 0 to 99<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:MNCODE 45" !Sets the cell's mobile network code to 45.` | | |

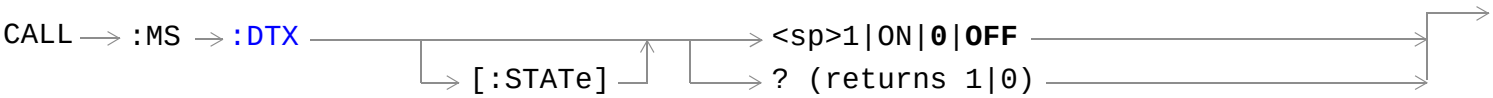
## CALL[:CELL]:MNCode[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the Mobile Network Code (MNC) for the active (that is the selected) format. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 99<br>Resolution: 1 |
| Query | | Range: 0 to 99<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | "Configuring the Broadcast Channel (BCH)" on page 110 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:MNCODE:SELECTED 45" !Sets the cell's mobile network code to 45.` | | |

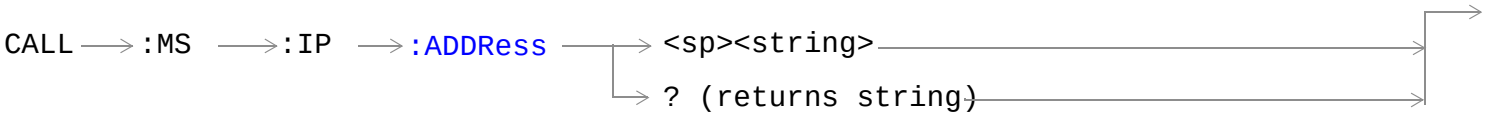
## CALL[:CELL]:MNCode:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the value of the Mobile Network Code (MNC) for the GPRS format. This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 338). |
| Setting | | Range: 0 to 99<br>Resolution: 1 |
| Query | | Range: 0 to 99<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | “Configuring the Broadcast Channel (BCH)” on page 110 |
| Programming Example<br>`OUTPUT 714;”CALL:CELL:MNCODE:GPRS 45” !Sets the cell’s mobile network code to 45.` | | |

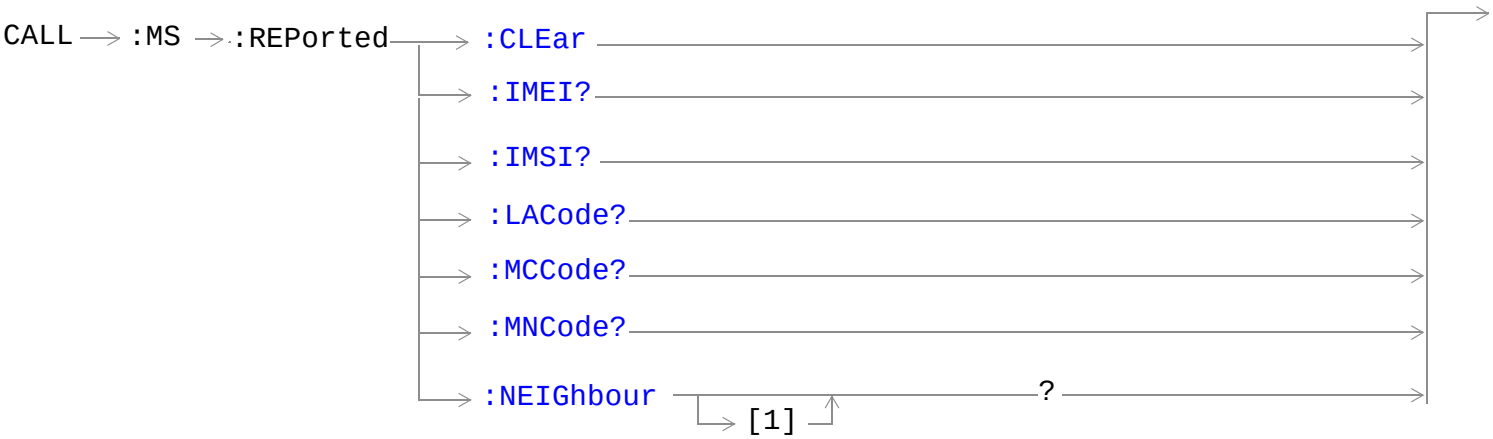
# CALL:MS



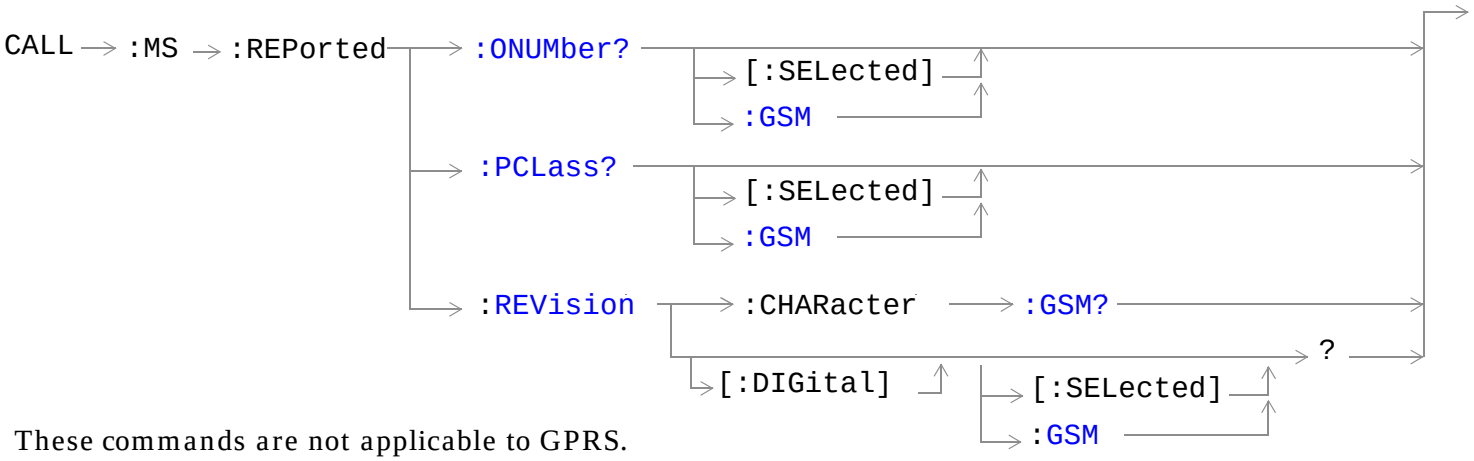

This command is not applicable to GPRS.



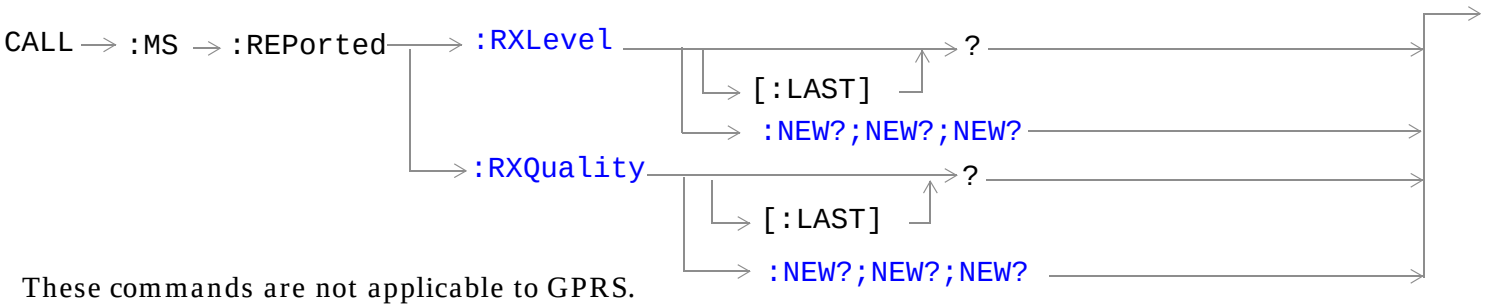

This command is applicable only to the GPRS *lab* application.



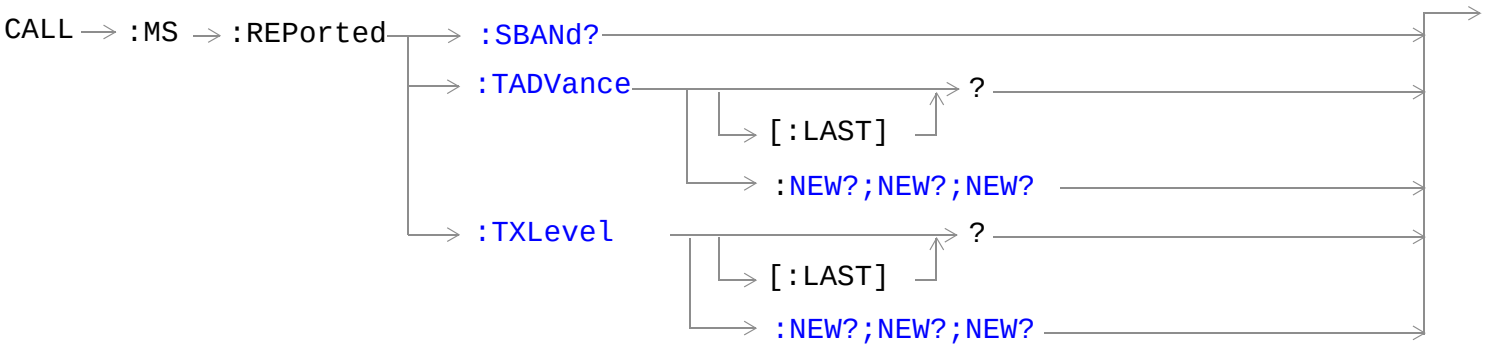

These commands are not applicable to GPRS.

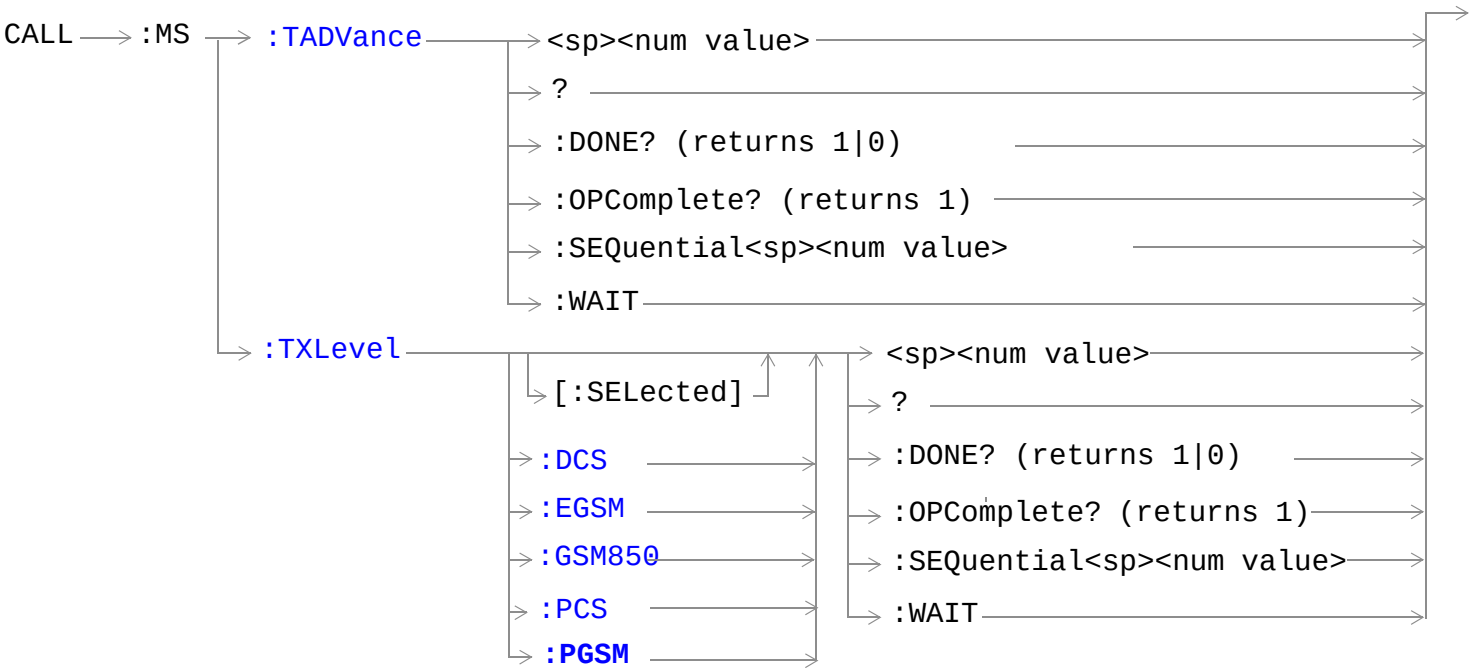



These commands are not applicable to GPRS.

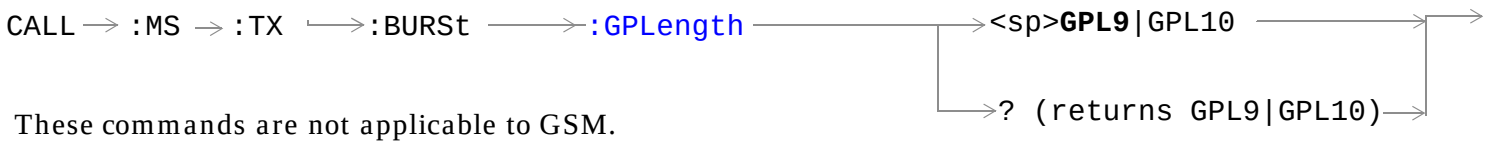



These commands are not applicable to GPRS.






These commands are not applicable to GPRS.




These commands are not applicable to GSM.

"Diagram Conventions" on page 323

## CALL:MS:DTX[:STATe]

| | | |
|---|---|---|
| Function | GSM | This command turns the mobile station Discontinuous Transmission (DTX) on or off. The query form returns a 1 (state = on) or a 0 (state = off). See "Configuring Mobile Station Operating Parameters" on page 97. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0\|OFF |

Programming Example

```
OUTPUT 714;"CALL:MS:DTX OFF" !Turns mobile station discontinuous
                             !transmission OFF.
```

## CALL:MS:IP:ADDRess

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to GPRS test application. |
| | GPRS LA | This command sets/queries the mobile station's internet protocol (IP) address. The address is and IP v4 address written in dotted decimal format, for example 147.123.159.15. The entered address must be on the same subnet as the test set (but it cannot have an identical address). The subnet is defined through the combination of the test set's LAN IP address ("SYSTem:COMMunicate:LAN[:SELF]:ADDRess" ) and its subnet mask ("SYSTem:COMMunicate:LAN[:SELF]:SMASk" ).<br><br>Values entered for this command are stored in non-volatile memory and will persist after the instrument is reset or power-cycled.<br><br>Any part of this address with leading zeros (for example, 145.156.063.12) will have the leading zeros removed. Most operating systems treat parts of IP addresses entered with leading zeros as octal numbers, the test set does not. |
| *RST Setting | | none |

Programming Example

```
OUTPUT 714;"CALL:MS:IP:ADDRESS?"
```

## CALL:MS:REPorted:CLEar

| | | |
|---|---|---|
| Function | GSM | This command clears the mobile station SAACH reported items. The values of the four mobile reported items - that is, Timing Adv, Tx Level, Rx Level and Rx Qual - are set to 9.91E+37 (NAN). |
| | GPRS | This command is not applicable to GPRS. |

Programming Example

```
OUTPUT 714;"CALL:MS:REPORTED:CLEAR"
```

### CALL:MS:REPorted:IMEI?

| | | |
|---|---|---|
| Function | GSM | This command queries the International Mobile Equipment Identity of the ME. An ME is a mobile station without a SIM.<br>This parameter is reported if the IMEI:AUTO state is ON, see "CALL:IMEI" on page 412 or the mobile station has no SIM. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: up to 15 decimal digits and ""<br>Resolution: 1 |
| *RST Setting | | "" (null string) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:IMEI?"` | | |

### CALL:MS:REPorted:IMSI?

| | | |
|---|---|---|
| Function | GSM | This command queries the International Mobile Subscriber Identity of the SIM in the mobile station. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: up to 15 decimal digits and ""<br>Resolution: 1 |
| *RST Setting | | "" (null string) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:IMSI?"` | | |

### CALL:MS:REPorted:LACode?

| | | |
|---|---|---|
| Function | GSM | This command queries the last Location Area Code the mobile station was camped on. |
| | GPRS | This command is not applicable to GPRS. |
| Range | | 0 to 65535 (default: NAN) |
| Data Type | | Real |
| Query | | Range: 0 to 65535 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:LACODE?"` | | |

### CALL:MS:REPorted:MCCode?

| | | |
|---|---|---|
| Function | GSM | This command queries the last Mobile Country Code the mobile station was camped on. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 999 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:MCCODE?"` | | |

### CALL:MS:REPorted:MNCode?

| | | |
|---|---|---|
| Function | GSM | This command queries the last Mobile Network Code the mobile station was camped on. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:MNCODE?"` | | |

### CALL:MS:REPorted:NEIGhbour[1]?

| | | |
|---|---|---|
| Function | GSM | This query will return 4 data items separated by commas for neighbor cell one.<br>ARFCN, RFLEVEL,NCC,BCC are returned in that order. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 1023 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:NEIGHBOUR?"!Returns ARFCN,RFLEVEL,NCC,BCC in`<br>`!that order.` | | |

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

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station for the originated number keyed in on the mobile station for the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: up to 21 ASCII characters and ““<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:ONUMBER:SELECTED?" !Returns the phone number of the last`<br>`!MS that called the test set.` | | |

### CALL:MS:REPorted:ONUMber:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station for the originated number keyed in on the mobile station. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: up to 21 ASCII characters and ““<br>Resolution: 1 |
| *RST Setting | | ““ (null string) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:ONUMBER:GSM?" !Returns the phone number of the last`<br>`!MS that called the test set.` | | |

### CALL:MS:REPorted:PCLass[:SELected]?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station for its Power Class mark for the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range:<br>PGSM \| EGSM \| GSM850 = 1 to 5 and 9.91E+37<br>DCS \| PCS = 1 to 3 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:PCLASS:SELECTED?" !Returns the mobile's power class.` | | |

### CALL:MS:REPorted:PCLass:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the GSM mobile station for its Power Class mark. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range:<br>PGSM \| EGSM \| GSM850 = 1 to 5 and 9.91E+37<br>DCS \| PCS = 1 to 3 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:PCLASS:GSM?" !Returns the MS reported power class.` | | |

### CALL:MS:REPorted:REVision:CHARacter:GSM?

| | | |
|---|---|---|
| Function | GSM | Prior to the A.07 revision you would have used the command CALL:MS:REPorted:REVision? to query which phase of the GSM standards your mobile complies with. However, this command had to change at A.07 to allow it to operate in the fast switching environment with AMPS/136. If you previously used the old command you will need to change it to this command to allow your code to run. Sorry for the inconvenience.<br><br>If you are using GSM A.07 and had never used the original command, it is recommended that you don't use this command. Instead, you should use the "CALL:MS:REPorted:REVision[:DIGital]:GSM?" command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: UNKNown \| PHASe1 \| PHASe2 |
| *RST Setting | | PHASe2 |

Programming Example

```
OUTPUT 714;"CALL:MS:REPORTED:REVISION:CHARACTER:GSM?" !Returns the MS reported
                                                      ! protocol version.
```

### CALL:MS:REPorted:REVision[:DIGital][:SELected]?

| | | |
|---|---|---|
| Function | GSM | This command queries the MS on the active (that is the selected) format to determine which phase of the standard it complies with. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range:<br>9.91E+37 (NAN) = Unknown<br>+1.00000000E+000 = Phase 1<br>+2.00000000E+000 = Phase 2 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"CALL:MS:REPORTED:REVISION:DIGITAL:SELECTED?" !Returns the MS reported
                                                         !protocol version.
```

### CALL:MS:REPorted:REVision[:DIGital]:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station to determine which phase of GSM standards it complies with. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range:<br>9.91E+37 (NAN) = Unknown<br>+1.00000000E+000 = Phase 1<br>+2.00000000E+000 = Phase 2 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:REVISION:DIGITAL:GSM?" !Returns the MS reported !protocol version.` | | |

### CALL:MS:REPorted:RXLevel[:LAST]?

| | | |
|---|---|---|
| Function | GSM | This command queries the received level of the TCH in dB (relative to -110 dBm) which the mobile station measured during the last SACCH multiframe. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 63 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:RXLEVEL:LAST?"` | | |

### CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?

| | | |
|---|---|---|
| Function | GSM | This command queries the received level of the TCH in dB (relative to -110 dBm) which the mobile station measured.<br>Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent or until 10 seconds have elapsed at which point the test set times out.<br>This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 68 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:RXLEVEL:NEW?;NEW?;NEW?" !The third result is valid.` | | |

### CALL:MS:REPorted:RXQuality[:LAST]?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station reported quality of the signal used for the RX Level during the last SACCH report. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 7 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:RXQUALITY:LAST?"` | | |

### CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station reported received quality from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent or until 10 seconds have elapsed at which point the test set times out.<br>This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 7 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:RXQUALITY:NEW?;NEW?;NEW?" ! The third result is valid.` | | |

### CALL:MS:REPorted:SBANd?

| | | |
|---|---|---|
| Function | GSM | This command queries for the frequency band supported by the mobile station. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: PGSM \| EGSM \| DCS \| PCS \| GSM850 \| "" |
| *RST Setting | | "" (null string) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:SBAND?"` | | |

### CALL:MS:REPorted:TADVance[:LAST]?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station for the last TCH Timing Advance actually used by the mobile station. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 63 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:TADVANCE:LAST?"` | | |

### CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station reported timing advance from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent or until 10 seconds have elapsed at which point the test set times out.<br>This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 63 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:TADVANCE:NEW?;NEW?;NEW?" ! The third result is valid.` | | |

### CALL:MS:REPorted:TXLevel[:LAST]?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station for the last reported transmit level. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 31 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:TXLEVEL:LAST?"` | | |

### CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?

| | | |
|---|---|---|
| Function | GSM | This command queries the mobile station reported transmit level from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent or until 10 seconds have elapsed at which point the test set times out.<br>This will return 3 variables the first two must be ignored, the value from the third new query is valid data. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 31 and 9.91E+37<br>Resolution: 1 |
| *RST Setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?" The third result is valid.` | | |

### CALL:MS:TADVance

| | | |
|---|---|---|
| Function | GSM | This command sets the mobile station's uplink TCH timing advance.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 63<br>Resolution: 1 |
| *RST Setting | | zero |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TADVANCE 3" !Sets the mobile station TCH Timing Advance to 3 on !the uplink.` | | |

## CALL:MS:TX:BURSt:GPLength

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command defines the width of the guard period between the two uplink bursts. The command and parameters to use are determined by the mobile station segmentation of the TDMA frame and the particular bursts transmitted in the multislot configuration.<br>Whether or not you need to use this command depends on your mobile station.<br>If the mobile station segments the frame into six bursts of 156 bit duration and two bursts of 157 bit duration then this command should be set as follows:<br>• Use GPL10 if the first burst in the multislot configuration is timeslot 4 or 7.<br>• Use GPL9 if the first burst in the multislot configuration is in any other timeslot. |
| Setting | | Range: GPL9\|GPL10 |
| Query | | Range: GPL9\|GPL10 |
| *RST Setting | | GPL9 |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TX:BURSt:GPLength GPL9" !Sets the Guard Period !length to 9 bits.` | | |

## CALL:MS:TXLevel[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects the mobile station uplink power control level for the band already selected. See "GSM Frequency Banded Parameters" on page 115.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 31<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST Setting | | Band: PGSM<br>TXLevel: 15 |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TXLEVEL:SELECTED 10"` | | |

## CALL:MS:TXLevel:DCS

| | | |
|---|---|---|
| Function | GSM | This command selects the mobile station uplink power control level for the DCS band. See "GSM Frequency Banded Parameters" on page 115.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See"Call Processing Subsystem Overlapped Commands" on page 303. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 31 (default 10)<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST Setting | | Band: PGSM<br>TXLevel: 15 |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TXLEVEL:DCS 8"` | | |

## CALL:MS:TXLevel:EGSM

| | | |
|---|---|---|
| Function | GSM | This command selects the mobile station uplink power control level for the EGSM band. See "GSM Frequency Banded Parameters" on page 115.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 31 (default 15)<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST Setting | | Band: PGSM<br>TXLevel: 15 |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TXLEVEL:EGSM 20"` | | |

## CALL:MS:TXLevel:GSM850

| | | |
|---|---|---|
| Function | GSM | This command selects the mobile station uplink power control level for the GSM850 band. See "GSM Frequency Banded Parameters" on page 115.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 31 (default 15)<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST Setting | | Band: PGSM<br>TXLevel: 15 |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TXLEVEL:GSM850 20"` | | |

## CALL:MS:TXLevel:PCS

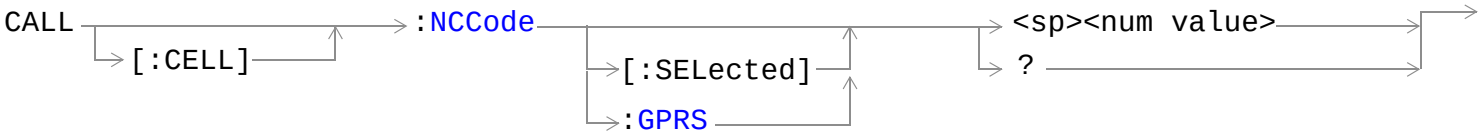
| | | |
|---|---|---|
| Function | GSM | This command selects the mobile station uplink power control level for the PCS band. See "GSM Frequency Banded Parameters" on page 115.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 31 (default 10)<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST Setting | | Band: PGSM<br>TXLevel: 15 |
| Programming Example<br>`OUTPUT 714;"CALL;MS;TXLEVEL:PCS 31"` | | |

## CALL:MS:TXLevel:PGSM

| | | |
|---|---|---|
| Function | GSM | This command selects the mobile station uplink power control level for the PGSM band. See "GSM Frequency Banded Parameters" on page 115.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 31 (default 15)<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST Setting | | Band: PGSM<br>TXLevel: 15 |
| Programming Example<br>`OUTPUT 714;"CALL:MS:TXLEVEL:PGSM 22"` | | |

# CALL:NCCode

This command is not applicable to GPRS.




These commands are applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL[:CELL]:NCCode

| | | |
|---|---|---|
| Function | GSM | Sets/queries the Network Color Code. See "Configuring the Broadcast Channel (BCH)" on page 110.<br>This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:NCCODE 2"` | | |

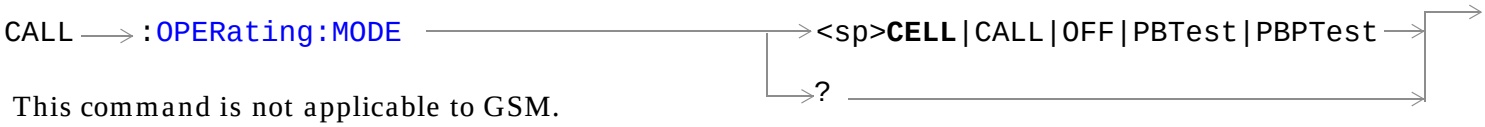
## CALL[:CELL]:NCCode[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the Network Color Code for the active (that is the selected) format. See "Configuring the Broadcast Channel (BCH)" on page 110.<br>This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:NCCODE:SELECTED 2"` | | |

## CALL[:CELL]:NCCode:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | Sets/queries the Network Color Code for the GPRS format. See "Configuring the Broadcast Channel (BCH)" on page 110.<br>This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:NCCODE:GPRS 2"` | | |

# CALL:OPERating




This command is not applicable to GSM.

This command is not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL:OPERating:MODE

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the operating mode (behavior) of the test set.<br>CELL and CALL are exactly the same and set the operating mode to Active Cell (see "Active Cell For GSM" on page 99). The query returns CELL.<br>TEST sets the operating mode to Test Mode (see "GSM Test Mode Operation" on page 101). |
| | GPRS | This command sets/queries the operating mode (behavior) of the test set.<br>CELL and CALL are exactly the same and set the operating mode to Active Cell (see "Active Cell For GPRS" on page 100). The query returns CELL.<br>PBTest sets the operating mode to GPRS Test Mode BCH (see "GPRS Test Mode BCH Behavior" on page 108).<br>PBPTest sets the operating mode to GPRS Test Mode BCH+PDTCH (see "GPRS Test Mode BCH + PDTCH Behavior" on page 108).<br>OFF sets the operating mode to OFF (see "OFF Behavior" on page 108). |
| Setting | GSM | Range: CALL \| CELL \| TEST |
| | GPRS | Range: CALL \| CELL \|OFF\| PBTest \| PBPTest |
| Query | GSM | Range: CELL \| TEST |
| | GPRS | Range: CALL \|OFF\| PBTest \| PBPTest |
| *RST Setting | | CELL |

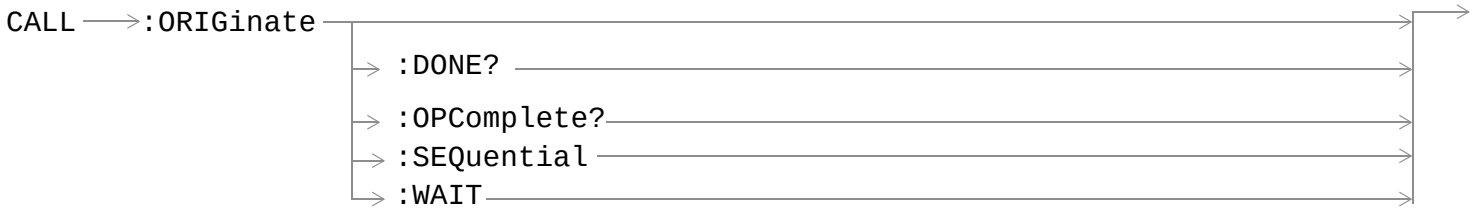
Programming Example (GSM)

```
OUTPUT 714;"CALL:OPERATING:MODE TEST" !Sets the operating mode to Test Mode.
```

Programming Example (GPRS)

```
OUTPUT 714;"CALL:OPERATING:MODE PBPTest" !Sets the operating mode to GPRS Test Mode PDTCH.
```

# CALL:ORIGinate




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

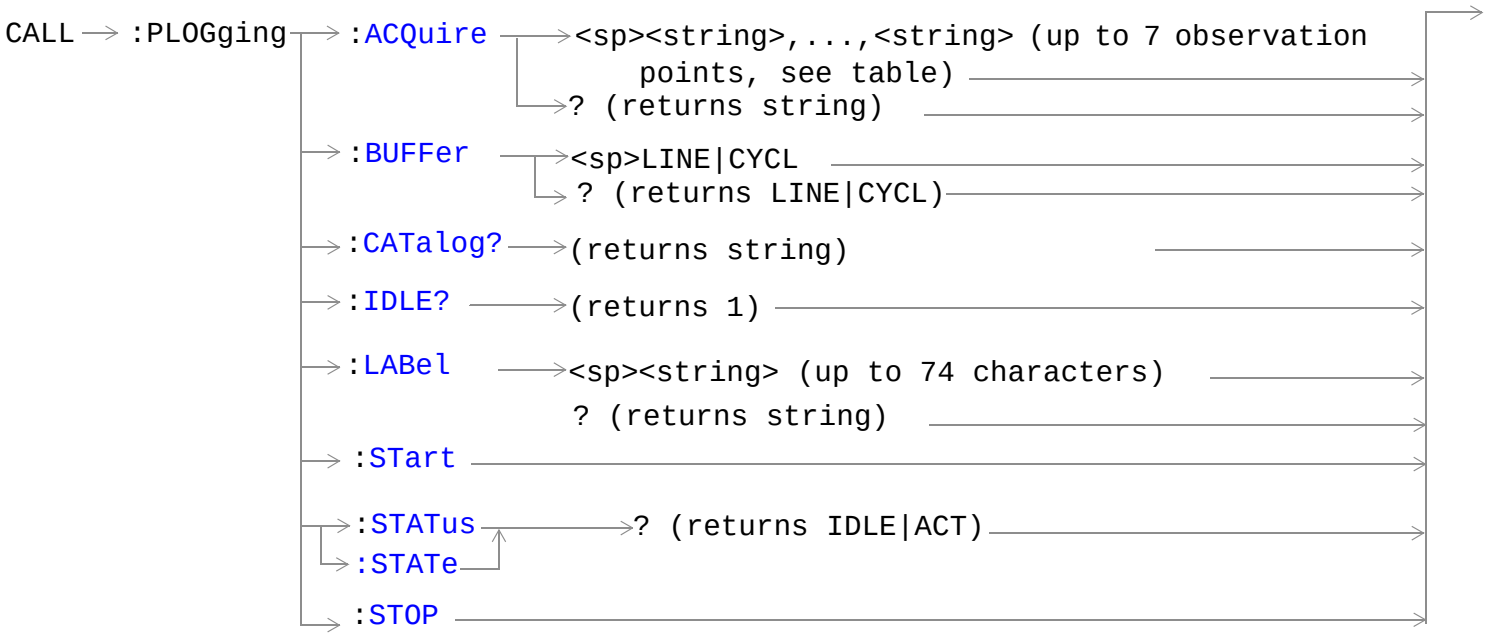
### CALL:ORIGinate

| | | |
|---|---|---|
| Function | GSM | Performs a BS Originated call. See "Call Processing Event Synchronization" on page 300.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |

Programming Example

```
OUTPUT 714;"CALL:ORIGINATE:SEQUENTIAL" !Orignates a base station call.
                                       !Appending SEQUENTIAL to this command
                                       !causes the command to be
                                       !performed sequentially.
```

# CALL:PLOGging




These commands are not applicable to GSM.
These commands apply only to the GPRS *lab* application; they are not applicable to the GPRS *test* application.

"Diagram Conventions" on page 323

## CALL:PLOGging:ACQuire

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries observation points for protocol logging. The observation points are selected with a comma separated list of strings (see Setting/Query Range below). Sending this command causes the specified observation points to be turned on and all others to be turned off. |
| Setting | | Range:<br>• L1_Interface - raw layer 1 bits<br>• RLC/MAC - radio link control and medium access control<br>• LLC - logical link control over-the-air messages<br>• GMM/SM - GPRS mobility management and session management<br>• GSM_L3 - GSM layer 3 over-the-air messages<br>• SNDCP - subnet dependent convergence protocol over-the-air messages<br>• IP - internet protocol messages |
| Query | | Range: L1_I \| RLC/MAC \| LLC \| GMM/SM \| GSM_L3 \| SNDCP \| IP |
| *RST Setting | | • L1_Interface - off<br>• RLC/MAC - on<br>• LLC - off<br>• GMM/SM - off<br>• GSM_L3 -off<br>• SNDCP - off<br>• IP - off |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:ACQUIRE?" !Queries the observation points currently enabled.` | | |

## CALL:PLOGging:BUFFer

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the buffer mode. In linear (LINE) mode a stop operation is generated when the buffer is full. In CYCL mode, logging wraps back to the beginning of the buffer when the end of the buffer is reached. A new message that is logged replaces the oldest message stored in the buffer. |
| Setting | | Range: LINE \| CYCL |
| Query | | Range: LINE \| CYCL |
| *RST Setting | | LINE |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:BUFFER LINE" !Stops logging when the buffer is full.` | | |

## CALL:PLOGging:CATalog?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command returns the complete list of available observation points. If logging is idle, a 1 is returned. |
| Query | | Range: L1_Interface, RLC/MAC, LLC, GMM/SM, GSM_L3, SNDCP, IP |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:CATalog?" !Returns a complete list of observation points.` | | |

## CALL:PLOGging:IDLE?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries whether logging is idle. If logging is idle, the query will immediately return a 1. If logging is active, it will wait until logging is idle and then return a 1. |
| Query | | Range: 1 |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:IDLE?"` | | |

### CALL:PLOGging:LABel

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries a user definable comment for the header of the detailed log. The comment can be an alphanumeric string of up to 74 charactes. |
| Setting | | Range: Up to 74 alphanumeric characters |
| Query | | Range: Up to 74 alphanumeric characters |
| *RST Setting | | " " |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:LABEL 'Model XYZ 4769'"` | | |

### CALL:PLOGging:STARt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command starts protocol logging. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:START" !Starts protocol logging.` | | |

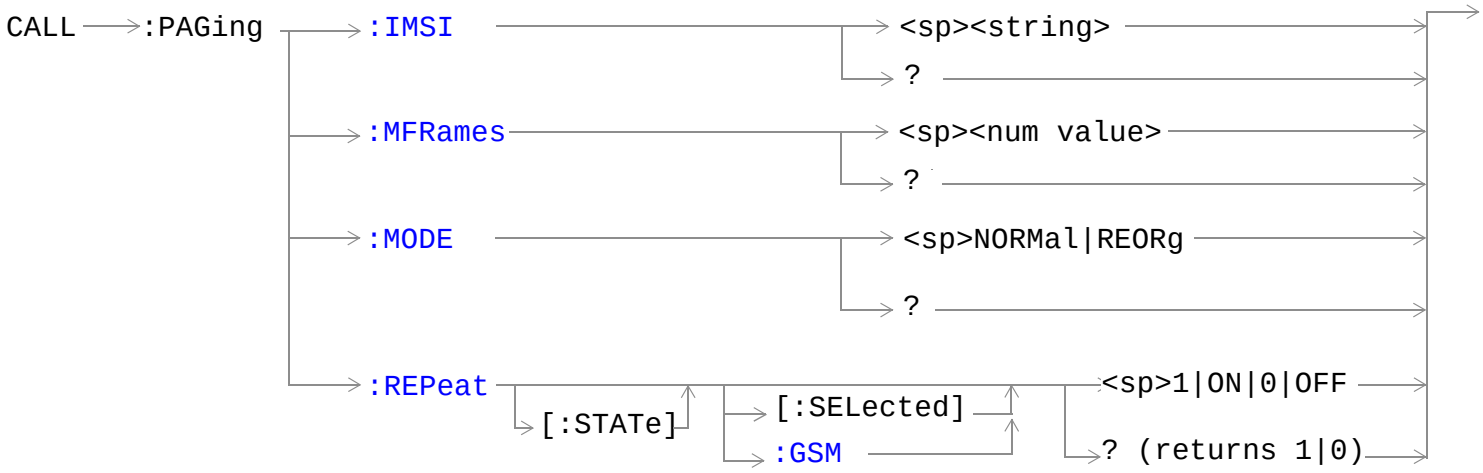
### CALL:PLOGging:STATus? *or* CALL:PLOGging:STATe?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command queries the protcol logging status (idle or active). |
| Query | | Range: IDLE \| ACT |
| *RST Setting | | IDLE |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:STATE?"` | | |

## CALL:PLOGging:STOP

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command stops protocol logging. |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:PLOGGING:STOP"` | | |

# CALL:PAGing




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL:PAGing:IMSI

| | | |
|---|---|---|
| Function | GSM | Sets/queries the paging IMSI (International Mobile Subscriber Identity) field, used for paging the MS. The test set will stay in Active Cell Status (Setup Request), see "Call Processing State Synchronization" on page 305 until the paging IMSI is returned if the state is on.<br>The paging IMSI is automatically updated by the test set during an MS originated call using the IMSI reported by the MS. If the MS has no SIM, the paging IMSI is left unchanged. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: up to 15 decimal digits<br>Resolution: 1 |
| Query | | Range: up to 15 decimal digits<br>Resolution: 1 |
| *RST Setting | | 001012345678901 |
| Programming Example<br>`OUTPUT 714;"CALL:PAGing:IMSI '01012345678901'"!Set paging IMSI`<br>`!to 01012345678901.` | | |

## CALL:PAGing:MODE

| | | |
|---|---|---|
| Function | GSM | Sets/queries the paging mode that the test set will use to page the MS. Some mobile stations can be set to a discontinuous reception mode (DRX), which configures the MS to look for a page in a pre-defined paging subchannel only.<br>When paging mode is set to Reorg (DRX off), the test set will page the MS on the paging channel in the next available paging subchannel without waiting for the defined paging group.<br>When paging mode is set to Normal (DRX on), the test set will page the MS on the correct paging subchannel defined by the mobile station's paging group. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: REORg \| NORMal |
| Query | | Range: REOR \| NORM |
| *RST Setting | | Reorg |
| Programming Example<br>`OUTPUT 714;"CALL:PAGING:MODE REOR" ! MS will be sent a page on the`<br>`! next available paging subchannel` | | |

## CALL:PAGing:MFRames

| | | |
|---|---|---|
| Function | GSM | Sets/queries the number of multiframes between paging subchannels.<br>This parameter is used when the paging mode is normal. MFRames and IMSI are used to define the mobile station's paging group. The paging group determines when an MS can expect a page if paging mode is normal. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 2 to 9<br>Resolution: 1 |
| Query | | Range: 2 to 9<br>Resolution: 1 |
| *RST Setting | | 2 |
| Programming Example<br>`OUTPUT 714;"CALL:PAGING:MFRAMES 5" ! Sets the number of multiframes`<br>`! between paging subchannels.` | | |

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

| | | |
|---|---|---|
| Function | GSM | Sets/queries repeat paging state for the active (that is the selected) format. When the state is ON paging repeats until the test set receives a RACH. When the state is OFF the test set returns the No response to page timer T3113 expiry. See "Fixed Timer Messages" on page 974. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | 0 \| OFF \| 1 \| ON |
| Query | | 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:PAGING:REPEAT:STATE:SELECTED ON" !Turns paging repeat ON.` | | |

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

| | | |
|---|---|---|
| Function | GSM | Sets/queries repeat paging state for the GSM format. When the state is ON paging repeats until the test set receives a RACH. When the state is OFF the test set returns the No response to page timer T3113 expiry. See "Fixed Timer Messages" on page 974. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | 0 \| OFF \| 1 \| ON |
| Query | | 0 \| 1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"CALL:PAGING:REPEAT:STATE:GSM ON" !Turns paging repeat ON.` | | |

# CALL:PBPTest

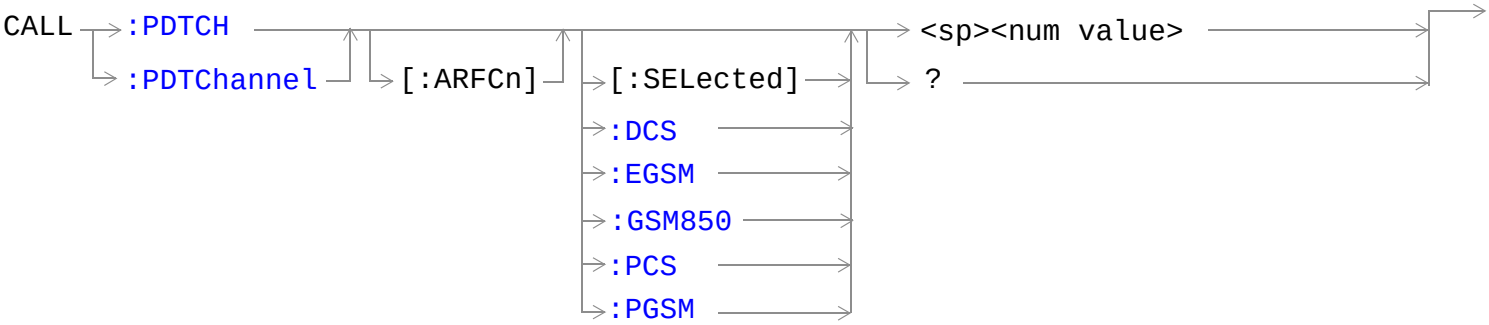
This command is not applicable to GSM.

"Diagram Conventions" on page 323

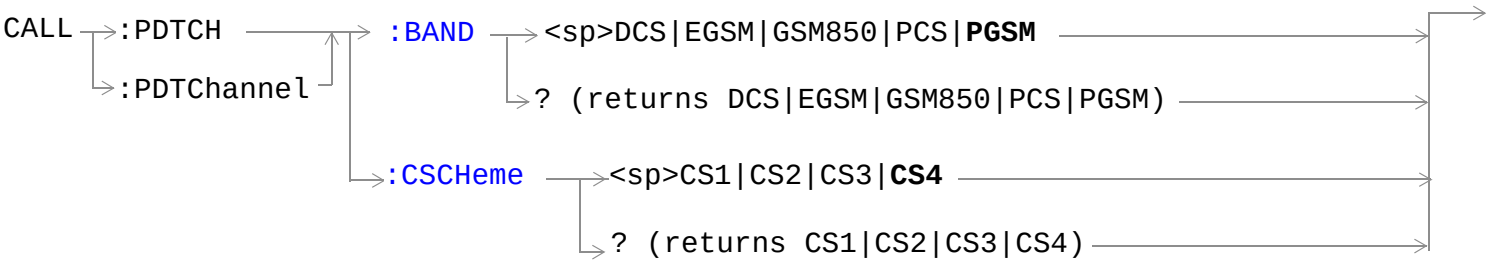
### CALL:PBPTest:RLCMac[:HEADer]:STATe

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the RLC/MAC header state. This setting is only applicable when the operating mode is set to GPRS Test Mode BCH+PDTCH (PBPTest).<br>If the RLC/MAC header state is changed when the operating mode is any mode other than GPRS Test Mode BCH+PDTCH, the setting is remembered until the next time you use GPRS Test Mode BCH+PDTCH. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"CALL:PBPTest:RLCMac:HEADer:STATe ON" !Enables the RLC/MAC header.` | | |

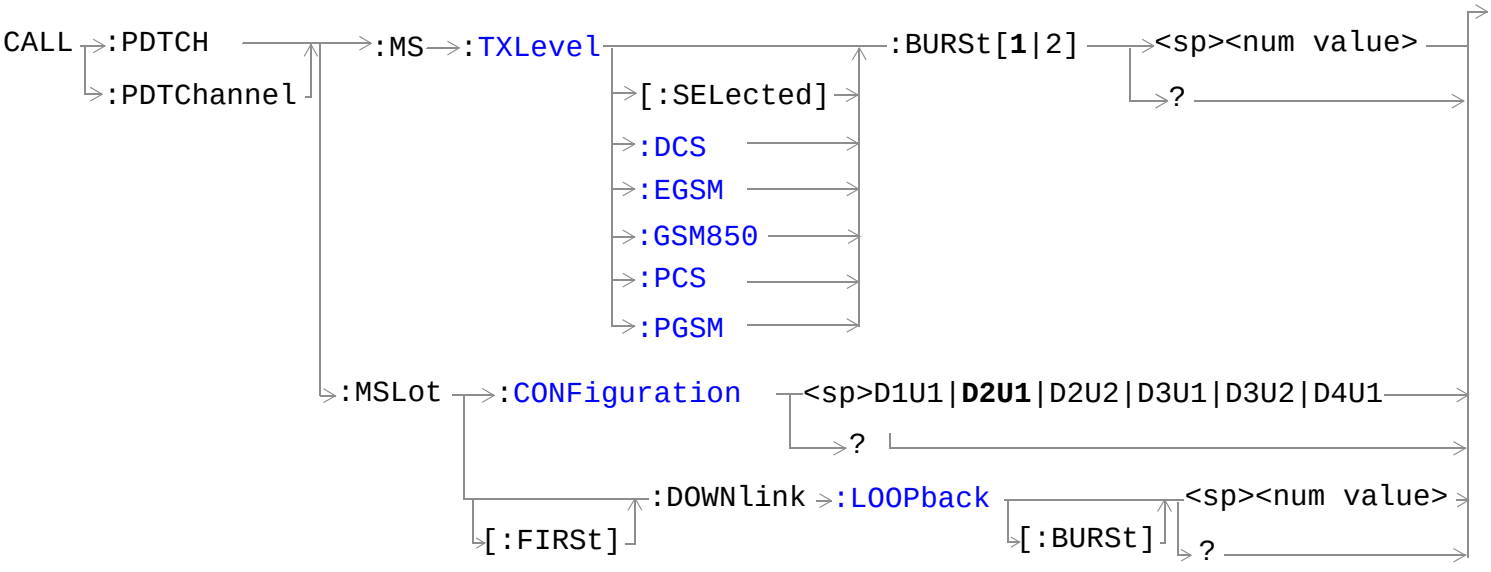
# CALL:PDTCH|PDTChannel



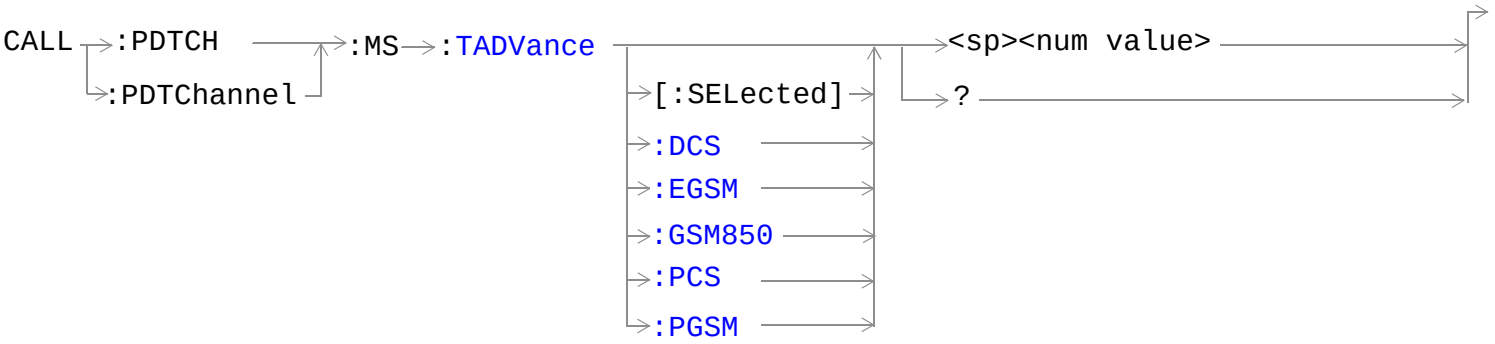

These commands are not applicable to GSM.



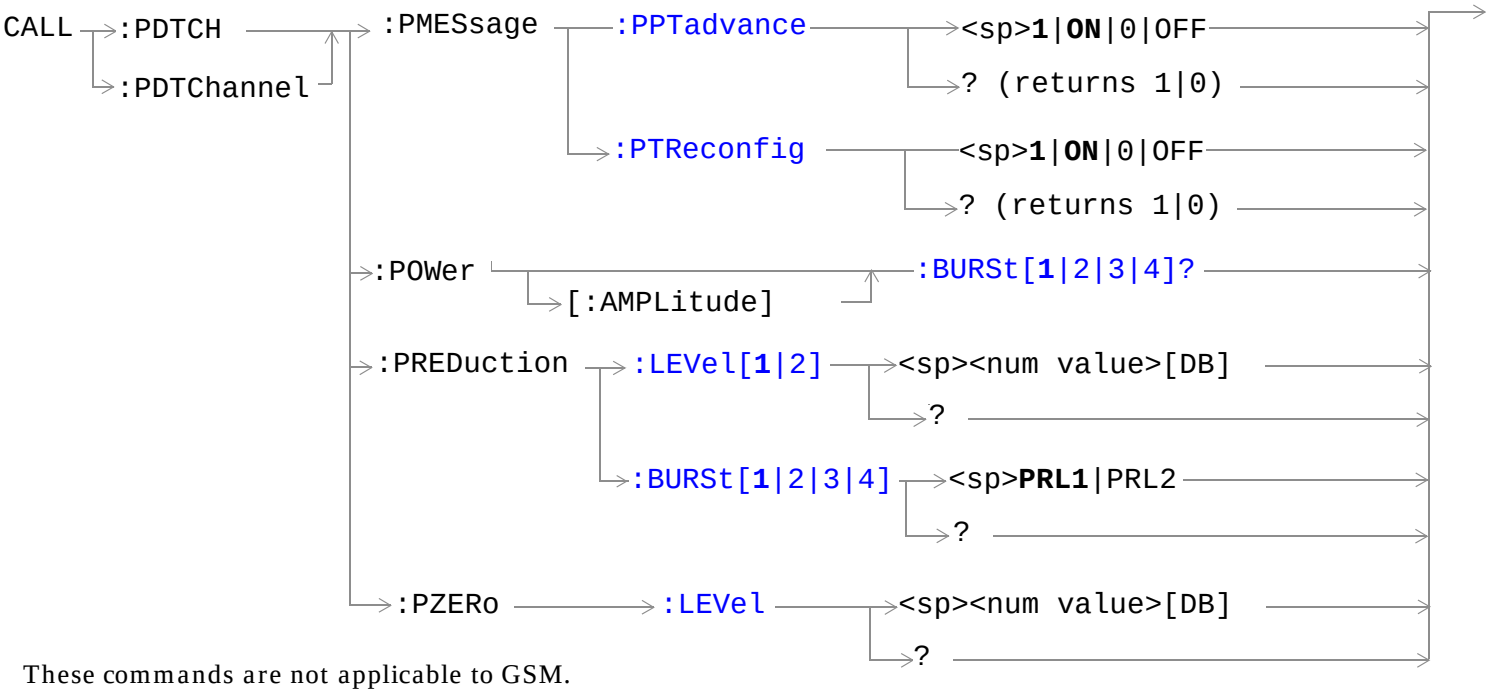

These commands are not applicable to GSM.



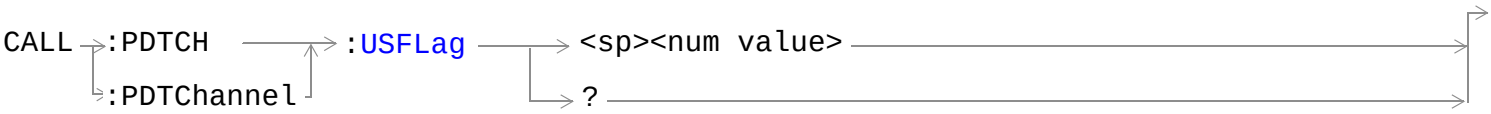

These commands are not applicable to GSM.




These commands are applicable only to the GPRS *lab* application.




These commands are not applicable to GSM.




This command is not applicable to GSM.
This commands applies only to the GPRS *lab* application; it is not applicable to the GPRS *test* application.

"Diagram Conventions" on page 323

## CALL:PDTCH[:ARFCn][:SELected]
## CALL:PDTChannel[:ARFCn][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the ARFCN of the downlink and uplink PDTCH for the band already selected. |
| Setting | | Range:<br>• DCS band, channels 512 to 885<br>• EGSM band, channels 0 to 124 and 975 to 1023<br>• GSM850 band, channels 128 to 251<br>• PCS band, channels 512 to 810<br>• PGSM band, channels 1 to 124<br>Resolution: 1 |
| Query | | Range:<br>• DCS band, channels 512 to 885<br>• EGSM band, channels 0 to 124 and 975 to 1023<br>• GSM850 band, channels 128 to 251<br>• PCS band, channels 512 to 810<br>• PGSM band, channels 1 to 124<br>Resolution: 1 |
| *RST setting | | PGSM and EGSM bands: 30, DCS and PCS bands: 698, GSM850: 160 |

Programming Example

```
OUTPUT 714;"CALL:PDTCH:ARFCN:SELECTED 512" !Sets the ARFCN of the selected band to
                                           !512, if 512 is valid for the selected
                                              !band.
```

### CALL:PDTCH:BAND
### CALL:PDTChannel:BAND

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the PDTCH band, therefore constraining the range of PDTCH ARFCNs. |
| Setting | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| Query | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| *RST setting | | PGSM |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:BAND DCS" !Sets the band to DCS.` | | |

### CALL:PDTCH:CSCHeme
### CALL:PDTChannel:CSCHeme

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the PDTCH coding scheme.<br>When you make a coding scheme change, all the measurements and the Block Error Rate (BLER) reports are stopped before the change is made. They are then re-started after the change has taken effect. |
| Setting | | Range: CS1 \| CS2\| CS3\|CS4 |
| Query | | Range: CS1 \| CS2\| CS3\|CS4 |
| *RST setting | | CS4 |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCHannel:CSCHeme CS1" !Sets the PDTCH coding scheme to CS1.` | | |

### CALL:PDTCH:MS:TXLevel[:SELected]:BURSt[1|2]
### CALL:PDTChannel:MS:TXLevel[:SELected]:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects the mobile station uplink power control level for the band already selected. See "GPRS Frequency Banded Parameters" on page 116.<br>If you do not specify a burst then burst one is assumed. |
| Setting | | Range (all bands): 0 to 31<br>Resolution (all bands): 1 |
| Query | | Range (all bands): 0 to 31<br>Resolution (all bands): 1 |
| *RST Setting | | PGSM and EGSM bands: 15, DCS and PCS bands: 10 |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:MS:TXLevel:BURSt 10" !Sets the uplink power level of burst one in the !selected band to 10.` | | |

### CALL:PDTCH:MS:TADVance[:SELected]
### CALL:PDTChannel:MS:TADVance[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the timing advance that is sent to the device under test. This value tells the device how much to offset its transmission to simulate the effects of propagation delays. |
| Setting | | Range (all bands): 0 to 63<br>Resolution (all bands): 1 |
| Query | | Range (all bands): 0 to 63<br>Resolution (all bands): 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:MS:TADVance:PCS 10" !Sets timing advance to 10 for the PCS band.` | | |

## CALL:PDTCH:MSLot:CONFiguration
## CALL:PDTChannel:MSLot:CONFiguration

<table>
<tr><td rowspan="2">Function</td><td>GSM</td><td>This command is not applicable to GSM.</td></tr>
<tr><td>GPRS</td><td>This command sets/queries the multislot configuration.<br><br>The effect this command has on the number of uplink and downlink timeslots depends on the Data Connection Type (see “CALL:FUNCtion:DATA:TYPE” on page 408):<br><br>• Type A - The multislot configuration command only affects the number of uplink timeslots, therefore configurations D1U1, D2U1, D3U1 and D4U1 will appear similar.<br><br>• Type B - The multislot configuration command constrains the number of uplink timeslots to be less than or equal to the number of downlink timeslots.<br><br>• BLER - The multislot configuration command only affects the number of downlink timeslots, therefore D2U2 and D2U1 will appear similar.<br><br>The actual timeslots used in each configuration are fixed as follows:<br><br>Multislot Configuration — Downlink Timeslots Used — Uplink Timeslots Used<br>D1U1 — 3 — 3<br>D2U1 — 3, 4 — 4<br>D2U2 — 3, 4 — 3, 4<br>D3U1 — 3, 4, 5 — 4<br>D3U2 — 3, 4, 5 — 4, 5<br>D4U1 — 3, 4, 5, 6 — 5<br><br>When a multislot configuration change is executed, all measurements will be stopped before the change is made, and re-started after the change has taken effect.</td></tr>
<tr><td colspan="2">Setting</td><td>Range: D1U1 | D2U1 | D2U2 | D3U1 | D3U2 | D4U1</td></tr>
<tr><td colspan="2">Query</td><td>Range: D1U1 | D2U1 | D2U2 | D3U1 | D3U2 | D4U1</td></tr>
<tr><td colspan="2">*RST Setting</td><td>D2U1</td></tr>
<tr><td colspan="3">Programming Example<br><br>OUTPUT 714;”CALL:PDTCH:MSLot:CONFiguration D2U1” !Sets the multislot configuration to be 2<br>!downlink PDTCHs and 1 uplink PDTCH.</td></tr>
</table>

### CALL:PDTCH:MSLot[:FIRSt]:DOWNlink:LOOPback[:BURSt]
### CALL:PDTChannel:MSLot[:FIRSt]:DOWNlink:LOOPback[:BURSt]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the first downlink burst to be looped back in the first uplink burst. Subsequent downlink bursts are looped back in subsequent uplink bursts.<br>When the operating mode is set to Active Cell, any attempt to change this setting while the data connection state is Transferring and the data connection type is Type B will be rejected.<br>If the multislot configuration is set to a value that has a number of downlink bursts less than the current setting of this parameter, the downlink burst looped back will be determined by the calculation:<br>*(First Downlink Burst to Loop) modulo (current number of downlink bursts)*<br>For example, if the setting of First Downlink Burst to Loop is 4, and the multislot configuration is set to D3U2, then the first downlink burst looped on the uplink will be 1 (4 modulo 3). |
| Setting | | Range: 1 to 4 |
| Query | | Range: 1 to 4 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:MSLot:DOWNlink:LOOPback 2" ! Sets downlink burst 2 as the first ! downlink burst to be looped back.` | | |

### CALL:PDTCH:PMESsage:PPTadvance
### CALL:PDTChannel:PMESsage:PPTadvance

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries whether or not to send a Packet Power Timing Advance (PPTA) message to the mobile when applying deferred or immediate PDTCH parameters to an active data connection (that is, data connection status is Transferring).<br>Setting this command to On ensures that a PPTA message is sent.<br>If you set this command while the data connection status is Transferring, any changes you make will take effect immediately during the current data connection.<br>This command along with "CALL:PDTCH:PMESsage:PTReconfig" on page 462 provides you with power control settings for mobiles that do not fully support the Packet Timeslot Reconfigure (PTR) message. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | ON |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:PMESsage:PPTadvance OFF" !Sets the PPTA message state to ON.` | | |

## CALL:PDTCH:PMESsage:PTReconfig
## CALL:PDTChannel:PMESsage:PTReconfig

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries whether or not to send a Packet Timeslot Reconfigure (PTR) message to the mobile. Setting this command to:<br>• On, sends a PTR message to the mobile when applying deferred or immediate PDTCH parameters to an active data connection (that is, data connection status is Transferring).<br>• Off, sends an alternative message to the mobile instead of a PTR message. The alternative message that is sent to the mobile depends on the type of data connection (set using "CALL:FUNCtion:DATA:TYPE" on page 408):<br>— If the data connection type is BLER a Packet Downlink Assignment (PDA) message is sent.<br>— If the data connection type is ETSI Type A a Packet Uplink Assignment (PUA) message is sent.<br>— If the data connection type is ETSI Type B, both PDA and PUA messages are sent.<br>If you set this command while the data connection status is Transferring, any changes you make will take effect immediately during the current data connection.<br>This command along with "CALL:PDTCH:PMESsage:PPTadvance" on page 461 provides you with power control settings for mobiles that do not fully support the Packet Timeslot Reconfigure (PTR) message. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | OFF |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:PMESSAGE:PTRECONFIG ON" !Sets the PTR message state to ON.` | | |

### CALL:PDTCH:POWer[:AMPLitude]:BURSt[1|2|3|4]?
### CALL:PDTChannel:POWer[:AMPLitude]:BURSt[1|2|3|4]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the current absolute power level of the downlink PDTCH burst. The level is calculated from the current BCH Level, current power reduction reference level P0 and the current power reduction level. For more detail on these power levels, refer to "Testing a GPRS Mobile Station" on page 241.<br>If you do not specify a burst then burst one is assumed. |
| Query | | Range: -169.0 to -10.0 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.1 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:POWer:BURst?" !Returns current power level of downlink PDTCH burst 1.` | | |

### CALL:PDTCH:PREDuction:BURSt[1|2|3|4]
### CALL:PDTChannel:PREDuction:BURSt[1|2|3|4]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the power reduction level for any of the downlink bursts. You can define the levels of PRL1 and PRL2 using "CALL:PDTCH:PREDuction:LEVel[1\|2]" on page 464.<br>For further information see "Downlink PDTCH Power Control" on page 244.<br>If you do not specify a burst then burst one is assumed. |
| Setting | | Range: PRL1 \| PRL2 |
| Query | | Range: PRL1 \| PRL2 |
| *RST setting | | PRL1 |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:PRED:BURS PRL1" !Sets the power reduction level of the first burst to !PRL1.` | | |

## CALL:PDTCH:PREDuction:LEVel[1|2]
## CALL:PDTChannel:PREDuction:LEVel[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | In GPRS, power levels are referred to as power reduction levels relative to the BCCH. This command sets/queries two power reduction levels. These levels can then be applied to up to four bursts using "CALL:PDTCH:PREDuction:BURSt[1\|2\|3\|4]" on page 463.<br><br>For further information see "Downlink PDTCH Power Control" on page 244.<br><br>If you do not specify a burst then burst one is assumed.<br><br>**NOTE** If the actual measured difference between two power reduction levels exceeds 20 dB, the test set's source specifications may no longer be valid.<br><br>When the Test Set's operating mode is set to GPRS Test Mode BCH+PDTCH and the RLC/MAC Header is turned ON, information is included in the PR field of the RLC/MAC Header to indicate a power reduction level to the mobile. When the Test Set's operating mode is set to GPRS Test Mode BCH+PDTCH and the RLC/MAC Header is turned Off, no information relating to power control is sent to the mobile. (When the operating mode is set to Active Cell the RLC/MAC header containing the PR field is always sent to the mobile.)<br><br>3GPP TS 04.60 section 10 Release 1999 defines that a maximum power reduction level of 10 dB can be indicated to the mobile in the PR field of the RLC/MAC header. If your mobile adheres strictly to the standards, and you set this command to a value greater than 10 dB, it is possible your mobile may not respond correctly to the power reduction level you set. |
| Setting | | Range: 0 to 25 dB<br>Resolution: 0.1 dB |
| Query | | Range: 0 to 25 dB<br>Resolution: 0.1 dB |
| *RST setting | | 0 dB |

Programming Example

```
OUTPUT 714;"CALL:PDTCH:PRED:LEV2 3" !Sets the second power reduction level (PRL2) to 3 dB.
```

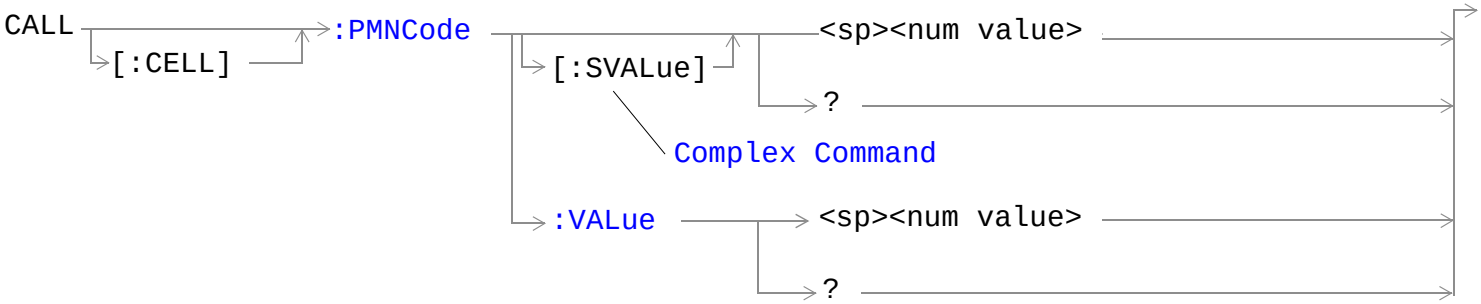
### CALL:PDTCH:PZERo:LEVel
### CALL:PDTChannel:PZERo:LEVel

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the power reduction reference level (ETSI refers to this as P0) for downlink PDTCH power control.<br>For further information see "Downlink PDTCH Power Control" on page 244. |
| Setting | | Range: 0 to 30 dB<br>Resolution: 2 dB |
| Query | | Range: 0 to 30 dB<br>Resolution: 2 dB |
| *RST setting | | 0 dB |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:PZERo:LEVel 30" !Sets the power reduction reference level (P0) to !30 dB.` | | |

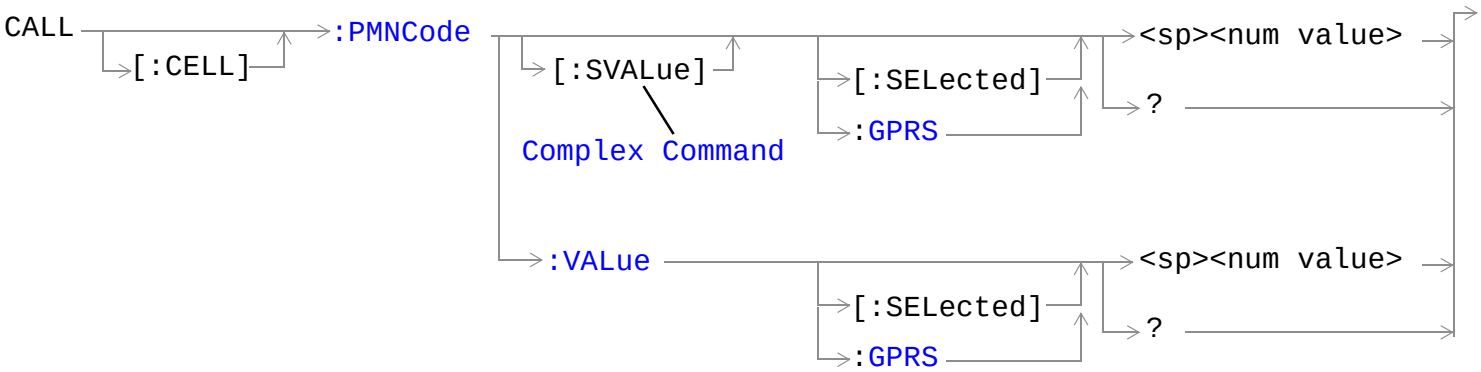
### CALL:PDTCH:USFLag
### CALL:PDTChannel:USFLag

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the uplink state flag (USF). The USF allows multiple mobiles to share over-the-air resources. The USF allows you to verify that your device under test only responds when required. |
| Setting | | Range: 0 to7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:PDTCH:USFLAG 5" !Sets the uplink state flag to 5.` | | |

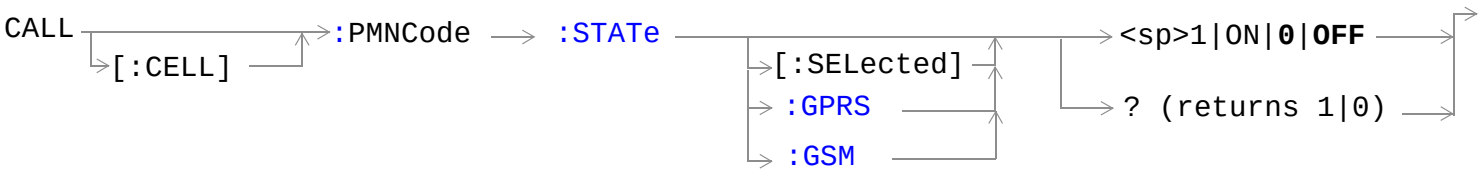
# CALL:PMNCode




These commands are not applicable to GPRS.




These commands are applicable only to the GPRS *lab* application.




"Diagram Conventions" on page 323

## CALL[:CELL]:PMNCode[:SVALue]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the 3 digit mobile network code. This command is used for the PCS band only. This command sets the PMNCode state to ON. This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCODE:SVALUE 798" !Sets the value to 798 and the state !to ON. Only used for PCS 1900 band.` | | |

## CALL[:CELL]:PMNCode[:SVALue][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the 3 digit mobile network code. This command is used for the PCS band only. This command sets the PMNCode state to ON for the active (that is the selected) format.<br>This value can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCODE:SVALUE:SELECTED 798"`<br>`!Sets the value to 798 and the state to ON. Only used for PCS 1900 band.` | | |

## CALL[:CELL]:PMNCode[:SVALue]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the 3 digit mobile network code. This command is used for the PCS band only. This command sets the PMNCode state to ON for the GPRS format.<br>This value can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCODE:SVALUE:GPRS 798"`<br>`!Sets the value to 798 and the state to ON. Only used for PCS 1900 band.` | | |

## CALL[:CELL]:PMNCode:VALue

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the 3 digit mobile network code value. This command is used for PCS band only. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCODE:VALUE 798" !Sets the 3 digit MNCode for PCS 1900 to 798.` | | |

## CALL[:CELL]:PMNCode:VALue[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the 3 digit mobile network code value for the active (that is the selected) format. This command is used for PCS band only. |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCODE:VALUE:SELECTED 798"`<br>`!Sets the 3 digit MNCode for PCS 1900 to 798.` | | |

## CALL[:CELL]:PMNCode:VALue:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the 3 digit mobile network code value for the GPRS format. This command is used for PCS band only. |
| Setting | | Range: 0 to 999<br>Resolution: 1 |
| Query | | Range: 0 to 999<br>Resolution: 1 |
| *RST Setting | | 1 |
| Requirements | | GPRS Lab Application |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCODE:VALUE:GPRS 798"`<br>`!Sets the 3 digit MNCode for PCS 1900 to 798.` | | |

### CALL[:CELL]:PMNCode:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the MNC state in the active (that is the selected) format. This command is used for the PCS band only. Setting it to ON configures the BCCH to use the 3 digit MNC. Note, this command can only be used when the Cell Operating Mode is OFF.<br>For GSM if the test set is in active cell operating mode, this command cannot be set unless the Cell Activated State is OFF. |
| | GPRS | |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCode:STATe ON" !Enables the 3 digit MNCode for PCS 1900.` | | |

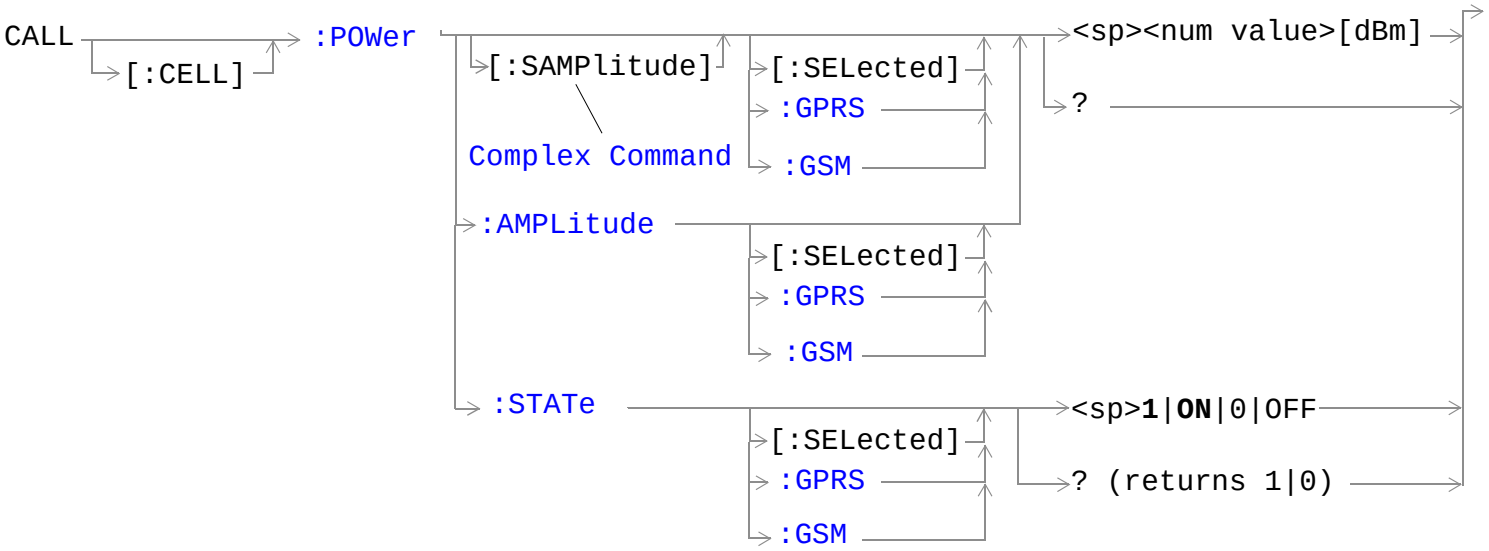
### CALL[:CELL]:PMNCode:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the MNC state in the GPRS format whether or not that format is active. This command is used for the PCS band only. Setting it to ON configures the BCCH to use the 3 digit MNC. Note, this command can only be used when the Cell Operating Mode is OFF. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCode:STATe:GPRS ON" !Enables the 3 digit MNCode for PCS 1900.` | | |

### CALL[:CELL]:PMNCode:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the MNC state in the GSM format whether or not that format is active. This command is used for the PCS band only. Setting it to ON configures the BCCH to use the 3 digit MNC. Note, if the test set is in active cell operating mode, this command cannot be set unless the Cell Activated State is OFF. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:PMNCode:STATe:GSM ON" !Enables the 3 digit MNCode for PCS 1900.` | | |

# CALL:POWer




"Diagram Conventions" on page 323

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

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Cell Power for the active (that is the selected) format and turns the state to ON.<br>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.<br>The suffix dBm is optional.<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| | GPRS | This command sets/queries the Cell Power for the active (that is the selected) format.<br>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.<br>The suffix dBm is optional.<br>The power level of the PDTCH is also affected by the setting of this command. However, the PDTCH level is also affected by other settings (see "Configuring the Packet Data Traffic Channel (PDTCH)" on page 126).<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| Setting | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| Query | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:SAMPlitude:SELected -50dBm" !Sets the value to -50dBm ! and the state to ON.` | | |

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

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the Cell Power for the GSM format whether or not that format is active.<br>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.<br>The suffix dBm is optional.<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| Setting | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| Query | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| *RST Setting | | -85 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:SAMPlitude:GPRS -50dBm" !Sets the value to -50dBm !and the state to ON.` | | |

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

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Cell Power for the GSM format whether or not that format is active.<br>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.<br>The suffix dBm is optional.<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| Query | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| *RST Setting | | -85 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:SAMPlitude:GSM -50dBm" !Sets the value to -50dBm !and the state to ON.` | | |

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

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Cell Power for the active (that is the selected) format.<br>The suffix dBm is optional.<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| | GPRS | This command sets/queries the Cell Power (BCH) for the active (that is the selected) format.<br>The suffix dBm is optional.<br>The power level of the PDTCH is also affected by the setting of this command. However, the PDTCH level is also affected by other settings (see "Configuring the Packet Data Traffic Channel (PDTCH)" on page 126).<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| Setting | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| Query | | Range: -10 dBm to -127 dBm<br>Resolution: .01dBm |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"CALL:CELL:POWer:AMPLitude:SELected -50dBm" !Set the cell power from test
                                                        !set to -50dBm.
```

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

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the Cell Power for the GPRS format whether or not that format is active.<br>The suffix dBm is optional.<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| Setting | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| Query | | Range: -10 dBm to -127 dBm<br>Resolution: .01dBm |
| *RST Setting | | -85 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:AMPLitude:GPRS -50dBm" !Set the cell power from test !set to -50dBm.` | | |

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

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Cell Power for the GSM format whether or not that format is active.<br>The suffix dBm is optional.<br>The Cell Power is affected when there is an amplitude offset (see "Amplitude Offset" on page 90). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -10 dBm to -127 dBm<br>Resolution: .01 dBm |
| Query | | Range: -10 dBm to -127 dBm<br>Resolution: .01dBm |
| *RST Setting | | -85 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:AMPLitude:GSM -50dBm" !Set the cell power from test !set to -50dBm.` | | |

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

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Cell Power state for the active (that is the selected) format.<br>When set to 1\|ON, the RF power for the cell is turned on. |
| | GPRS | |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:STATe:SELected 1" !Sets the cell power state to ON.` | | |

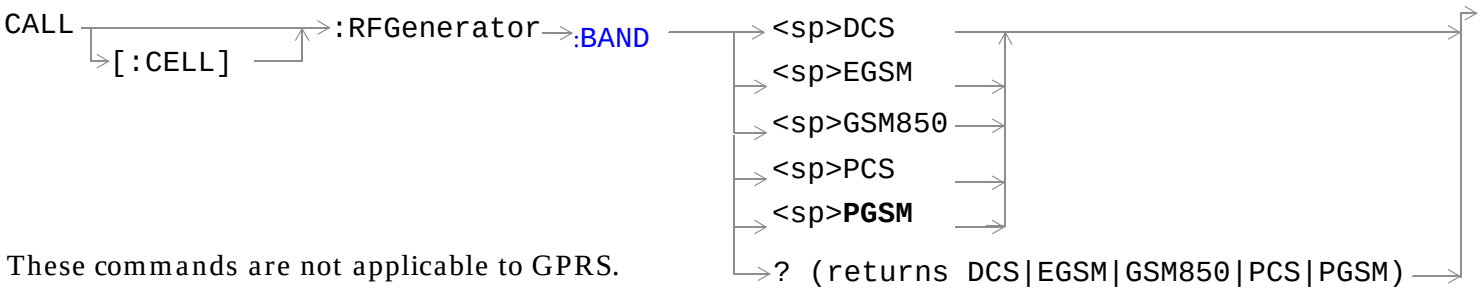
### CALL[:CELL]:POWer:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the Cell Power state in the GPRS format whether or not that format is active.<br>When set to 1\|0, the RF power for the cell is turned on. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | ON |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:STATe:GPRS 1" !Sets the cell power state to ON.` | | |

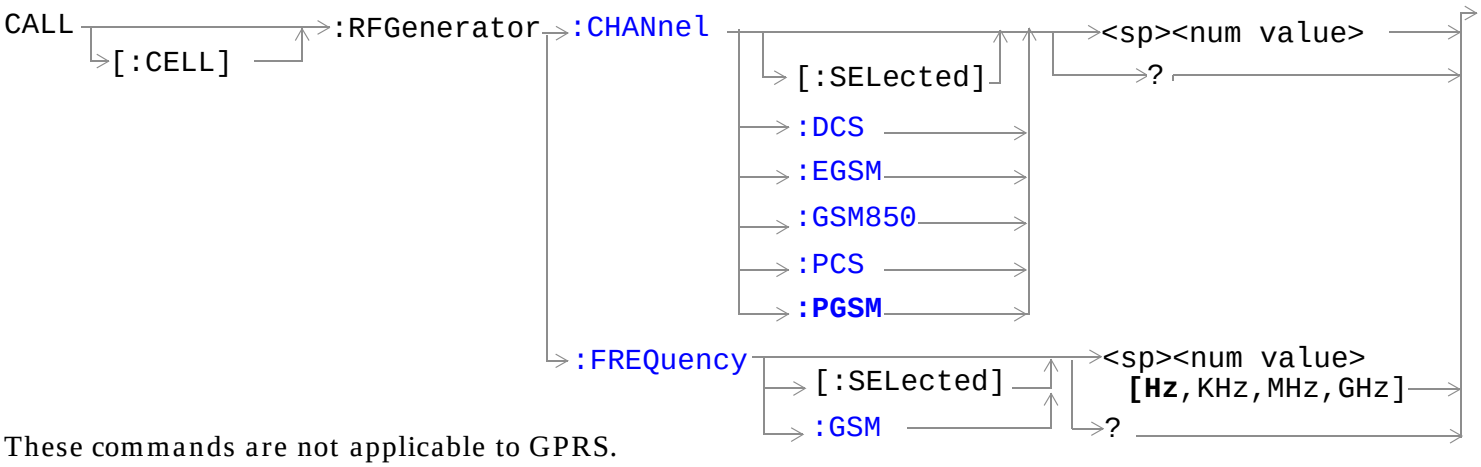
### CALL[:CELL]:POWer:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Cell Power state in the GSM format whether or not that format is active.<br>When set to 1\|0, the RF power for the cell is turned on. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | ON |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:POWer:STATe:GSM 1" !Sets the cell power state to ON.` | | |

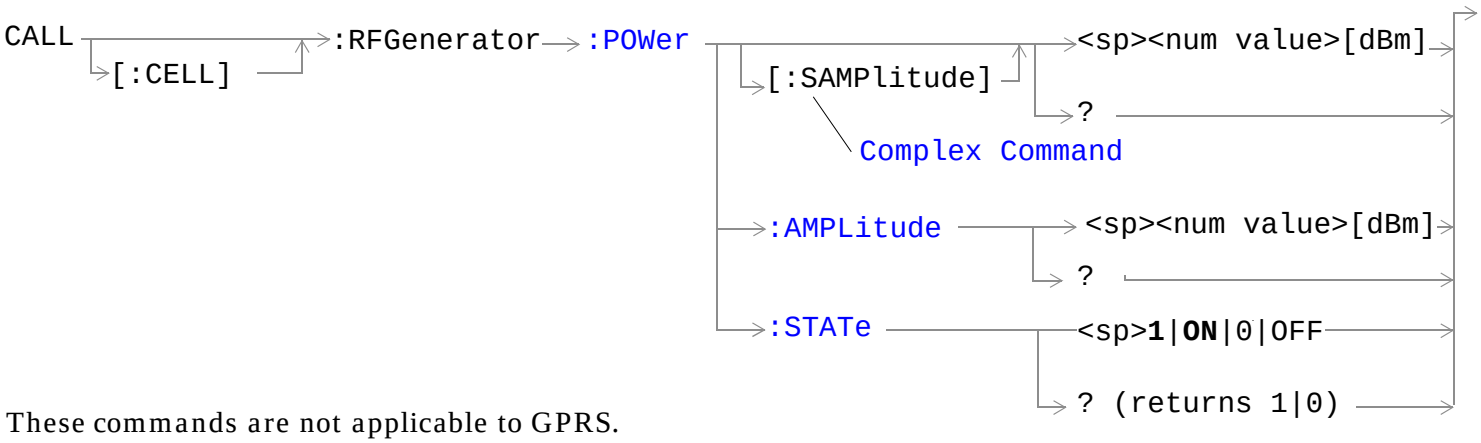
# CALL:RFGenerator




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL[:CELL]:RFGenerator:BAND

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel band.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• DCS channels 512 to 885<br>• EGSM channels 975 to 1023 and 0 to 124<br>• GSM850 channels 128 to 251<br>• PCS channels 512 to 810<br>• PGSM channels 1 to 124 |
| Query | | Range:<br>• DCS channels 512 to 885<br>• EGSM channels 975 to 1023 and 0 to 124<br>• GSM850 channels 128 to 251<br>• PCS channels 512 to 810<br>• PGSM channels 1 to 124 |
| *RST Setting | | 20 (PGSM band) |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:BAND DCS" !Sets the RF Generator band to DCS.` | | |

## CALL[:CELL]:RFGenerator:CHANnel[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel for the band already selected.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• DCS channels 512 to 885<br>• EGSM channels 975 to 1023 and 0 to 124<br>• GSM850 channels 128 to 251<br>• PCS channels 512 to 810<br>• PGSM channels 1 to 124 |
| Query | | Range:<br>• DCS channels 512 to 885<br>• EGSM channels 975 to 1023 and 0 to 124<br>• GSM850 channels 128 to 251<br>• PCS channels 512 to 810<br>• PGSM channels 1 to 124 |
| *RST Setting | | 20 (PGSM band) |

Programming Example

```
OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:SELECTED 512" !Sets the RF Generator
                                                        !channel to 512 for the
                                                        !band already selected.
```

## CALL[:CELL]:RFGenerator:CHANnel:DCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel for the DCS band using the RF Generator.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 885 (default 512)<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST Setting | | 20 (PGSM band) |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:DCS 512"` | | |

## CALL[:CELL]:RFGenerator:CHANnel:EGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel for the EGSM band using the RF Generator.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124 \| 975 to 1023 (default: 20)<br>Resolution: 1 |
| Query | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| *RST Setting | | 20 (PGSM band) |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:EGSM 124"` | | |

### CALL[:CELL]:RFGenerator:CHANnel:GSM850

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel for the GSM850 band using the RF Generator.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 128 to 251 (default: 150)<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST Setting | | 20 (PGSM band) |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:GSM850 200"` | | |

### CALL[:CELL]:RFGenerator:CHANnel:PCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel for the PCS band using the RF Generator.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 810 (default: 512)<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 20 (PGSM band) |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:PCS 512"` | | |

## CALL[:CELL]:RFGenerator:CHANnel:PGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Channel for the PGSM band using the RF Generator.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 303 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 124 (default: 20)<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST Setting | | 20 (PGSM band) |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:PGSM 124"` | | |

## CALL[:CELL]:RFGenerator:FREQuency[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Frequency for the active (that is the selected) format.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>The units (Hz\|kHz\|MHz\|GHz) are optional, if no units are specified then units default to Hz. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 292 MHz to 2700 MHz<br>Resolution: 1 |
| Query | | Range: 292 MHz to 2700 MHz<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:FREQUENCY:SELECTED 896.2MHZ" !Sets RF Gen frequency.` | | |

## CALL[:CELL]:RFGenerator:FREQuency:GSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Frequency for the GSM format whether or not that format is active.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>The units (Hz\|kHz\|MHz\|GHz) are optional, if no units are specified then units default to Hz. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 292 MHz to 2700 MHz<br>Resolution: 1 |
| Query | | Range: 292 MHz to 2700 MHz<br>Resolution: 1 |
| *RST Setting | | 939 MHz |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:FREQUENCY:GSM 896.2MHZ" !Sets RF Gen frequency.` | | |

## CALL[:CELL]:RFGenerator:POWer[:SAMPLitude]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the value for RF Gen Power and turns the state to ON.<br>The suffix dBm is optional.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107.<br>The RF Gen Power field is affected when there is an amplitude offset, see "Amplitude Offset" on page 90. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -10 to -100 dBm<br>Resolution: 0.01 dBm |
| Query | | Range: -10 to -100 dBm<br>Resolution: 0.01 dBm |
| *RST Setting | | -85 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:POWER:SAMPLITUDE -50DBM"` | | |

## CALL[:CELL]:RFGenerator:POWer:AMPLItude

| | | |
|---|---|---|
| Function | GSM | Set/queries Rf Gen Power.<br>The suffix dBm is optional.<br>Operating mode = Test Mode and Downlink Function = CW. see "CW Test Function Behavior" on page 107.<br>The RF Gen Power field is affected when there is an amplitude offset, see "Amplitude Offset" on page 90. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -10 to -100 dBm<br>Resolution: 0.01 dBm |
| Query | | Range: -10 to -100 dBm<br>Resolution: 0.01 dBm |
| *RST Setting | | -85 dBm |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:POWER:AMPLITUDE -50DBM"` | | |

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

| | | |
|---|---|---|
| Function | GSM | Sets/queries the RF Gen Power State.<br>Operating mode = Test Mode and Downlink Function = CW. See "CW Test Function Behavior" on page 107. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| OFF \| 1 \| ON |
| *RST Setting | | ON |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RFGENERATOR:POWER:STATE OFF"` | | |

# CALL:RACode

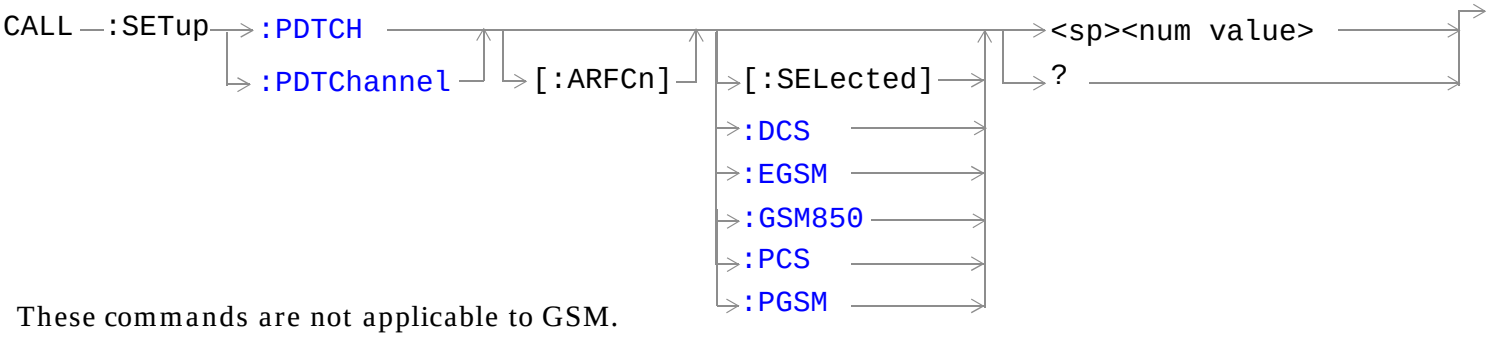
This is applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

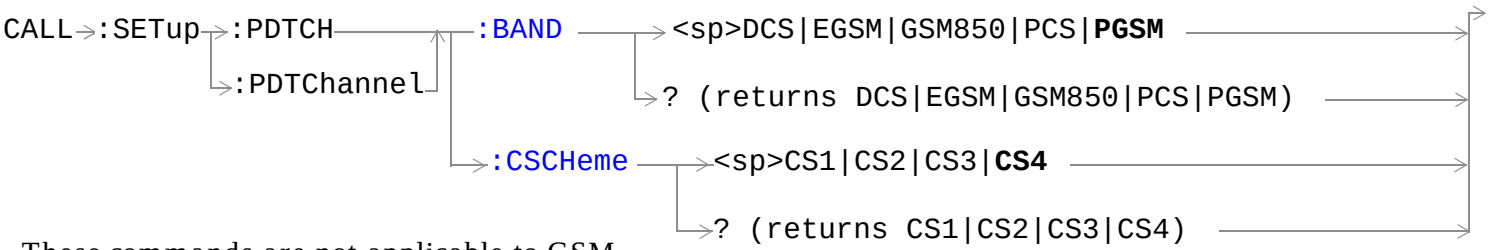
### CALL[:CELL]:RACode

| | | |
|---|---|---|
| Function | GSM | This command does not apply to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application |
| | GPRS LA | Sets/queries the value of the Routing Area Code (RAC). This can only be set when the Cell Activated State parameter is set to Off (see "CALL:ACTivated" on page 338). |
| Setting | | Range: 0 to 255<br>Resolution: 1 |
| Query | | Range: 0 to 255<br>Resolution: 1 |
| *RST Setting | | 1 |
| Related Topics | | See "Configuring the Broadcast Channel (BCH)" on page 110. |
| Programming Example<br>`OUTPUT 714;"CALL:CELL:RACODE 111" !Sets the cell's routing area code to 111.` | | |

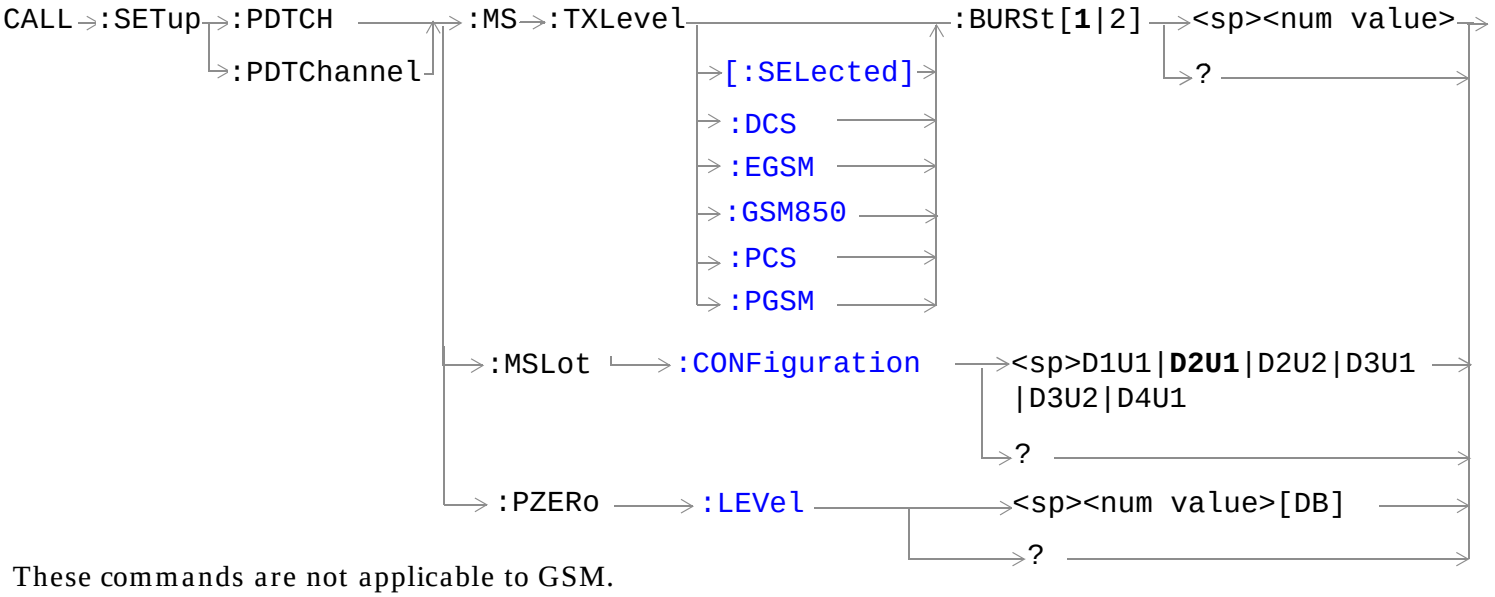
# CALL:SETup



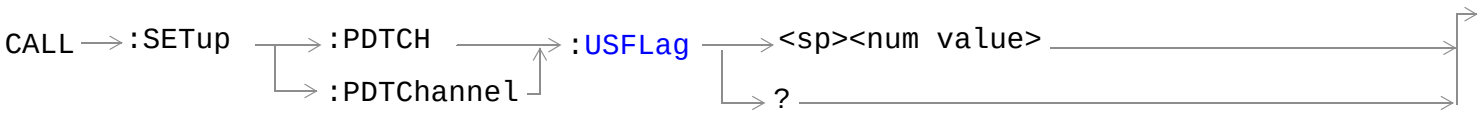

These commands are not applicable to GSM.




These commands are not applicable to GSM.




These commands are not applicable to GSM.




This command is applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL:SETup:PDTCH[:ARFCn][:SELected]
## CALL:SETup:PDTChannel[:ARFCn][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH ARFCN for the band specified using the command "CALL:SETup:PDTCH:BAND" on page 493. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The ARFCN range varies with the selected PDTCH band. The correspondence between ARFCN and frequency differs for each band and that a single ARFCN specifies a separate frequency for uplink and downlink.<br>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.<br>The PDTCH ARFCN is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter. |
| Setting | | Range:<br>• DCS band, channels 512 to 885<br>• EGSM band, channels 0 to 124 and 975 to 1023<br>• PCS band, channels 512 to 810<br>• PGSM band, channels 1 to 124<br>Resolution: 1 |
| Query | | Range:<br>• DCS band, channels 512 to 885<br>• EGSM band, channels 0 to 124 and 975 to 1023<br>• PCS band, channels 512 to 810<br>• PGSM band, channels 1 to 124<br>Resolution: 1 |
| *RST setting | | PGSM and EGSM bands: 30, DCS and PCS bands: 698 |
| Programming Example | | |

```
OUTPUT 714;"CALL:SETup:PDTCH 515" !Sets the ARFCN to 515 if it is
                                  !appropriate in the current band.
```

## CALL:SETup:PDTCH[:ARFCn]:DCS
## CALL:SETup:PDTChannel[:ARFCn]:DCS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH ARFCN within the DCS band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The ARFCN range varies with the selected PDTCH band.<br>A single ARFCN specifies a separate frequency for uplink and downlink<br>The PDTCH ARFCN selects the ARFCN (and thus carrier frequency) for all the PDTCHs which you can configure.<br>The PDTCH ARFCN is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter. |
| Setting | | Range: 512 to 885<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST setting | | 698 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:DCS 600 !Sets the ARFCN to 600 in the DCS band.` | | |

## CALL:SETup:PDTCH[:ARFCn]:EGSM
## CALL:SETup:PDTChannel[:ARFCn]:EGSM

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH ARFCN within the EGSM band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The ARFCN range varies with the selected PDTCH band.<br>A single ARFCN specifies a separate frequency for uplink and downlink<br>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.<br>The PDTCH ARFCN is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter. |
| Setting | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| Query | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| *RST setting | | 30 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:EGSM 987" !Sets the ARFCN to 987 in the EGSM band.` | | |

## CALL:SETup:PDTCH[:ARFCn]:GSM850
## CALL:SETup:PDTChannel[:ARFCn]:GSM850

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH ARFCN within the GSM850 band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The ARFCN range varies with the selected PDTCH band.<br>A single ARFCN specifies a separate frequency for uplink and downlink<br>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.<br>The PDTCH ARFCN is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter. |
| Setting | | Range: 128 to 251<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST setting | | 160 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:GSM850 230" !Sets the ARFCN to 230 in the GSM850 band.` | | |

## CALL:SETup:PDTCH[:ARFCn]:PCS
## CALL:SETup:PDTChannel[:ARFCn]:PCS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH ARFCN within the PCS band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The ARFCN range varies with the selected PDTCH band.<br>A single ARFCN specifies a separate frequency for uplink and downlink<br>The PDTCH ARFCN selects the ARFCN (and thus carrier frequency) for all the PDTCHs you can configure.<br>The PDTCH ARFCN is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter. |
| Setting | | Range: 512 to 810<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST setting | | 698 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:PCS 608" !Sets the ARFCN to 608 in the PCS band.` | | |

### CALL:SETup:PDTCH[:ARFCn]:PGSM
### CALL:SETup:PDTChannel[:ARFCn]:PGSM

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH ARFCN within the PGSM band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The ARFCN range varies with the selected PDTCH band.<br>A single ARFCN specifies a separate frequency for uplink and downlink<br>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.<br>The PDTCH ARFCN is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter. |
| Setting | | Range: 1 to 124<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST setting | | 30 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:PGSM 44" !Sets the ARFCN to 44 in the PGSM band.` | | |

### CALL:SETup:PDTCH:BAND
### CALL:SETup:PDTChannel:BAND

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred GSM band. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411). |
| Setting | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| Query | | Range: PGSM \| EGSM \| GSM850 \| DCS \| PCS |
| *RST setting | | PGSM |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:BAND DCS" !Sets the deferred band to DCS` | | |

### CALL:SETup:PDTCH:CSCHeme
### CALL:SETup:PDTChannel:CSCHeme

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred PDTCH coding scheme. Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>When a Coding Scheme change is executed, all measurements and BLER reports are stopped before the change is made, and re-started after the change has taken effect. |
| Setting | | Range: CS1 \| CS2\|CS3\|CS4 |
| Query | | Range: CS1 \| CS2\|CS3\|CS4 |
| *RST setting | | CS4 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:CSCHeme CS4" !Sets the PDTCH deferred coding scheme to CS4` | | |

### CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1|2]
### CALL:SETup:PDTChannel:MS:TXLevel[:SELected]:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred mobile station transmit power level for the deferred PDTCH band. The transmit power is set individually for each uplink burst. Depending on the "Multislot Configuration" setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 494). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br>The mobile station transmit power level is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter.<br>The mobile station transmit power level is a bursted parameter. Refer to "Bursted Parameters" on page 130 for a detailed description of being a bursted parameter. |
| Setting | | Range: 0 to 31<br>Resolution: 1 |
| Query | | Range: 0 to 31<br>Resolution: 1 |
| *RST setting | | PGSM and EGSM bands:15, DCS and PCS bands: 10 |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:BURSt2 13"! Sets the deferred mobile station TX !level for the 2nd uplink burst in !the currently selected band.` | | |

## CALL:SETup:PDTCH:MS:TXLevel:DCS:BURSt[1|2]
## CALL:SETup:PDTChannel:MS:TXLevel:DCS:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred mobile station transmit power level for the DCS band. The transmit power is set individually for each uplink burst. Depending on the "Multislot Configuration" setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1 \| 2]" on page 494). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br><br>The mobile station transmit power level is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter.<br><br>The mobile station transmit power level is a bursted parameter. Refer to "Bursted Parameters" on page 130 for a detailed description of being a bursted parameter. |
| Setting | | Range: 0 to 31<br><br>Resolution: 1 |
| Query | | Range: 0 to 31<br><br>Resolution: 1 |
| *RST setting | | 10 |

Programming Example

```
OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:DCS:BURST1 13" !Sets the deferred mobile station
                                                       !TX level for the 1st uplink
                                                          !burst to 13 in the DCS band.
```

## CALL:SETup:PDTCH:MS:TXLevel:EGSM:BURSt[1|2]
## CALL:SETup:PDTChannel:MS:TXLevel:EGSM:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred mobile station transmit power level for the EGSM band. The transmit power is set individually for each uplink burst. Depending on the "Multislot Configuration" setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1 \| 2]" on page 494). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br><br>The mobile station transmit power level is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter.<br><br>The mobile station transmit power level is a bursted parameter. Refer to "Bursted Parameters" on page 130 for a detailed description of being a bursted parameter. |
| Setting | | Range: 0 to 31<br><br>Resolution: 1 |
| Query | | Range: 0 to 31<br><br>Resolution: 1 |
| *RST setting | | 15 |
| Programming Example<br><br>`OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:EGSM:BURSt1 19"! Sets the deferred mobile !station TX level for the 1st !uplink burst to 19 in the EGSM !band.` | | |

## CALL:SETup:PDTCH:MS:TXLevel:GSM850:BURSt[1|2]
## CALL:SETup:PDTChannel:MS:TXLevel:GSM850:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred mobile station transmit power level for the GSM850 band. The transmit power is set individually for each uplink burst. Depending on the "Multislot Configuration" setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 494). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br><br>The mobile station transmit power level is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter.<br><br>The mobile station transmit power level is a bursted parameter. Refer to "Bursted Parameters" on page 130 for a detailed description of being a bursted parameter. |
| Setting | | Range: 0 to 31<br><br>Resolution: 1 |
| Query | | Range: 0 to 31<br><br>Resolution: 1 |
| *RST setting | | 15 |
| Programming Example<br><br>`OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:GSM850:BURSt1 6"! Sets the deferred mobile !station TX level for the 1st !uplink burst to 6 in the GSM850 !band.` | | |

## CALL:SETup:PDTCH:MS:TXLevel:PCS:BURSt[1|2]
## CALL:SETup:PDTChannel:MS:TXLevel:PCS:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred mobile station transmit power level for the PCS band. The transmit power is set individually for each uplink burst. Depending on the "Multislot Configuration" setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1\|2]" on page 494). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br><br>The mobile station transmit power level is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter.<br><br>The mobile station transmit power level is a bursted parameter. Refer to "Bursted Parameters" on page 130 for a detailed description of being a bursted parameter. |
| Setting | | Range: 0 to 31<br><br>Resolution: 1 |
| Query | | Range: 0 to 31<br><br>Resolution: 1 |
| *RST setting | | 10 |
| Programming Example<br><br>`OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:PCS:BURST2 12" !Sets the deferred mobile station !TX Level for the 2nd uplink !burst to 12 in the PCS band.` | | |

## CALL:SETup:PDTCH:MS:TXLevel:PGSM:BURSt[1|2]
## CALL:SETup:PDTChannel:MS:TXLevel:PGSM:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred mobile station transmit power level for the PGSM band. The transmit power is set individually for each uplink burst. Depending on the "Multislot Configuration" setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see "CALL:SETup:PDTCH:MS:TXLevel[:SELected]:BURSt[1 \| 2]" on page 494). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see "CALL:HANDover \| HANDoff[:IMMediate]" on page 411).<br><br>The mobile station transmit power level is a frequency banded parameter. Refer to "Frequency Banded Parameters" on page 115 for a detailed description of the implications of being a banded parameter.<br><br>The mobile station transmit power level is a bursted parameter. Refer to "Bursted Parameters" on page 130 for a detailed description of being a bursted parameter. |
| Setting | | Range: 0 to 31<br><br>Resolution: 1 |
| Query | | Range: 0 to 31<br><br>Resolution: 1 |
| *RST setting | | 15 |

Programming Example

```
OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:PGSM:BURSt2 21" !Sets the deferred mobile
                                                        !station TX Level for the 2nd
                                                        !uplink burst to 21 in the PGSM
                                                           !band.
```

## CALL:SETup:PDTCH:MSLot:CONFiguration
## CALL:SETup:PDTChannel:MSLot:CONFiguration

<table>
<tr><td rowspan="2">Function</td><td>GSM</td><td>This command is not applicable to GSM.</td></tr>
<tr><td>GPRS</td><td>This command sets/queries the deferred number of downlink and uplink PDTCHs. These deferred PDTCHs are only applied when the Execute Channel Change action is initiated using “CALL:HANDover | HANDoff[:IMMediate]” on page 411.<br><br>The effect this command has on the number of uplink and downlink timeslots depends on the Data Connection Type:<br><br>• Type A - The multislot configuration command only affects the number of uplink timeslots, therefore configurations D1U1, D2U1, D3U1, and D4U1 will appear similar.<br><br>• Type B - The multislot configuration command constrains the number of uplink timeslots to be less than or equal to the number of downlink timeslots.<br><br>• BLER - The multislot configuration command only affects the number of downlink timeslots, therefore D2U2 and D2U1 will appear similar.<br><br>The actual timeslots used in each configuration are fixed as follows:<br><br>Multislot Configuration — Downlink Timeslots Used — Uplink Timeslots Used<br>D1U1 — 3 — 3<br>D2U1 — 3, 4 — 4<br>D2U2 — 3, 4 — 3, 4<br>D3U1 — 3, 4, 5 — 4<br>D3U2 — 3, 4, 5 — 4, 5<br>D4U1 — 3, 4, 5, 6 — 5<br><br>When the Multislot Configuration is set to D1U1, D2U1, D3U1 or D4U1 the measurement burst is set to 1.<br><br>When a multislot configuration change is executed, all measurements are stopped before the change is made, and restarted after the change has taken effect.</td></tr>
<tr><td colspan="2">Setting</td><td>D1U1|D2U1|D2U2|D3U1|D3U2|D4U1<br><br>“D<n>U<m>” corresponds to “Downlink<n>Uplink<m>”, where <n> indicates the number of downlink timeslots and <m> represents the number of uplink timeslots.</td></tr>
<tr><td colspan="2">Query</td><td>Range: D1U1 | D2U1 | D2U2 | D3U1|D3U2|D4U1</td></tr>
<tr><td colspan="2">*RST Setting</td><td>D2U1</td></tr>
<tr><td colspan="3">Programming Example<br><br>OUTPUT 714;”CALL:SETup:PDTCH:MSLot:CONFiguration D2U2” !Sets the number of downlink<br>!timeslots to 2 and uplink<br>!timeslots to 2.</td></tr>
</table>

### CALL:SETup:PDTCH:PZERo:LEVel
### CALL:SETup:PDTChannel:PZERo:LEVel

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the deferred Power Reduction reference level to be used for connections. Deferred parameters are applied when the Execute Channel Change action is initiated using "CALL:HANDover \| HANDoff[:IMMediate]" on page 411.<br>When Data Connection Type "ETSI Type A" is used, there is no downlink PDTCH and therefore changing this parameter has no effect other than remembering the new value until the Data Connection Type "ETSI Type B" or "BLER" is used. |
| Setting | | Range: 0 to 30 dB<br>Resolution: 2 dB |
| Query | | Range: 0 to 30 dB<br>Resolution: 2 dB |
| *RST setting | | 0 dB |
| Programming Example<br>`OUTPUT 714;"CALL:SETup:PDTCH:PZERo:LEVel 15 dB" ! Sets the deferred Power Reduction ! reference level to 15 dB.` | | |

### CALL:SETup:PDTCH:USFLag
### CALL:SETupPDTChannel:USFLag

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS TA | This command is not applicable to the GPRS test application. |
| | GPRS LA | This command sets/queries the uplink state flag (USF) for handoffs. The USF allows multiple mobiles to share over-the-ari resources. The USF allows you to verify that your device under test only responds when required. |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | 0 |
| Programming Example<br>`OUTPUT 714;"CALL:SETUP:PDTCH:USFLAG 5" !Sets the handoff uplink state flag to 5.` | | |

# CALL:SIGNaling

This command is not applicable to GPRS.

"Diagram Conventions" on page 323

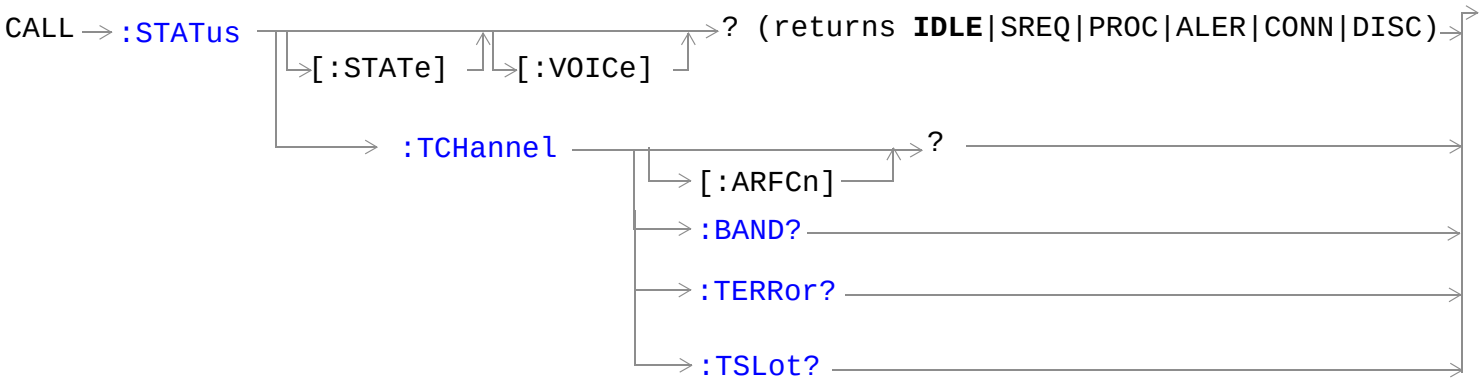
### CALL:SIGNaling:MS:TXLevel:FACCH

| | | |
|---|---|---|
| Function | GSM | Sets/queries the TX Level FACCH Signaling parameter.<br>When TX Level FACCH Signaling is set to on, the base station emulator uses both a FACCH (Fast Associated Control CHannel) channel assignment and an update to the SACCH (Slow Associated Control CHannel) header to signal the mobile to change to a new power level.<br>When TX Level FACCH Signaling is set to off, the base station emulator uses only an update to the SACCH header to signal the mobile to change to a new power level. A FACCH channel assignment message is not sent. This setting is useful if you want to update the SACCH header's TX Level field without performing a channel assignment.<br>The setting of TX Level FACCH Signaling can be changed in either of the test set's two operating modes, Active Cell or Test mode. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON \|0\|OFF |
| Query | | 1\|0 |
| *RST Setting | | 1\|ON |
| Programming Example<br>`OUTPUT 714;"CALL:SIGNALING:MS:TXLEVEL:FACCH 0"` | | |

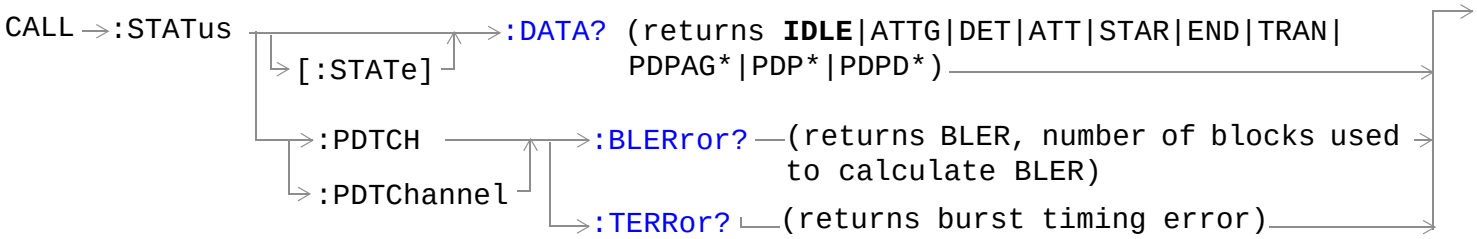
## Related Topics

"Configuring the Broadcast Channel (BCH)" on page 110

# CALL:STATus




These commands are not applicable to GPRS.




These commands are not applicable to GSM.
*These data connection states are applicable only to the GPRS *lab* application.

"Diagram Conventions" on page 323

## CALL:STATus[:STATe][:VOICe]?

| | | |
|---|---|---|
| Function | GSM | This query returns the status of the call. For details on the call states see "Call Processing State Synchronization" on page 305. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: IDLE \| SREQ \| PROC \|ALER \| CONN \| DISC |
| *RST setting | | IDLE |
| Programming Example<br>`OUTPUT 714;"CALL:STATUS:STATE?"` | | |

## CALL:STATus[:STATe]:DATA?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the status of the data connection. For details on the data connection states see "Data Connection Processing State Synchronization" on page 317. |
| Setting | | Range:<br>• GPRS Test Application: IDLE \| ATTG \| DET \|ATT \| STAR \| END \| TRAN<br>• GPRS Lab Application: IDLE \| ATTG \| DET \|ATT \| STAR \| END \| TRAN \| PDPAG \| PDP \| PDPD |
| Query | | Range:<br>• GPRS Test Application: IDLE \| ATTG \| DET \|ATT \| STAR \| END \| TRAN<br>• GPRS Lab Application: IDLE \| ATTG \| DET \|ATT \| STAR \| END \| TRAN \| PDPAG \| PDP \| PDPD |
| *RST setting | | IDLE |
| Programming Example<br>`OUTPUT 714;"CALL:STATUS:DATA?"` | | |

### CALL:STATus:PDTCH | PDTChannel:BLERror?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the block error rate (BLER) result and the number of blocks tested to calculate the BLER result.<br>The BLER result is only available when the data connection type is set to BLER (see "CALL:FUNCtion:DATA:TYPE" on page 408).<br>The BLER result is only updated when the data connection state is transferring (TRAN). See "CALL:STATus[:STATe]:DATA?" on page 504. To reset the BLER result you must use "SYSTem:MEASurement:RESet" on page 864. The BLER result does not reset automatically when you connect a different GPRS mobile station.<br>If you require more details on BLER, see "Block Error Rate (BLER) Report Measurement Description" on page 47. |
| Query | | Block error rate<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Blocks tested<br>• Range: 0 to 100000 and 9.91E+37 (NAN)<br>• Resolution: 1 |
| *RST setting | | Block error rate: 9.91E+37 (NAN), Blocks tested: 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:STATus:PDTCH:BLERror?"` | | |

### CALL:STATus:PDTCH | PDTChannel:TERRor?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the burst timing error report which provides a course indication of the difference between the actual and expected burst reception times. The error is calculated on a burst by burst basis from the adaptive equalization filter coefficients. The reporting period for burst timing error is approximately 0.5 seconds, and the value returned is the peak timing error occurring during the period. Note that this report is not based on a demodulated midamble position.<br>When there are no active PDTCHs, Burst Timing Error results are not available |
| Query | | Range: -8 to +30 T and 9.91 E+37 (NAN)<br>Resolution: 0.25 T |
| Programming Example<br>`OUTPUT 714;"CALL:STATus:PDTCH:TERRor?"` | | |

### CALL:STATus:TCHannel[:ARFCN]?

| | | |
|---|---|---|
| Function | GSM | This query returns the TCH ARFCN for the current band.<br>The CALL:STATUS:STATE must be connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range:<br>• DCS band, channels 512 to 885<br>• EGSM band, channels 975 to 1023 and 0 to 124<br>• GSM850 band, channels 128 to 251<br>• PCS band, channels 512 to 810<br>• PGSM band, channels 1 to 124<br>• 9.91E+37<br>Resolution: 1 |
| *RST setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:STATUS:TCHANNEL:ARFCN?"` | | |

### CALL:STATus:TCHannel:BAND?

| | | |
|---|---|---|
| Function | GSM | This query returns the current TCH band. See "Configuring the Traffic Channel (TCH)" on page 113.<br>The CALL:STATUS:STATE must be connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: DCS \| EGSM \| GSM850 \| PCS \| PGSM \| "" |
| *RST setting | | "" (null string) |
| Programming Example<br>`OUTPUT 714;"CALL:STATUS:TCHANNEL:BAND?"` | | |

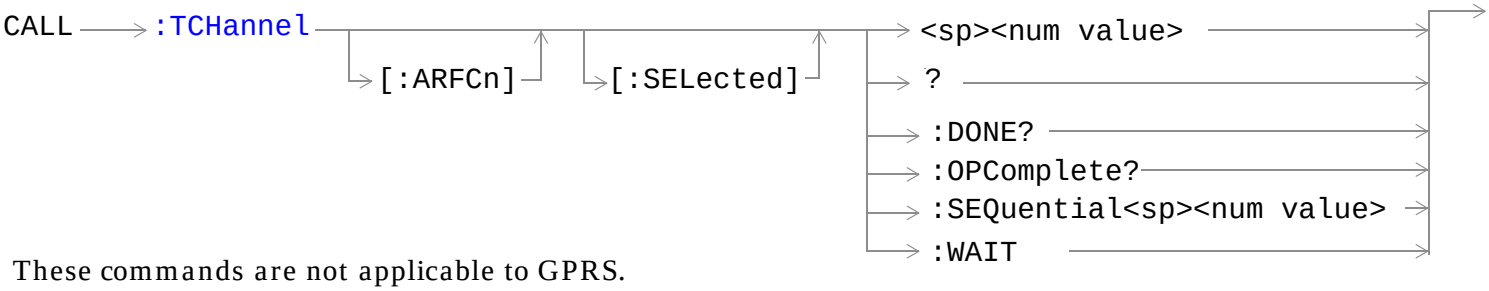
### CALL:STATus:TCHannel:TERRor?

| | | |
|---|---|---|
| Function | GSM | This query returns the last burst timing error measurement.<br>This indicates the worst case timing error of all bursts received in a reporting period. If all of the bursts reporting in a period are missing, the query returns 9.91E+37 (NAN).<br>The reference for burst timing error measurements is with respect to the (downlink TCH slot) + (3 slot TX/RX delay (468.75 bits)) - (TCH Timing Advance).<br>The CALL:STATUS:STATE must be connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>Burst timing error is continuously updated every 480 ms . Burst timing error is displayed in the Call Setup window. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: -8 to +30 T and 9.91E+37 (NAN)<br>Resolution: 0.25 T |
| *RST setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:STATUS:TCHANNEL:TERROR?" ! Returns Burst Timing Error.` | | |

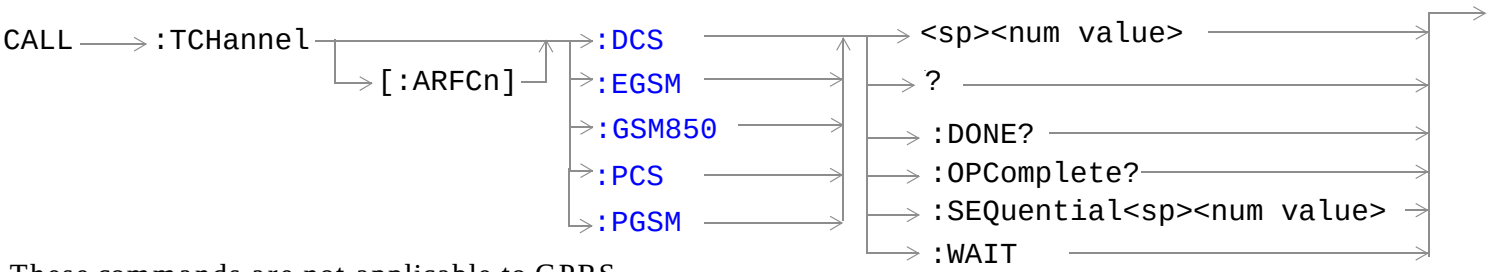
### CALL:STATus:TCHannel:TSLot?

| | | |
|---|---|---|
| Function | GSM | This query returns the Timeslot that the BS Emulator is using for the TCH. See "Configuring the Traffic Channel (TCH)" on page 113.<br>The CALL:STATUS:STATE must be connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 3 \| 4 \| 5 \| 9.91E+37 |
| *RST setting | | 9.91E+37 (NAN) |
| Programming Example<br>`OUTPUT 714;"CALL:STATUS:TCHANNEL:TSLOT?"` | | |

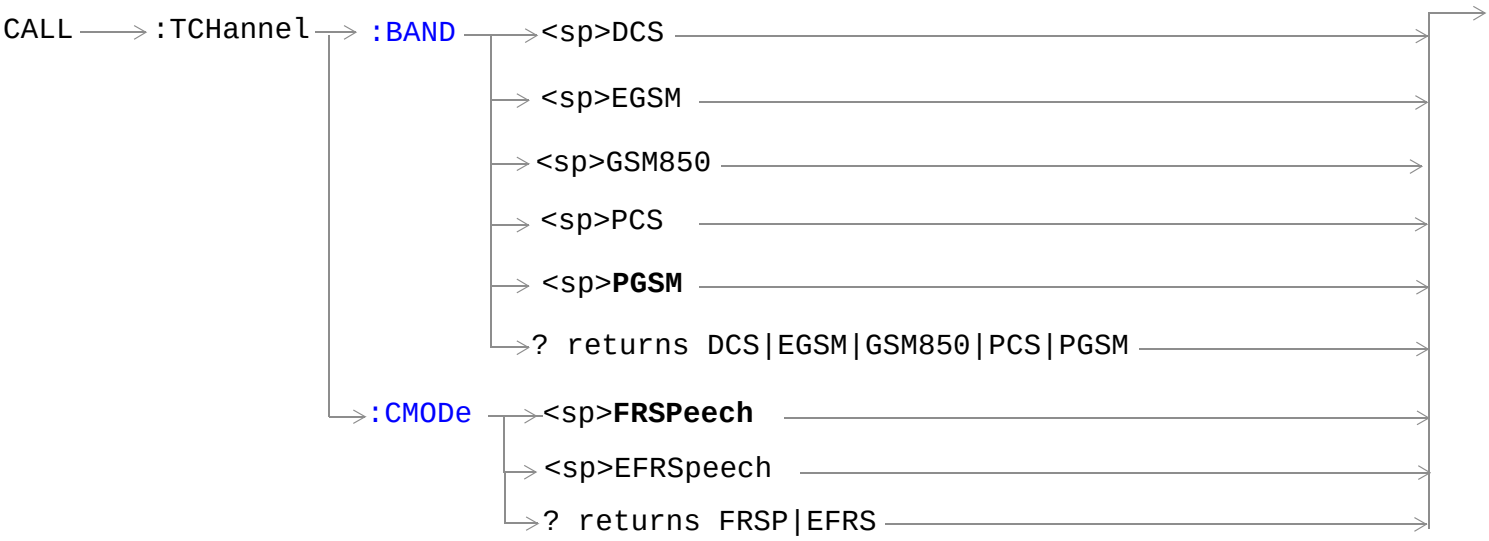
# CALL:TCHannel



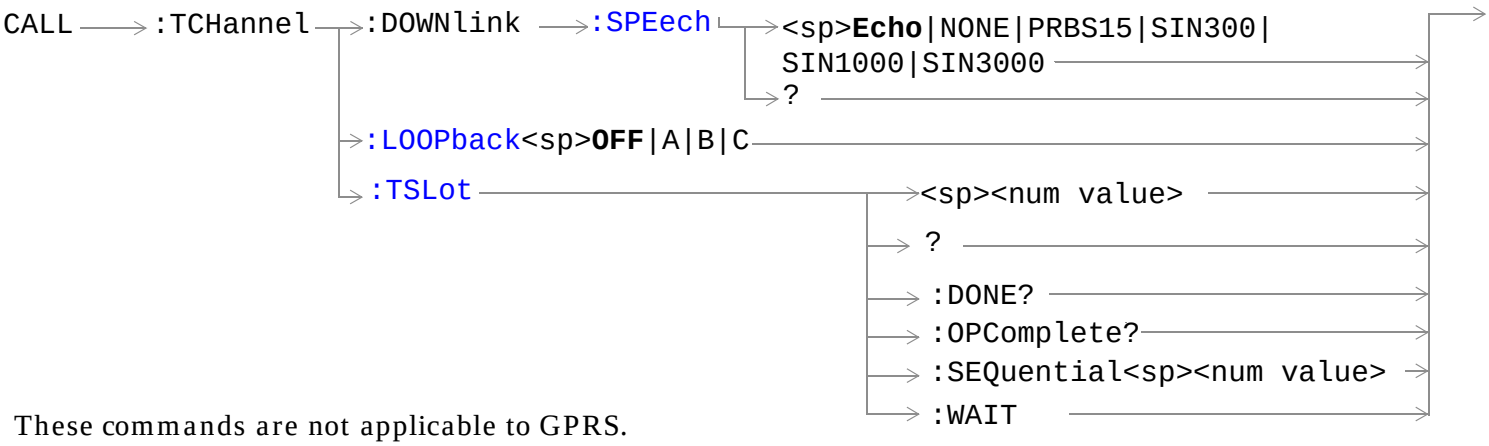

These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## CALL:TCHannel[:ARFCn][:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the channel number of downlink and uplink TCH for the band already selected.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• DCS band, channels 512 to 885 (default: 698)<br>• EGSM band, channels 0 to 124 and 975 to 1023 (default: 30)<br>• GSM850 band, channels 128 to 251 (default: 160)<br>• PCS band, channels 512 to 810 (default: 698)<br>• PGSM band, channels 1 to 124 (default: 30)<br>Resolution: 1 |
| Query | | Range:<br>• DCS band, channels 512 to 885<br>• EGSM band, channels 0 to 124 and 975 to 1023<br>• GSM850 band, channels 128 to 251<br>• PCS band, channels 512 to 810<br>• PGSM band, channels 1 to 124<br>Resolution: 1 |
| *RST Setting | | PGSM and EGSM bands: 30, DCS and PCS bands: 698, GSM850: 160 |

Programming Example

```
OUTPUT 714;"CALL:TCHANNEL:ARFCN:SELECTED 512" !Selects ARFCN of 512 on the
                                              !test set.
```

## CALL:TCHannel[:ARFCn]:DCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the channel number for downlink and uplink TCH for the DCS band. See "Configuring the Traffic Channel (TCH)" on page 113.<br>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 885 (default: 698)<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST Setting | | 698 |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:ARFCN:DCS 512"` | | |

## CALL:TCHannel[:ARFCn]:EGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the channel number for downlink and uplink TCH for EGSM band. See "Configuring the Traffic Channel (TCH)" on page 113.<br>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124 \| 975 to 1023 (default: 30)<br>Resolution: 1 |
| Query | | Range: 0 to 124 \| 975 to 1023<br>Resolution: 1 |
| *RST Setting | | 30 |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:ARFCN:EGSM 124"` | | |

## CALL:TCHannel[:ARFCn]:GSM850

| | | |
|---|---|---|
| Function | GSM | Sets/queries the channel number for downlink and uplink TCH for the GSM850 band. See "Configuring the Traffic Channel (TCH)" on page 113.<br>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 128 to 251<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST Setting | | 160 |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:ARFCN:GSM850 135"` | | |

## CALL:TCHannel[ARFCN]:PCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the channel number for downlink and uplink TCH for the PCS band. See "Configuring the Traffic Channel (TCH)" on page 113.<br>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 810 (default: 698)<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST Setting | | 698 |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:ARFCN:PCS 512"` | | |

## CALL:TCHannel[:ARFCn]:PGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the channel number for downlink and uplink TCH for the PGSM band. See "Configuring the Traffic Channel (TCH)" on page 113.<br>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 124 (default: 30)<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST Setting | | 30 |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:ARFCN:PGSM 124"` | | |

## CALL:TCHannel:BAND

| | | |
|---|---|---|
| Function | GSM | Sets/queries which GSM band the BS Emulator should use for the TCH.<br>The test set may be queried for the current TCH band when the CALL:STATUS:STATE is idle or connected, see "CALL:STATus[:STATe][:VOICe]?" on page 504.<br>The test set uses this command to perform a channel assignment, see "How the Test Set Performs a Dualband Handover" on page 123 when the MS will support the band and the CALL:STATUS:STATE is CONNected. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: DCS \| EGSM \| GSM850 \| PCS \| PGSM bands<br>Resolution: 1 |
| Query | | Range: DCS \| EGSM \| GSM850 \| PCS \| PGSM bands<br>Resolution: 1 |
| *RST Setting | | PGSM |
| Related Topic | | See "Traffic Band Parameter" on page 118. |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:BAND DCS"` | | |

## CALL:TCHannel:CMODe

| | | |
|---|---|---|
| Function | GSM | Sets/queries which channel mode the mobile station should use for speech data. This setting is either full rate speech (FRSPeech) or enhanced full rate speech (EFRSpeech). See "Programming a Channel Mode Change" on page 124. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: FRSPeech \| EFRSpeech |
| Query | | Range: FRSP \| EFRS |
| *RST Setting | | FRSPeech |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:CMODE EFRSPEECH"` | | |

## CALL:TCHannel:DOWNlink:SPEech

| | | |
|---|---|---|
| Function | GSM | Set which kind of Speech data is transmitted on the downlink TCH.<br>See "Configuring the Traffic Channel (TCH)" on page 113 or "Fast Bit Error Measurement Description" on page 55 or "Test Mode Operating Modes" on page 101. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: ECHO \| NONE \| PRBS15 \| SIN300 \| SIN1000 \| SIN3000 |
| Query | | Range: ECHO \| NONE \| PRBS15 \| SIN300 \| SIN1000 \| SIN3000 |
| *RST Setting | | ECHO |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:DOWNLINK:SPEECH ECHO"` | | |

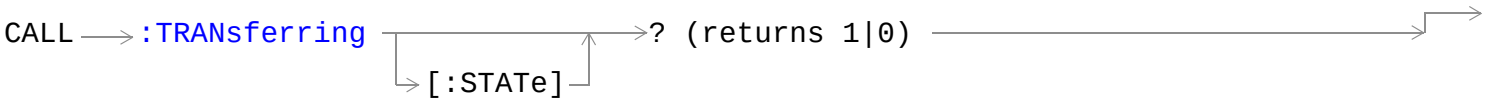
## CALL:TCHannel:LOOPback

| | | |
|---|---|---|
| Function | GSM | Sets traffic channel loopback state and type for the MS.<br>The loopback type must be set before a Fast Bit Error or a Bit Error measurement will function.<br>The test set will automatically set the correct loopback type if the signalling loopback control is set to on, after the measurement the test set will automatically set the loopback to off. See "SETup:BERRor:SLControl[:STATe]" on page 653 or "SETup:FBERror:SLControl[:STATe]" on page 673.<br>See "Fast Bit Error Measurement Description" on page 55 or "GSM Bit Error Measurement" on page 41. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• OFF - Sets the TCH Loop state for the MS to OFF. The loop back is open.<br>• A- Sets the TCH Loop state for the MS to type A. Full-rate speech TCH loopback with signaling of erased frames, (residual).<br>• B- Sets the TCH Loop state for the MS to type B. Full-rate speech TCH loopback without signalling of erased frames, (non-residual).<br>• C - Sets the TCH Loop state for the MS to type C. TCH burst by burst loopback. |
| *RST Setting | | OFF |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:LOOPBACK C" !Sets loopback type.` | | |

## CALL:TCHannel:TSLot

| | | |
|---|---|---|
| Function | GSM | Sets the Timeslot number used for downlink and uplink Traffic Channel.<br>See "Configuring the Traffic Channel (TCH)" on page 113.<br>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 301 for examples. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 3 \| 4 \| 5<br>Resolution: 1 |
| Query | | Range: 3 \| 4 \| 5<br>Resolution: 1 |
| *RST Setting | | 4 |
| Programming Example<br>`OUTPUT 714;"CALL:TCHANNEL:TSLOT 5" !Sets time slot number.` | | |

# CALL:TRANsferring




This command is not applicable to GSM.

"Diagram Conventions" on page 323

### CALL:TRANsferring[:STATe]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries whether or not the data connection is in the transferring state. 1 is returned if the data connection is in the transferring state. 0 is returned if the data connection is in any other non-transitory state. For more details on the Transferring State query or the data connection states, see "Data Connection Processing State Synchronization" on page 317. |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 \| OFF |
| Programming Example<br>`OUTPUT 714;"CALL:TRANsferring:STATe?"` | | |

# 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.

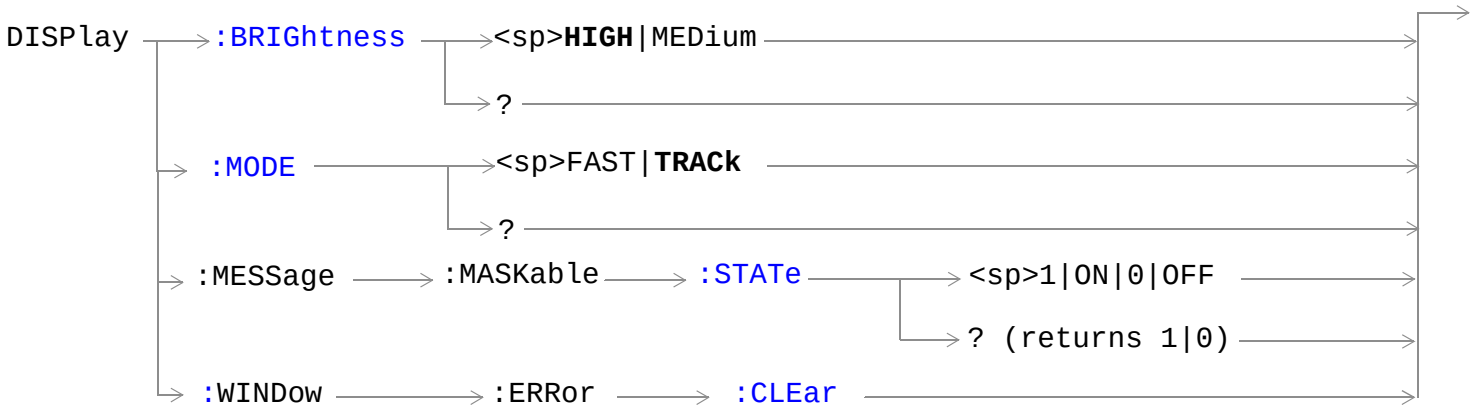
### Display Backlight Dimming

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 323

### DISPlay:BRIGhtness

| | | |
|---|---|---|
| Function | GSM | Sets/queries the test set's display brightness.<br>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 517. |
| | GPRS | |
| 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<br>`OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" !Sets display brightness to medium.` | | |

### DISPlay:MODE

| | | |
|---|---|---|
| Function | GSM | Sets/queries the test set's display mode. |
| | GPRS | See "Display Mode (Track/Fast)" on page 1029. |
| Setting | | Range: FAST \| TRACK |
| Query | | Range: FAST \| TRAC |
| *RST setting | | TRACK |
| Programming Example<br>`OUTPUT 714;"DISPLAY:MODE FAST" !Sets display mode to fast.` | | |

### DISPlay:MESSage:MASKable:STATe

| | | |
|---|---|---|
| Function | GSM | Blocks maskable messages from appearing on the test set display screen but not from the Message Log. Maskable messages are reported to the Message Log in either state. |
| | GPRS | |
| Setting | | Range: On \| Off |
| Query | | Range: On \| Off |
| Factory setting | | On |
| Programming Example<br>`OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.` | | |

### DISPlay:WINDow:ERRor:CLEar

| | | |
|---|---|---|
| Function | GSM | Clears the error message from the display screen but not from the Message Log. |
| | GPRS | |
| Programming Example<br>`OUTPUT 714;"DISPLAY:WINDOW:ERROR:CLEAR" !Clears an error message from the display.` | | |

# 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:AAUDio" on page 521 *GSM Only*

"FETCh:BERRor" on page 530 *GSM Only*

"FETCh:DAUDio" on page 538 *GSM Only*

"FETCh:DPOWer" on page 542 *GSM Only*

"FETCh:FBERror" on page 545 *GSM Only*

"FETCh:GBERror" on page 548 *GPRS Only*

"FETCh:IQTuning" on page 551 *GSM Only*

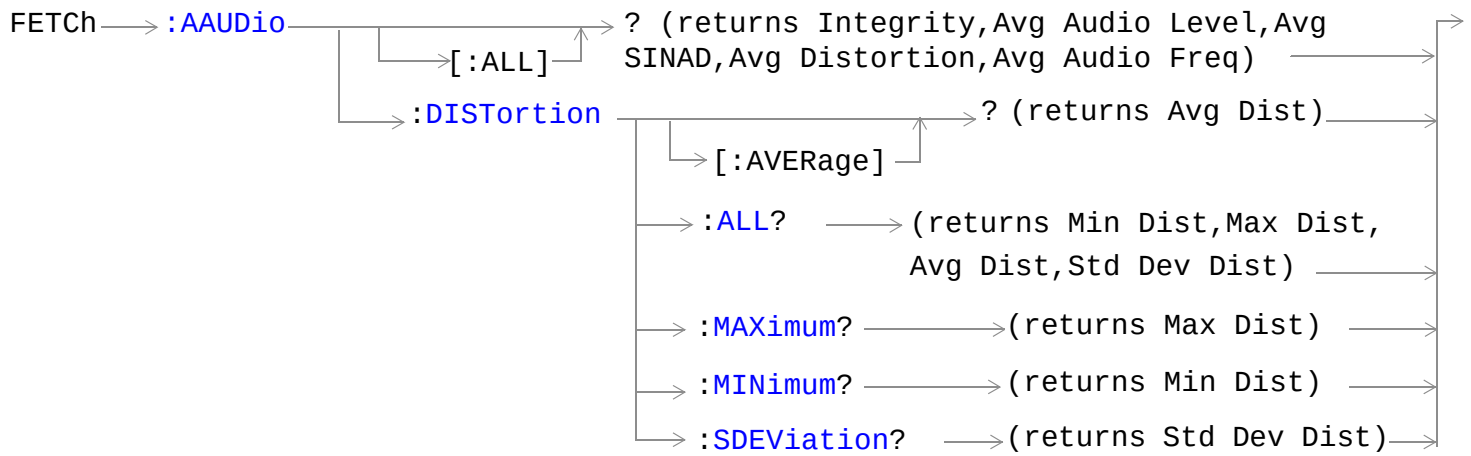
"FETCh:ORFSpectrum" on page 555

"FETCh:PFERror" on page 562

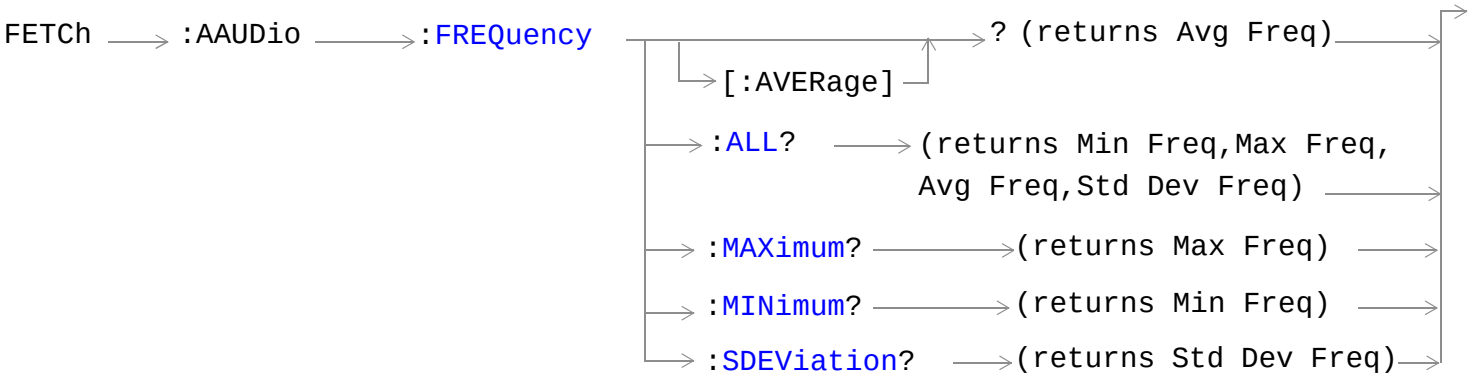
"FETCh:PVTime" on page 571

"FETCh:TXPower" on page 598

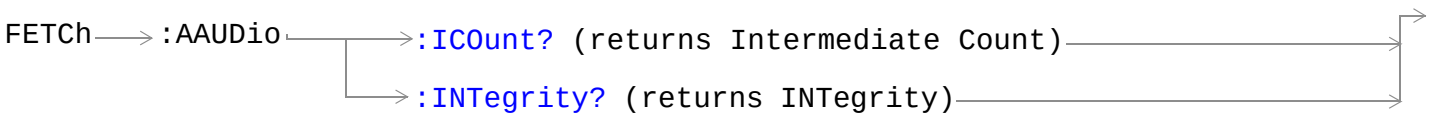
# FETCh:AAUDio



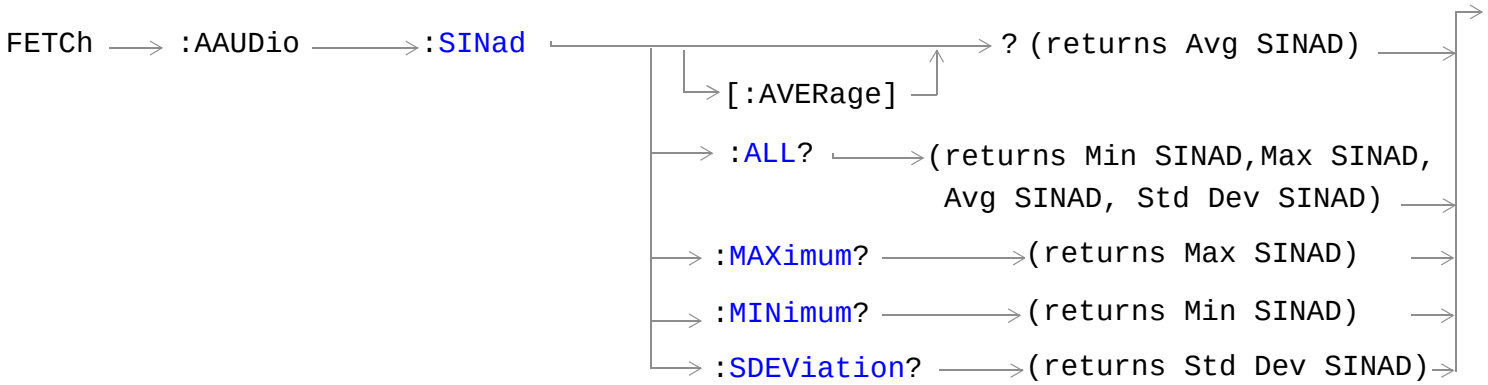

These commands are not applicable to GPRS.



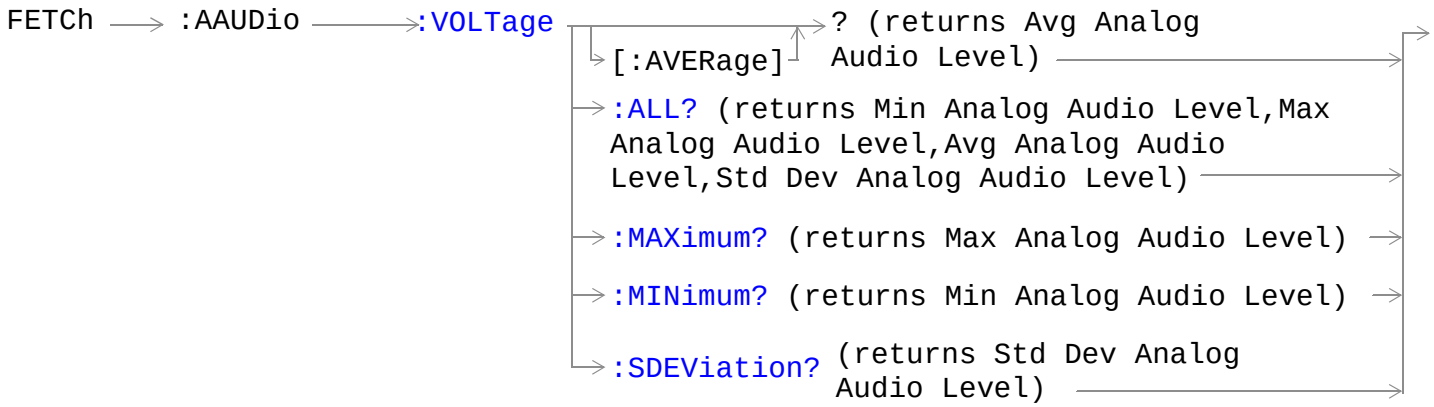

These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## FETCh:AAUDio[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This query returns the analog audio measurement results. This query returns an integrity indicator (see "Integrity Indicator" on page 283), average analog audio level, average SINAD, average distortion and the average audio frequency. Values are returned in a comma-separated list.<br>If the analog audio Multi-Measurement Count field is off, the level returned by this command is displayed in the Analog Audio In Level field. If the analog audio multi-measurement count is on, the level returned by this command is displayed in the Analog Audio Average field. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Average analog audio level<br>• Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>• Resolution: 0.1 $mV_{rms}$<br>Average SINAD<br>• Range: -99 to 99 dB, 9.91 E+37<br>• Resolution: 0.01 dB<br>Average distortion<br>• Range: 0 to 99%<br>• Resolution: 0.01%<br>Average audio frequency<br>• Range: 0 to 99999 Hz<br>• Resolution: 0.01 Hz |

### FETCh:AAUDio:DISTortion[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | This query returns the average audio distortion measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Average audio distortion<br>• Range: 0 to 99%, 9.91 E+37<br>• Resolution: 0.01% |

### FETCh:AAUDio:DISTortion:ALL?

| | | |
|---|---|---|
| Function | GSM | This query returns the audio distortion measurements.<br>The measurement results are returned in the following order: minimum distortion, maximum distortion, average distortion, and standard deviation distortion. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Minimum, maximum, and average audio distortion:<br>• Range: 0 to 99%, 9.91 E+37<br>• Resolution: 0.01%<br>Standard deviation audio distortion:<br>• Range: 0 to 99%, 9.91 E+37<br>• Resolution: 0.001% |

### FETCh:AAUDio:DISTortion:MAXimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the maximum audio distortion. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99%, 9.91 E+37<br>Resolution: 0.01% |

### FETCh:AAUDio:DISTortion:MINimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the minimum audio distortion. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99%, 9.91 E+37<br>Resolution: 0.01% |

### FETCh:AAUDio:DISTortion:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This query returns the standard deviation audio distortion. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99%, 9.91 E+37<br>Resolution: 0.001% |

### FETCh:AAUDio:FREQuency[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | This query returns the average audio frequency measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Average audio frequency<br>• Range: 0 to 99999 Hz, 9.91 E+37<br>• Resolution: 0.01 Hz |

### FETCh:AAUDio:FREQuency:ALL?

| | | |
|---|---|---|
| Function | GSM | This query returns the audio frequency measurements.<br>The measurement results are returned in the following order: minimum frequency, maximum frequency, average frequency, standard deviation frequency. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Minimum, maximum, and average audio frequency:<br>• Range: 0 to 99999 Hz, 9.91 E+37<br>• Resolution: 0.01 Hz<br>Standard deviation audio frequency:<br>• Range: 0 to 99999 Hz, 9.91 E+37<br>• Resolution: 0.001 Hz |

### FETCh:AAUDio:FREQuency:MAXimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the maximum audio frequency. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99999 Hz, 9.91 E+37<br>Resolution: 0.01 Hz |

### FETCh:AAUDio:FREQuency:MINimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the minimum audio frequency. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99999 Hz, 9.91 E+37<br>Resolution: 0.01 Hz |

### FETCh:AAUDio:FREQuency:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This query returns the standard deviation audio frequency. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99999 Hz, 9.91 E+37<br>Resolution: 0.01 Hz |

### FETCh:AAUDio:ICOunt?

| | | |
|---|---|---|
| Function | GSM | This query returns the intermediate count of analog audio multi-measurements completed. This value is not available over the manual interface. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 999<br>Resolution: 1 |

### FETCh:AAUDio:INTegrity?

| | | |
|---|---|---|
| Function | GSM | This query returns the integrity indicator for the last analog audio measurement completed. Zero indicates a normal measurement. See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:AAUDio:SINad[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | This query returns the average SINAD measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Average SINAD<br>• Range:-99 to 99 dB, 9.91 E+37<br>• Resolution: 0.01 dB |

### FETCh:AAUDio:SINad:ALL?

| | | |
|---|---|---|
| Function | GSM | Queries the SINAD measurements.<br>Measurement results are returned in the following order: minimum SINAD, maximum SINAD, average SINAD, and standard deviation SINAD. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Minimum, maximum, average SINAD:<br>• Range: -99 to 99 dB, 9.91 E+37<br>• Resolution: 0.01 dB<br>Standard deviation SINAD<br>• Range: -99 to 99 dB, 9.91 E+37<br>• Resolution: 0.001 dB |

### FETCh:AAUDio:SINad:MAXimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the maximum SINAD measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: -99 to 99 dB, 9.91 E+37<br>Resolution: 0.01 dB |

### FETCh:AAUDio:SINad:MINimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the minimum SINAD measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: -99 to 99 dB, 9.91 E+37<br>Resolution: 0.01 dB |

### FETCh:AAUDio:SINad:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This query returns the standard deviation SINAD measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 99 dB, 9.91 E+37<br>Resolution: 0.001 dB |

### FETCh:AAUDio:VOLTage[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | This query returns the average analog audio level. Value is returned in units of $V_{rms}$. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>Resolution: 0.1 $mV_{rms}$ |

## FETCh:AAUDio:VOLTage:ALL?

| | | |
|---|---|---|
| Function | GSM | This query returns the analog audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Minimum<br>• Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>• Resolution: 0.1 $mV_{rms}$<br>Maximum<br>• Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>• Resolution: 0.1 $mV_{rms}$<br>Average<br>• Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>• Resolution: 0.1 $mV_{rms}$<br>Standard deviation<br>• Range: 0 V to 14.14214 V<br>• Resolution: 0.01 mV |

## FETCh:AAUDio:VOLTage:MAXimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the analog audio multi-measurement maximum analog audio voltage. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>Resolution: 0.1 $mV_{rms}$ |

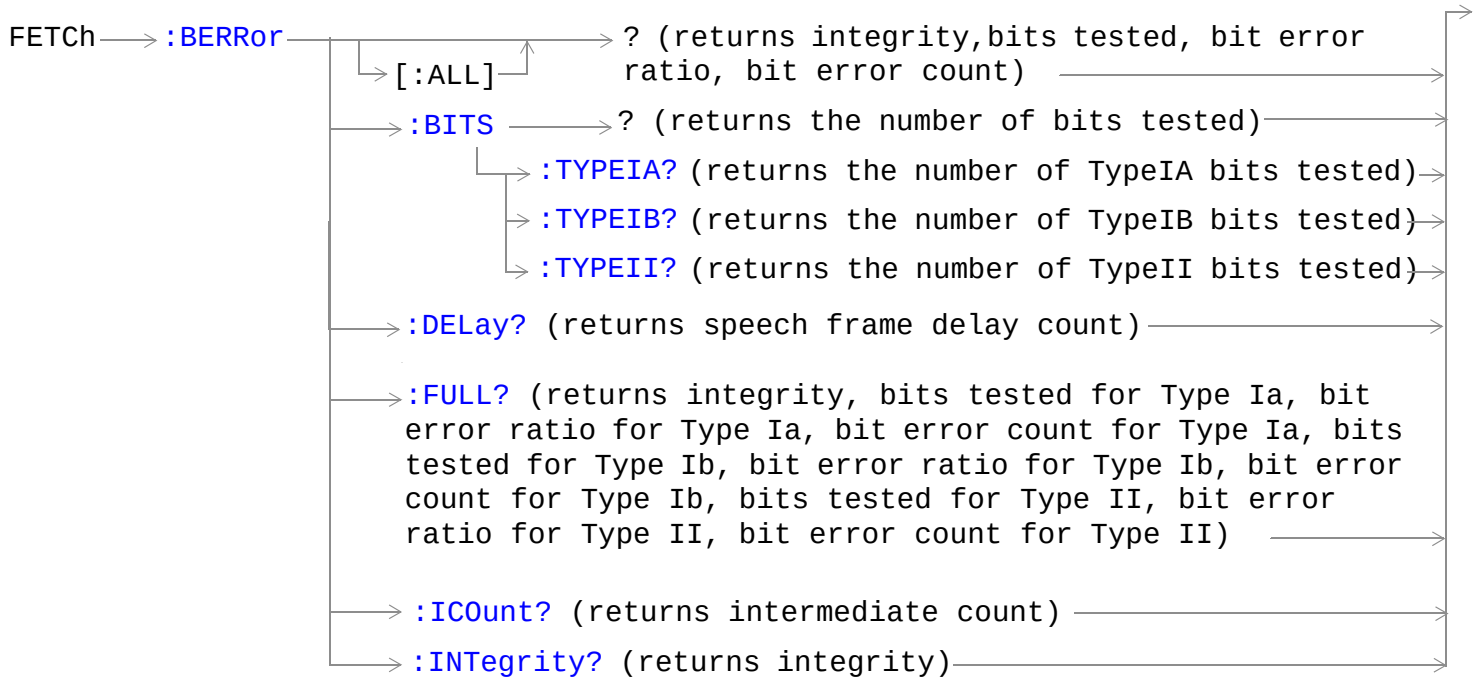
## FETCh:AAUDio:VOLTage:MINimum?

| | | |
|---|---|---|
| Function | GSM | This query returns the analog audio multi-measurement minimum analog audio voltage. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 10 $mV_{rms}$ to 20 $V_{rms}$<br>Resolution: 0.1 $mV_{rms}$ |

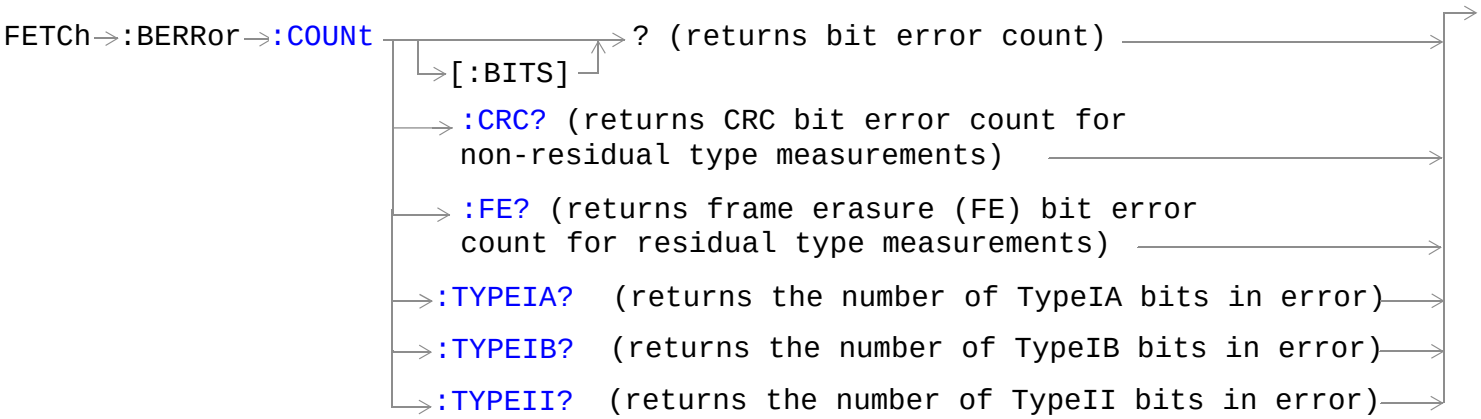
## FETCh:AAUDio:VOLTage:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This query returns the analog audio multi-measurement standard deviation. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 V to 14.14214 V<br>Resolution: 0.01 mV |

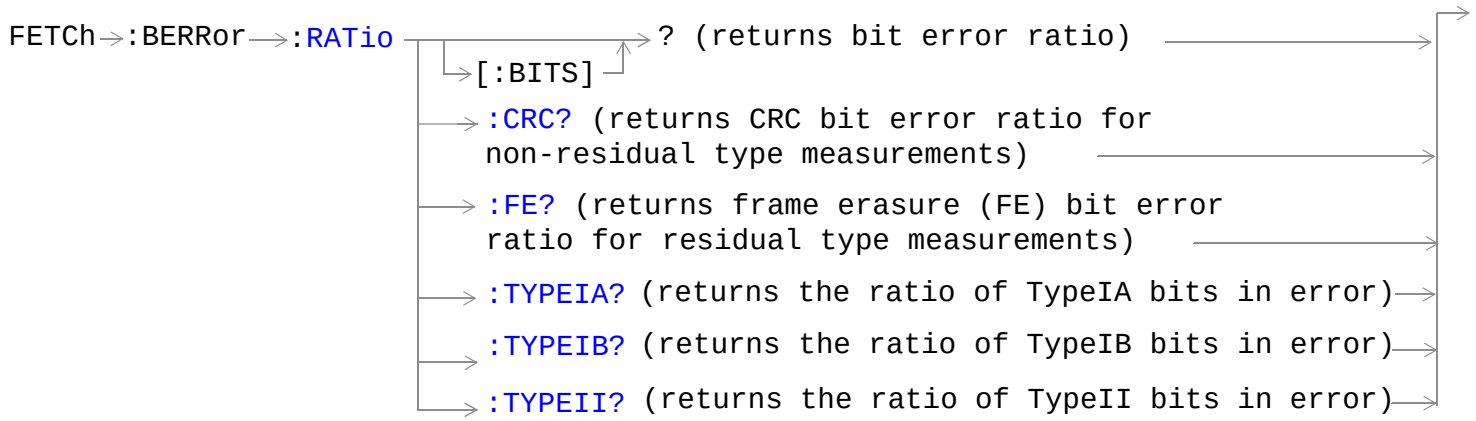
# FETCh:BERRor




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## FETCh:BERRor[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries the bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count. (A similar query, "FETCh:BERRor:FULL?" on page 535, returns the same results but for all bit types simultaneously.) See "Bit Error Measurement Description" on page 41. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Bits tested<br>• Range: 0 to 999,131 and 9.91 E+37 (NAN)<br>• Resolution: 1<br>Bit error ratio<br>• Range: 0 to 100 and 9.91 E+37 (NAN)<br>• Resolution: 0.01<br>Bit error count<br>• Range: 1 to 999,131 and 9.91 E+37 (NAN)<br>• Resolution: 1 |

## FETCh:BERRor:BITS?

| | | |
|---|---|---|
| Function | GSM | Queries the number of bits actually tested. This query only returns the result of the bit type set using the SETup:BERRor[:TYPE] command.<br>The number of bits actually tested will exceed the number requested because the test set rounds up the number requested to the nearest number that results in an integral number of speech frames. One speech frame is 132 bits. The test set measures complete a speech frame and it is queried for bits. See "Bit Error Measurement Description" on page 41 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Bits tested<br>• Range: 0 to 999,131 and 9.91 E+37 (NAN)<br>• Resolution: 1 |
| *RST Setting | | 10,000 |

### FETCh:BERRor:BITS:TYPEIA|TYPEIB|TYPEII?

| | | |
|---|---|---|
| Function | GSM | Queries the number of bits which have been tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See "Bit Error Measurement Description" on page 41 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN)<br>Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN)<br>Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:BERRor:COUNt[:BITS]?

| | | |
|---|---|---|
| Function | GSM | Queries the number of bits that were in error during the last bit error test. See "Bit Error Measurement Description" on page 41<br>The manual user must set the measurement unit to count. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 999,131 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:BERRor:COUNt:CRC?

| | | |
|---|---|---|
| Function | GSM | Queries the number of bad cyclic redundancy checks (CRCs) for a non-residual measurement type, loopback type B test. See "Bit Error Measurement Description" on page 41<br>The mobile station re-transmits the CRC it received from the test set on the uplink.<br>A bad CRC occurs when the CRC transmitted by the test set does not match what is received back from the mobile station.<br>The manual user must set the measurement unit to count. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 19,980 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:BERRor:COUNt:FE?

| | | |
|---|---|---|
| Function | GSM | Queries the number of frames erased during a residual measurement type, looback type A test.<br>The manual user must set the measurement's unit to count. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 19,980 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:BERRor:COUNt:TYPEIA|TYPEIB|TYPEII?

| | | |
|---|---|---|
| Function | GSM | Queries the number of bits in error. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See "Bit Error Measurement Description" on page 41 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN)<br>Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN)<br>Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:BERRor:DELay?

| | | |
|---|---|---|
| Function | GSM | Queries the delay (in speech frames) that the test set used during the last bit error measurement to correlate uplink information bits with downlink information bits.<br>This value is displayed in the Speech Frames Delay field.<br>This value can be determined automatically, or manually set by the user. See "SETup:BERRor:MANual:DELay" on page 652 and "SETup:BERRor:LDControl:AUTO" on page 652.<br>Refer also to the "Bit Error Measurement Description" on page 41 for a description of frame delay and how it is used in the bit error measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 15 and 9.91 E+37 (NAN)<br>Resolution: 1 |
| *RST Setting | | Auto |

## FETCh:BERRor:FULL?

| | | |
|---|---|---|
| Function | GSM | Queries the bit error measurement.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II bits. (A similar query, "FETCh:BERRor[:ALL]?" on page 532, returns the same results but only for the bit type previously set using the SETup:BERRor[:TYPE] command.) See "Bit Error Measurement Description" on page 41 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Type Ia Bits tested<br>• Range: 0 to 999,000 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type Ia Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 0.01<br>Type Ia Bit error count<br>• Range: 0 to 999,000 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type Ib Bits tested<br>• Range: 0 to 2,637,369 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type Ib Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 0.01<br>Type Ib Bit error count<br>• Range: 0 to 2,637,369 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type II Bits tested<br>• Range: 0 to 15,584,400 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type II Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 0.01<br>Type II Bit error count<br>• Range: 0 to 1,558,440 and 9.91E+37 (NAN)<br>• Resolution: 1 |

### FETCh:BERRor:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count of bits tested (measurement progress report). See "Measurement Progress Report" on page 275 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 999<br>Resolution: 1 |

### FETCh:BERRor:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:BERRor:RATio[:BITS]?

| | | |
|---|---|---|
| Function | GSM | 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 "Bit Error Measurement Description" on page 41<br>The manual user must set the measurement unit to %. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 100 and 9.91 E+37 (NAN)<br>Resolution: 0.01 |

### FETCh:BERRor:RATio:CRC?

| | | |
|---|---|---|
| Function | GSM | Queries the ratio of bad cyclic redundancy checks (CRCs) to the total number of CRCs received for a non-residual measurement type, looback type B test and returns it as a percentage. See "Bit Error Measurement Description" on page 41<br>The mobile station re-transmits the CRC it received from the test set on the uplink.<br>A bad CRC occurs when the CRC transmitted by the test set does not match what is received back from the mobile station.<br>The manual user must set the measurement's unit to %. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100 and 9.91 E+37 (NAN)<br>Resolution: 0.01 |

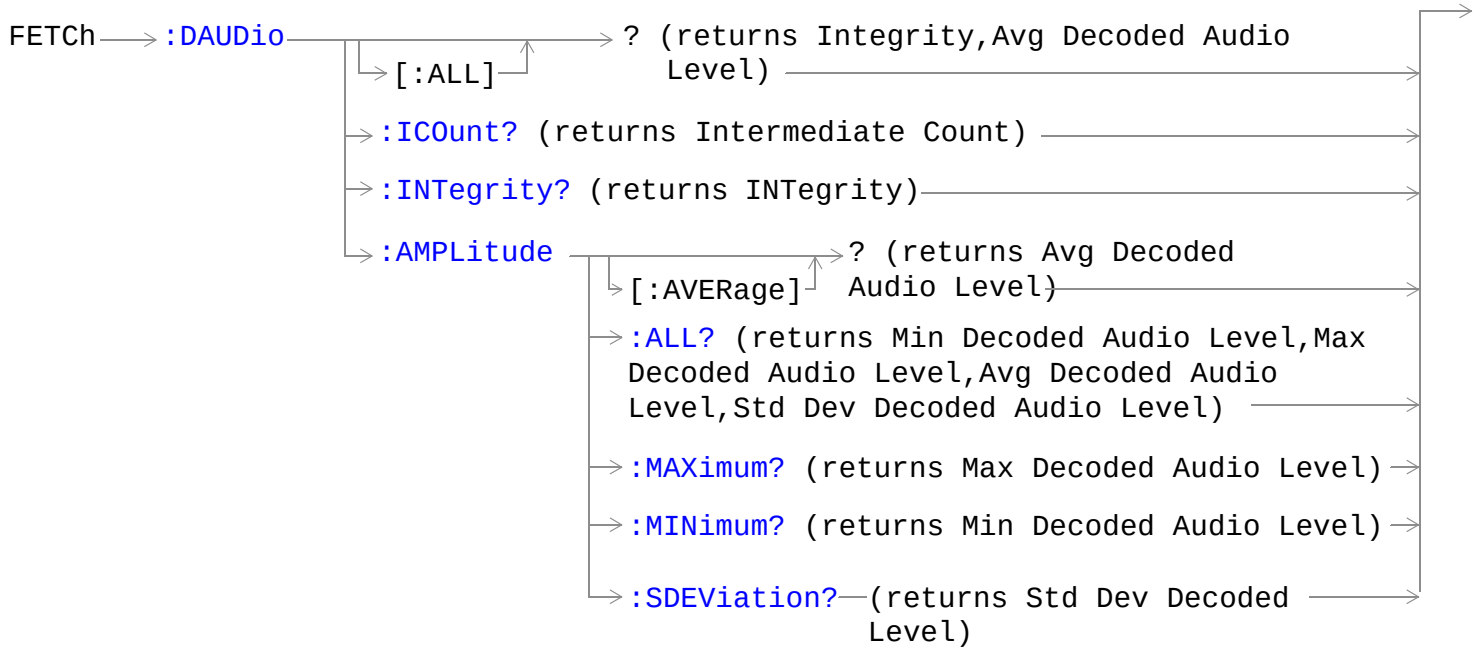
### FETCh:BERRor:RATio:FE?

| | | |
|---|---|---|
| Function | GSM | Queries the ratio of erased frames to the total number of frames received for a residual measurement type, looback type A test and returns them as a percentage. See "Bit Error Measurement Description" on page 41<br>The manual user must set the measurement's unit to %. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100 and 9.91 E+37 (NAN)<br>Resolution: 0.01 |

### FETCh:BERRor:RATio:TYPEIA|TYPEIB|TYPEII?

| | | |
|---|---|---|
| Function | GSM | Queries the number of bits in error to the number of bits tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. The result is returned as a percentage. See "Bit Error Measurement Description" on page 41 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100 and 9.91 E+37 (NAN)<br>Resolution: 0.01 |

# FETCh:DAUDio




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

### FETCh:DAUDio[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries integrity indicator and average decoded audio results. Values are returned in a comma-separated list. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator:<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Decoded audio:<br>• Range: 0 to 100%<br>• Resolution: 0.01% FS |

### FETCh:DAUDio:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count of decoded audio multi-measurements completed.<br>This value is not displayed on the test set. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 999<br>Resolution: 1 |

### FETCh:DAUDio:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Queries the integrity indicator for the last decoded audio measurement completed. Zero indicates a normal measurement.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:DAUDio:AMPLitude[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | Queries the average decoded audio result from an uplink speech level measurement in percent full scale.<br>If the decoded audio multi-measurement count field is off, the level returned by this command is displayed in the Decoded Audio Level field. If the decoded audio multi-measurement count is on, the level returned by this query is displayed in the Average field |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100%<br>Resolution: 0.01% FS |

## FETCh:DAUDio:AMPLitude:ALL?

| | | |
|---|---|---|
| Function | GSM | Queries the decoded audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list.<br>The values returned are displayed in the Minimum, Maximum, Average, and Std. Dev. fields, which are displayed when the decoded audio multi-measurement count is not off. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Minimum:<br>• Range: 0 to 100%<br>• Resolution: 0.01% FS<br>Maximum:<br>• Range: 0 to 100%<br>• Resolution: 0.01% FS<br>Average:<br>• Range: 0 to 100%<br>• Resolution: 0.01% FS<br>Standard deviation:<br>• Range: 0 to 71%<br>• Resolution: 0.001% FS |

### FETCh:DAUDio:AMPLitude:MAXimum?

| | | |
|---|---|---|
| Function | GSM | Queries the decoded audio multi-measurement maximum decoded audio voltage.<br>The value returned is displayed in the Decoded Audio Maximum field, which is displayed when the decoded audio multi-measurement count is not off. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100%<br>Resolution: 0.01% FS |

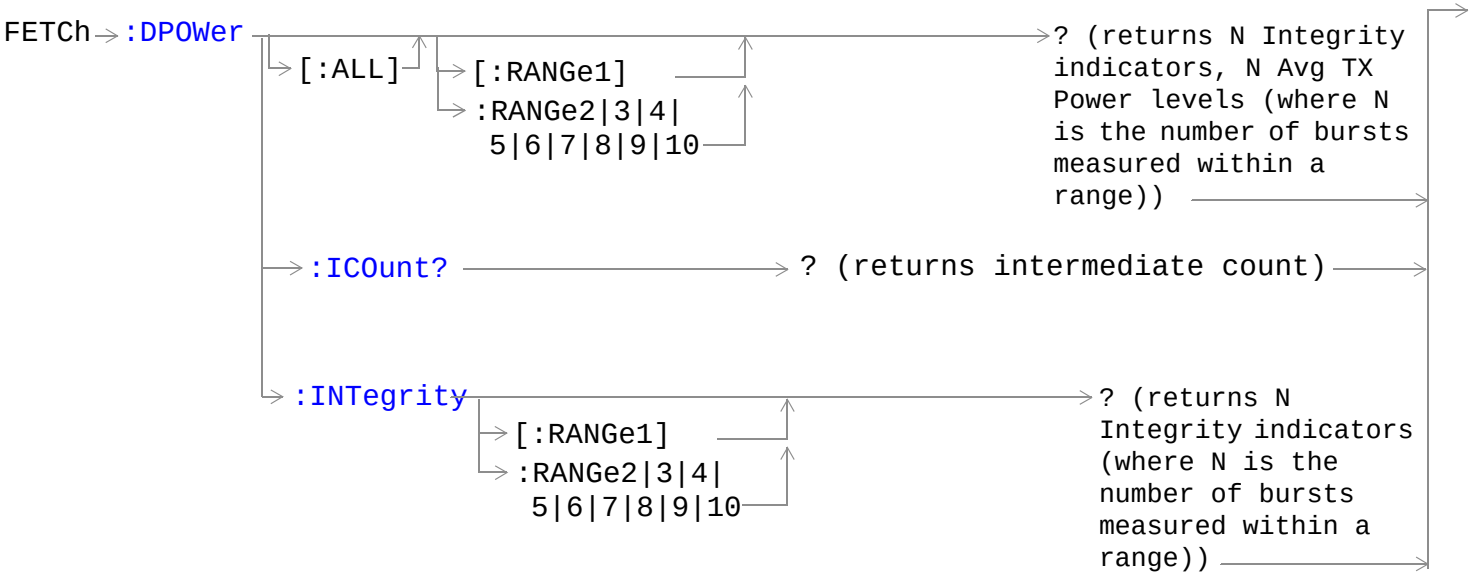
### FETCh:DAUDio:AMPLitude:MINimum?

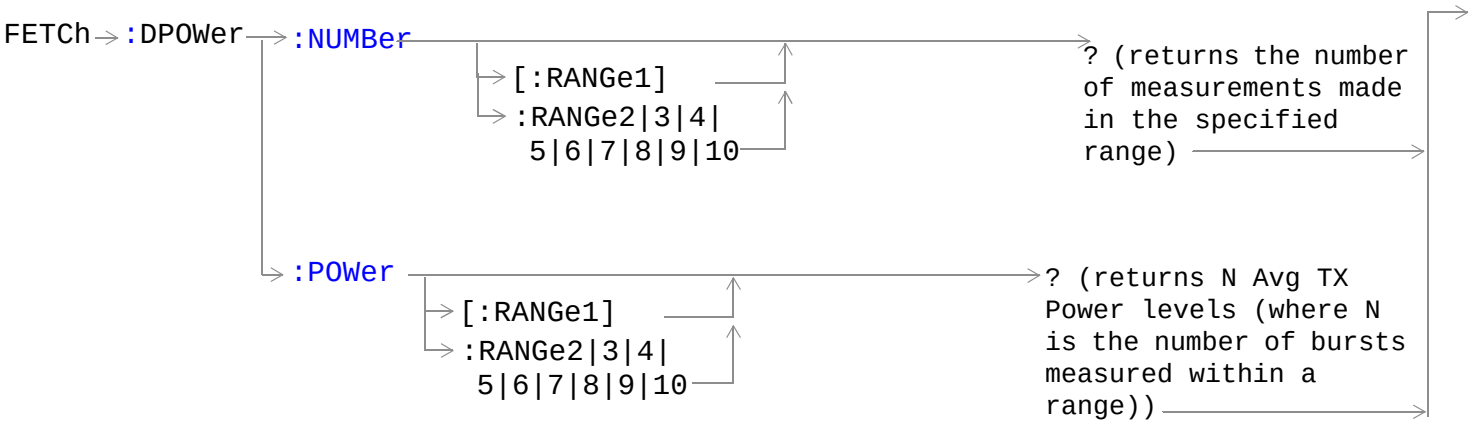
| | | |
|---|---|---|
| Function | GSM | Queries the decoded audio multi-measurement minimum decoded audio voltage<br>The value returned is displayed in the Decoded Audio Minimum field, which is displayed when the decoded audio multi-measurement count is not off. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100%<br>Resolution: 0.01% FS |

### FETCh:DAUDio:AMPLitude:SDEViation?

| | | |
|---|---|---|
| Function | GSM | Queries the decoded audio multi-measurement standard deviation.<br>The value returned is displayed in the Decoded Audio Std Dev. field, which is displayed when the Decoded Audio multi-measurement count is not off. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 71%<br>Resolution: 0.001% FS |

# FETCh:DPOWer




"Diagram Conventions" on page 323

### FETCh:DPOWer[:ALL][:RANGe1]?
### FETCh:DPOWer[:ALL]:RANGe2|3|4|5|6|7|8|9|10?

| | | |
|---|---|---|
| Function | GSM | 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 663.<br>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. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicators for each individual burst<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Average TX power levels for each individual burst<br>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dBm |
| Programming Example<br>`OUTPUT 714;"FETCh:DPOWer?" !Queries the Dynamic Power measurement results for the first 100 bursts.` | | |

### FETCh:DPOWer:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count of measurements completed in a multi-measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 999 |
| Programming Example<br>`OUTPUT 714;"FETCH:DPOWER:ICOUNT?"` | | |

### FETCh:DPOWer:INTegrity[:RANGe1]?
### FETCh:DPOWer:INTegrity:RANGe2|3|4|5|6|7|8|9|10?

| | | |
|---|---|---|
| Function | GSM | 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 663.<br>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. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |
| Programming Example<br>`OUTPUT 714;"FETCh:DPOWer:INTegrity:RANGe3?" !Queries the integrity results for bursts 201 through 300.` | | |

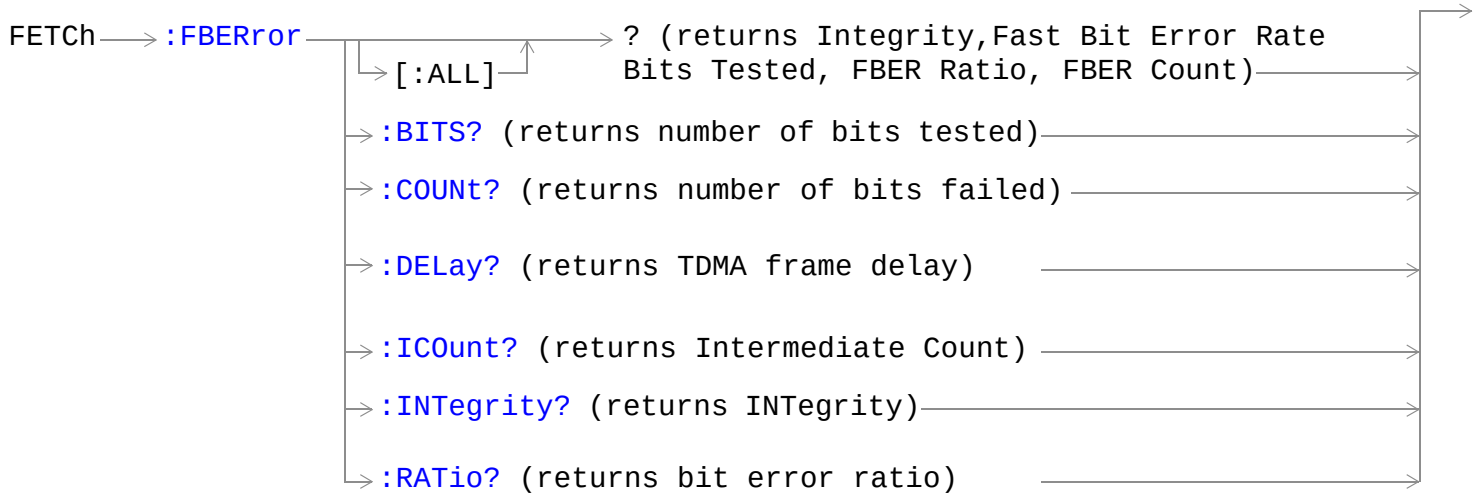
### FETCh:DPOWer:NUMBer[:RANGe1]?
### FETCh:DPOWer:POWer:NUMBer:RANGe2|3|4|5|6|7|8|9|10?

| | | |
|---|---|---|
| Function | GSM | Queries the number of measurements made in the specified range.<br>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. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 100 (per range) |
| Programming Example<br>`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 | GSM | 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 663.<br>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. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: -100 to +100 dB and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |
| Programming Example<br>`OUTPUT 714;"FETCh:DPOWer:POWer:RANGe2?" !Queries the average TX power for bursts 101 through 200.` | | |

# FETCh:FBERror




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## FETCh:FBERror[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries the fast bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count.<br>Bit error ratio is displayed in the Fast Bit Error field. The other values returned by this query are not available on the front panel display. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator:<br>• See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Bits tested:<br>• Range: 1 to 999,455 and 9.91 E+37 (NAN)<br>• Resolution: 1<br>Bit error ratio:<br>• Range: 0 to 100 and 9.91 E+37 (NAN)<br>• Resolution: 0.01<br>Fast bit error count:<br>• Range: 1 to 999,455 and 9.91 E+37 (NAN)<br>• Resolution: 1 |

## FETCh:FBERror:BITS?

| | | |
|---|---|---|
| Function | GSM | Queries the total number of information bits tested during the last fast bit error measurement. See "SETup:FBERror:COUNt" on page 671<br>This value is not available on the front panel display. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 999,455 and 9.91 E+37 (NAN)<br>Resolution: 1 |

## FETCh:FBERror:COUNt?

| | | |
|---|---|---|
| Function | GSM | Queries the number of information bits that were deemed errors during the last fast bit error test.<br>This value is not available on the front panel display. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 999,455 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:FBERror:DELay?

| | | |
|---|---|---|
| Function | GSM | Queries the delay (in TDMA frames) the test set used during the last fast bit error measurement to correlate uplink information bits with downlink information bits.<br>This value is displayed in the TDMA Frame Delay field.<br>This value can be determined automatically, or set by the user. See "SETup:FBERror:MANual:DELay" on page 672 and "SETup:FBERror:LDControl:AUTO" on page 671 for setting this value manually.<br>Refer also to the "Fast Bit Error Measurement Description" on page 55 for a description of frame delay and how it is used in the fast bit error measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 26 and 9.91 E+37<br>Resolution: 1 |

### FETCh:FBERror:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count (measurement progress report) of bits tested |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 999,455 and 99.9 E+37 |

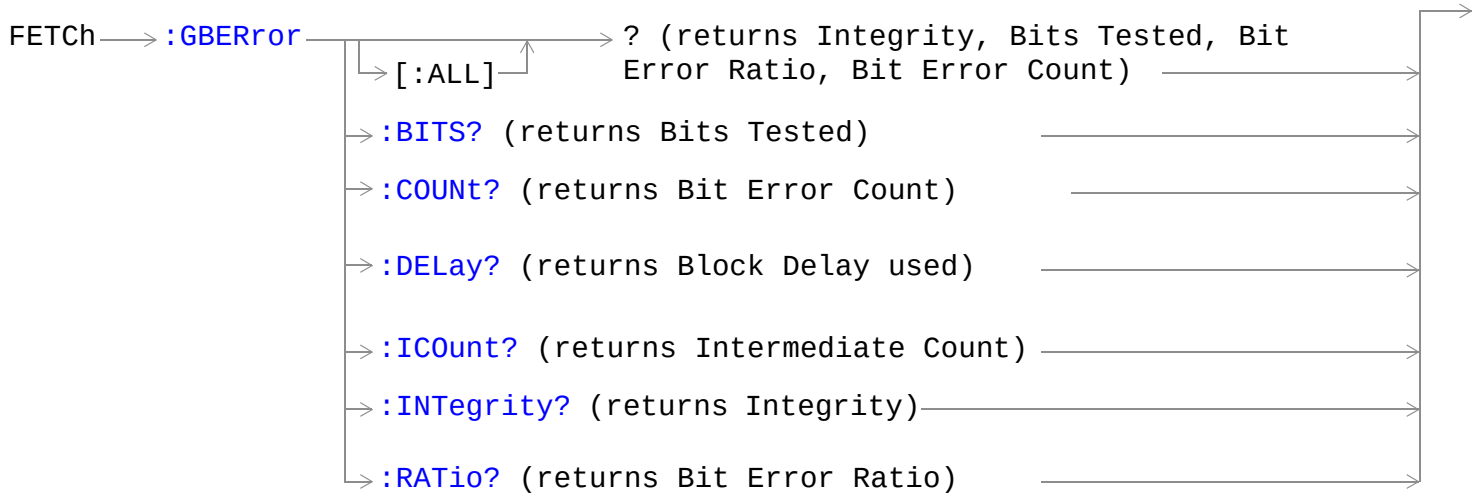
### FETCh:FBERror:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Returns the integrity indicator value for the last fast bit error measurement performed. Zero indicates a normal result.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:FBERror:RATio?

| | | |
|---|---|---|
| Function | GSM | Queries the ratio of bits deemed bad to total bits tested during the last fast bit error measurement performed. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 100 and 9.99 E+37<br>Resolution: 0.01 |

# FETCh:GBERror




These commands are not applicable to GSM.

"Diagram Conventions" on page 323

### FETCh:GBERror[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the bit error measurement results. The integrity indicator, bits tested, bit error ratio, and bit error count are returned. |
| Query | | Integrity indicator:<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Bits tested:<br>• Range: 0 to 999,427 and 9.91 E+37 (NAN)<br>• Resolution: 1<br>Bit error ratio:<br>• Range: 0 to 100 and 9.91 E+37 (NAN)<br>• Resolution: 0.01<br>Bit error count:<br>• Range: 0 to 999,427 and 9.91 E+37 (NAN)<br>• Resolution: 1 |

### FETCh:GBERror:BITS?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the total number of information bits tested during the last bit error measurement. See "FETCh:GBERror:COUNt?" on page 549. |
| Query | | Range: 0 to 999,427 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:GBERror:COUNt?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the count of erroneous bits found during the last bit error measurement. |
| Query | | Range: 0 to 999,427 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:GBERror:DELay?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the block delay the test set used during the last bit error measurement.<br>This value can be determined automatically by the test set, or you can set it manually. See "SETup:GBERror:MANual:DELay" on page 677 and "SETup:GBERror:LDControl:AUTO" on page 676 for setting this value manually.<br>Refer also to the "GPRS Bit Error Measurement" on page 45 for a description of block delay and how it is used in the bit error measurement. |
| Query | | Range: 1 to 6 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:GBERror:ICOunt?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the intermediate count (measurement progress report) of bits tested. |
| Query | | Range: 0 to 999,455 and 9.91 E+37 (NAN) |

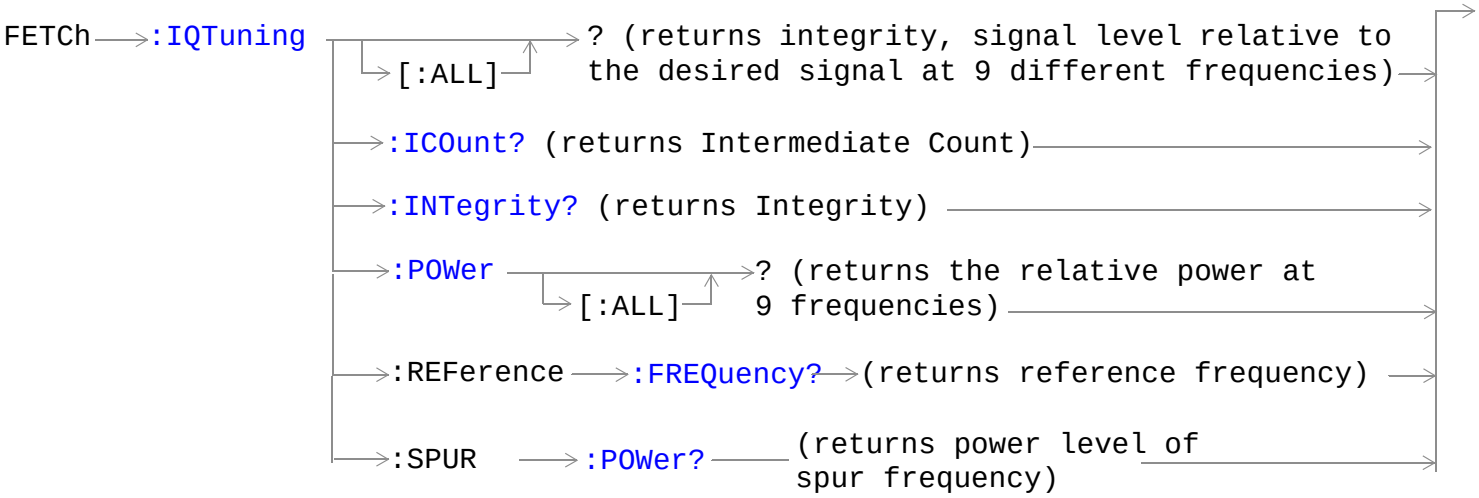
### FETCh:GBERror:INTegrity?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:GBERror:RATio?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the ratio of erroneous bits found during the last bit error measurement. |
| Query | | Range: 0 to 100 and 9.91 E+37 (NAN)<br>Resolution: 0.01 |

# FETCh:IQTuning




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## FETCh:IQTuning[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries the I/Q Tuning measurement results. Query returns the integrity indicator and the relative power level at the following offset frequencies: carrier frequency, +/-67.7083 kHz, +/-135.417 kHz, +/-203.125 kHz, +/-270.833 kHz. The spur measurement result is also returned. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Signal level relative to the desired signal at 9 different frequencies<br>• Range: -100 to +100 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>The order of the signal level results are:<br>• -270.833 kHz<br>• -203.125 kHz<br>• -135.417 kHz<br>• -67.7083 kHz<br>• carrier frequency<br>• +67.7083 kHz<br>• +135.417 kHz<br>• +203.125 kHz<br>• +270.833 kHz<br>Relative power of the spur frequency:<br>• Range: -100 to +100 dB and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

## FETCh:IQTuning:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate number of I/Q Tuning multi-measurements completed. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 999<br>Resolution: 1 |

### FETCh:IQTuning:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Returns the integrity indicator value for the last I/Q Tuning measurement performed. Zero indicates a normal result. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:IQTuning:POWer[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries the I/Q Tuning measurement results. Query returns the relative power level at the following offset frequencies: carrier frequency, ±67.7083 kHz, ±135.417 kHz, ±203.125 kHz, ±270.833 kHz. The spur measurement result is also returned. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Signal level relative to the desired signal at 9 different frequencies<br>• Range: -100 to +100 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>The order of the signal level results are:<br>• -270.833 kHz<br>• -203.125 kHz<br>• -135.417 kHz<br>• -67.7083 kHz<br>• carrier frequency<br>• +67.7083 kHz<br>• +135.417 kHz<br>• +203.125 kHz<br>• +270.833 kHz<br>Relative power of the spur frequency:<br>• Range: -100 to +100 dB and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

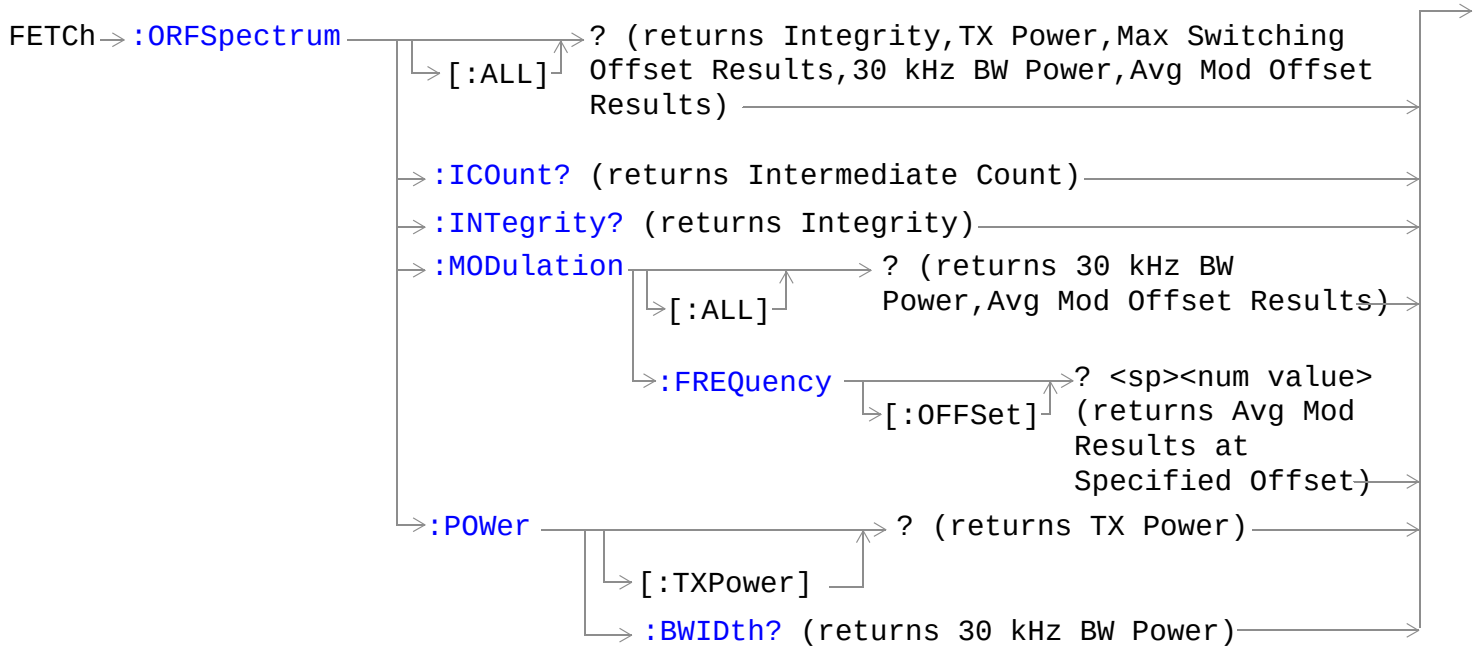
### FETCh:IQTuning:REFerence:FREQuency?

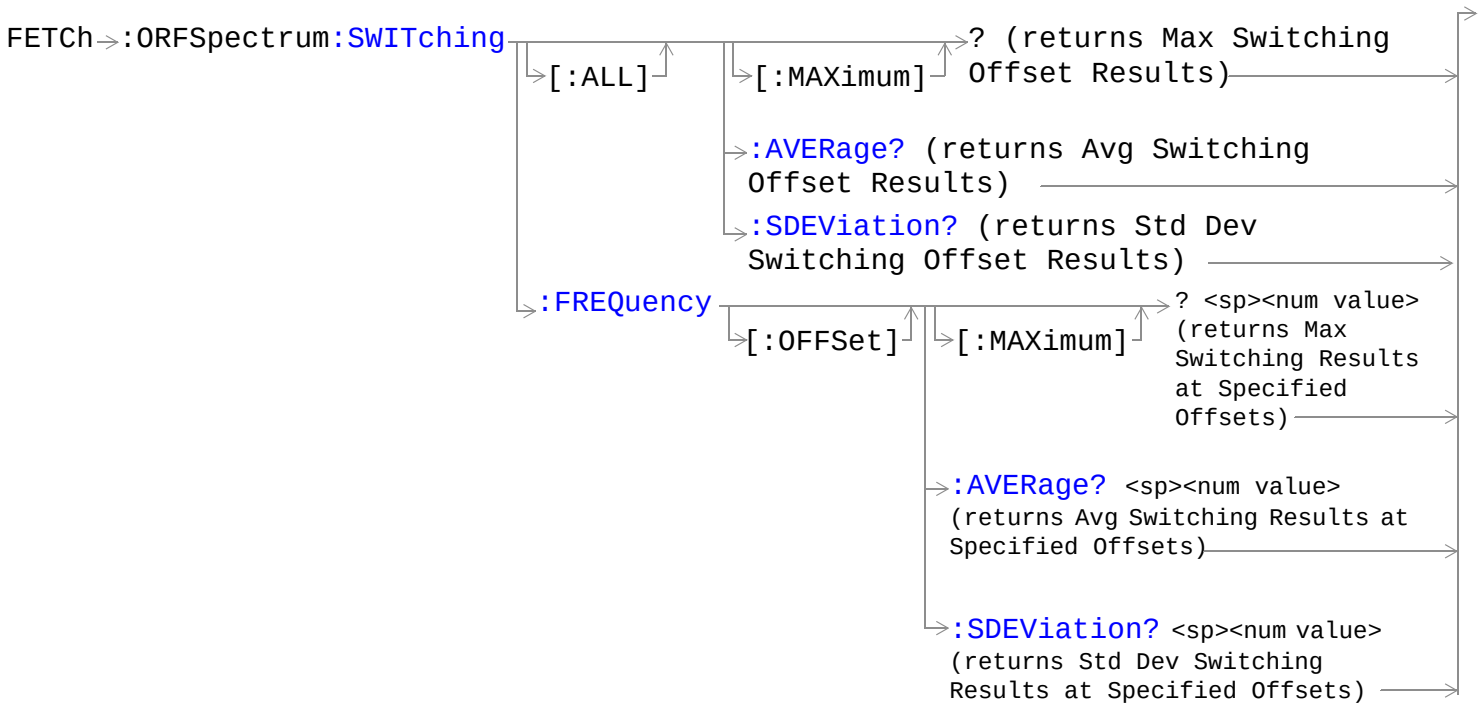
| | | |
|---|---|---|
| Function | GSM | Queries the offset frequency being used as the reference for the measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | NEG67KHZ\|ZEROKHZ\|POS67KHZ\|UNKNOWN |

## FETCh:IQTuning:SPUR:POWer?

| | | |
|---|---|---|
| Function | GSM | Queries the relative power level of the spur frequency. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: -100 to +100 dB and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

# FETCh:ORFSpectrum




"Diagram Conventions" on page 323

## FETCh:ORFSpectrum[:ALL]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries integrity indicator, TX carrier power, up to eight comma-separated output RF spectrum due to switching (max) results, 30 kHz bandwidth power, and up to 22 output RF spectrum due to modulation (average) results.<br>The "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The "SETup:ORFSpectrum:SWITching:FREQuency:POINts[:SELected]?" queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching (max) values to expect when you FETCh results.<br>The "SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet][:SELected]" command sets up the number of output RF spectrum due to modulation offsets that are turned on and their frequency values. The "SETup:ORFSpectrum:MODulation:FREQuency:POINts[:SELected]?" command queries the number of output RF spectrum due to modulation points that are turned on, indicating the number of output RF spectrum due to modulation (average) values to expect when you FETCh results. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>TX Carrier Power<br>• Range: –100 dBm to +100 dBm and 9.91 E+37<br>• Resolution: 0.01 dB<br>Output RF Spectrum Due to Switching (Max)<br>• Range: –100 dBm to +100 dBm and 9.91 E+37<br>• Resolution: 0.01 dB<br>30 kHz Bandwidth Power<br>• Range: –100 dBm to +100 dBm and 9.91 E+37<br>• Resolution: 0.01 dB<br>Output RF Spectrum due to Modulation (Average)<br>• Range: –200 dB to +100 dB and 9.91 E+37<br>• Resolution: 0.01 dB |

## FETCh:ORFSpectrum:ICOunt?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the intermediate count of ORFS multi-measurements completed. This number will climb to the number returned by "SETup:ORFSpectrum:ICOunt:MAXimum[:SELected]?" on page 701. |
| Query | | Range: 0 to 29971<br>Resolution: 1 |

## FETCh:ORFSpectrum:INTegrity?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the integrity indicator for the output RF spectrum analyzer measurement. Zero indicates a normal result.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

## FETCh:ORFSpectrum:MODulation[:ALL]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries TX Carrier Power, 30 kHz BW Power, and up to 22 comma-separated output RF spectrum due to modulation (average) results<br>The "SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet][:SELected]" command sets up the number of output RF spectrum due to modulation offsets that are turned on and their frequency values. The "SETup:ORFSpectrum:MODulation:FREQuency:POINts[:SELected]?" command queries the number of output RF spectrum due to modulation points that are turned on, indicating the number of output RF spectrum due to modulation (average) values to expect when you FETCh output RF spectrum due to modulation results. |
| Query | | TX Carrier Power<br>• Range: –100 dBm to +100 dBm and 9.91 E+37<br>• Resolution: 0.01 dB<br>30 kHz Bandwidth Power<br>• Range: –100 dBm to +100 dBm and 9.91 E+37<br>• Resolution: 0.01 dB<br>Output RF Spectrum due to Modulation (Average)<br>• Range: –200 dB to +100 dB and 9.91 E+37<br>• Resolution: 0.01 dB |

## FETCh:ORFSpectrum:MODulation:FREQuency[:OFFSet]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the ORFS due to modulation measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to modulation (average) measurements at the frequencies listed, in the order they are listed.<br>Frequencies must have a one-to-one correspondence to ORFS due to modulation frequency offsets that are currently turned on. Frequencies must be separated by commas. (See "SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet][:SELected]" for the command that turns on frequency offsets.)<br>Each frequency value is (optionally) followed by: HZ\|KHZ\|MHZ\|GHZ . The default units are HZ (hertz). |
| Query | | Range: –200 dB to +100 dB and 9.91 E+37<br>Resolution: 0.01 dB |
| Programming Example<br>`OUTPUT 714;"FETCH:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET? 200 KHZ, 400 KHZ"`<br>`!Returns the ORFS due to modulation (average) measurement`<br>`!results at the 200 kHz and 400 kHz offsets only, assuming`<br>`these offsets are turned on.` | | |

## FETCh:ORFSpectrum:POWer?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Returns the TX carrier power measurement result from the last ORFS measurement. This measurement is made using the method described in the "Transmit Power Measurement Description" on page 83. |
| Query | | Range: –100 dBm to +100 dBm and NAN.<br>Resolution: 0.01 dB |
| Programming Example<br>`OUTPUT 714;"FETCH:ORFSPECTRUM:POWER:TXPOWER?" !Returns TX carrier power.` | | |

## FETCh:ORFSpectrum:POWer:BWIDth?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the ORFS 30 kHz bandwidth power measurement. See "Output RF Spectrum Measurement Description" on page 60. |
| Query | | Range: –100 dBm to +100 dBm and NAN.<br>Resolution: 0.01 dB |

### FETCh:ORFSpectrum:SWITChing[:ALL][:MAXimum]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries output RF spectrum due to switching (maximum) measurement results at all frequency offsets currently turned on (there can be up to eight).<br>The "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The "SETup:ORFSpectrum:SWITching:FREQuency:POINts[:SELected]?" queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching (max) values to expect when you FETCh results. |
| Query | | Range: –100 dBm to +100 dBm and 9.91 E+37<br>Resolution: 0.01 dB |

Programming Example

```
OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:ALL:MAXIMUM?"  !Returns the ORFS due to
                                                       !switching (maximum)
                                                       !measurement results at
                                                       !all frequency offsets
                                                        !currently turned on.
```

### FETCh:ORFSpectrum:SWITChing[:ALL]:AVERage?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries output RF spectrum due to switching (average) measurement results at all frequency offsets currently turned on (there can be up to eight).<br>The "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The "SETup:ORFSpectrum:SWITching:FREQuency:POINts[:SELected]?" queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching values to expect when you FETCh results. |
| Query | | Range: –100 dBm to +100 dBm and 9.91 E+37<br>Resolution: 0.01 dB |

Programming Example

```
OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:ALL:AVERAGE?"  !Returns the ORFS due to
                                                       !switching (average)
                                                       !measurement results at
                                                       !all frequency offsets
                                                              !currently turned on.
```

## FETCh:ORFSpectrum:SWITChing:FREQuency[:OFFSet][:MAXimum]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the ORFS due to switching measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to switching (maximum) measurements at the frequencies listed, in the order they are listed.<br>Frequencies must have a one-to-one correspondence to ORFS due to switching frequency offsets that are currently turned on. Frequencies must be separated by commas. (See "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" for the command that turns on frequency offsets.)<br>Each value is (optionally) followed by: HZ\|KHZ\|MHZ\|GHZ . The default units are HZ (hertz). |
| Query | | Range: –100 dB to +100 dB and 9.91 E+37<br>Resolution: 0.01 dB |
| Programming Example<br>`OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:MAXIMUM? 200 KHZ, 400 KHZ" !Returns the ORFS due to switching (maximum) measurement results !at the 200 kHz and 400 kHz offsets only, assuming these offsets are !turned on` | | |

## FETCh:ORFSpectrum:SWITChing:FREQuency[:OFFSet]:AVERage?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the ORFS due to switching measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to switching (average) measurements at the frequencies listed, in the order they are listed.<br>Frequencies must have a one-to-one correspondence to ORFS due to switching frequency offsets that are currently turned on. Frequencies must be separated by commas. (See "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" for the command that turns on frequency offsets.)<br>Each value is (optionally) followed by: HZ\|KHZ\|MHZ\|GHZ . The default units are HZ (hertz). |
| Query | | Range: –100 dB to +100 dB and 9.91 E+37<br>Resolution: 0.01 dB |
| Programming Example<br>`OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:AVERAGE? 200 KHZ, 400 KHZ" !Returns the ORFS due to switching (average) measurement results at the !200 kHz and 400 kHz offsets only, assuming these offsets are turned on.` | | |

## FETCh:ORFSpectrum:SWITChing:FREQuency[:OFFSet]:SDEViation?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the ORFS due to switching measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to switching (standard deviation) measurements at the frequencies listed, in the order they are listed.<br>Frequencies must have a one-to-one correspondence to ORFS due to switching frequency offsets that are currently turned on. Frequencies must be separated by commas. (See "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" for the command that turns on frequency offsets.)<br>Each value is (optionally) followed by: HZ \| KHZ \| MHZ \| GHZ . The default units are HZ (hertz). |
| Query | | Range: 0 dB to +150 dB and 9.91 E+37<br>Resolution: 0.001 dB |

Programming Example

```
OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:STDEVIATION? 200 KHZ, 400 KHZ"
!Returns the ORFS due to switching (standard deviation) measurement
         !results at the 200 kHz and 400 kHz offsets only, assuming these
         !offsets are turned on.
```

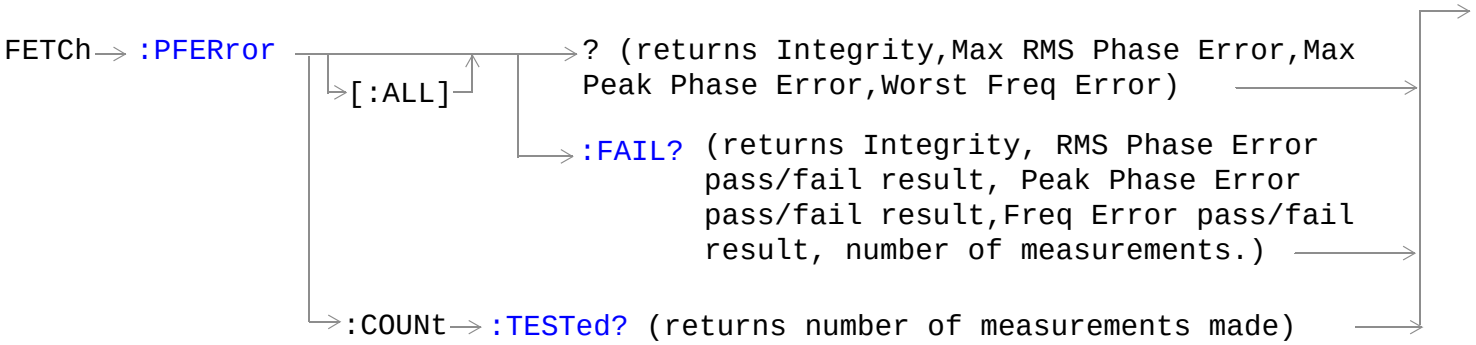
## FETCh:ORFSpectrum:SWITChing[:ALL]:SDEViation?

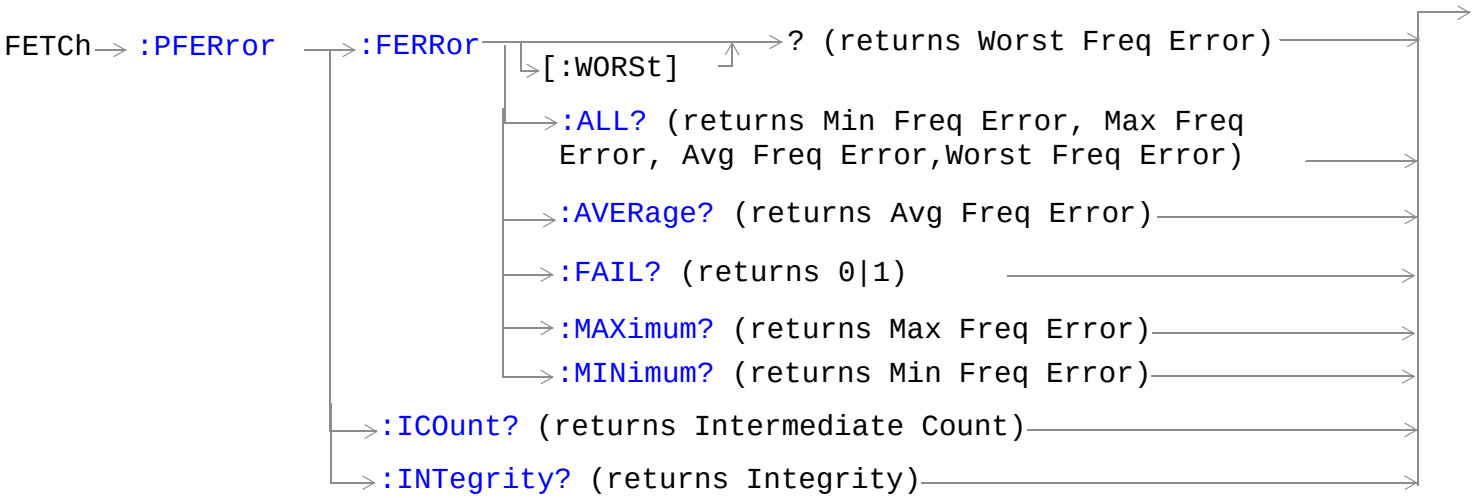
| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries output RF spectrum due to switching (standard deviation) measurement results at all frequency offsets currently turned on (there can be up to eight).<br>The "SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]" command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The "SETup:ORFSpectrum:SWITching:FREQuency:POINts[:SELected]?" queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching values to expect when you FETCh results. |
| Query | | Range: –100 dBm to +100 dBm and 9.91 E+37<br>Resolution: 0.01 dB |

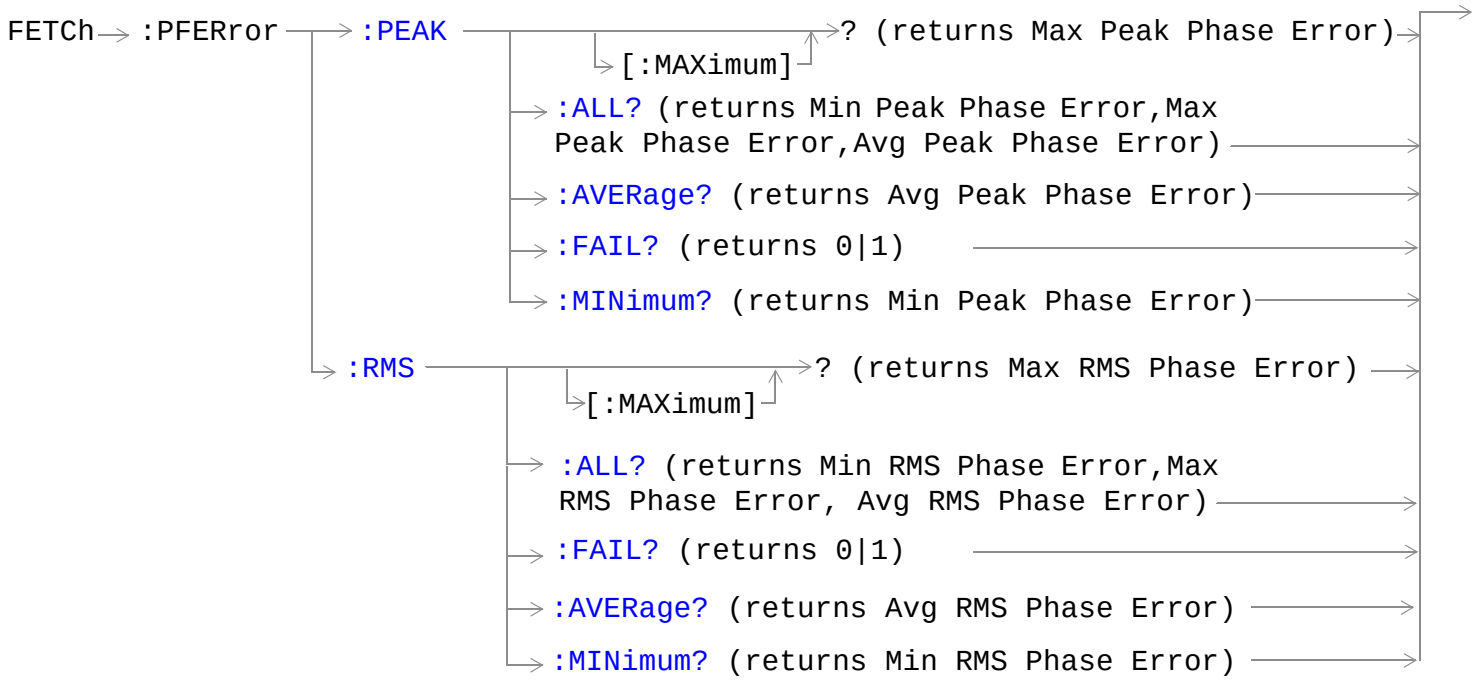
Programming Example

```
OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:ALL:SDEVIATION?"  !Returns the ORFS due
                                                          !to switching
                                                          !(standard
                                                          !deviation)
                                                          !measurement
                                                          !results at all
                                                          !frequency offsets
                                                          !currently turned on.
```

# FETCh:PFERror






"Diagram Conventions" on page 323

## FETCh:PFERor[:ALL]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries integrity indicator, maximum RMS phase error, maximum peak phase error and worst frequency error. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Maximum RMS Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Maximum Peak Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Worst Frequency Error<br>• Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>• Resolution: 0.1 kHz |
| Programming Example<br>`OUTPUT 714;"FETCH:PFERROR:ALL?" !Returns integrity, maximum RMS phase error,`<br>`!maximum peak phase error and worst`<br>`!frequency error.` | | |

## FETCh:PFERor[:ALL]:FAIL?

| | | |
|---|---|---|
| Function | GSM | Queries integrity indicator, RMS phase error pass/fail indicator, peak phase error pass/fail indicator, frequency error pass/fail indicator and the number of measurements taken.<br>The number of measurements taken may be of interest to you if you are using the confidence level feature. For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>RMS Phase Error pass/fail indicator<br>• Range: 0 \| 1<br>Peak Phase Error pass/fail indicator<br>• Range: 0 \| 1<br>Frequency Error pass/fail indicator<br>• Range: 0 \| 1<br>Number of measurements taken<br>• Range: 0 to 999 and 9.91 E+37 (NAN)<br>• Resolution: 1 |

Programming Example

```
OUTPUT 714;"FETCH:PFERROR:ALL:FAIL?" !Returns integrity, RMS phase error pass/fail result,
                                     !peak phase error pass/fail result, frequency error
                                     !pass/fail result and the number of measurements made.
```

## FETCh:PFERror:COUNt:TESTed?

| | | |
|---|---|---|
| Function | GSM | Queries the number of measurements taken.<br>If you are *not* using the confidence level feature then the value returned, after a successful measurement completes, is the same as that returned by the query of "SETup:PFERror:COUNt:NUMBer:GSM" on page 732. However if you are using the confidence level feature then this value may be lower than that set for multi-measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 999 and 9.91 E+37 (NAN)<br>Resolution: 1 |

### FETCh:PFERror:FERRor:ALL?

| | | |
|---|---|---|
| Function | GSM | Queries minimum, maximum, average, and worst frequency error, in Hz.<br>The minimum frequency error is the value closest to negative infinity from the last multi-measurement cycle. The maximum frequency error is the value closest to positive infinity from the last multi-measurement cycle. |
| | GPRS | |
| Query | | Minimum Frequency Error<br>• Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>• Resolution: 0.1 kHz<br>Maximum Frequency Error<br>• Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>• Resolution: 0.1 kHz<br>Average Frequency Error<br>• Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>• Resolution: 0.1 kHz<br>Worst Frequency Error<br>• Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>• Resolution: 0.1 kHz |
| Programming Example<br>`OUTPUT 714;"FETCH:PFERROR:FERROR:ALL?" !Returns minimum, maximum, average and !worst frequency error results.` | | |

### FETCh:PFERror:FERRor:AVERage?

| | | |
|---|---|---|
| Function | GSM | Queries the single or average (from a multi-measurement) frequency error measurement result, in Hz. |
| | GPRS | |
| Query | | Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>Resolution: 0.1 kHz |

### FETCh:PFERror:FERRor:FAIL?

| | | |
|---|---|---|
| Function | GSM | Queries whether the frequency error passed or failed the value set using either of the following commands:<br>• "SETup:PFERror:FERRor[:LIMit]:GSM" on page 733, or<br>• "SETup:PFERror:FERRor[:LIMit][:SELected]" on page 734 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 (pass), 1 (fail), and 9.91 E+37 (NAN) |

### FETCh:PFERror:FERRor: MAXimum?

| | | |
|---|---|---|
| Function | GSM | Queries the maximum (from a multi-measurement) frequency error measurement result, in Hz. |
| | GPRS | |
| Query | | Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>Resolution: 0.1 kHz |

### FETCh:PFERror:FERRor:MINimum?

| | | |
|---|---|---|
| Function | GSM | Queries the minimum (from a multi-measurement) frequency error measurement result, in Hz. |
| | GPRS | |
| Query | | Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>Resolution: 0.1 kHz |

### FETCh:PFERror:FERRor[:WORSt]?

| | | |
|---|---|---|
| Function | GSM | Queries the frequency error from the individual multi-measurements that is furthest from 0 Hz. If the most positive and the most negative frequency errors are the same, the positive value will be returned. |
| | GPRS | |
| Query | | Range: –750 kHz to +750 kHz and 9.91 E+37 (NAN)<br>Resolution: 0.1 kHz |

### FETCh:PFERror:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count of phase and frequency multi-measurements completed. This number will increase to the value returned by “SETup:PFERror:COUNt:NUMBer[:SELected]” on page 731. |
| | GPRS | |
| Query | | Range: 0 to 999<br>Resolution: 1 |

### FETCh:PFERror:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Queries the integrity indicator for the phase and frequency error measurement. Zero indicates a normal result.<br>See “Integrity Indicator” on page 283 for descriptions of non-zero integrity indicators. |
| | GPRS | |
| Query | | Range: See “Integrity Indicator” on page 283.<br>Resolution: 1 |

### FETCh:PFERror:PEAK:ALL?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the minimum, maximum, and average peak phase error measurement result, in degrees. |
| Query | | Minimum Peak Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Maximum Peak Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Average Peak Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees |
| Programming Example<br>`OUTPUT 714;"FETCH:PFERROR:PEAK:ALL?" !Returns minimum, maximum, and average peak phase error results.` | | |

### FETCh:PFERror:PEAK:AVERage?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the single or average (from a multi-measurement) peak phase error measurement result, in degrees. |
| Query | | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>Resolution: 0.01 degrees |

### FETCh:PFERror:PEAK:FAIL?

| | | |
|---|---|---|
| Function | GSM | Queries whether the peak phase error passed or failed the value set using either of the following commands:<br>• "SETup:PFERror:PEAK[:LIMit]:GSM" on page 734, or<br>• "SETup:PFERror:PEAK[:LIMit][:SELected]" on page 735 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 (pass), 1 (fail), and 9.91 E+37 (NAN) |

### FETCh:PFERror:PEAK[:MAXimum]?

| | | |
|---|---|---|
| Function | GSM | Queries the maximum (from a multi-measurement) peak phase error result, in degrees. |
| | GPRS | |
| Query | | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>Resolution: 0.01 degrees |

### FETCh:PFERror:PEAK:MINimum?

| | | |
|---|---|---|
| Function | GSM | Queries the minimum (from a multi-measurement) peak phase error measurement result, in degrees. |
| | GPRS | |
| Query | | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>Resolution: 0.01 degrees |

### FETCh:PFERror:RMS:ALL?

| | | |
|---|---|---|
| Function | GSM | Queries the minimum, maximum, and average RMS phase error measurement result, in degrees. |
| | GPRS | |
| Query | | Minimum RMS Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Maximum RMS Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Average RMS Phase Error<br>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>• Resolution: 0.01 degrees |
| Programming Example<br>`OUTPUT 714;"FETCH:PFERROR:RMS:ALL?" !Returns minimum, maximum, and average`<br>`!RMS phase error.` | | |

### FETCh:PFERror:RMS:AVERage?

| | | |
|---|---|---|
| Function | GSM | Queries the single or average (from a multi-measurement) RMS phase error measurement result, in degrees. |
| | GPRS | |
| Query | | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>Resolution: 0.01 degrees |

### FETCh:PFERror:RMS:FAIL?

| | | |
|---|---|---|
| Function | GSM | Queries whether the RMS phase error passed or failed the value set using either of the following commands:<br>• "SETup:PFERror:RMS[:LIMit]:GSM" on page 735, or<br>• "SETup:PFERror:RMS[:LIMit][:SELected]" on page 736 |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 (pass), 1 (fail), and 9.91 E+37 (NAN) |

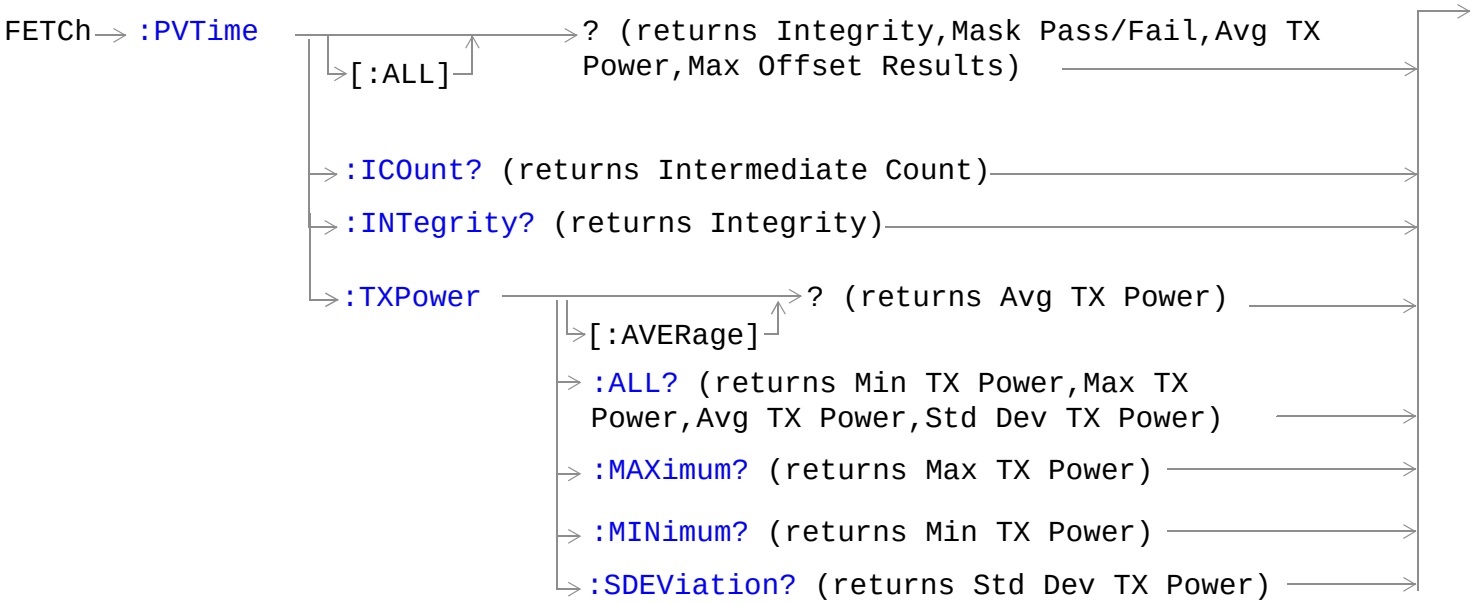
### FETCh:PFERror:RMS[:MAXimum]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the Maximum (from a multi-measurement) RMS phase error measurement result, in degrees. |
| Query | | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>Resolution: 0.01 degrees |
| Programming Example<br>`OUTPUT 714;"FETCH:PFERROR:RMS:MAXIMUM?" !Returns the maximum RMS phase error.` | | |

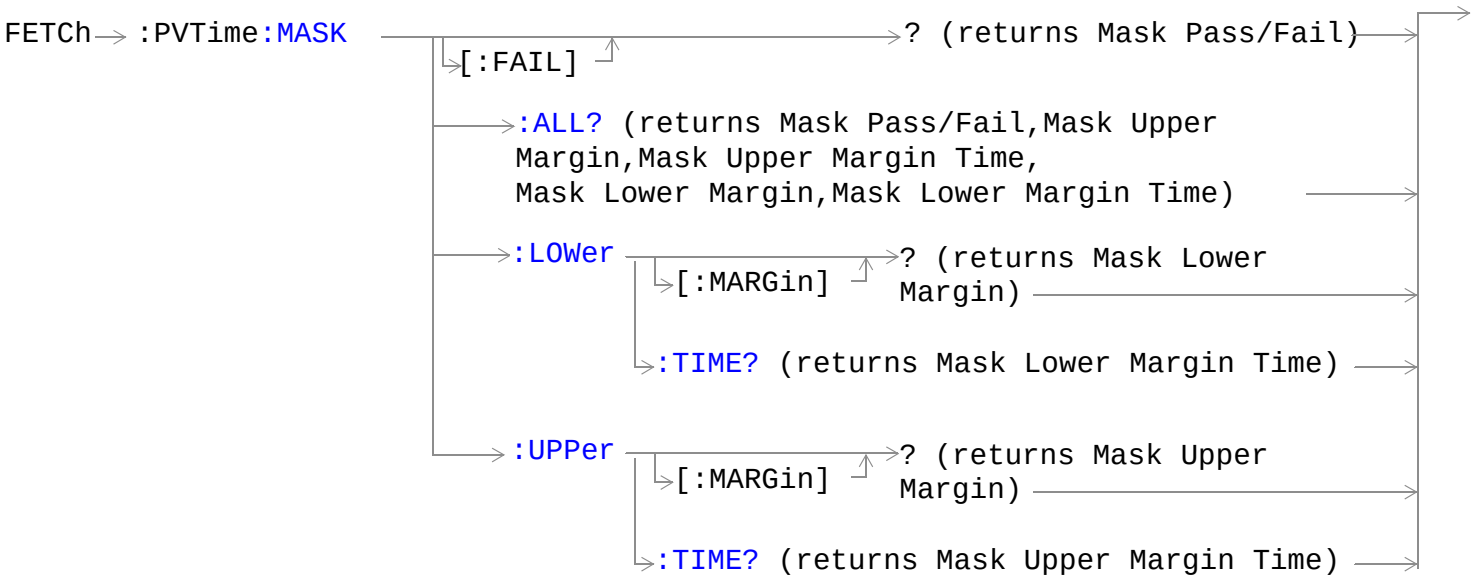
### FETCh:PFERror:RMS:MINimum?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the minimum (from a multi-measurement) RMS phase error measurement result, in degrees. |
| Query | | Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)<br>Resolution: 0.01 degrees |

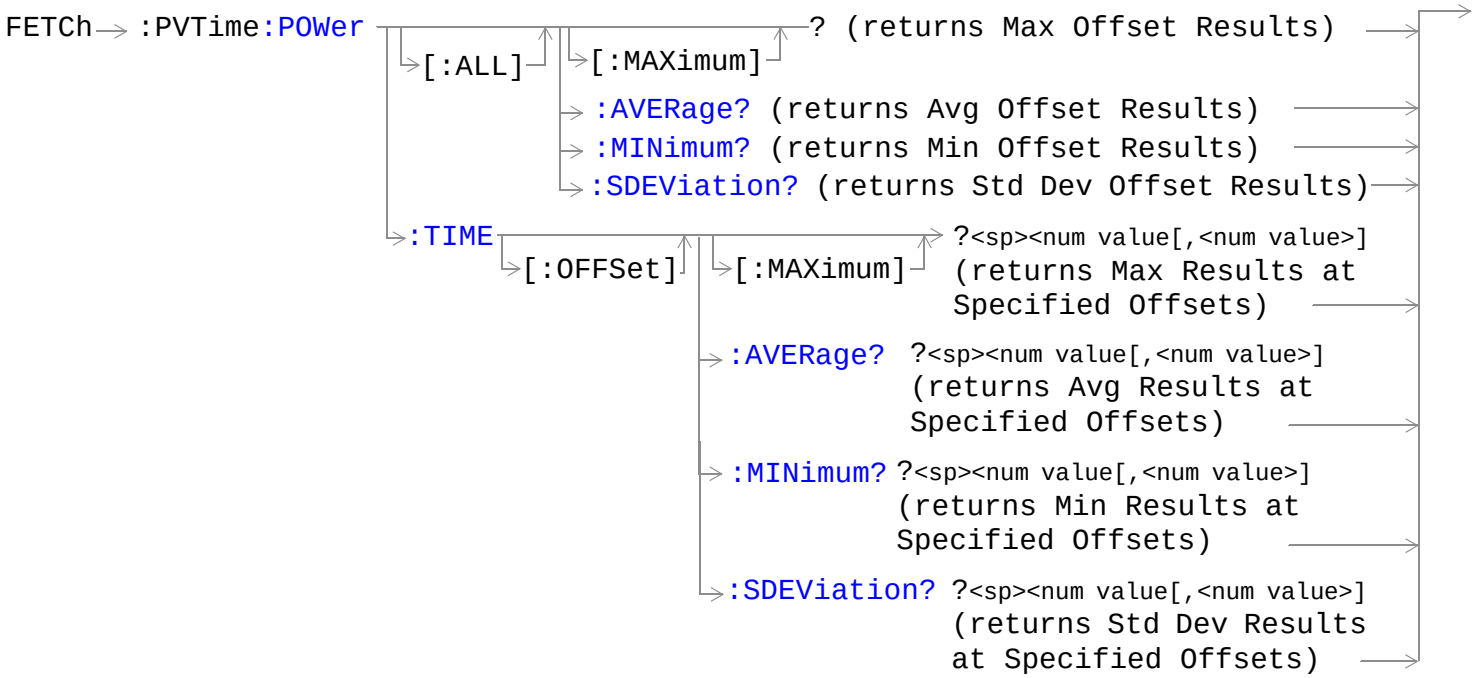
# FETCh:PVTime



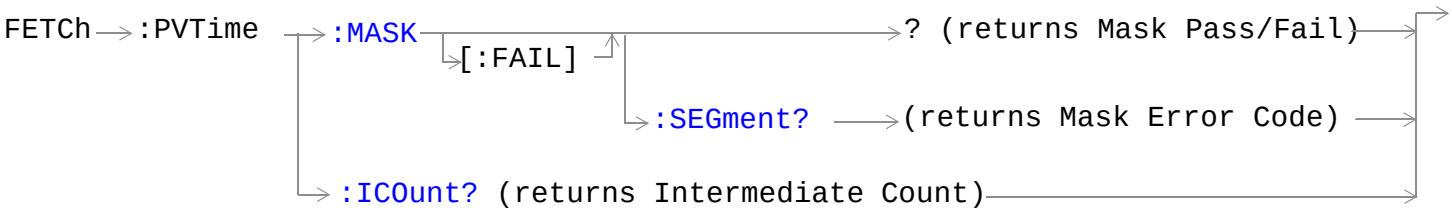

These commands are not applicable to GPRS.



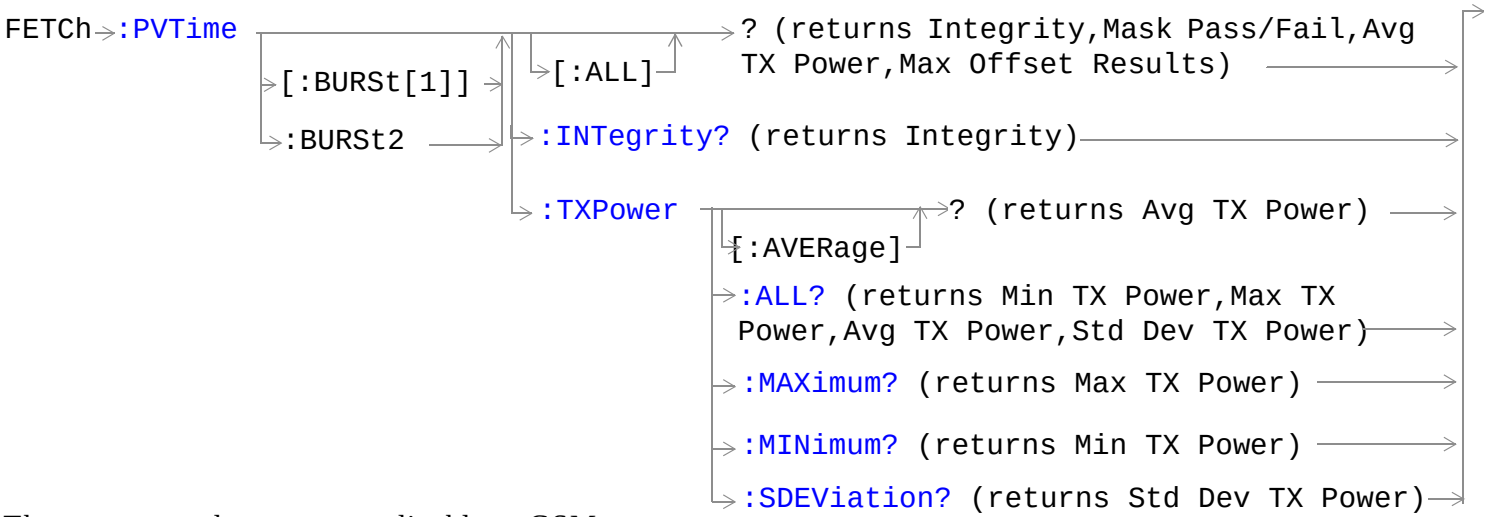

These commands are not applicable to GPRS.



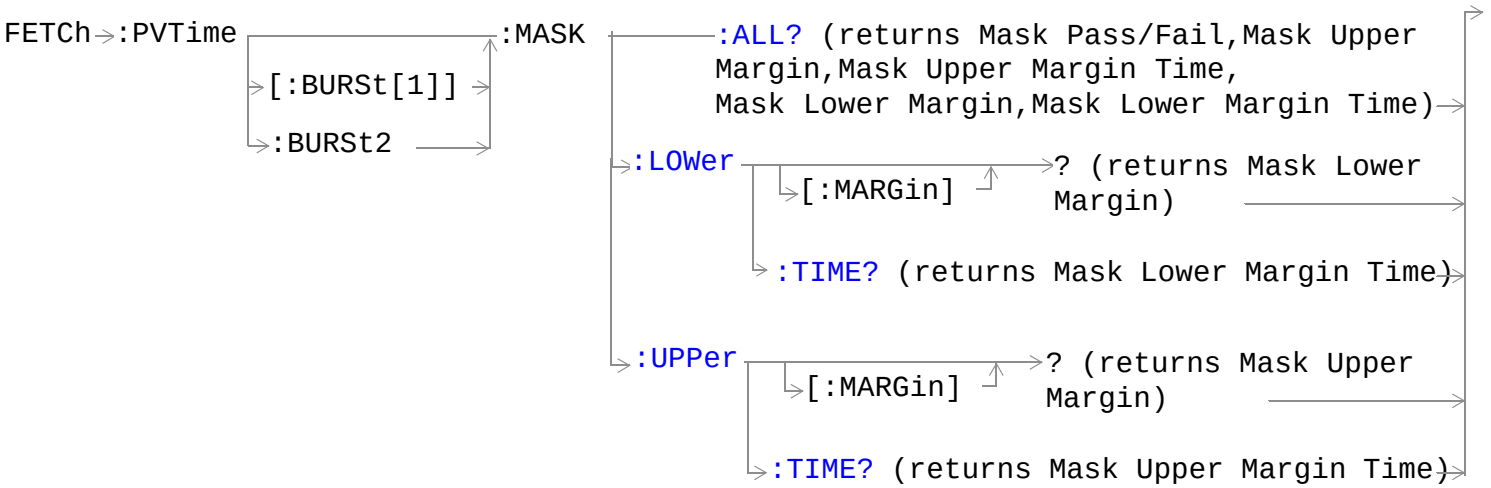

These commands are not applicable to GPRS.



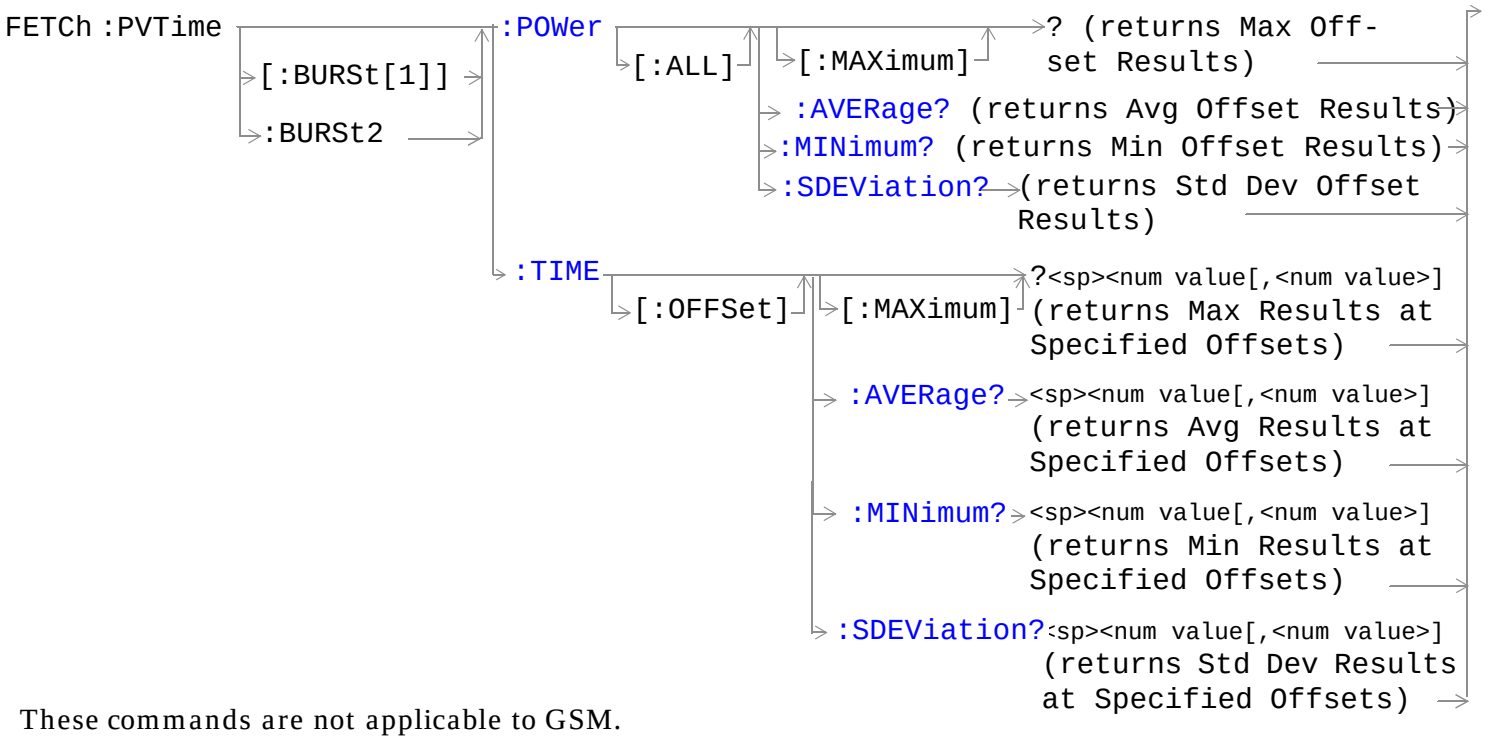

These commands are not applicable to GSM.




These commands are not applicable to GSM.




These commands are not applicable to GSM.




These commands are not applicable to GSM.

"Diagram Conventions" on page 323

## FETCh:PVTime[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries integrity indicator, mask pass/fail indicator, power versus time (PvT) transmit power (average), and PvT power (maximum) at up to 12 time offsets.<br>The number of PvT measurement offsets that will be returned can be queried using the "SETup:PVTime:TIME:POINts[:SELected]?" on page 758. The time offsets are set up using the command "SETup:PVTime:TIME[:OFFSet][:SELected]" on page 754. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Power versus time mask pass/fail<br>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)<br>Power versus time TX carrier power<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time power (maximum) - up to 12 individual results depending on the number of time offsets<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB |

## FETCh:PVTime:TXPower:ALL?

| | | |
|---|---|---|
| Function | GSM | Queries power versus time carrier power (average), power versus time carrier power (minimum), power versus time carrier power (maximum), and power versus time carrier power (standard deviation). |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Power versus time carrier power (average)<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time carrier power (minimum)<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time carrier power (maximum)<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time carrier power (standard deviation)<br>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.001 dB |

## FETCh:PVTime:TXPower:MINimum?

| | | |
|---|---|---|
| Function | GSM | Queries power versus time carrier power (minimum). |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime:TXPower:MAXimum?

| | | |
|---|---|---|
| Function | GSM | Queries power versus time carrier power (maximum). |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime:TXPower[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | Queries power versus time carrier power (average). |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime:TXPower:SDEViation?

| | | |
|---|---|---|
| Function | GSM | Queries power versus time carrier power (standard deviation). |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 dB to 100 dB and 9.91 E+37 (9.91 E+37 (NAN))<br>Resolution: 0.001 dB |

## FETCh:PVTime:MASK:ALL?

| | | |
|---|---|---|
| Function | GSM | Queries the power versus time measurement mask pass/fail indicator and the following worst case margins:<br>• Upper limit margin time<br>• Upper limit margin result<br>• Lower limit margin time<br>• Lower limit margin result<br>Margin time is the point in time, relative to burst bit 0, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the power level boundary specified by the power versus time mask). See the "Typical GSM PvT Measurement" on page 70.<br>Margin result is the difference between the measured power and the power level boundary specified by the power versus time mask. See the "Typical GSM PvT Measurement" on page 70. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Power versus time mask pass/fail<br>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)<br>Power versus time upper limit margin time worst case result<br>• Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>• Resolution: 1 ns<br>Power versus time upper limit margin worst case result:<br>• Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time lower limit margin time worst case result<br>• Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>• Resolution: 1 ns<br>Power versus time lower limit margin worst case result<br>• Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB |

### FETCh:PVTime:MASK[:FAIL]?

| | | |
|---|---|---|
| Function | GSM | Queries power versus time measurement mask pass/fail indicator. |
| | GPRS | |
| Query | | Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) |

### FETCh:PVTime:MASK[:FAIL]:SEGment?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This query returns the mask error code for the entire multislot configuration. This error code indicates which parts, if any are causing the multislot configuration to fail the power versus time mask.<br>The error codes are:<br>• 0 = No Mask Failures<br>• 1 (bit 1) = Rising Edge Failure<br>• 2 (bit 2) = Falling Edge Failure<br>• 4 (bit 3) = Active Part of First Burst<br>• 8 (bit 4) = First Guard Period<br>• 16 (bit 5) = Active Part of Second Burst<br>The above list shows values which can be returned if any single error causes the multislot configuration to fail the mask. (For example, if 4 is returned the failure is due to the active part of the first burst. Note that the value returned could indicate a combination of errors which is causing the multislot configuration to fail. For example, if 9 is returned, this indicates that a rising edge failure and the first guard period has caused the failure. |
| Query | | Range: 0 to 31 |

### FETCh:PVTime:MASK:UPPer[:MARGin]?

| | | |
|---|---|---|
| Function | GSM | Queries the power versus time measurement upper limit margin worst case result.<br>The upper limit margin, worst case result is the power versus time measurement with the least difference between measured power and the power level boundary specified by the power versus time mask. See the "Typical GSM PvT Measurement" on page 70. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

## FETCh:PVTime:MASK:UPPer:TIME?

| | | |
|---|---|---|
| Function | GSM | Queries the power versus time measurement's upper limit margin time, worst case result.<br>The upper limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the upper power level boundary specified by the power versus time mask). See the "Typical GSM PvT Measurement" on page 70. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>Resolution: 1 ns |

## FETCh:PVTime:MASK:LOWer[:MARGin]?

| | | |
|---|---|---|
| Function | GSM | Queries the power versus time measurement's lower limit margin, worst case result.<br>The lower limit margin, worst case result is the power versus time measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask. See the "Typical GSM PvT Measurement" on page 70. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

## FETCh:PVTime:MASK:LOWer:TIME?

| | | |
|---|---|---|
| Function | GSM | Queries the power versus time measurement's lower limit margin time, worst case result.<br>The lower limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement (the measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask). See the "Typical GSM PvT Measurement" on page 70. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>Resolution: 1 ns |

### FETCh:PVTime:POWer[:ALL]:MINimum?

| | | |
|---|---|---|
| Function | GSM | Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime:POWer[:ALL][:MAXimum]?

| | | |
|---|---|---|
| Function | GSM | Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

## FETCh:PVTime:POWer[:ALL]:AVERage?

| | | |
|---|---|---|
| Function | GSM | Queries the average power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Results are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

## FETCh:PVTime:POWer[:ALL]:SDEViation?

| | | |
|---|---|---|
| Function | GSM | Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset that is currently turned on.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.001 dB |

## FETCh:PVTime:POWer:TIME[OFFSet]:MINimum?

| | | |
|---|---|---|
| Function | GSM | Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) will be returned for specified offsets that do not correspond to offsets currently turned on).<br>Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements will be returned by this query in the same order they are listed in the command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Power levels:<br>• Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MINIMUM? 0 US, 570.8 US"
!Returns the !minimum of power versus time measurements at the 0.0 ms and
!570.8 ms offsets.
```

## FETCh:PVTime:POWer:TIME[:OFFSet][:MAXimum]?

| | | |
|---|---|---|
| Function | GSM | Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) will be returned for specified offsets that do not correspond to offsets currently turned on).<br>Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements will be returned by this query in the same order they are listed in the command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Power levels:<br>• Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MAXIMUM? 0 US, 570.8 US"
!Returns the maximum of power versus time measurements at the 0.0 ms
!and 570.8 ms offsets.
```

## FETCh:PVTime:POWer:TIME[:OFFSet]:AVERage?

| | | |
|---|---|---|
| Function | GSM | Queries the average power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) will be returned for specified offsets that do not correspond to offsets currently turned on).<br>Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements will be returned by this query in the same order they are listed in the command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Power levels:<br>• Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:AVERAGE? 0 US, 570.8 US"
!Returns the average of power versus time measurements at the
!0.0 ms and 570.8 ms offsets.
```

## FETCh:PVTime:POWer:TIME[:OFFSet]:SDEViation?

| | | |
|---|---|---|
| Function | GSM | Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset appended to this command. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) will be returned for specified offsets that do not correspond to offsets currently turned on).<br>Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements will be returned by this query in the same order they are listed in the command. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Power levels:<br>• Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)<br>• Resolution: 0.001 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:SDEVIATION? 0 US, 570.8 US"
!Returns the standard deviation of power versus time measurements
at the 0.0 ms and 570.8 ms offsets.
```

## FETCh:PVTime:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count of power versus time multi-measurements completed. |
| | GPRS | |
| Query | | Range: 0 to 999<br>Resolution: 1 |

### FETCh:PVTime:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Queries the integrity indicator for the power versus time measurement. Zero indicates a normal result.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:PVTime[:BURSt[1]][:ALL]?
### FETCh:PVTime:BURSt2[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries integrity indicator, mask pass/fail indicator, power versus time (PvT) transmit power (average), and PvT power (maximum) at up to 12 time offsets for the burst of the multislot configuration that you specify.<br>The number of PvT measurement offsets that will be returned can be queried using the "SETup:PVTime[BURSt[1]]:TIME:POINts[:SELected]? SETup:PVTime:BURSt2:TIME:POINts[:SELected]?" on page 759. The time offsets are set up using the command "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" on page 756. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Power versus time mask pass/fail<br>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)<br>Power versus time TX carrier power<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time power (maximum) - up to 12 individual results depending on the number of time offsets<br>• Range: –100 dBc to 100 dBc and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:TXPower:ALL?FETCh:PVTime:BURSt2:TXPower:ALL?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the power versus time carrier power results for the burst of the multislot configuration that you specify. It returns the average, minimum, maximum, and standard deviation. |
| Query | | Power versus time carrier power (average)<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time carrier power (minimum)<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time carrier power (maximum)<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time carrier power (standard deviation)<br>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.001 dB |

### FETCh:PVTime[:BURSt[1]]:TXPower:MINimum?<br>FETCh:PVTime:BURSt2:TXPower:MINimum?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries power versus time minimum carrier power for the burst of the multislot configuration that you specify. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:TXPower:MAXimum?
### FETCh:PVTime:BURSt2:TXPower:MAXimum?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries power versus time maximum carrier power for the burst of the multislot configuration that you specify. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:TXPower[:AVERage]?
### FETCh:PVTime:BURSt2:TXPower[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries power versus time average carrier power for the burst of the multislot configuration that you specify. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:TXPower:SDEViation?
### FETCh:PVTime:BURSt2:TXPower:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries power versus time standard deviation for the burst of the multislot configuration that you specify. |
| Query | | Range: 0 dB to 100 dB and 9.91 E+37 (NAN)<br>Resolution: 0.001 dB |

## FETCh:PVTime[:BURSt[1]]:MASK:ALL?
## FETCh:PVTime:BURSt2:MASK:ALL?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the mask pass/fail indicator and the following worst case margins for the specified burst of the multislot configuration:<br>• Upper limit margin time<br>• Upper limit margin result<br>• Lower limit margin time<br>• Lower limit margin result<br>Margin time is the point in time, relative to burst bit 0, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the power level boundary specified by the power versus time mask). See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75.<br>Margin result is the difference between the measured power and the power level boundary specified by the power versus time mask. See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75. |
| Query | | Power versus time mask pass/fail<br>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)<br>Power versus time upper limit margin time worst case result<br>• Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>• Resolution: 1 ns<br>Power versus time upper limit margin worst case result:<br>• Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time lower limit margin time worst case result<br>• Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>• Resolution: 1 ns<br>Power versus time lower limit margin worst case result<br>• Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:MASK[:FAIL]?
### FETCh:PVTime:BURSt2:MASK[:FAIL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries power versus time measurement mask pass/fail indicator for the burst of the multislot configuration that you specify. |
| Query | | Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) |

### FETCh:PVTime[:BURSt[1]]:MASK:UPPer[:MARGin]?
### FETCh:PVTime:BURSt2:MASK:UPPer[:MARGin]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the power versus time measurement upper limit margin worst case result for the burst of the multislot configuration that you specify.<br>The upper limit margin, worst case result is the power versus time measurement with the least difference between measured power and the power level boundary specified by the power versus time mask. See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75. |
| Query | | Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:MASK:UPPer:TIME?
### FETCh:PVTime:BURSt2:MASK:UPPer:TIME?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the power versus time measurement's upper limit margin time, worst case result for the burst of the multislot configuration that you specify.<br>The upper limit margin time result is the point in time, relative to bit 0 in the burst, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the upper power level boundary specified by the power versus time mask). See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75. |
| Query | | Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>Resolution: 1 ns |

### FETCh:PVTime[:BURSt[1]]:MASK:LOWer[:MARGin]?
### FETCh:PVTime:BURSt2:MASK:LOWer[:MARGin]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the power versus time measurement's lower limit margin, worst case result for the burst of the multislot configuration that you specify.<br>The lower limit margin, worst case result is the power versus time measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask. See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75. |
| Query | | Range: –100 dB to 0 dB and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:MASK:LOWer:TIME?
### FETCh:PVTime:BURSt2:MASK:LOWer:TIME?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the power versus time measurement's lower limit margin time, worst case result for the burst of the multislot configuration that you specify.<br>The lower limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement (the measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask). See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 75. |
| Query | | Range: –50 µs to 593 µs and 9.91 E+37 (NAN)<br>Resolution: 1 ns |

### FETCh:PVTime[:BURSt[1]]:POWer[:ALL]:MINimum?
### FETCh:PVTime:BURSt2:POWer[:ALL]:MINimum?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify. Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime[BURSt[1]]:TIME:POINts[:SELected]? SETup:PVTime:BURSt2:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| Query | | Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:POWer[:ALL][:MAXimum]?
### FETCh:PVTime:BURSt2:POWer[:ALL][:MAXimum]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify. Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime[BURSt[1]]:TIME:POINts[:SELected]? SETup:PVTime:BURSt2:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| Query | | Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:POWer[:ALL]:AVERage?
### FETCh:PVTime:BURSt2:POWer[:ALL]:AVERage?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the average power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify. Results are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime[BURSt[1]]:TIME:POINts[:SELected]? SETup:PVTime:BURSt2:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| Query | | Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:PVTime[:BURSt[1]]:POWer[:ALL]:SDEViation?
### FETCh:PVTime:BURSt2:POWer[:ALL]:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify.<br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime[BURSt[1]]:TIME:POINts[:SELected]? SETup:PVTime:BURSt2:TIME:POINts[:SELected]?" queries the number of offset points that are turned on, indicating the number of values to expect when you send this command. |
| Query | | Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.001 dB |

## FETCh:PVTime[:BURSt[1]]:POWer:TIME[OFFSet]:MINimum?
## FETCh:PVTime:BURSt2:POWer:TIME[OFFSet]:MINimum?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).<br><br>Power levels are relative to the power versus time carrier power measurement.<br><br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements will be returned by this query in the same order they are listed in the command. |
| Query | | Power levels:<br>• Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MINIMUM? 0US, 570.8US"
!Returns the minimum of power versus time measurements at the 0.0 us and
!570.8 us offsets.
```

## FETCh:PVTime[:BURSt[1]]:POWer:TIME[:OFFSet][:MAXimum]?
## FETCh:PVTime:BURSt2:POWer:TIME[:OFFSet][:MAXimum]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).<br><br>Power levels are relative to the power versus time carrier power measurement.<br><br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements are returned by this query in the same order they are listed in the command. |
| Query | | Power levels:<br><br>• Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br><br>Time offsets:<br><br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MAXIMUM? 0US, 570.8US"
!Returns the maximum of power versus time measurements at the 0.0 us
!and 570.8 us offsets.
```

## FETCh:PVTime[:BURSt[1]]:POWer:TIME[:OFFSet]:AVERage?
## FETCh:PVTime:BURSt2:POWer:TIME[:OFFSet]:AVERage?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the average power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).<br><br>Power levels are relative to the power versus time carrier power measurement.<br><br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements are returned by this query in the same order they are listed in the command. |
| Query | | Power levels:<br>• Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" query. |

Programming Example

```
OUTPUT 714;"FETCH:PVTIME:BURSt2:POWER:TIME:OFFSET:AVERAGE? 0US, 570.8US"
!Returns the average of power versus time measurements at the
!0.0 us and 570.8 us offsets.
```

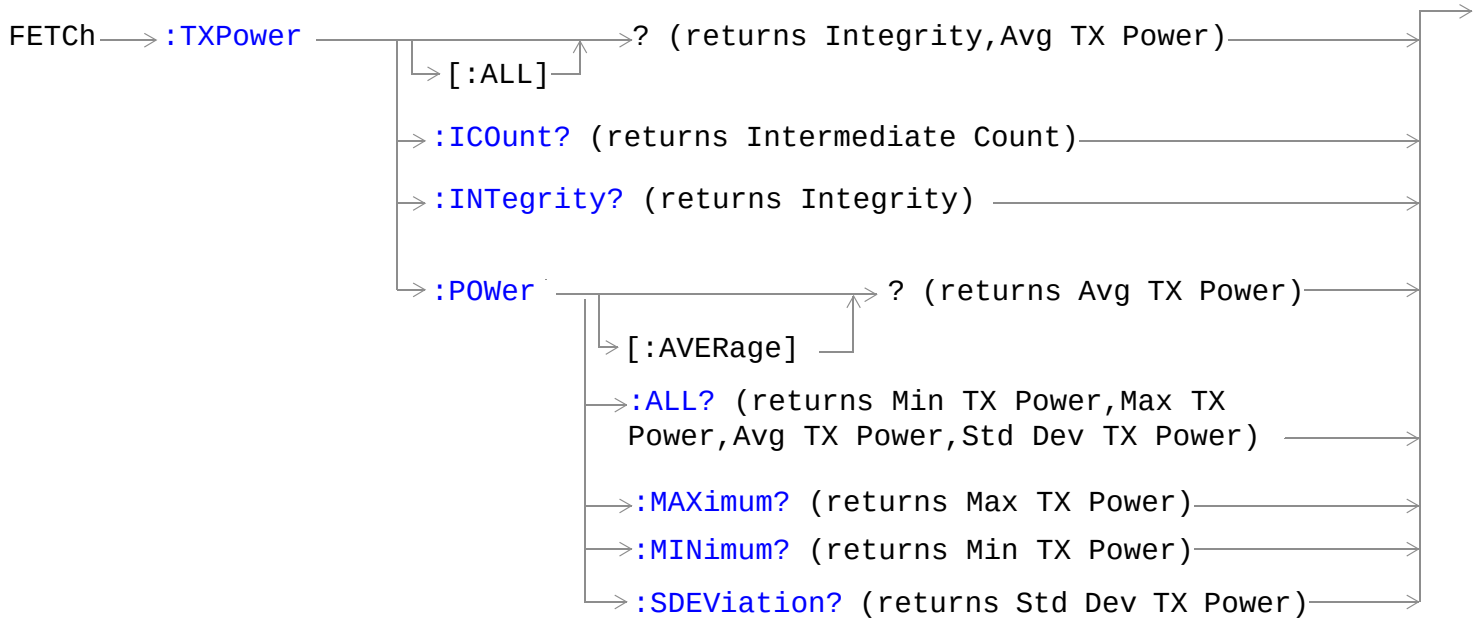
### FETCh:PVTime[:BURSt[1]]:POWer:TIME[:OFFSet]:SDEViation?
### FETCh:PVTime:BURSt2:POWer:TIME[:OFFSet]:SDEViation?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).<br>Power levels are relative to the power versus time carrier power measurement.<br>The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" command sets up the number of offsets that are turned on and their time values. Measurements are returned by this query in the same order they are listed in the command. |
| Query | | Power levels:<br>• Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)<br>• Resolution: 0.001 dB<br>Time offsets:<br>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).<br>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected] SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]" query. |
| Programming Example<br>`OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:SDEVIATION? 0US, 570.8US"`<br>`!Returns the standard deviation of power versus time measurements`<br>`at the 0.0 us and 570.8 us offsets.` | | |

### FETCh:PVTime[:BURSt[1]]:INTegrity?
### FETCh:PVTime:BURSt2:INTegrity?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries the integrity indicator for the power versus time measurement. This query returns the integrity indicator for the burst that you specify. Zero indicates a normal result.<br>See "Integrity Indicator" on page 283 for descriptions of non-zero integrity indicators. |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

# FETCh:TXPower




"Diagram Conventions" on page 323

### FETCh:TXPower[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries integrity indicator and average transmit power.<br>A value of zero for the integrity indicator is normal. See "Integrity Indicator" on page 283 for non-zero integrity indicators. |
| | GPRS | |
| Query | | Integrity:<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Transmit power:<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB |

### FETCh:TXPower:ICOunt?

| | | |
|---|---|---|
| Function | GSM | Queries the intermediate count of transmit power measurements completed. |
| | GPRS | |
| Query | | Range: 1 to 999<br>Resolution: 1 |

### FETCh:TXPower:INTegrity?

| | | |
|---|---|---|
| Function | GSM | Queries the integrity indicator. Zero indicates normal.<br>For non-zero integrity indicators, refer to "Integrity Indicator" on page 283. |
| | GPRS | |
| Query | | Range: See "Integrity Indicator" on page 283.<br>Resolution: 1 |

### FETCh:TXPower:POWer[:AVERage]?

| | | |
|---|---|---|
| Function | GSM | Queries average transmit power. |
| | GPRS | |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:TXPower:POWer:ALL?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries average, minimum, maximum and standard deviation of transmit power multi-measurement results. |
| Query | | Average:<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Minimum:<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Maximum:<br>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>Standard deviation:<br>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.001 dB |

### FETCh:TXPower:POWer:MAXimum?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries maximum transmit power results from a multi-measurement. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:TXPower:MINimum?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries minimum transmit power results from a multi-measurement. |
| Query | | Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)<br>Resolution: 0.01 dB |

### FETCh:TXPower:SDEViation?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the standard deviation from a transmit power multi-measurement. |
| Query | | Range: 0 dB to 100 dB and 9.91 E+37 (NAN)<br>Resolution: 0.001 dB |

# INITiate Subsystem

## Syntax Diagrams and Command Descriptions

"INITiate" on page 603

## 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 Transmit Power and PFER measurements, and then uses the INITiate:DONE? command in a loop to query the status of these measurements, see "Measurement Event Synchronization" on page 296.

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 278.

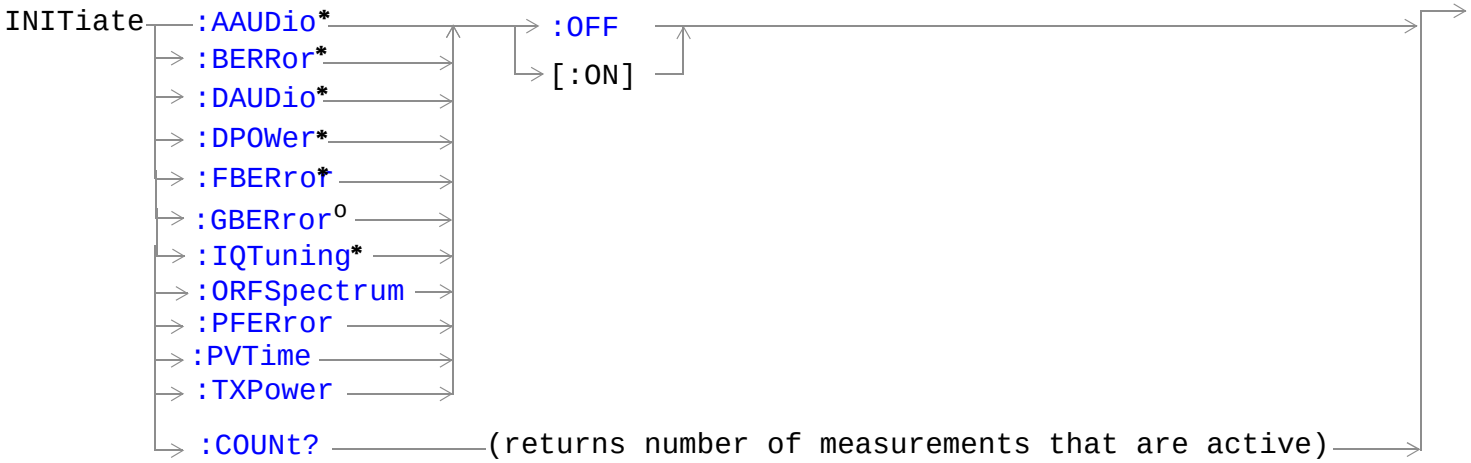
**NOTE** Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. The best practice (during remote operation) is to use single measurement mode. This simplifies the tasks of starting concurrent measurements, then using the INIT subsystem commands to determine which measurements are ready to be FETCHed.

```
10 OUTPUT 714;”SETup:ALL:CONTinuous:OFF” ! selects single measurement mode
20 OUTPUT 714;”INITiate:TXPower;PFERror” ! starts TX power/phase frequency error measurement
30 LOOP
40 OUTPUT 714;”INITiate:DONE?” !query to find out if any measurements are done
50 ENTER 714;Meas_complete
60 SELECT Meas_complete$$
70 CASE “TXP” !tests for the string “TXP” which would indicate TX power measurement is done
80 OUTPUT 714;”FETCh:TXPower:POWer?” !Queries average TX power measurement
90 ENTER 714;Avg_tx_power
100 CASE “PFER”!tests for the string “PFER” which would indicate phase/frequency error
measurement is done
110 OUTPUT 714;”FETCh:PFERror:RMS?” !Queries PFER maximum phase error measurement
120 ENTER 714;Max_phs_error
130 END SELECT
140 EXIT IF Meas_complete$ = “NONE”
150 END LOOP
160 END
```

INITiate commands should be sent only when the test set has finished performing any operations, such as handovers, that require settling. For example, the following code performs a handover to a new traffic channel using the :SEQ (sequential) appendage, then initiates a TX power measurement.

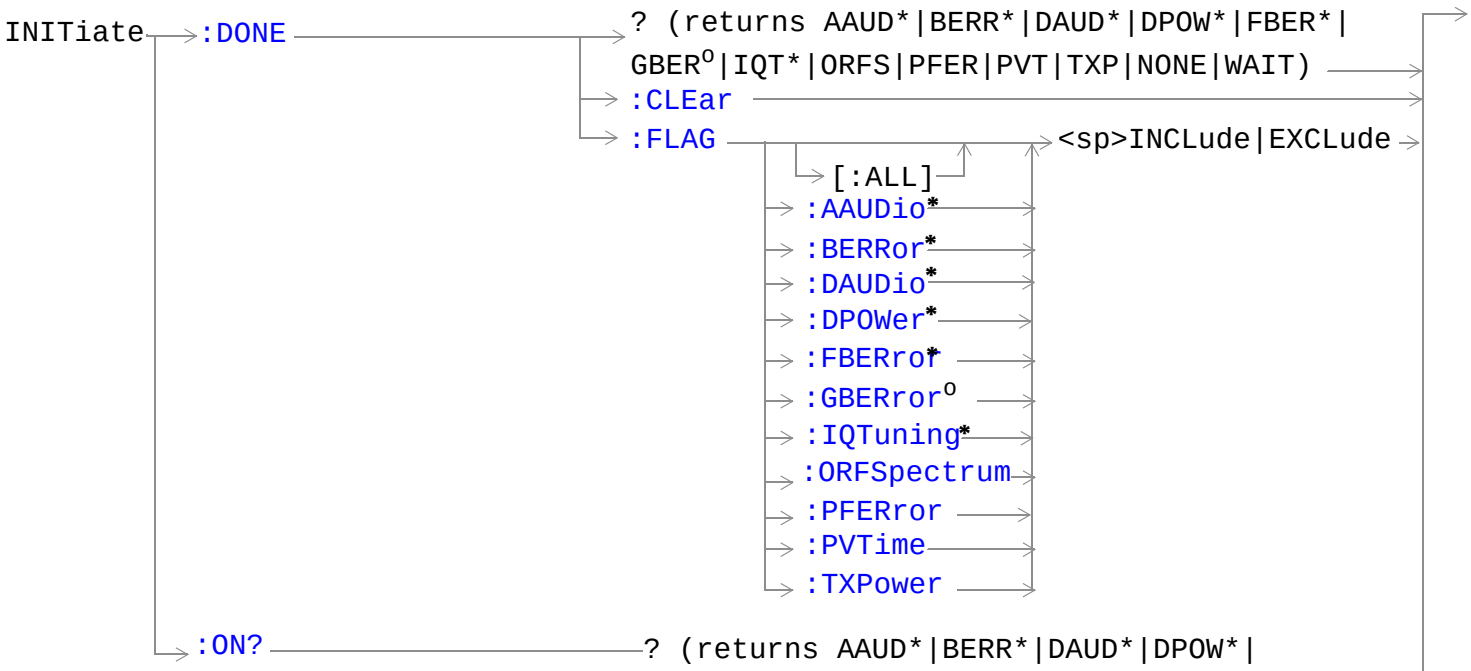
```
OUTPUT 714;”CALL:TCH:SEQ 65” !Hands over traffic channel to channel 65, waits for process
                             !to complete before accepting next command.
OUTPUT 714;”INITiate:TXPower” !Initiates TX power measurement
```

# INITiate




* Not applicable to GPRS

° Not applicable to GSM




* Not applicable to GPRS.

° Not applicable to GSM

"Diagram Conventions" on page 323

### INITiate:<measurement mnemonic>[:ON]

| | | |
|---|---|---|
| Function | GSM | Starts measurements with the test set.<br>The INITiate command is associated with the SETup command, and the FETCh? command, see "SETup Subsystem" on page 637 and "FETCh? Subsystem" on page 520.<br>One or more measurements may be initiated on the same program line. See "Concurrent Measurements" on page 269.<br>This command is also used to activate a measurement. See "INITiate Programming Examples (how INIT commands are used)" on page 601. |
| | GPRS | |

Programming Example

```
OUTPUT 714;"INITIATE:TXPOWER:ON" !Initiates a TX Power measurement.
OUTPUT 714;"INITIATE:TXPOWER;PFERROR:ON" !Initiates TX Power and
!phase and frequency error measurements.
OUTPUT 714;"INITIATE:PVTIME;ORFSPECTRUM;FBERROR:ON" !Initiates power
!versus time output RF spectrum, and fast bit error rate measurements.
```

### INITiate:<measurement mnemonic>:OFF

| | | |
|---|---|---|
| Function | GSM | Deactivates the selected measurement. See "Measurement States" on page 278.<br>Only one measurement can be deactivated at a time. To stop one or more measurements and leave them in the active state, see "ABORt" on page 326. |
| | GPRS | |

Programming Example

```
OUTPUT 714;"INITIATE:TXPOWER:OFF" !Deactivates TX power measurement.
```

### INITiate:COUNt?

| | | |
|---|---|---|
| Function | GSM | Queries the number of measurements that have been initiated (that are activate). See "Measurement States" on page 278. |
| | GPRS | |
| Query | | Range: 0 to 10<br>Resolution: 1 |

### INITiate:DONE?

| | | |
|---|---|---|
| Function | GSM | Queries (one at a time) which measurements if any are available or have timed out.<br>See"Measurement Event Synchronization" on page 296 for details on how to use this command.<br>See "Measurement States" on page 278 to understand the test set's measurement states.<br>See "INITiate:DONE:FLAG:<measurement mnemonic>" on page 606 for include or exclude commands.<br>Note that WAIT is returned when no measurements are done. NONE is returned when all measurements are done. |
| | GPRS | |
| Query | GSM | Range: NONE \| TXP \| PVT \| PFER \| ORFS \| AAUD \| DAUD \| DPOW \| FBER \| BERR \| IQT \| WAIT |
| | GPRS | Range: NONE \| TXP \| PVT \| PFER \| ORFS \| GBER \| WAIT |

### INITiate:DONE:CLEar

| | | |
|---|---|---|
| Function | GSM | Clears the done flag from all measurements. See"INITiate:DONE?" on page 605. |
| | GPRS | |
| Programming Example<br>`OUTPUT 714;"INITIATE:DONE:CLEAR" !clears done flag.` | | |

### INITiate:DONE:FLAG[:ALL]

| | | |
|---|---|---|
| Function | GSM | Specifies that all measurements are considered, (included or excluded) when the DONE? query is sent.<br>If a measurements trigger arm, see "Trigger Arm (Single or Continuous) Description" on page 278, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see "INITiate:DONE?" on page 296. 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 trigger arm must be left in continuous mode the user should (exclude) it, using this command, from the INITiate:DONE? query results.<br>Once the 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) to be an (included measurement) with any form of preset, see "Preset Descriptions" on page 232. |
| | GPRS | |
| Setting | | Range<br>• INCLude: include all measurements<br>• EXCLude: exclude all measurements |
| Programming Example<br>`OUTPUT 714;"INITIATE:DONE:FLAG:ALL EXCLUDE" !Excludes all measurements from !contributing the INITIATE:DONE? !query, see "INITiate:DONE?" on !page 6.` | | |

### INITiate:DONE:FLAG:<measurement mnemonic>

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Specifies which measurements are considered, (included or excluded) when the DONE? query is sent.<br>If a measurements trigger arm, see "Trigger Arm (Single or Continuous) Description" on page 278, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see "INITiate:DONE?" on page 296. 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 trigger arm must be left in continuous mode the user should (exclude) it, using this command, from the INITiate:DONE? query results.<br>Once the 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) to be an (included measurement) with any form of preset, see "Preset Descriptions" on page 232. |
| Setting | GSM | Range<br>• INCLude<br>:AAUDio \| :BERRor \| :DAUDio \| :DPOWer \| :FBERror \| :IQTuning \| :ORFSpectrum \| :PFERror \| :PVTime \| :TXPower<br>• EXCLude<br>:AAUDio \| :BERRor \| :DAUDio \| :DPOWer \| :FBERror \| :IQTuning \| :ORFSpectrum \| :PFERror \| :PVTime \| :TXPower |
| | GPRS | Range<br>• INCLude<br>GBERror \| :ORFSpectrum \| :PFERror \| :PVTime \| :TXPower<br>• EXCLude<br>GBERror\| :ORFSpectrum \| :PFERror \| :PVTime \| :TXPower |
| Related Topics | | "INITiate:DONE?" on page 605 |

Programming Example

```
OUTPUT 714;"INITIATE:DONE:FLAG:PFERROR EXCLUDE" !excludes PFERROR measurements
                                                !from contributing to the
                                                !INITIATE:DONE? query.
```

### INITiate:ON?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the names of the measurements (none, one, or more than one) that are ON in a comma separated list of measurement mnemonics. See "INITiate:<measurement mnemonic>[:ON]" on page 604. |
| Query | GSM | Range: AAUD \| BERR \| DAUD \| DPOW \| FBER \| IQT \| NONE \| ORFS \| PFER \| PVT \| TXP |
| | GPRS | Range: GBER \| NONE \|ORFS \| PFER \| PVT \| TXP |

# READ? Subsystem

### Syntax Diagram and Command Descriptions

"READ"

## 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:

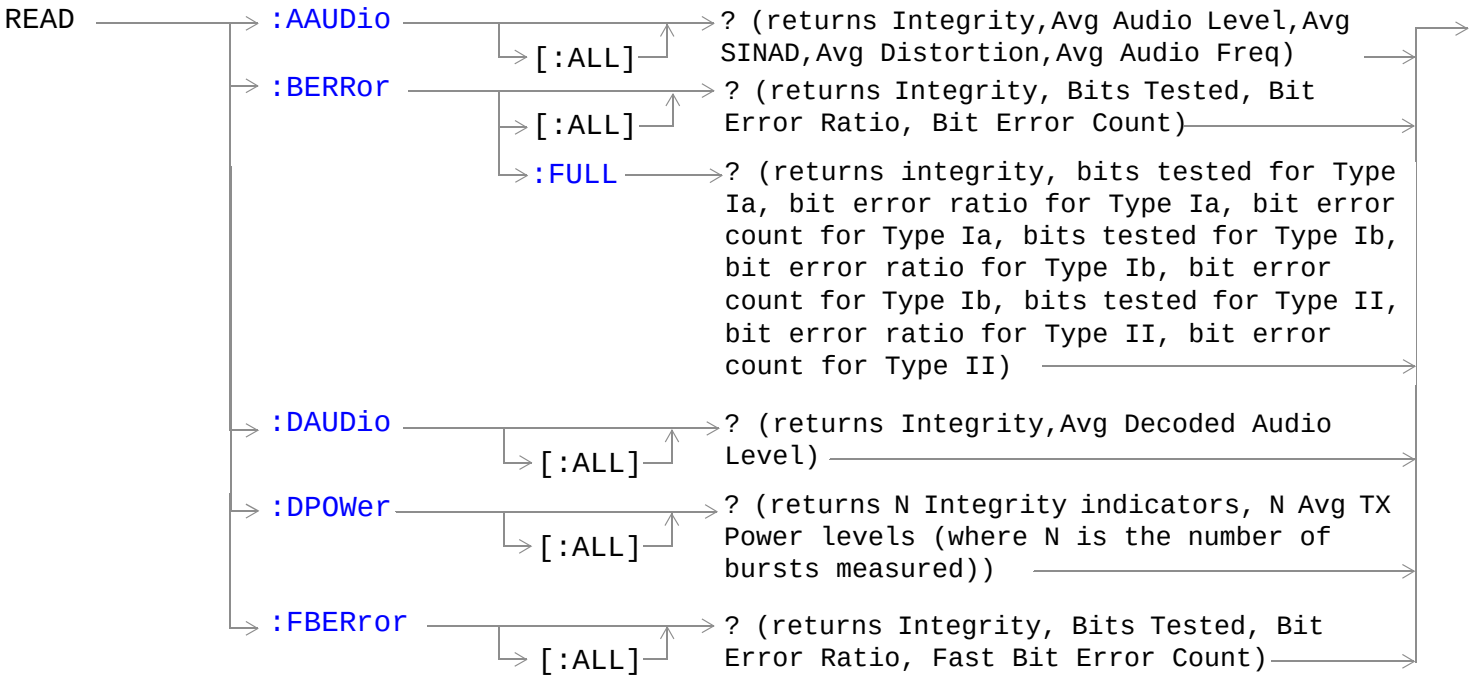
- The test set does not process any additional GPIB commands until the requested measurement results are available.
- The sequential nature of the READ? command does not allow the user to make concurrent measurements. Concurrent measurements require the overlapped commands INITiate, DONE? and FETCh? .
- 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).

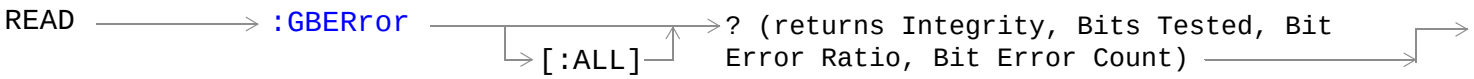
## Programming Example

```
OUTPUT 714;"READ:TXPower?" !Starts TX power measurement. As soon as the
                           !measurement cycle has completed, the test set
                           !provides the TX power measurement results to the
                           !controlling application.
ENTER 714;integrity, tx_carrier_power !Enters the integity indicator and
                                      !TX carrier power measurement into
                                      !controlling application.
```

# READ

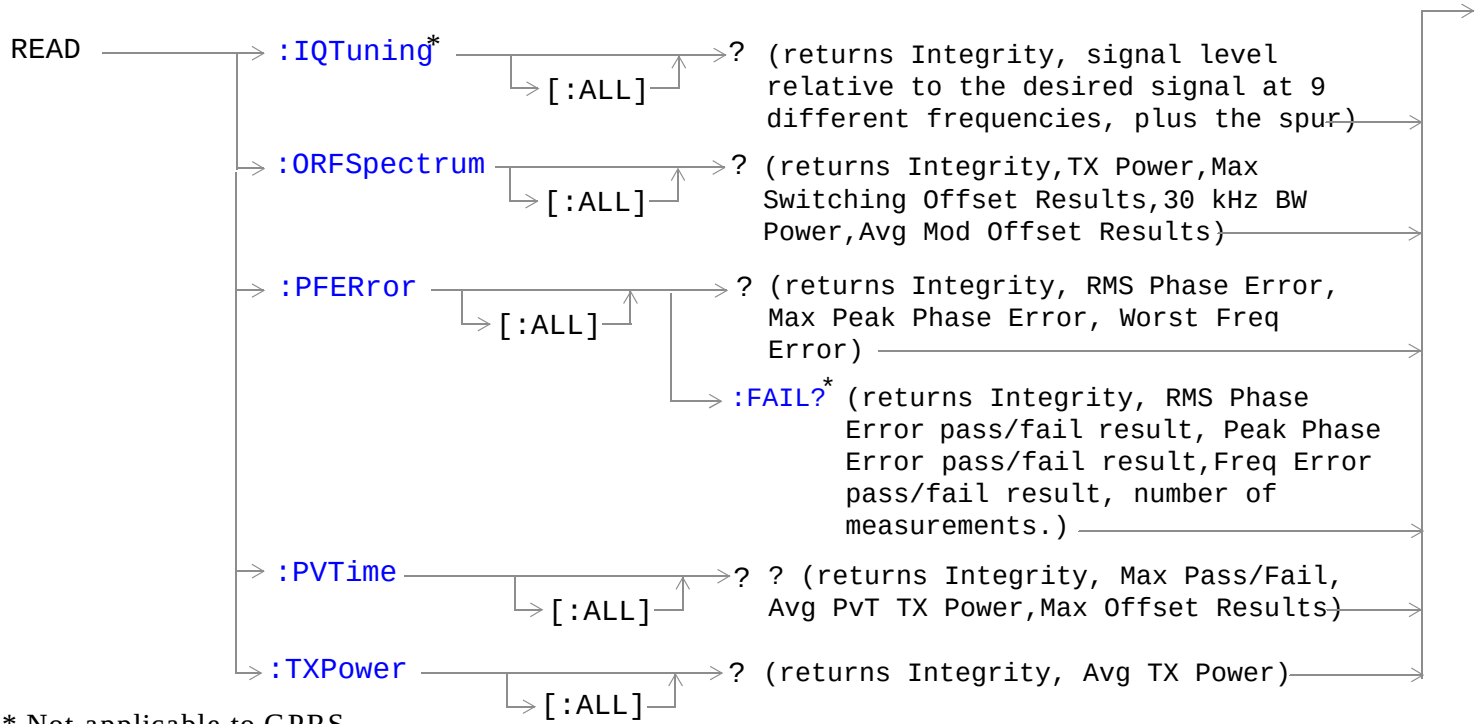



These commands are not applicable to GPRS.

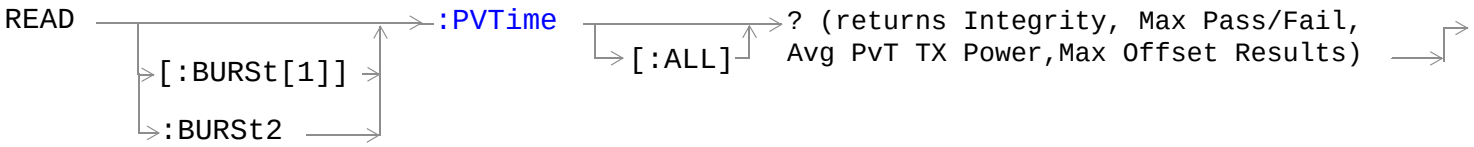



* This command is not applicable to GSM.

**READ**




* Not applicable to GPRS.




This command is not applicable to GSM.

"Diagram Conventions" on page 323

## READ:AAUDio[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one analog audio measurement as a sequential operation.<br>Returns an integrity indicator (see "Integrity Indicator" on page 283), average analog audio level, average SINAD, average distortion and the average audio frequency. Values are returned in a comma-separated list.<br>Returns Integrity Indicator, see "Integrity Indicator" on page 283 and analog audio (average). The FETCh command should be used to obtain other measurement results. See "FETCh:AAUDio" on page 521. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Analog audio (average)<br>• Range: 0 to 20 volts<br>• Resolution: 0.1mv |

## READ:BERRor[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one RX bit error measurement as a sequential operation.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, Bits Tested, Bit Error Ratio and Bit Error Count, for the bit type set using "SETup:BERRor[:TYPE]" on page 650. (A similar query, "READ:BERRor:FULL?" on page 612, returns the same results but for all residual, or all non-residual bit types simultaneously.) The FETCh command should be used to obtain other measurement results. See "FETCh:BERRor" on page 530. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Bits tested<br>• Range: 0 to (<RX bits to test +131) and 9.91E+37 (NAN)<br>• Resolution: 1<br>Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Bit error count<br>• Range: 0 to (<RX bits to test +131) and 9.91E+37 (NAN)<br>• Resolution: 1 |

## READ:BERRor:FULL?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one RX bit error measurement as a sequential operation. Either all of the residual or non-residual results are returned, depending on the type of bit error measurement set using "SETup:BERRor[:TYPE]" on page 650.<br><br>Returns Integrity Indicator (see "Integrity Indicator" on page 283), Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II.<br><br>(A similar query, "READ:BERRor[:ALL]?" on page 611, returns the same results but only for the bit type previously set using "SETup:BERRor[:TYPE]" on page 650.)<br><br>The FETCh command should be used to obtain other measurement results. See "FETCh:BERRor" on page 530. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Type Ia Bits tested<br>• Range: 0 to 999000 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type Ia Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 0.01<br>Type Ia Bit error count<br>• Range: 0 to 999000 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type Ib Bits tested<br>• Range: 0 to 2637369 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type Ib Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 0.01<br>Type Ib Bit error count<br>• Range: 0 to 2637369 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type II Bits tested<br>• Range: 0 to 15584400 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Type II Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 0.01<br>Type II Bit error count<br>• Range: 0 to 1558440 and 9.91E+37 (NAN)<br>• Resolution: 1 |

## READ:DAUDio[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one decoded audio (uplink speech level) measurement as a sequential operation.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283 and decoded audio (average). The FETCh command should be used to obtain other measurement results. See "FETCh:DAUDio" on page 538. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Decoded audio (average)<br>• Range: 0 to 100% FS (full scale)<br>• Resolution: 0.01% FS |

## READ:DPOWer[:ALL]?

| | | |
|---|---|---|
| Function | GSM | 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 663. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicators for each individual burst<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Average TX power levels for each individual burst<br>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dBm |

## READ:FBERror[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one fast bit error measurement as a sequential operation.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, Bits Tested, Bit Error Ratio, and Fast Bit Error Count using mobile station burst-by-burst looback (type C loopback). The FETCh command should be used to obtain other measurement results. See "FETCh:BERRor" on page 530. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Bits tested<br>• Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN)<br>• Resolution: 1<br>Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Fast bit error count<br>• Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN)<br>• Resolution: 1 |

## READ:GBERror[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Queries (initiates and fetches) one bit error measurement as a sequential operation.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, Bits Tested, Bit Error Ratio, and Bit Error Count. The FETCh command should be used to obtain other measurement results. See "FETCh:GBERror" on page 548. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Bits tested<br>• Range: 0 to 999,427 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Bit error ratio<br>• Range: 0 to 100 and 9.91E+37 (NAN)<br>• Resolution: 1<br>Bit error count<br>• Range: 0 to 999,427 and 9.91E+37 (NAN)<br>• Resolution: 1 |

## READ:IQTuning[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) the I/Q Tuning measurement results. Query returns the integrity indicator and the relative power level at the following offset frequencies: carrier frequency, ±67.7083 kHz, ±135.417 kHz, ±203.125 kHz, ±270.833 kHz. The spur measurement result is also returned.<br>The FETCh command should be used to return other measurement results. See "FETCh:IQTuning" on page 551. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Signal level relative to the desired signal at 9 different frequencies<br>• Range: -100 to +100 dB and 9.91 E+37 (NAN)<br>• Resolution: 0.01 dB<br>The order of the signal level results are:<br>• -270.833 kHz<br>• -203.125 kHz<br>• -135.417 kHz<br>• -67.7083 kHz<br>• carrier frequency<br>• +67.7083 kHz<br>• +135.417 kHz<br>• +203.125 kHz<br>• +270.833 kHz<br>Relative power of the spur frequency:<br>• Range: -100 to +100 dB and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

## READ:ORFSpectrum[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one output RF spectrum measurement as a sequential operation. |
| | GPRS | Returns Integrity Indicator see "Integrity Indicator" on page 283, TX Power, Output RF Spectrum due to Switching (Max), 30 kHz Bandwidth Power, and Output RF Spectrum due to Modulation (Average). The FETCh command should be used to obtain other measurement results. See "FETCh:ORFSpectrum" on page 555. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>TX power<br>• Range: –100 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB<br>Output RFspectrum due to switching (Max)<br>• Range: 0 to 8 comma separated values –100 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB<br>30 kHz bandwidth power<br>• Range: –100 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB<br>Output RF spectrum due to modulation (average)<br>• Range: 0 to 22 comma separated values –200 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

## READ:PFERror[:ALL]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries (initiates and fetches) one Phase and Frequency Error measurement as a sequential operation.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, RMS Phase Error (Max), Peak Phase Error(Max), Frequency Error (Worst). The FETCh command should be used to obtain other measurement results. See "FETCh:PFERror" on page 562.<br>Worst frequency error (negative or positive) is the value furthest from zero. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>rms phase error (max)<br>• Range: 0 to 180 degrees and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB<br>Peak phase error (max)<br>• Range: 0 to 180 degrees and 9.91E+37 (NAN)<br>• Resolution: 0.01 degrees<br>Frequency error (worst)<br>• Range: –750 kHz to +750 kHz and 9.91E+37 (NAN)<br>• Resolution: 0.01 Hz |

## READ:PFERror[:ALL]:FAIL?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one Phase and Frequency Error measurement as a sequential operation.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, RMS Phase Error pass/fail indicator, Peak Phase Error pass/fail indicator, Frequency Error pass/fail indicator, and the number of measurements taken. The number of measurements taken may be of interest to you if you are using the confidence level feature. For more information on using confidence levels refer to "Confidence Levels" on page 1035.<br>The FETCh command should be used to obtain other measurement results. See "FETCh:PFERror" on page 562.<br>Worst frequency error (negative or positive) is the value furthest from zero. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>RMS phase error pass/fail indicator<br>• Range: 0 \| 1<br>Peak phase error pass/fail indicator<br>• Range: 0 \| 1<br>Frequency error pass/fail indicator<br>• Range: 0\|1<br>Number of measurements taken<br>• Range: 0 to 999 and 9.91 E+37 (NAN)<br>• Resolution: 1 |

## READ:PVTime[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one power versus time measurement as a sequential operation. |
| | GPRS | Returns Integrity Indicator see "Integrity Indicator" on page 283, Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See "FETCh:PVTime" on page 571. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Mask pass/fail<br>• Range: 0 \| 1 and 9.91E+37 (NAN)<br>Power versus time transmit power<br>• Range: –100 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time offset (max)<br>• Range: Up to 12 comma-separated power versus time values returned with max power = –100 dBc to +100 dBc (relative to power versus time carrier power) and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

### READ[:BURSt[1]]:PVTime[:ALL]?
### READ:BURSt2:PVTime[:ALL]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable for GSM. |
| | GPRS | Queries (initiates and fetches) one power versus time measurement as a sequential operation for the burst in the multislot configuration that you specify.<br>Returns Integrity Indicator see "Integrity Indicator" on page 283, Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See "FETCh:PVTime" on page 571. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Mask pass/fail<br>• Range: 0 \| 1 and 9.91E+37 (NAN)<br>Power versus time transmit power<br>• Range: –100 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB<br>Power versus time offset (max)<br>• Range: Up to 12 comma-separated power versus time values returned with max power = –100 dBc to +100 dBc (relative to power versus time carrier power) and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

### READ:TXPower[:ALL]?

| | | |
|---|---|---|
| Function | GSM | Queries (initiates and fetches) one TX power measurement as a sequential operation. |
| | GPRS | Returns Integrity Indicator see "Integrity Indicator" on page 283 and transmit power (average). The FETCh command should be used to obtain other measurement results. See "FETCh:TXPower" on page 598. |
| Query | | Integrity indicator<br>• Range: See "Integrity Indicator" on page 283.<br>• Resolution: 1<br>Transmit power (average)<br>• Range: –100 to +100 dBm and 9.91E+37 (NAN)<br>• Resolution: 0.01 dB |

# RFANalyzer Subsystem

Last updated: November 14, 2001

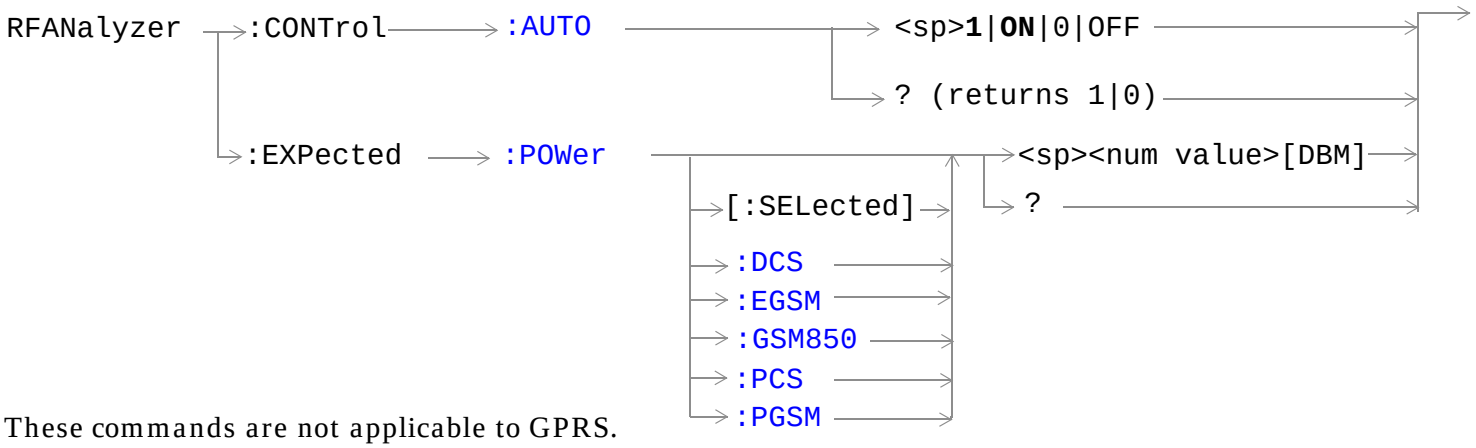
## Description

The RFANalyzer command subsystem performs “lower-level” functions that control the Test Set's measuring receiver. Most of these functions are normally controlled indirectly by commands in other subsystems. One exception would be when operating in Test Mode. For example, the command CALL:TCHannel:<channel number> would set the RFANalyzer:EXPected:FREQuency parameter to the frequency that maps to the uplink traffic channel specified.

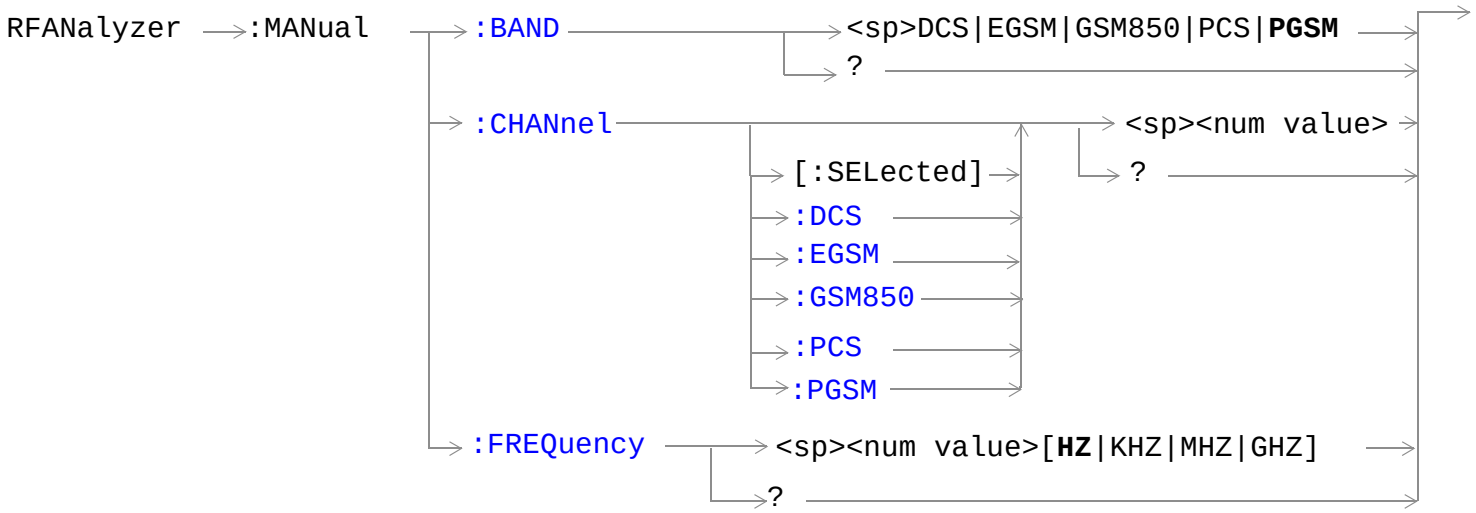
### Syntax Diagrams and Command Descriptions

“RFANalyzer” on page 623

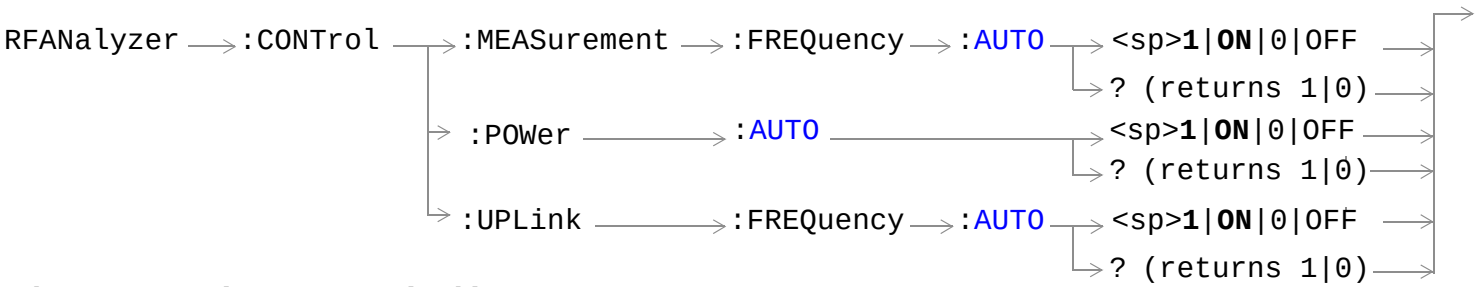
# RFANalyzer



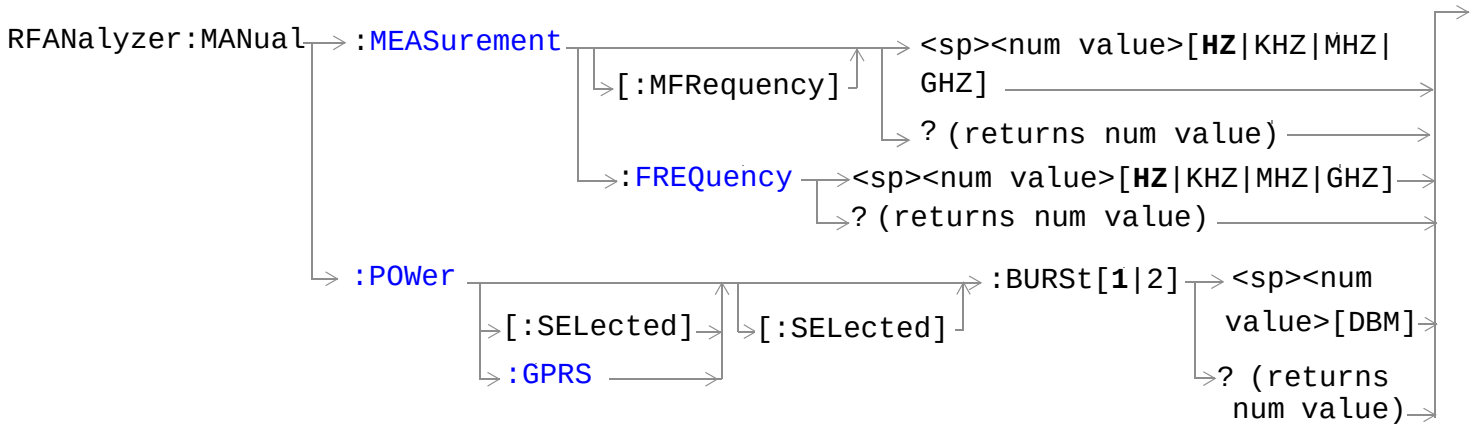

These commands are not applicable to GPRS.



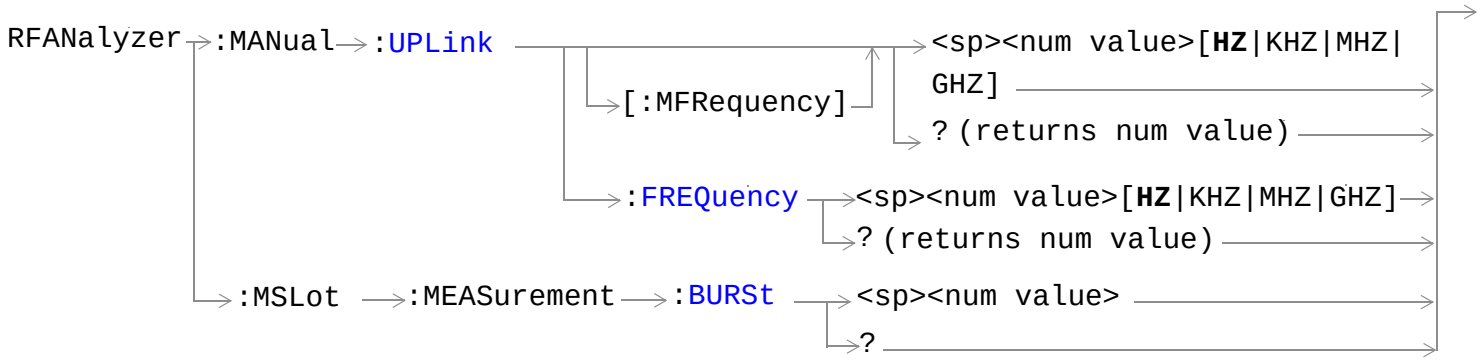

These commands are not applicable to GPRS.




These commands are not applicable to GSM.




These commands are not applicable to GSM.




These commands are not applicable to GSM.

"Diagram Conventions" on page 323

### RFANalyzer:CONTrol:AUTO

| | | |
|---|---|---|
| Function | GSM | Sets/queries the test set's receiver control. The measuring receiver is either under the control of the test set's base station emulator (AUTO ON) or under manual control by the user (AUTO OFF). See "Receiver Control" on page 235.<br>Setting the manual band will change the receiver control to manual. see "RFANalyzer:MANual:BAND" on page 628.<br>Setting the manual channel in the band that is currently active will change the receiver control to manual. See"RFANalyzer:MANual:CHANnel[:SELected]" on page 629.<br>Setting the manual frequency will change the receiver control to manual. See "RFANalyzer:MANual:FREQuency" on page 632.<br>Setting the broadcast band will change the receiver control to auto. See "CALL:BAND" on page 364. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 0\|1 |
| *RST setting | | 1\|ON |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:CONTROL:CONTROL:AUTO 0" !Sets receiver control to manual.` | | |

### RFANalyzer:EXPected:POWer[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the power level in DBM that the mobile station is expected to transmit for the selected band. The units DBM are optional. The test set will set up its input signal path to measure this power level when a user is in manual control. See "Expected Power" on page 237. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| Query | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Expected Power: +13 dBm |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10" !Sets the test set expected`<br>`!input level to 10 dBm.` | | |

## RFANalyzer:EXPected:POWer:DCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See "Receiver Control" on page 235. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| Query | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Expected Power: +13dBm |

Programming Example

```
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:DCS -10" !Sets expected power in DCS band
                                               !to -10 dBm.
```

## RFANalyzer:EXPected:POWer:EGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See "Receiver Control" on page 235. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| Query | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Expected Power: +13 dBm |

Programming Example

```
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:EGSM -10" !Sets expected power in EGSM
                                                !band to -10 dBm.
```

### RFANalyzer:EXPected:POWer:GSM850

| | | |
|---|---|---|
| Function | GSM | Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See "Receiver Control" on page 235. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| Query | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Expected Power: +13 dBm |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:EXPECTED:POWER:GSM850 -10" !Sets expected power in GSM850 !band to -10 dBm.` | | |

### RFANalyzer:EXPected:POWer:PCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See "Receiver Control" on page 235. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| Query | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Expected Power: +13 dBm |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PCS -10" !Sets expected power in PCS band !to -10 dBm.` | | |

## RFANalyzer:EXPected:POWer:PGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See "Receiver Control" on page 235. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| Query | | Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Amplitude Offset" on page 90.<br>Resolution: .01 dBm |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Expected Power: +13 dBm |

Programming Example

```
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PGSM -10" !Sets expected power in PGSM
                                                !band to -10 dBm.
```

## RFANalyzer:MANual:BAND

| | | |
|---|---|---|
| Function | GSM | Sets/queries the frequency band that the test set will expect the mobile station to operate on. This setting is used by the test set to map an expected channel (ARFCN) to an uplink frequency. See "Receiver Control" on page 235.<br>The receiver control is set to manual when a manual band is selected. See "RFANalyzer:CONTrol:AUTO" on page 625.<br>The manual band must be set before manual channel will update. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: DCS \| EGSM \| GSM850 \| PCS \| PGSM |
| Query | | Range: DCS \| EGSM \| GSM850 \| PCS \| PGSM |
| *RST setting | | PGSM |

Programming Example

```
OUTPUT 714;"RFANALYZER:MANUAL:BAND DCS" !Sets the band in manual
                                        !receiver control.
```

### RFANalyzer:MANual:CHANnel[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the ARFCN that the mobile station is expected to transmit on for the band selected. The test set will tune to the corresponding uplink frequency for the frequency band currently selected. See "Receiver Control" on page 235.<br>The manual band must be set before the manual channel will update. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Any ARFCN within the currently selected frequency band. |
| Query | | Any ARFCN within the currently selected frequency band. |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Traffic Channel: 30 |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:SELECTED 512" !Configures the test set to !ARFCN 512 if apprpriate.` | | |

### RFANalyzer:MANual:CHANnel:DCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the DCS frequency band. See "Receiver Control" on page 235.<br>The manual band must be set before the manual channel will update. see"RFANalyzer:MANual:BAND" on page 628. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 885<br>Resolution: 1 |
| Query | | Range: 512 to 885<br>Resolution: 1 |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Traffic Channel: 30 |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:DCS 512" !Sets ARFCN for DSC in manual !receiver mode.` | | |

### RFANalyzer:MANual:CHANnel:EGSM

| | | |
|---|---|---|
| Function | GSM | Sets /queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the EGSM frequency band. See "Receiver Control" on page 235<br>The manual band must be set before manual channel will update. See "RFANalyzer:MANual:BAND" on page 628. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 124 and 975 to 1023<br>Resolution: 1 |
| Query | | Range: 0 to 124 and 975 to 1023<br>Resolution: 1 |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Traffic Channel: 30 |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:EGSM 975" !Sets ARFCN for EGSM in manual !receiver mode.` | | |

### RFANalyzer:MANual:CHANnel:GSM850

| | | |
|---|---|---|
| Function | GSM | Sets /queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the GSM850 frequency band. See "Receiver Control" on page 235<br>The manual band must be set before manual channel will update. See "RFANalyzer:MANual:BAND" on page 628. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 128 to 251<br>Resolution: 1 |
| Query | | Range: 128 to 251<br>Resolution: 1 |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Traffic Channel: 30 |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:GSM850 150" !Sets ARFCN for GSM850 in manual !receiver mode.` | | |

### RFANalyzer:MANual:CHANnel:PCS

| | | |
|---|---|---|
| Function | GSM | Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the PCS frequency band. See "Receiver Control" on page 235.<br>The manual band must be set before manual channel will update. See "RFANalyzer:MANual:BAND" on page 628. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 512 to 810<br>Resolution: 1 |
| Query | | Range: 512 to 810<br>Resolution: 1 |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Traffic Channel: 30 |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:PCS 512" !Sets ARFCN for PCS in manual !receiver mode.` | | |

### RFANalyzer:MANual:CHANnel:PGSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the PGSM frequency band. See "Receiver Control" on page 235<br>The manual band must be set before manual channel will update. See "RFANalyzer:MANual:BAND" on page 628. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 124<br>Resolution: 1 |
| Query | | Range: 1 to 124<br>Resolution: 1 |
| *RST setting | | Sets the receiver control to auto<br>Band: PGSM<br>Traffic Channel: 30 |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:PGSM 124" !Sets ARFCN for PGSM in manual !receiver mode.` | | |

## RFANalyzer:MANual:FREQuency

| | | |
|---|---|---|
| Function | GSM | Sets/queries the frequency that the mobile station is expected to transmit on. See "Receiver Control" on page 235.<br>The units (HZ \| KHZ \| MHZ \| GHZ) are optional, if no units are specified then units default to Hz.<br>Setting the manual frequency changes the receiver control to manual. See "RFANalyzer:CONTrol:AUTO" on page 625. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 0.01 Hz |
| Query | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 0.01 Hz |
| *RST setting | | 896 MHz |
| Programming Example<br>`OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 942.6MHZ" !Sets the expected frequency !to 942.6 MHz in manual !receiver mode.` | | |

## RFANalyzer:CONTrol:MEASurement:FREQuency:AUTO

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries whether the test set's receiver is set to automatic (AUTO ON) or manual (AUTO OFF) measurement frequency control. See "Receiver Control" on page 235. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 1 \|ON |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:CONTrol:MEASurement:FREQuency:AUTO OFF"`<br>`!Enables manual control of the measurement receiver's frequency.` | | |

### RFANalyzer:CONTrol:POWer:AUTO

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries 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 235. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 1 \|ON |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:CONTrol:POWer:AUTO OFF"` | | |

### RFANalyzer:CONTrol:UPLink:FREQuency:AUTO

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries 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 235. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 1 \|ON |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:CONTrol:UPLink:FREQuency:AUTO OFF" !The test set's demodulation !receiver is set to manual !uplink frequency control.` | | |

### RFANalyzer:MANual:MEASurement[:MFRequency]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | 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).<br>This command automatically sets the receiver to manual mode and changes the measurement frequency. |
| Setting | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 1 Hz |
| Query | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 1 Hz |
| *RST setting | | 896.000 MHz |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:MANual:MEASurement:MFRequency 942.6 MHZ"`<br>`!Enables manual receiver control and sets the test set's receiver frequency to 942.6 MHz.` | | |

## RFANalyzer:MANual:MEASurement:FREQuency

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | 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<br>Resolution: 1 Hz |
| Query | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 1 Hz |
| *RST setting | | 896.000 MHz |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:MANual:MEASurement:FREQency 942.6 MHZ"`<br>`!Sets the test set's receiver frequency to 942.6 MHz when manual control is used.` | | |

## RFANalyzer:MANual:POWer[:SELected][:SELected]:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries the power level in dBm that the test set's receiver is expecting the mobile station uplink burst to transmit at for the active (that is the selected) format.<br>This command automatically sets the test set to manual mode. see "Receiver Control" on page 235. |
| Setting | | Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see "Amplitude Offset" on page 90.<br>Resolution: 0.01 dBm |
| Query | | Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see "Amplitude Offset" on page 90.<br>Resolution: 0.01 dBm |
| *RST setting | | PGSM, EGSM and GSM850 bands: 13 dBm, DCS and PCS bands: 10 dBm |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:MANual:POWer:BURSt 7" ! Sets the test set expected burst power !level to 7 dBm.` | | |

### RFANalyzer:MANual:POWer:GPRS[:SELected]:BURSt[1|2]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries the burst power level in dBm that the test set's receiver is expecting the mobile station uplink burst to transmit at for the GPRS format. It does this for the GPRS format whether or not that format is active. |
| Setting | | Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see "Amplitude Offset" on page 90. |
| Query | | Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see "Amplitude Offset" on page 90.<br>Resolution: 0.01 dBm |
| *RST setting | | PGSM, EGSM and GSM850 bands: 13 dBm, DCS and PCS bands: 10 dBm |

Programming Example

```
OUTPUT 714;"RFANalyzer:MANual:POWer:GPRS:BURSt 7" ! Sets the test set receiver expected
                                                  !GPRS burst power level to 7 dBm.
```

### RFANalyzer:MANual:UPLink[:MFRequency]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries the test set's demodulation receiver frequency, used to demodulate information from the mobile's reverse channel transmission. |
| Setting | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 1 Hz |
| Query | | Range: 292.5 MHz to 2700 MHz |
| *RST setting | | 896.000 MHz |

Programming Example

```
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.
```

## RFANalyzer:MANual:UPLink:FREQuency

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | 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<br>Resolution: 1 Hz |
| Query | | Range: 292.5 MHz to 2700 MHz<br>Resolution: 1 Hz |
| *RST setting | | 896.000 MHz |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:MANual:UPLink:FREQuency 942.6 MHZ"`<br>`!Sets the test set's demodulation receiver frequency to 942.6 MHz.` | | |

## RFANalyzer:MSLot:MEASurement:BURSt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | Sets/queries the mobile station uplink burst number on which the measurement is performed.<br>The choice is based on the selection table under the multislot selection command, see "CALL:SETup:PDTCH:MSLot:CONFiguration" on page 500.<br>The actual uplink timeslots used in each configuration are fixed as follows:<br>*Multislot Configuration* — *Uplink Timeslots Used*<br>D1U1 — 3<br>D2U1 — 4<br>D2U2 — 3, 4<br>D3U1 — 4<br>D3U2 — 4, 5<br>D4U1 — 5<br>If the CALL:PDTCH \| PDTChannel:MSLot:CONFiguration command is set to D1U1, D2U1 or D3U1, then the measurement burst is set to 1 and any subsequent attempts to set the measurement burst to 2 generates an out of range error (see "CALL:PDTCH:MSLot:CONFiguration" on page 460). |
| Setting | | Range: 1 \|2 |
| Query | | Range: 1 \|2 |
| *RST setting | | 1 |
| Programming Example<br>`OUTPUT 714;"RFANalyzer:MSLot:MEASurement:BURSt 2" !Sets the measurement burst number to !2` | | |

# 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.

### Syntax Diagrams and Command Descriptions

“SETup:AAUDio” on page 639 *GSM Only*

“SETup:BERRor” on page 648 *GSM Only*

“SETup:CONTinuous” on page 638

“SETup:DAUDio” on page 655 *GSM Only*

“SETup:DPOWer” on page 661 *GSM Only*

“SETup:FBERror” on page 668 *GSM Only*

“SETup:GBERror” on page 675 *GPRS Only*

“SETup:IQTuning” on page 679 *GSM Only*

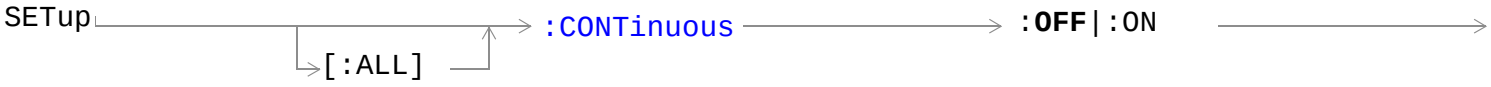
“SETup:ORFSpectrum” on page 696

“SETup:PFERror” on page 722

“SETup:PVTime” on page 745

“SETup:TXPower” on page 767

# SETup:CONTinuous

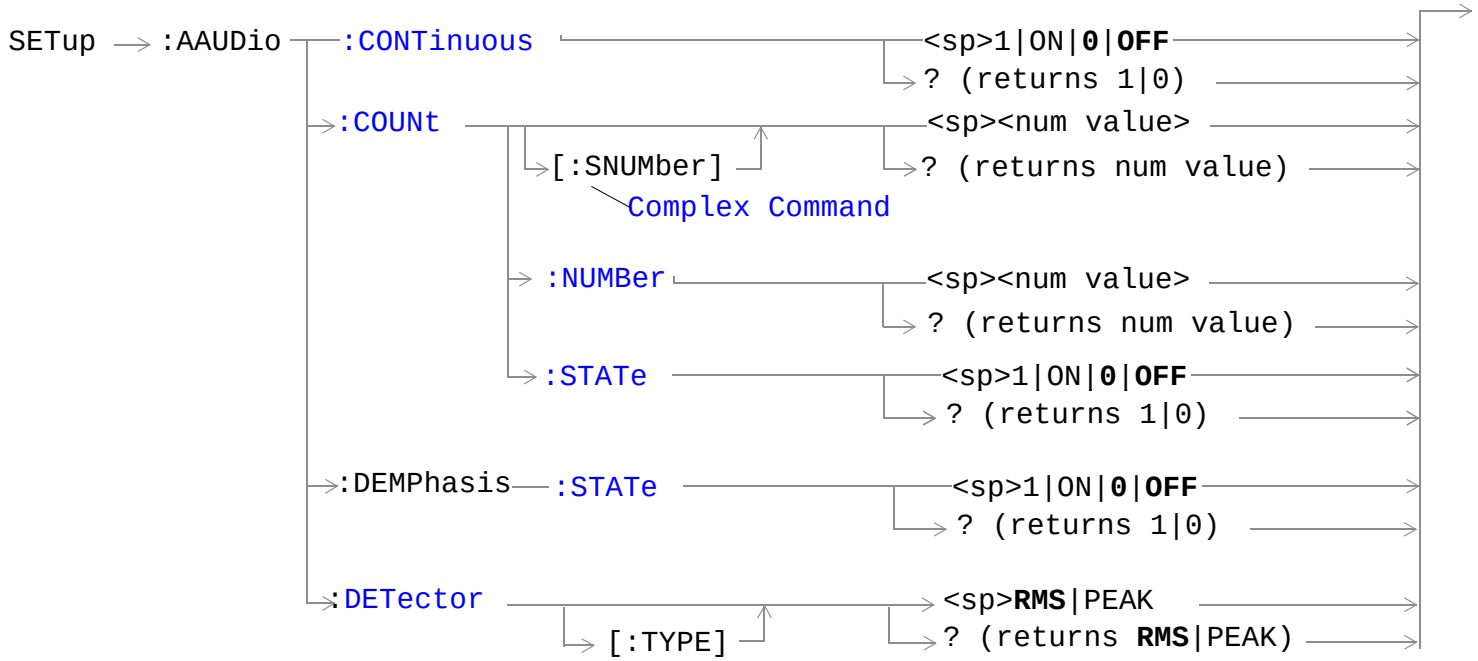



"Diagram Conventions" on page 323

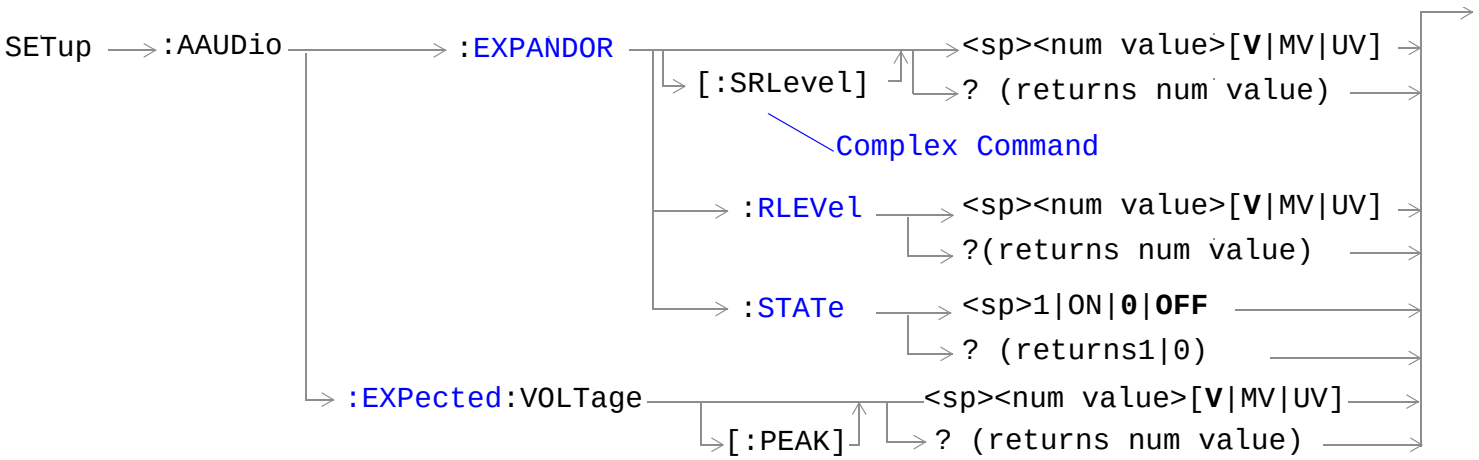
### SETup[:ALL]:CONTinuous

| | | |
|---|---|---|
| Function | GSM | This command sets trigger arm to OFF (single trigger) or ON (continuous trigger) for all measurements. See "Trigger Arm (Single or Continuous) Description" on page 278.<br><br>At power-on and a (manual user) full preset the trigger arm is set to continuous. Partial preset has no effect on the trigger arm state. See "Preset Descriptions" on page 232.<br><br>Remote full preset sets the trigger arm to single, this is the recommended trigger arm for any remote measurements.<br><br>Trigger arm may be set and queried for each individual measurement. For GPIB command syntax, see the measurement's SETup<meas-mnemonic>:CONTinuous command description. (For example, "SETup:PVTime:CONTinuous[:SELected]" on page 747 allows you to set the trigger arm for the Power versus Time measurement.) |
| | GPRS | |
| Setting | | Range:<br>• Continuous trigger = ON<br>• Single trigger = OFF |
| *RST Setting | | Single |
| Programming Example<br>`OUTPUT 714;"SETUP:ALL:CONTINUOUS:OFF" !Sets trigger arm for all measurements`<br>`!to single.` | | |

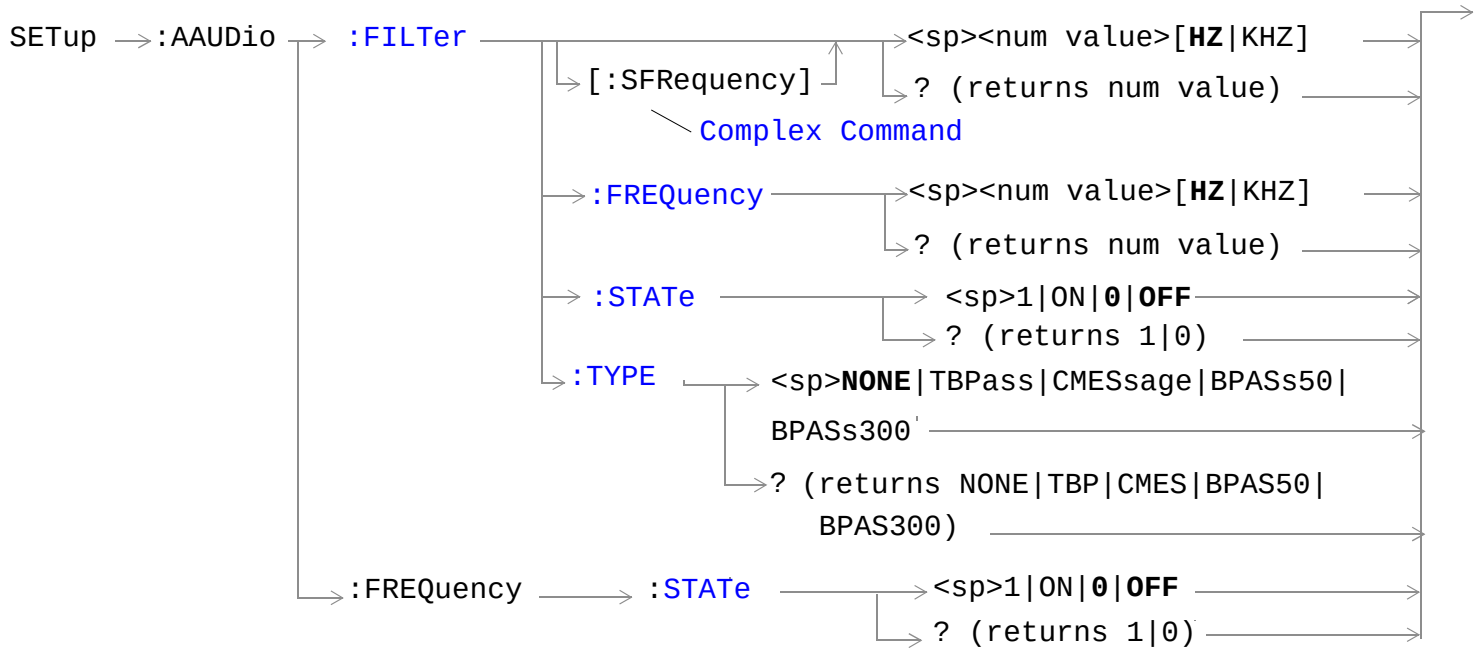
# SETup:AAUDio



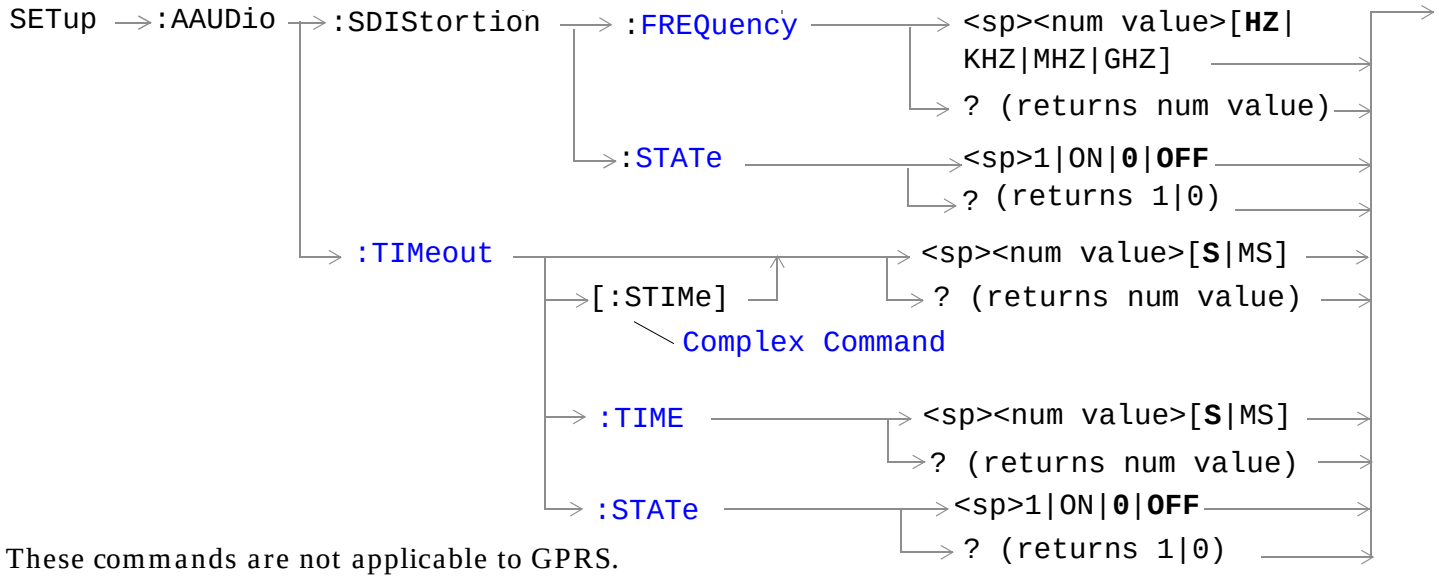

These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

### SETup:AAUDio:CONTinuous

| | | |
|---|---|---|
| Function | GSM | Selects/queries the trigger arm state for Analog Audio measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger arm mode = 1 \| ON<br>• Single trigger arm mode = 0 \| OFF |
| Query | | Range: 0 \| 1 |
| *RST setting | | Single |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:CONTINUOUS OFF" !Selects single trigger mode.` | | |

### SETup:AAUDio:COUNt[:SNUMber]

| | | |
|---|---|---|
| Function | GSM | Selects the number of Analog Audio multi-measurements the test set will make and sets the count state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:COUNT:SNUMBER 5" !Sets the value to 5 and the state to on.` | | |

### SETup:AAUDio:COUNt:NUMBer

| | | |
|---|---|---|
| Function | GSM | Selects/queries the number of Analog Audio measurements the test set will make when the "SETup:AAUDio:COUNt:STATe" is ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST setting | | 10 |

Programming Example

```
OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.
OUTPUT 714;"SETUP:AAUDIO:COUNT:NUMBER 10" !Sets the audio multi-measurement
                                          !count number to 10.
```

### SETup:AAUDio:COUNt:STATe

| | | |
|---|---|---|
| Function | GSM | Selects/queries the Analog Audio multi-measurement count state. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON \| 0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:COUNT:STATE ON" !Turns the analog audio measurement`<br>`!multi-measurement count state on.` | | |

### SETup:AAUDIO:DEMPhasis:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries whether 750 us de-emphasis is enabled. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:DEMPhasis:STATE ON" !Turns the de-emphasis on.` | | |

### SETup:AAUDio:DETector[:TYPE]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the detector type for audio level measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: RMS\|PEAK |
| Query | | Range: RMS\|PEAK |
| *RST setting | | RMS |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:DETECTOR:TYPE PEAK"` | | |

### SETup:AAUDio:EXPANDOR[:SRLevel]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the expandor's reference level and automatically sets the expandor's state to ON. The units (V\|MV\|UV) are optional, if no units are specified then units default to V. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 10 mV to 10 V<br>Resolution: 1 mV |
| Query | | Range: 10 mV to 10 V<br>Resolution: 1 mV |
| *RST setting | | 1 V |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:SRLEVEL 5V"`<br>`!Sets expandor state to on and level to 5 V.` | | |

### SETup:AAUDio:EXPANDOR:RLEVel

| | | |
|---|---|---|
| Function | GSM | Sets/queries the expandor's reference level to be used when the expandor's state is set to ON. The units (V\|MV\|UV) are optional, if no units are specified then units default to V. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 10 mV to 10 V<br>Resolution: 1 mV |
| Query | | Range: 10 mV to 10 V<br>Resolution: 1 mV |
| *RST setting | | 1 V |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:RLEVEL 5V" !Sets expandor reference level to 5 V.` | | |

### SETup:AAUDio:EXPANDOR:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries whether the expandor is enabled. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:STATE ON"` | | |

## SETup:AAUDio:EXPected:VOLTage[:PEAK]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the maximum expected peak voltage (clipping level) of the Analog Audio signal to be measured. The units (V \| MV \| UV) are optional, if no units are specified then units default to V. See "SETup:AAUDio" on page 639. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 10 mV to 20 V peak<br>Resolution: 0.1 mV |
| Query | | Range: 10 mV to 20 V peak<br>Resolution: 0.1 mV |
| *RST setting | | 20 V |

Programming Example

```
OUTPUT 714;"SETUP:AAUDIO:EXPECTED:VOLTAGE 5V" !Sets the clipping level of
                                               !Analog Audio measurements
                                               !to 5 volts.
```

## SETup:AAUDio:FILTer[:SFRequency]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the center frequency for the 100 Hz bandpass filter applied to Analog Audio measurements and sets the state to on. Units (KHZ \| HZ) are optional, if no units are specified then units default to Hz. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 200 Hz to 20.0 kHz<br>Resolution: 0.1 Hz |
| Query | | Range: 200 Hz to 20.0 kHz<br>Resolution: 0.1 Hz |
| *RST setting | | 1000 Hz |

Programming Example

```
OUTPUT 714;"SETUP:AAUDIO:FILTER:SFREQUENCY 1000" !This sets the aaudio filter state
                                                  !to on and sets the bandpass
                                                  !filter frequency to 1 kHz.
```

### SETup:AAUDio:FILTer:FREQuency

| | | |
|---|---|---|
| Function | GSM | Sets/queries the center frequency for the 100 Hz bandpass filter applied to Analog Audio measurements. Units (KHZ \| HZ) are optional, if no units are specified then units default to Hz. See "SETup:AAUDio" on page 639. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 200 Hz to 20.0 kHz<br>Resolution: 0.1 Hz |
| Query | | Range: 200 Hz to 20.0 kHz<br>Resolution: 0.1 Hz |
| *RST setting | | 1000 Hz |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:FILTER:FREQUENCY 217HZ" !Set aaudio bandpass filter to 217 hz.` | | |

### SETup:AAUDio:FILTer:STATe

| | | |
|---|---|---|
| Function | GSM | Selects/queries the state of the Analog Audio bandpass filter. see "SETup:AAUDio" on page 639 |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON \|0 \|OFF |
| Query | | Range: 1 \| 0 |
| *RST setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:FILTER:STATE ON" !Sets filter state on.` | | |

### SETup:AAUDio:FILTer:TYPE

| | | |
|---|---|---|
| Function | GSM | Sets/queries the filter type for audio measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: NONE \| TBPass \| CMESsage \| BPASs50 \| BPASs300 |
| Query | | Range: NONE \| TBP \| CMES \| BPAS50 \| BPAS300 |
| *RST setting | | NONE |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:FILTER:TYPE BPASS50"`<br>`!Selects the 50 Hz to 15 kHz bandpass filter.` | | |

### SETup:AAUDio:FREQuency:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries whether the audio frequency measurement is enabled. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:FREQUENCY:STATE ON"` | | |

### SETup:AAUDio:SDIStortion:FREQuency

| | | |
|---|---|---|
| Function | GSM | Sets/queries the fundamental frequency setting for the SINAD/distortion measurement. Units (KHZ\|HZ) are optional, if no units are specified then units default to Hz. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 100.0 to 10000 Hz<br>Resolution: 0.1 Hz |
| Query | | Range: 100.0 to 10000 Hz<br>Resolution: 0.1 Hz |
| *RST setting | | 1000 Hz |
| Programming Example<br>`10 OUTPUT 714;SETUP:AAUDIO:SDISTORTION:FREQUENCY 300HZ"` | | |

### SETup:AAUDio:SDIStortion:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries whether the SINAD/distortion measurement is enabled. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|0N\|0\|OFF |
| Query | | Range: 1\|0 |
| *RST setting | | 0 (off) |
| Programming Example<br>`10 OUTPUT 714;SETUP:AAUDIO:SDISTORTION:STATE ON"` | | |

### SETup:AAUDio:TIMEout[:STIME]

| | | |
|---|---|---|
| Function | GSM | Selects/queries the timeout value in seconds that will be used for Analog Audio measurements and sets the timeout state to ON. Units (S \| MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STIME 3" !Sets the timeout !state to on and sets the !timeout value.` | | |

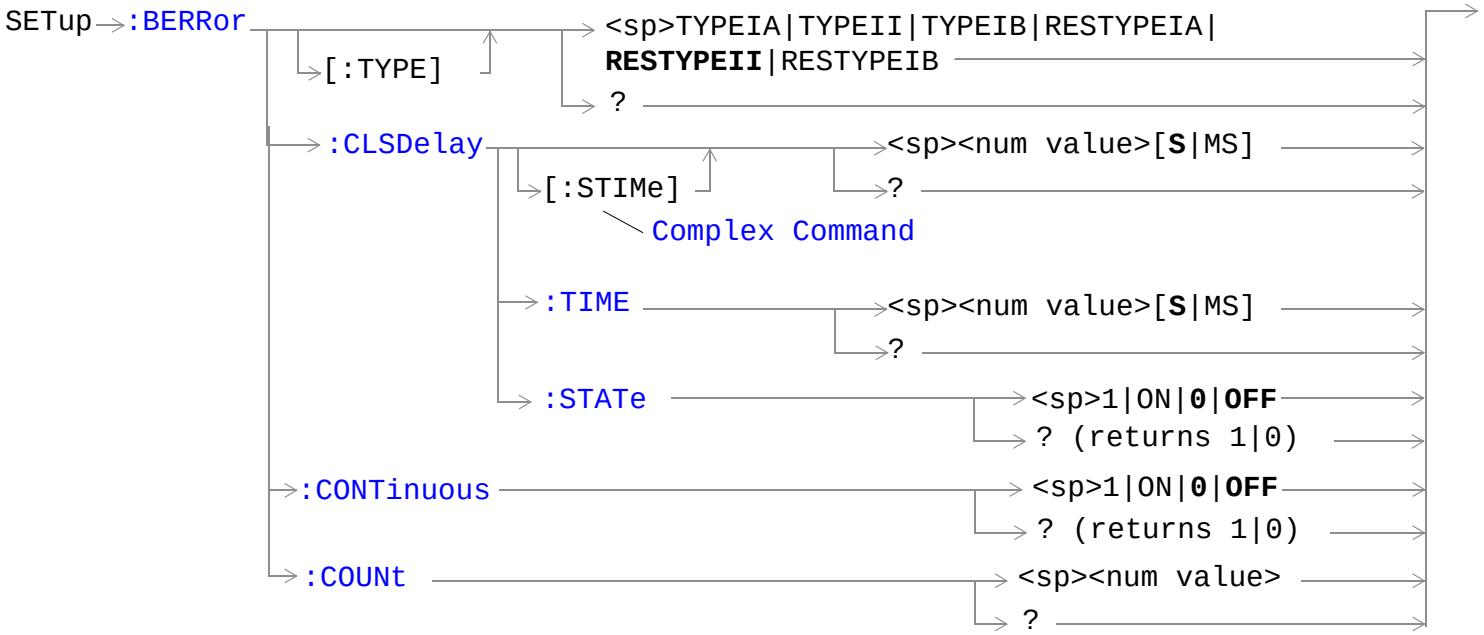
### SETup:AAUDio:TIMEout:STATe

| | | |
|---|---|---|
| Function | GSM | Selects/queries the Analog Audio measurement timeout state. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.` | | |

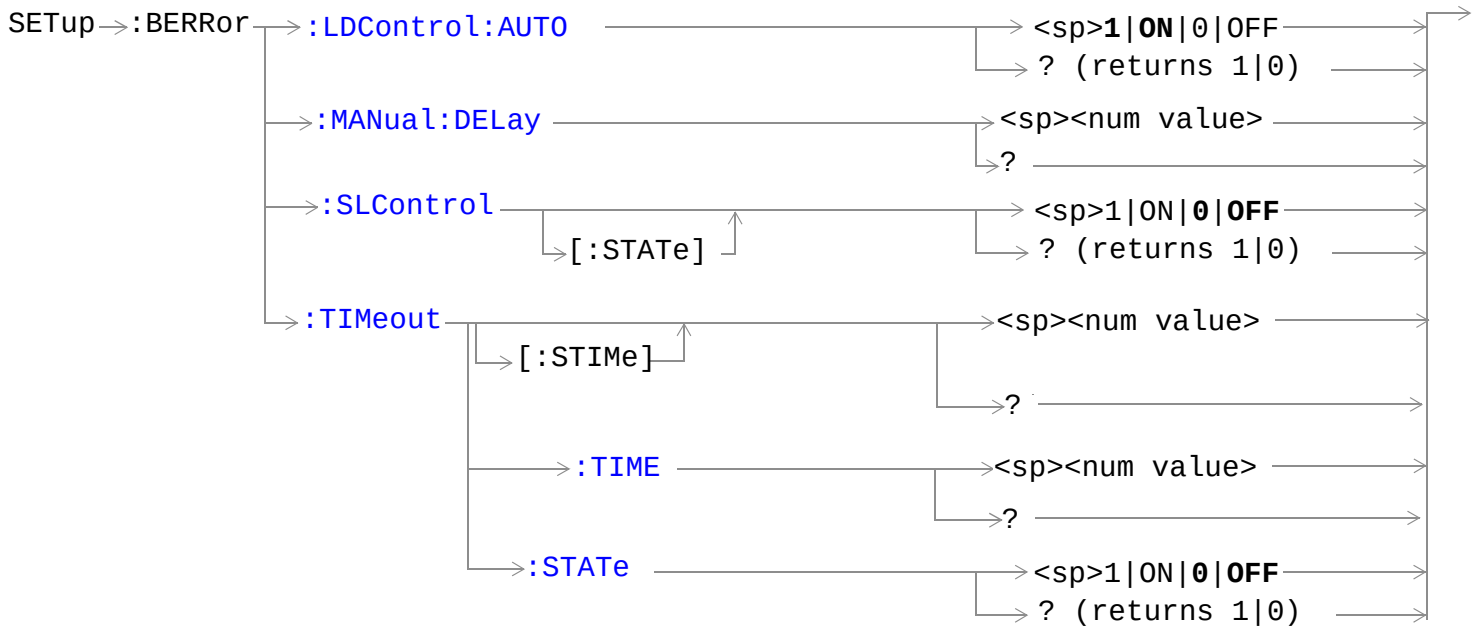
### SETup:AAUDio:TIMEout:TIME

| | | |
|---|---|---|
| Function | GSM | Selects/queries the timeout value in seconds that will be used for Analog Audio measurements when the timeout state is ON. Unit (S \| MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:TIME 5" !Sets timeout value to 5 seconds.` | | |

# SETup:BERRor




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

### SETup:BERRor:CLSDelay[:STIMe]

| | | |
|---|---|---|
| Function | GSM | Selects/queries the closed loop signalling delay time in seconds for Bit Error measurements and sets the delay state to ON. The units (S \| MS) are optional, if no units are specified than units default to S.<br>The delay time defines how long the test set should wait before starting a BERR measurement. The downlink signalling operation must be completed and the test set must send a close loop command to the MS before the measurement can begin. The delay time allows time for the loop to close.<br>When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| Query | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| *RST Setting | | 500 ms |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:CLSDELAY:STIME 400 MS" ! Set state to on`<br>`! and delay time` | | |

### SETup:BERRor:CLSDelay:TIME

| | | |
|---|---|---|
| Function | GSM | Selects/queries the closed loop signalling delay time in seconds for Bit Error measurements. The units (S \| MS) are optional, if no units are specified than units default to S.<br>The delay time defines how long the test set should wait before starting a BERR measurement. The downlink signalling operation must be completed and the test set must send a close loop command to the MS before the measurement can begin. The delay time allows time for the loop to close.<br>When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| Query | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| *RST Setting | | 500 ms |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:CLSDELAY:TIME 600MS" ! Set delay time` | | |

## SETup:BERRor:CLSDelay:STATe

| | | |
|---|---|---|
| Function | GSM | Selects/queries the closed loop signalling delay state for Bit Error measurements. If the state is off the test set will not wait to start a BERR measurement after a downlink signalling operation has completed.<br>The delay time defines how long the test set should wait before starting and BERR measurement after a downlink signalling operation has completed and after the test set has sent a close loop command to the MS.<br>When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:CLSDELAY:STATE ON"` | | |

## SETup:BERRor[:TYPE]

| | | |
|---|---|---|
| Function | GSM | Sets the measurement type for BER measurements including Type A (residual) and Type B (non-residual). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>TYPEIA \| TYPEII \|TYPEIB \| RESTYPEIA \| RESTYPEII \| RESTYPEIB |
| Query | | Range:<br>TYPEIA \| TYPEII \|TYPEIB \| RESTYPEIA \| RESTYPEII \| RESTYPEIB |
| *RST Setting | | RESTYPEII |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:TYPE TYPEIA" !Sets type of BER measurement.` | | |

### SETup:BERRor:CONTinuous

| | | |
|---|---|---|
| Function | GSM | Sets/queries the trigger state to single trigger mode or continuous trigger mode for BER measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETup:BERROR:CONTINUOUS OFF" !Sets BER measurement to single trigger mode.` | | |

### SETup:BERRor:COUNt

| | | |
|---|---|---|
| Function | GSM | Sets/queries the number of BER measurements the test set will make when the count state is on |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999,000<br>Resolution: 1 |
| Query | | Range: 1 to 999,000<br>Resolution: 1 |
| *RST Setting | | 10,000 |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:COUNT 880" !Set BER multi-measurement count !to 880.` | | |

## SETup:BERRor:LDControl:AUTO

| | | |
|---|---|---|
| Function | GSM | Sets/queries speech frames delay control mode. If speech frames delay control mode is automatic (Auto), the test set will determine the frame delay value that will allow correlation between uplink information bits with downlink information bits.<br>If speech frames delay control mode is manual (not Auto), the test set will use the frame delay value entered in the Speech Frames Delay field. Refer to. see"SETup:BERRor:MANual:DELay" on page 652<br>Refer also to the "Bit Error Measurement Description" on page 41 for a description of frame delay and its use in the BER measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | 0 \| 1 |
| *RST Setting | | 1 (automatic) |
| Related Topics | | "SETup:BERRor:MANual:DELay" on page 652 |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:LDCONTROL:AUTO OFF" !sets BER delay to manual the user`<br>`!must select the manual frame`<br>`!delay number.` | | |

## SETup:BERRor:MANual:DELay

| | | |
|---|---|---|
| Function | GSM | Sets/queries the number of frames the test set will use to correlate uplink information bits with downlink information bits when loop delay control mode is manual (AUTO OFF). To set the delay mode to manual, refer to "SETup:BERRor:LDControl:AUTO" on page 652.<br>This value is displayed in the Speech Frames Delay field when Auto is not displayed. (If you want to display this value and Auto is currently displayed, press the front-panel key labeled **OFF**).<br>Refer to "Bit Error Measurement Description" on page 41 for a description of frame delay and how it is used in this measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 15<br>Resolution : 1 |
| Query | | Range: 1 to 15<br>Resolution : 1 |
| *RST Setting | | 5 |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:MANUAL:DELAY 4" !Set delay of 4 speech frames.` | | |

### SETup:BERRor:SLControl[:STATe]

| | | |
|---|---|---|
| Function | GSM | Selects/queries the Signalling loopback control state for an BER measurement.<br>When signalling loopback control is set to on, the test set will automatically send the loopback for Type A (residual) or Type B (non-residual) loopback to the MS, based on the measurement type selected, and then set loopback to off when the measurement is complete.<br>The loopback type is controlled manually using **Mobile Loopback** (**F12**) on **Call Parms** menu **1 of 4**. See "CALL:TCHannel:LOOPback" on page 515 for a programming example and details about the command. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:BERROR:SLCONTROL ON" ! Test set will send`<br>`! loopback type automatically` | | |

### SETup:BERRor:TIMeout[:STIMe]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the timeout value in seconds for the trigger state during BER measurements and turns the timeout state on. The units (S \| MS) are optional, if no units are specified than units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999<br>Resolution: 0.1 |
| Query | | Range: 0.1 to 999<br>Resolution: 0.1 |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:BERR:TIMEOUT:STIME 8" !Sets BER measurement timeout to`<br>`!8 seconds and the state to on.` | | |

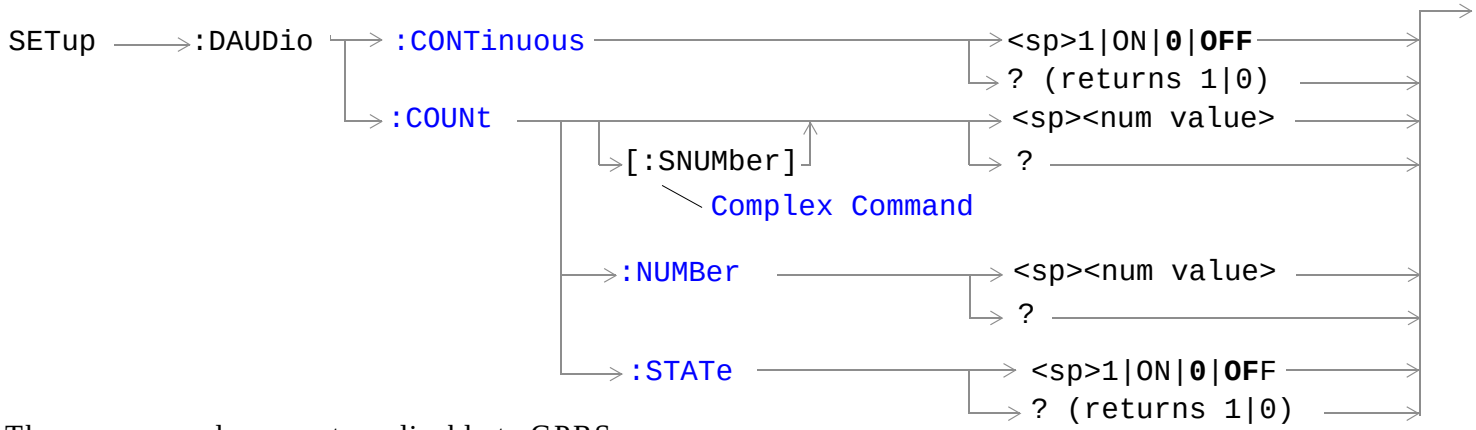
## SETup:BERRor:TIMeout:TIME

| | | |
|---|---|---|
| Function | GSM | Sets/queries the timeout value in seconds for the trigger state during BER measurements. The units (S \| MS) are optional, if no units are specified than units default to S (seconds). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999<br>Resolution: 0.1 |
| Query | | Range: 0.1 to 999<br>Resolution: 0.1 |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:BERR:TIMEOUT:TIME 8" !Sets BER measurement timeout to !8 seconds.` | | |

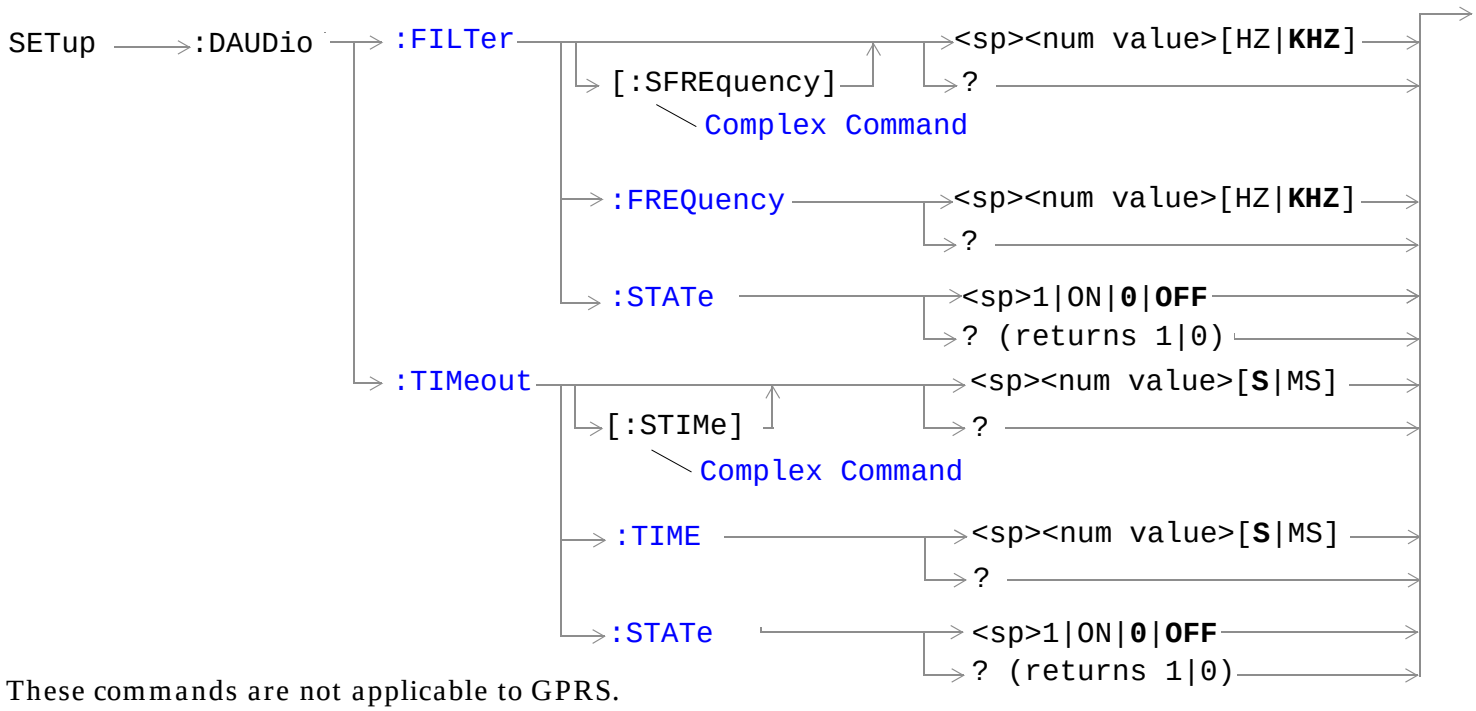
## SETup:BERRor:TIMeout:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries the timeout state for BER measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:BERR0R:TIMEOUT:STATE ON" !Sets the timeout state to on.` | | |

# SETup:DAUDio




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## SETup:DAUDio:CONTinuous

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger state for Decoded Audio measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous = 1\|ON<br>• Single = 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 0 (single) |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:CONTINUOUS OFF" !Set DAUDIO measurement to single`<br>`!trigger mode.` | | |

## SETup:DAUDio:COUNt[:SNUMber]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the number of Decoded Audio multi-measurements the Test Set will make. This command sets the count state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:COUNT:SNUMBER 10" !Sets the value to 10 and the state`<br>`!to on.` | | |

### SETup:DAUDio:COUNt:NUMBer

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the number of Decoded Audio measurements the test set will make when the multi-measurement count state is on. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |

Programming Example

```
OUTPUT 714;"SETUP:DAUDIO:COUNT:NUMBER 25" !Sets the number of DAUDIO
                                          !measurements that will be made.
```

### SETup:DAUDio:COUNt:STATe

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the Decoded Audio multi-measurement count state. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON \| 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 0 (off) |

Programming Example

```
OUTPUT 714;"SETUP:DAUDIO:COUNT:STATE OFF" !Sets trigger state for
                                          !DAUDIO measurement.
```

## SETup:DAUDio:FILTer [:SFREquency]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. This command sets the count state to ON. The units (HZ\|KHZ) are optional, if no units are specified then units default to KHZ. see "Decoded Audio Measurement Description" on page 50 |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 200 Hz to 3.6 kHz<br>Resolution: 1 Hz |
| Query | | Range: 200 Hz to 3.6 kHz<br>Resolution: 1 Hz |
| *RST Setting | | 1000 Hz |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:FILTER:SFREQUENCY 2.2KHZ" !This is a complex command`<br>`!that sets the value and the`<br>`!state to on.` | | |

## SETup:DAUDio:FILTer:FREQuency

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. The units (HZ\|KHZ) are optional, if no units are specified then units default to KHZ. see "Decoded Audio Measurement Description" on page 50 |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 200 Hz to 3.6 kHz<br>Resolution: 1 Hz |
| Query | | Range: 200 Hz to 3.6 kHz<br>Resolution: 1 Hz |
| *RST Setting | | 1000 Hz |
| Programming Example<br>`OUTPUT 714;"DAUDIO:FILTER:FREQUENCY 217HZ" !Sets bandpass filter frequency.` | | |

### SETup:DAUDio:FILTer:STATe

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the Decoded Audio bandpass filter state. see "Decoded Audio Measurement Description" on page 50 |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON \|0\|OFF |
| Query | | Range: 1\|0 |
| Programming Example<br>`OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.` | | |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:FILTER:STATE OFF" !Sets bandpass filter state to off.` | | |

### SETup:DAUDio:TIMeout[:STIMe]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeout value in seconds that will be used for Decoded Audio measurements. This command sets the timeout state to ON. The units (S\|MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999<br>Resolution: 0.1 |
| Query | | Range: 0.1 to 999<br>Resolution: 0.1 |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STIME 6" !Sets the value to 6 seconds and the !state to on.` | | |

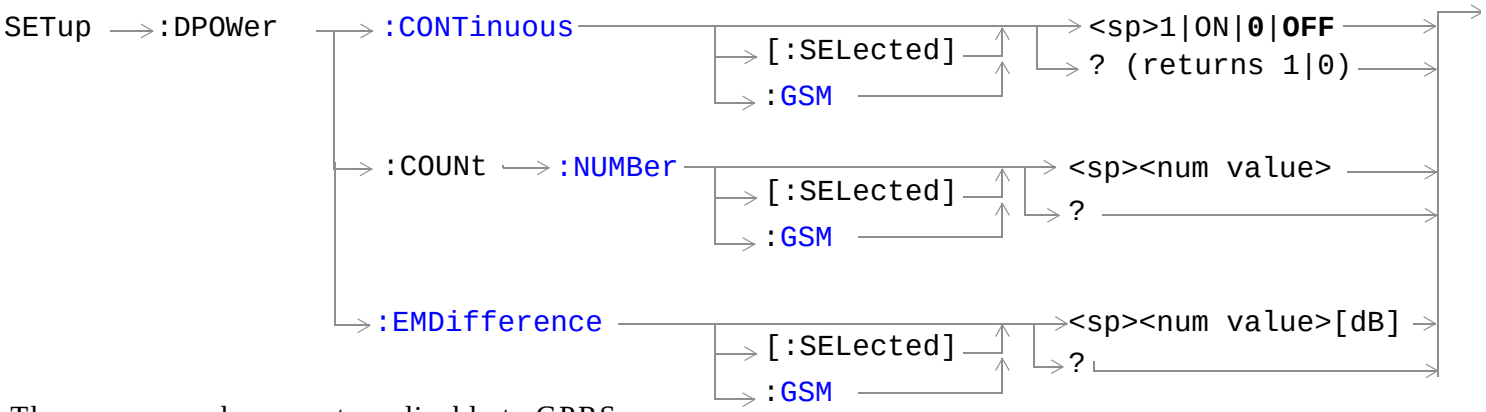
## SETup:DAUDio:TIMeout:TIME

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeout value used for Decoded Audio measurements when the timeout state is ON. The units (S\|MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:TIME 15" !Sets timeout value to 15 seconds.` | | |

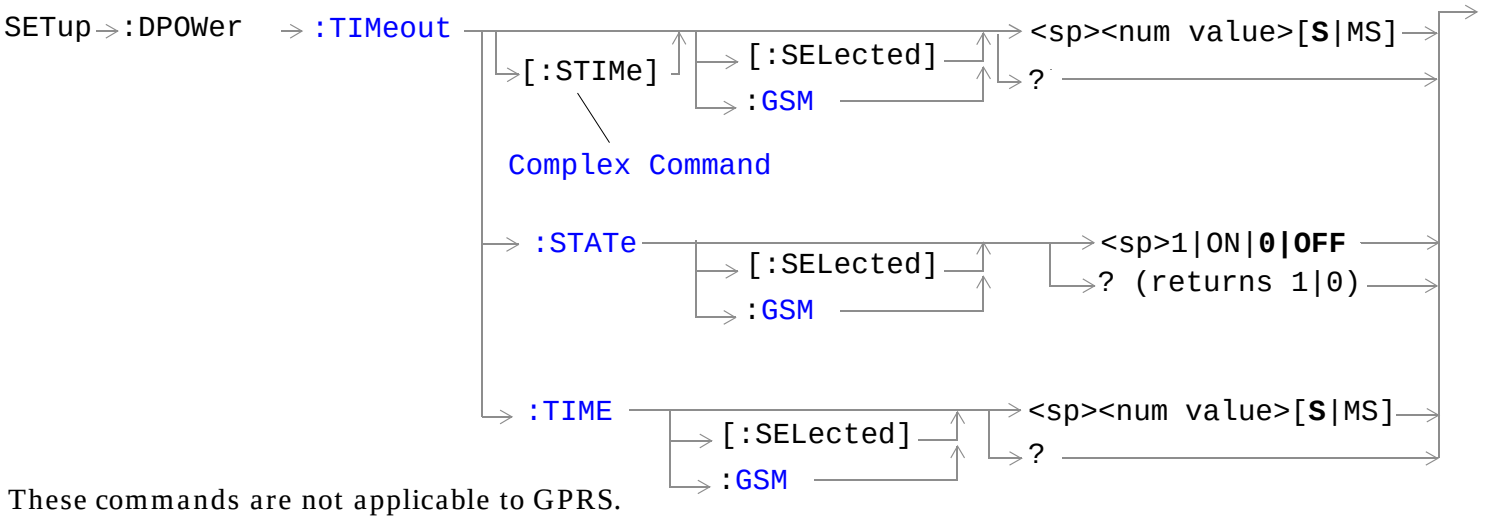
## SETup:DAUDio:TIMeout:STATe

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the Decoded Audio measurement timeout state. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1\|ON \| 0\|Off |
| Query | | Range: 1\|0 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.` | | |

# SETup:DPOWer




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

### SETup:DPOWer:CONTinuous[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger state for Dynamic Power measurements in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger mode: 1\|ON<br>• Single trigger mode: 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:CONTINUOUS:SELECTED ON" !Sets trigger mode to Continuous.` | | |

### SETup:DPOWer:CONTinuous:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger state for Dynamic Power measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger mode: 1\|ON<br>• Single trigger mode: 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:CONTINUOUS:GSM ON" !Sets trigger mode to Continuous.` | | |

### SETup:DPOWer:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of bursts for the Dynamic Power measurement in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER:SELECTED 25" !Sets the number of measurement bursts.` | | |

### SETup:DPOWer:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of bursts for the Dynamic Power measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER:GSM 50" !Sets the number of measurement bursts.` | | |

## SETup:DPOWer:EMDifference[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement in the active (that is the selected) format. The units dB are optional.<br>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.<br>The setting of this parameter does not affect the receiver Expected Power parameter. See "RFANalyzer:EXPected:POWer[:SELected]" on page 625. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -30 dB to +30 dB<br>Resolution: 0.01 dB |
| Query | | Range: -30 dB to +30 dB<br>Resolution: 0.01 dB |

Programming Example

```
OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE:SELECTED 20" !Sets the Expected Maximum Difference
                                                   !in measurement value.
```

### SETup:DPOWer:EMDifference:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement in the GSM format whether or not that format is active. The units dB are optional.<br>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.<br>The setting of this parameter does not affect the receiver Expected Power parameter. See "RFANalyzer:EXPected:POWer[:SELected]" on page 625. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -30 dB to +30 dB<br>Resolution: 0.01 dB |
| Query | | Range: -30 dB to +30 dB<br>Resolution: 0.01 dB |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE:GSM 10" !Sets the Expected Maximum Difference !in measurement value.` | | |

### SETup:DPOWer:TIMeout[:STIMe][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Dynamic Power measurement timeout value in seconds and sets the time-out state to on for the active (that is the selected) format. The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME:SELECTED 12S" !Sets the timeout state and value.` | | |

### SETup:DPOWer:TIMeout[:STIMe]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the Dynamic Power measurement timeout value in seconds and sets the time-out state to on for the GSM format whether or not that format is active. The units (S\|MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME:GSM 20" !Sets the timeout state and value.` | | |

### SETup:DPOWer:TIMeout:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time-out state for the Dynamic Power measurement in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF\|1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STATE:SELECTED ON" !Sets the timeout state.` | | |

### SETup:DPOWer:TIMeout:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time-out state for the Dynamic Power measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF\|1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STATE:GSM ON" !Sets the timeout state.` | | |

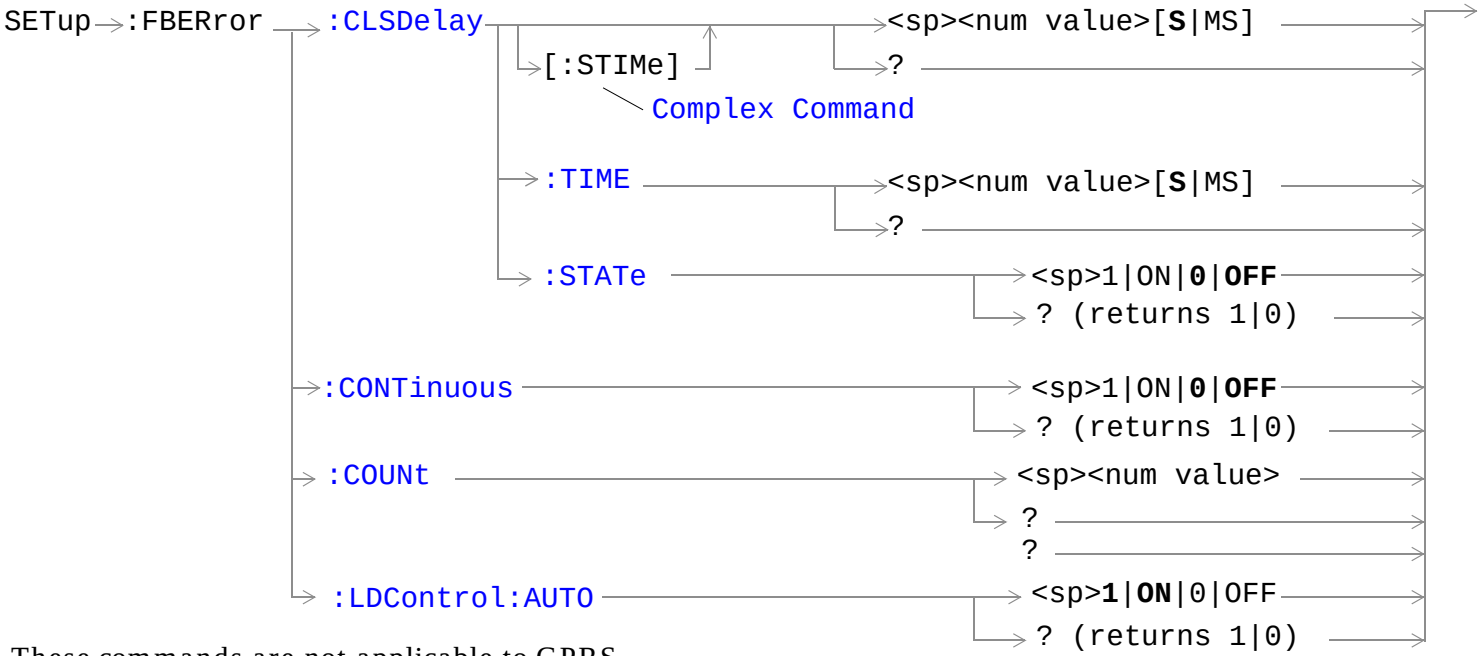
### SETup:DPOWer:TIMeout:TIMe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time-out value in seconds that is used for the Dynamic Power measurement for the active (that is the selected) format. The time-out state must be ON. The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME:SELECTED 15" !Sets the timeout value.` | | |

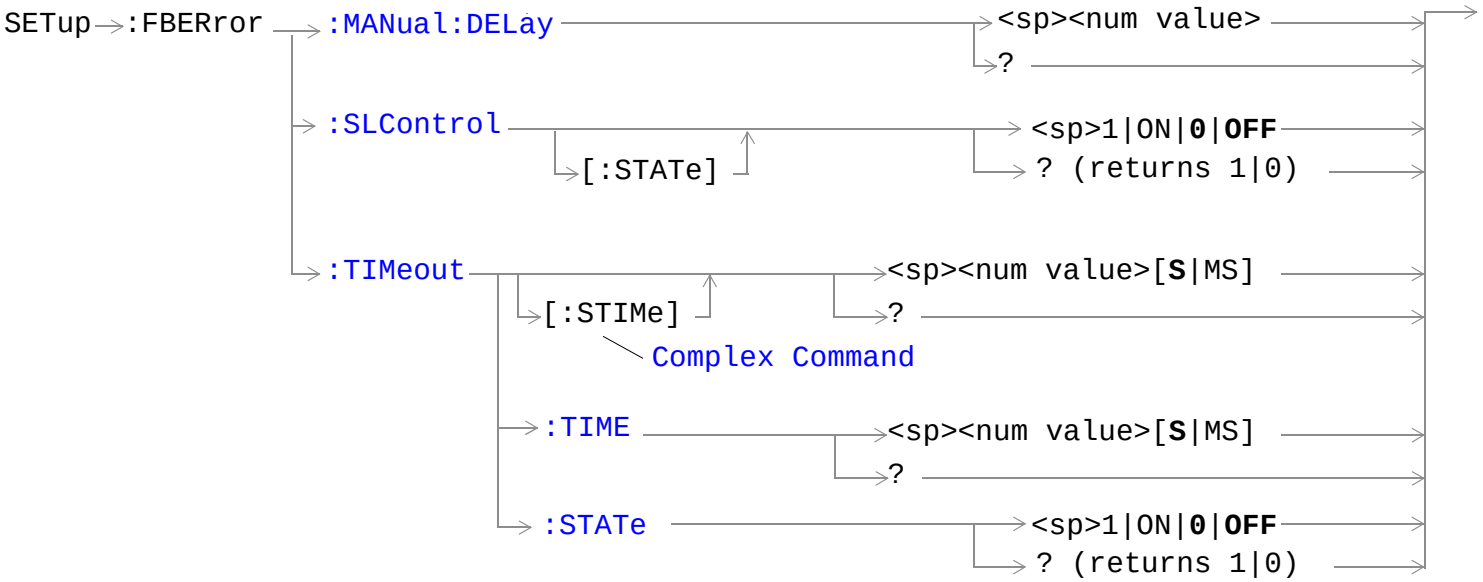
### SETup:DPOWer:TIMeout:TIMe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time-out value in seconds that is used for the Dynamic Power measurements when the time-out state is ON for the GSM format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME:GSM 10S" !Sets the timeout value.` | | |

# SETup:FBERror




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## SETup:FBERror:CLSDelay[:STIMe]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the closed loop signalling delay time in seconds for Fast Bit Error measurements and sets the delay state to ON. The units (S \| MS) are optional, if no units are specified than units default to S.<br>The delay time defines how long the test set should wait before starting a FBER measurement. The downlink signalling operation must be completed and the test set must send a close loop command to the MS before the measurement can begin. The delay time allows time for the loop to close.<br>When a close loop message is set to the MS the closed loop signalling delay time will hold off the FBER measurement from starting for the specified time period. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| Query | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| *RST Setting | | 500 ms |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay`<br>`! to 500 ms.` | | |

## SETup:FBERror:CLSDelay:TIME

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the closed loop signalling delay time in seconds for Fast Bit Error measurements. The units (S \| MS) are optional, if no units are specified than units default to S.<br>The delay time defines how long the test set should wait before starting a FBER measurement. The downlink signalling operation must be completed and the test set must send a close loop command to the MS before the measurement can begin. The delay time allows time for the loop to close.<br>When a close loop message is set to the MS the closed loop signalling delay time will hold off the FBER measurement from starting for the specified time period. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 5 seconds<br>Resolution: 100 ms |
| Query | | Range: 0 to 5 seconds<br>Resolution: 100ms |
| *RST Setting | | 500 ms |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:CLSDELAY:TIME 500 MS" ! Sets the Close Loop Delay`<br>`! to 500 ms.` | | |

## SETup:FBERror:CLSDelay:STATe

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the closed loop signalling delay state for Fast Bit Error measurements. If the state is off the test set will not wait to start a FBER measurement after a downlink signalling operation has completed.<br>The delay time defines how long the test set should wait before starting and FBER measurement after a downlink signalling operation has completed and after the test set has sent a close loop command to the MS.<br>When a close loop message is set to the MS the closed loop signalling delay time will hold off the FBER measurement from starting for the specified time period. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STATE ON" ! Sets the Close Loop Delay`<br>`! state to on.` | | |

## SETup:FBERror:CONTinous

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger state for Fast Bit Error Rate tests. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger mode = 1 \| ON<br>• Single trigger mode = 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 0 (single) |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:CONTINUOUS 0" !Specifies single trigger mode for Fast`<br>`!BER measurements.` | | |

### SETup:FBERror:COUNt

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of bits to test during each Fast Bit Error Rate test. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999,000<br>Resolution: 1 |
| Query | | Range: 1 to 999,000<br>Resolution: 1 |
| *RST Setting | | 10,000 |
| Comments | | The actual number of bits that are tested will be determined by the number of frames tested, and will be at least as great as this count |
| Programming Example<br>`OUTPUT 714;''SETUP:FBERROR:COUNT 10000" !Specifies the number of Fast BER bits`<br>`!to test at 10,000 bits.` | | |

### SETup:FBERror:LDControl:AUTO

| | | |
|---|---|---|
| Function | GSM | This command sets/queries loopback delay control mode. If loopback control mode is automatic (auto on), the test set will determine the frame delay value that will allow correlation between uplink information bits with downlink information bits. .<br>If loopback delay control mode is manual (auto off) , the test set will use the frame delay value entered in the TDMA Frames Delay field. Refer to "SETup:FBERror:MANual:DELay" on page 672 .<br>Refer also to the "Fast Bit Error Measurement Description" on page 55 for a description of frame delay and its use in the fast bit error rate measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 1 (automatic) |
| Related Topics | | see "SETup:FBERror:MANual:DELay" on page 672 |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:LDCONTROL OFF" !Set delay control to manual the user`<br>`!must select the manual frame`<br>`!delay number.` | | |

## SETup:FBERror:MANual:DELay

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of frames the test set will use to correlate uplink information bits with downlink information bits when loopback delay control mode is manual (auto off). To set the loopback delay mode to manual, refer to "SETup:FBERror:LDControl:AUTO" on page 671.<br>This value is displayed in the TDMA Frames Delay field when Auto is not displayed. (If you want to display this value and Auto is currently displayed, press the front panel key labeled MANUAL).<br>Refer to "Fast Bit Error Measurement Description" on page 55 for a description of frame delay and how it is used in this measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 26<br>Resolution: 1 |
| Query | | Range: 0 to 26<br>Resolution: 1 |
| *RST Setting | | 5 (loopback delay control is reset to automatic (auto on)). |
| Related Topics | | See "SETup:FBERror:LDControl:AUTO" on page 671. |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:MANUAL:DELAY 6" !Set frame delay to 6 frames.` | | |

### SETup:FBERror:SLControl[:STATe]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the Signalling loopback control state for an FBER measurement.<br>When the state is set to on, the test set will automatically send the command for Type C (burst-by-burst) loopback to the MS when a FBER measurement is activated, and then set loopback to off when the measurement is complete.<br>The loopback type is controlled manually from the Mobile Loopback F12 key, see "CALL:TCHannel:LOOPback" on page 515 for a program example and details about the command. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 \| ON \| 0 \| OFF |
| Query | | Range: 1 \| 0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:SLCONTROL ON" ! Sets the Signal Loop Control state to on.` | | |

### SETup:FBERror:TIMeout[:STIMe]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeout value in seconds for the trigger state during Fast Bit Error measurements and sets the timeout state to ON. The units (S \| MS) are optional, if no units are specified than units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STIME 20" !Sets the timeout value to`<br>`!20 seconds and the state to on.` | | |

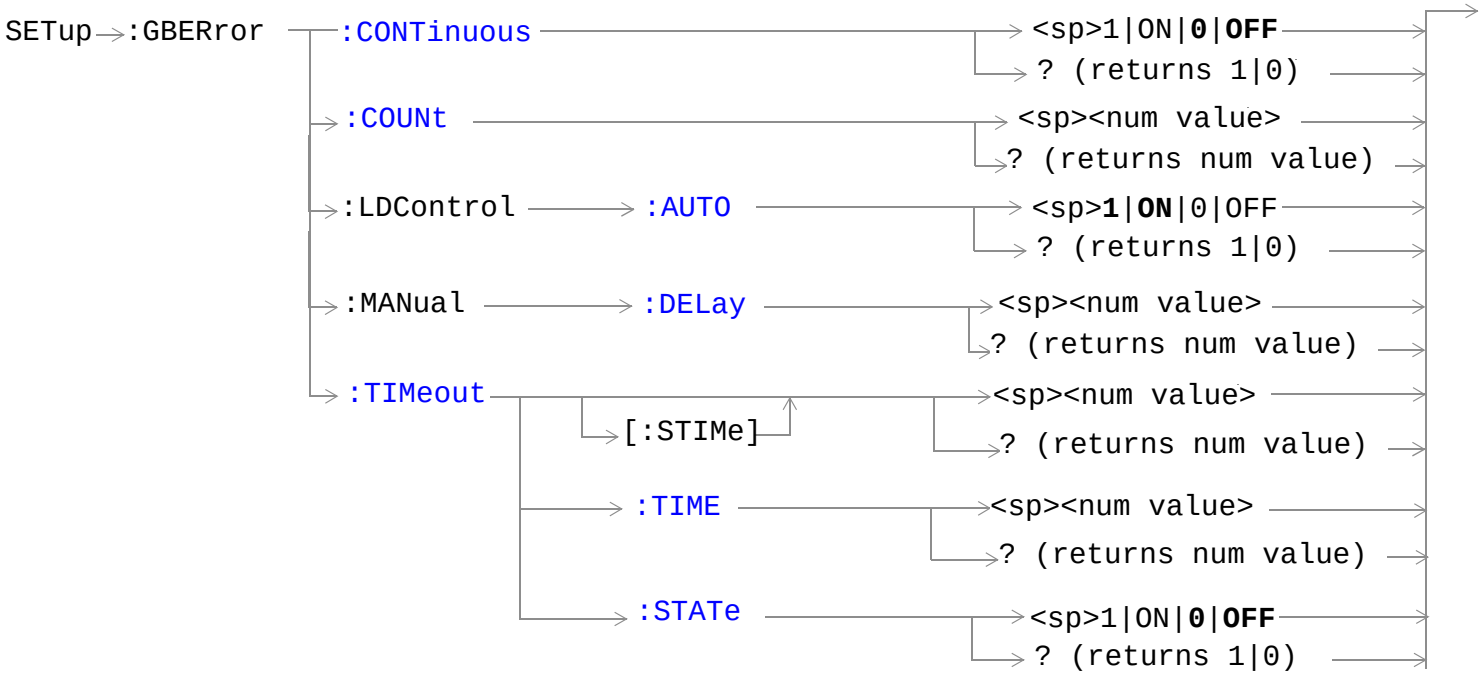
## SETup:FBERror:TIMeout:TIME

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeout value in seconds for the trigger state during Fast Bit Error measurements. The units (S \| MS) are optional, if no units are specified than units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:TIMEOUT:TIME 20" !Sets the timeout value to !20 seconds.` | | |

## SETup:FBERror:TIMeout:STATe

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout state for Fast BER measurements. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STATE ON" !Sets the timeout state to on.` | | |

# SETup:GBERror




These commands are not applicable to GSM.

"Diagram Conventions" on page 323

### SETup:GBERror:CONTinuous

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger state to single trigger mode or continuous trigger mode for the BER measurement. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:CONTinous OFF" !Sets BER measurement to single trigger mode.` | | |

## SETup:GBERror:COUNt

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of bits to measure when the count state is ON. |
| Setting | | Range: 1 to 999,000<br>Resolution: 1 |
| Query | | Range: 1 to 999,000<br>Resolution: 1 |
| *RST Setting | | 10,000 |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:COUNt 880" !Sets the number of bits to measure to 880.` | | |

## SETup:GBERror:LDControl:AUTO

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the loopback delay control mode.<br>If loopback delay control mode is automatic (ON), the test set determines the block delay value that allows the correlation between uplink and downlink data.<br>If loopback delay control mode is manual (OFF), the test set uses the block delay you specify using "SETup:GBERror:MANual:DELay" on page 677.<br>Refer to "How is a Bit Error (BER) Measurement Made?" on page 45 for a description of block delay and its use in the BER measurement. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:LDControl:AUTO OFF" !Sets the loopback delay control mode !to manual.` | | |

### SETup:GBERror:MANual:DELay

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the block delay when loopback delay control mode is manual. To set the delay mode to manual, refer to "SETup:GBERror:LDControl:AUTO" on page 676.<br>Refer to "GPRS Bit Error Measurement" on page 45 for a description of block delay and how it is used in this measurement. |
| Setting | | Range: 1 to 6<br>Resolution : 1 |
| Query | | Range: 1 to 6<br>Resolution : 1 |
| *RST Setting | | 2 |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:MANual:DELay 6" !Sets the number of blocks to 6.` | | |

### SETup:GBERror:TIMeout[:STIMe]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds for the trigger state during BER measurements and turns the timeout state on. The units (S \| MS) are optional, if no units are specified than units default to S. |
| Setting | | Range: 0.1 to 999<br>Resolution: 0.1 |
| Query | | Range: 0.1 to 999<br>Resolution: 0.1 |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:TIMeout:STIMe 12" !Sets BER measurement timeout to`<br>`!12 seconds and the state to on.` | | |

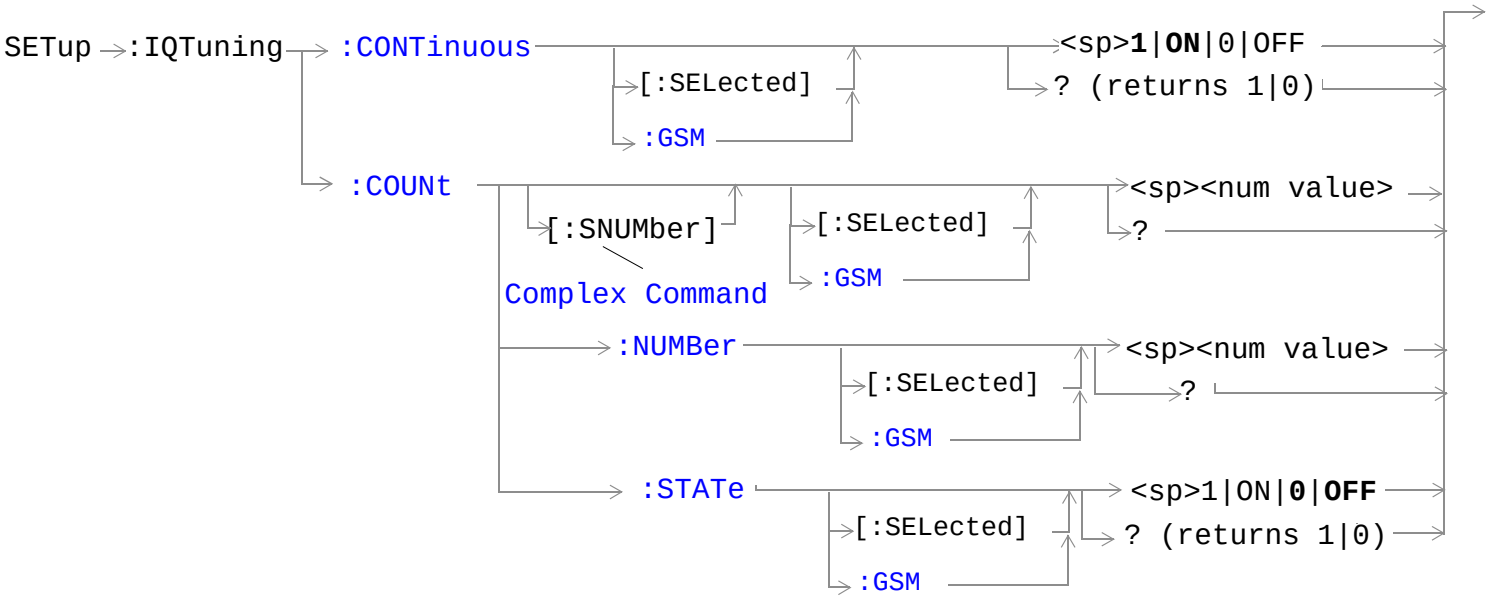
## SETup:GBERror:TIMeout:TIME

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds for the trigger state during BER measurements. The units (S \| MS) are optional, if no units are specified than units default to S (seconds). |
| Setting | | Range: 0.1 to 999<br>Resolution: 0.1 |
| Query | | Range: 0.1 to 999<br>Resolution: 0.1 |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:TIMeout:TIME 8" !Sets BER measurement timeout to !8 seconds.` | | |

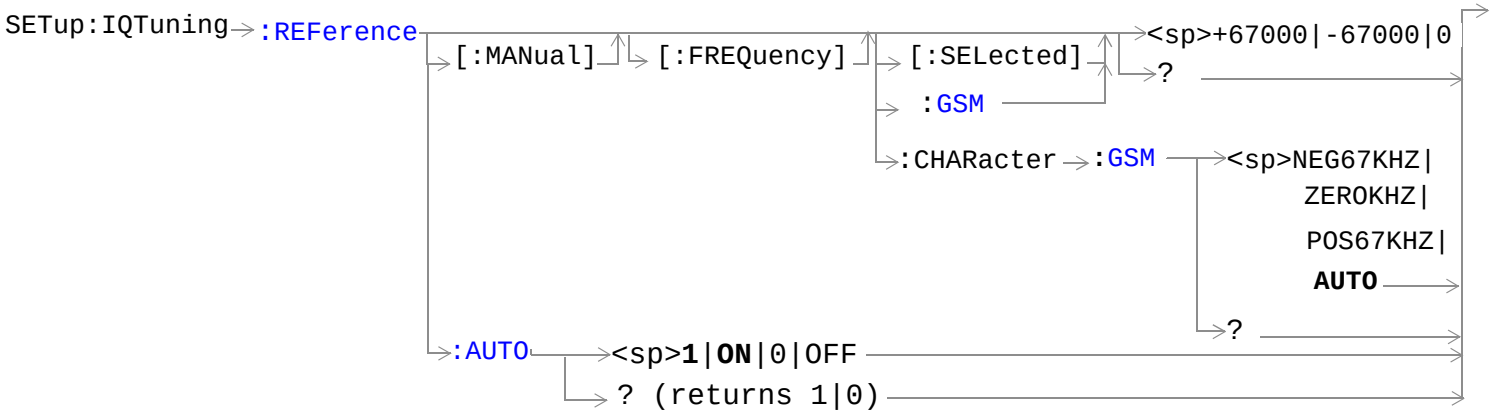
## SETup:GBERror:TIMeout:STATe

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout state for BER measurements. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETup:GBERror:TIMEout:STATe ON" !Sets the timeout state to on.` | | |

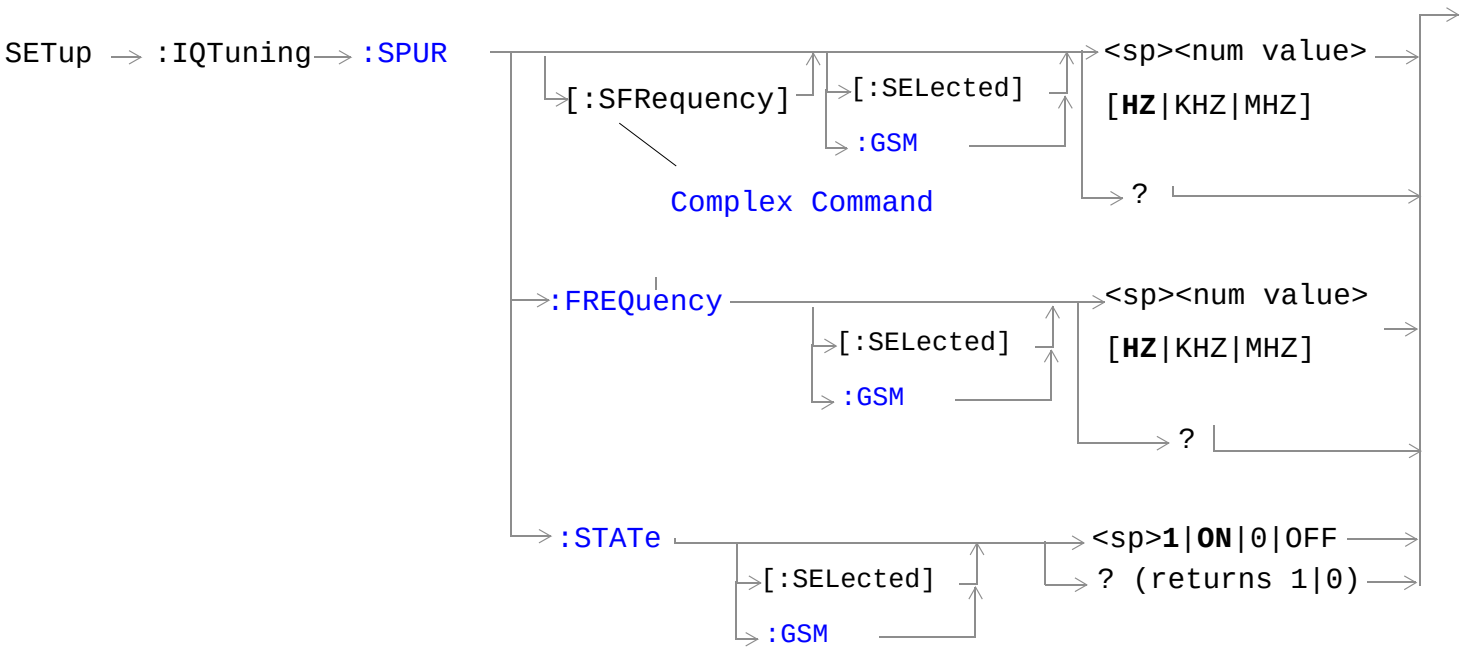
# SETup:IQTuning



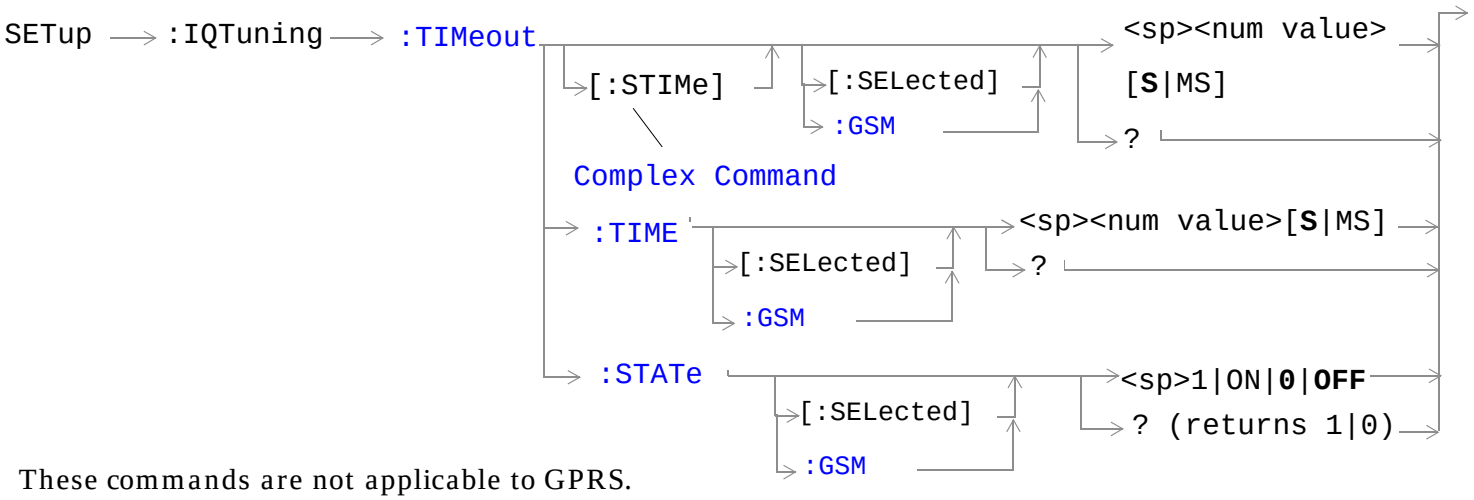

These commands are not applicable to GPRS.



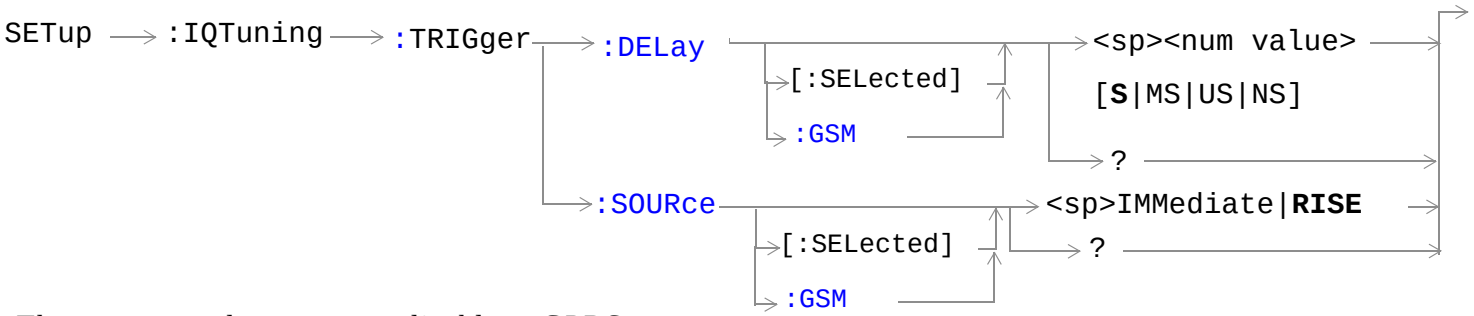

These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## SETup:IQTuning:CONTinuous[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the trigger arm state for the IQ tuning measurement in the active (that is the selected) 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)). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger mode = 1\|ON<br>• Single trigger mode = 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:CONTINUOUS:SELECTED ON" !Sets measurement to continuous trigger mode.` | | |

## SETup:IQTuning:CONTinuous:GSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the trigger arm state for the IQ tuning measurement in the GSM 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)). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger mode = 1\|ON<br>• Single trigger mode = 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:CONTINUOUS:GSM ON" !Sets measurement to continuous trigger mode.` | | |

### SETup:IQTuning:COUNt:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the multi-measurement state for the IQ tuning measurement in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE:SELECTED ON" !Turns on multi-measurements.` | | |

### SETup:IQTuning:COUNt:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | Sets/queries the multi-measurement state for the IQ tuning measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE:GSM ON" !Turns on multi-measurements.` | | |

### SETup:IQTuning:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the active (that is the selected) format. The multi-measurement count state must be on. See "I/Q Tuning Measurement Description" on page 58. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:COUNT:NUMBER:SELECTED 30"`<br>`!Sets the number of multi-measurements.` | | |

### SETup:IQTuning:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the GSM format whether or not that format is active. The multi-measurement count state must be on. See "I/Q Tuning Measurement Description" on page 58. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:COUNT:NUMBER:GSM 30"`<br>`!Sets the number of multi-measurements.` | | |

### SETup:IQTuning:COUNt[:SNUMBer][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the active (that is the selected) format. This command sets the count state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER:SELECTED 30"
!Turns on multi-measurement and sets the number of multi-measurements to 30.
```

### SETup:IQTuning:COUNt[:SNUMBer]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the GSM format whether or not that format is active. This command sets the count state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER:GSM 30"
!Turns on multi-measurement and sets the number of multi-measurements to 30.
```

## SETup:IQTuning:REFerence:AUTO

| | | |
|---|---|---|
| Function | GSM | This command allows you to specify whether or not the test set selects the most appropriate offset to be used for the measurement. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF\|1\|ON |
| Query | | 0\|1 |
| *RST Setting | | 1\|ON |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:REFERENCE:AUTO 1"
!Sets the test set to select the reference offset.
```

## SETup:IQTuning:REFerence[:MANual][:FREQuency][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the reference offset frequency to be used for the measurement in the active (that is the selected) format.<br>If your mobile is transmitting all ones you should set this command to -67000, and if your mobile is transmitting all zeros it should be set to +67000. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | -67000\|+67000\|0 |
| Query | | -67000\|+67000\|0 |
| *RST Setting | | This command is not affected by *RST. |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:SELECTED -67000"
!Sets reference frequency for IQ Tuning measurement.
```

### SETup:IQTuning:REFerence[:MANual][:FREQuency]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the reference offset frequency to be used for the measurement in the GSM format whether or not that format is active.<br>This means that if your mobile is transmitting all ones you should set this command to -67000, and if your mobile is transmitting all zeros it should be set to +67000. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | -67000 \| +67000 \| 0 |
| Query | | -67000 \| +67000 \| 0 |
| *RST Setting | | This command is not affected by *RST. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:GSM +67000"`<br>`!Sets reference frequency for IQ Tuning measurement.` | | |

### SETup:IQTuning:REFerence[:MANual][:FREQuency]:CHARacter:GSM

| | | |
|---|---|---|
| Function | GSM | Prior to the A.07 revision you would have used the command SETUP:IQTuning:REFerence[:FREQuency] to set/query the reference offset. However, this command had to change at A.07 to allow it to operate in the fast switching environment with AMPS/136. If you previously used the old command you must change it to this command to allow your code to run.<br>If you are using GSM A.07 and had never used the original command, it is recommended that you don't use this command. Instead, you should use the "SETup:IQTuning:REFerence[:MANual][:FREQuency]:GSM" on page 687 command. Alternatively you could use "SETup:IQTuning:REFerence:AUTO" on page 686 which allows the test set to select the most appropriate offset.<br>This command sets/queries the reference offset frequency to be used for the measurement in the GSM format whether or not that format is active.<br>This means that if your mobile is transmitting all ones you should set this command to NEG67KHZ, and if your mobile is transmitting all zeros it should be set to POS67KHZ. Alternatively you could select AUTO which allows the test set to select the most appropriate offset. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | NEG67KHZ \| ZEROKHZ \| POS67KHZ \| AUTO |
| Query | | NEG67KHZ \| ZEROKHZ \| POS67KHZ \| AUTO |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:CHARACTER:GSM AUTO"`<br>`!Sets reference frequency for IQ Tuning measurement (old command).` | | |

### SETup:IQTuning:SPUR:FREQuency[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the spur frequency for the I/Q Tuning measurement in the active (that is the selected) format. The units (HZ\|KHZ\|MHZ) are optional, if no units are specified then the default is HZ. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz<br>Resolution: 100 Hz |
| Query | | Range: -19 MHz to +19 MHz<br>Resolution: 100 Hz |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY:SELECTED 10MHZ"
!Sets spur measurement frequency.
```

### SETup:IQTuning:SPUR:FREQuency:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the spur frequency for the I/Q Tuning measurement in the GSM format whether or not that format is active. The units (HZ\|KHZ\|MHZ) are optional, if no units are specified then the default is HZ. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz<br>Resolution: 100 Hz |
| Query | | Range: -19 MHz to +19 MHz<br>Resolution: 100 Hz |
| *RST Setting | | 0 MHz |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY:GSM 10MHZ"
!Sets spur measurement frequency.
```

### SETup:IQTuning:SPUR:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the spur state for the I/Q Tuning measurement in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE:SELECTED ON"
!Sets state for spur measurement.
```

### SETup:IQTuning:SPUR:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the spur state for the I/Q Tuning measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE:GSM ON"
!Sets state for spur measurement.
```

### SETup:IQTuning:SPUR[:SFRequency][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the spur frequency for the I/Q Tuning measurement in the active (that is the selected) format. The units (HZ\|KHZ\|MHZ) are optional, if no units are specified then the default is HZ. This command sets the spur state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz<br>Resolution: 100 Hz |
| Query | | Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz<br>Resolution: 100 Hz |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:SPUR:SFREQUENCY:SELECTED 10MHZ"`<br>`!Sets frequency value and state for spur measurement.` | | |

### SETup:IQTuning:SPUR[:SFRequency]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the spur frequency for the I/Q Tuning measurement in the GSM format whether or not that format is active. The units (HZ\|KHZ\|MHZ) are optional, if no units are specified then the default is HZ. This command sets the spur state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz<br>Resolution: 100 Hz |
| Query | | Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz<br>Resolution: 100 Hz |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:SPUR:SFREQUENCY:GSM 10MHZ"`<br>`!Sets frequency value and state for spur measurement.` | | |

### SETup:IQTuning:TIMeout:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout state for the I/Q Tuning measurement in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STATE:SELECTED 25"
!Sets timeout state.
```

### SETup:TIMeout:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout state for the I/Q Tuning measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |

Programming Example

```
OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STATE:GSM 25"
!Sets timeout state.
```

## SETup:IQTuning:TIMeout[:STIMe][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the I/Q Tuning measurement time-out value in seconds in the active (that is the selected) format. This command sets the time-out state to on.<br>The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME:SELECTED 25"`<br>`!Sets timeout value and state.` | | |

## SETup:IQTuning:TIMeout[:STIMe]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the I/Q Tuning measurement time-out value in seconds for the GSM format whether or not that format is active. This command sets the timeout state to on.<br>The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME:GSM 25"`<br>`!Sets timeout value and state.` | | |

### SETup:IQTuning:TIMeout:TIMe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time-out value in seconds that is used for the I/Q Tuning measurements in the active (that is the selected) format. The timeout state must be on.<br>The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: .1 to 999 seconds<br>Resolution: .1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME:SELECTED 25"`<br>`!Sets timeout time value.` | | |

### SETup:IQTuning:TIMeout:TIMe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time-out value in seconds that is used for the I/Q Tuning measurements in the GSM format whether or not that format is active. The time-out state must be on.<br>The units (S \| MS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: .1 to 999 seconds<br>Resolution: .1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME:GSM 25"`<br>`!Sets timeout time value.` | | |

## SETup:IQTuning:TRIGger:DELay[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger delay time in seconds for an I/Q Tuning measurement in the active (that is the selected) format.<br>The units (S \| MS \| US \| NS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: -2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY:SELECTED 1.1MS"`<br>`!Sets trigger delay time.` | | |

## SETup:IQTuning:TRIGger:DELay:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger delay time in seconds for an I/Q Tuning measurement in the GSM format whether or not that format is active.<br>The units (S \| MS \| US \| NS) are optional, if no units are specified then the default is S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: -2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: -2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | zero seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY:GSM 1.1MS"`<br>`!Sets trigger delay time.` | | |

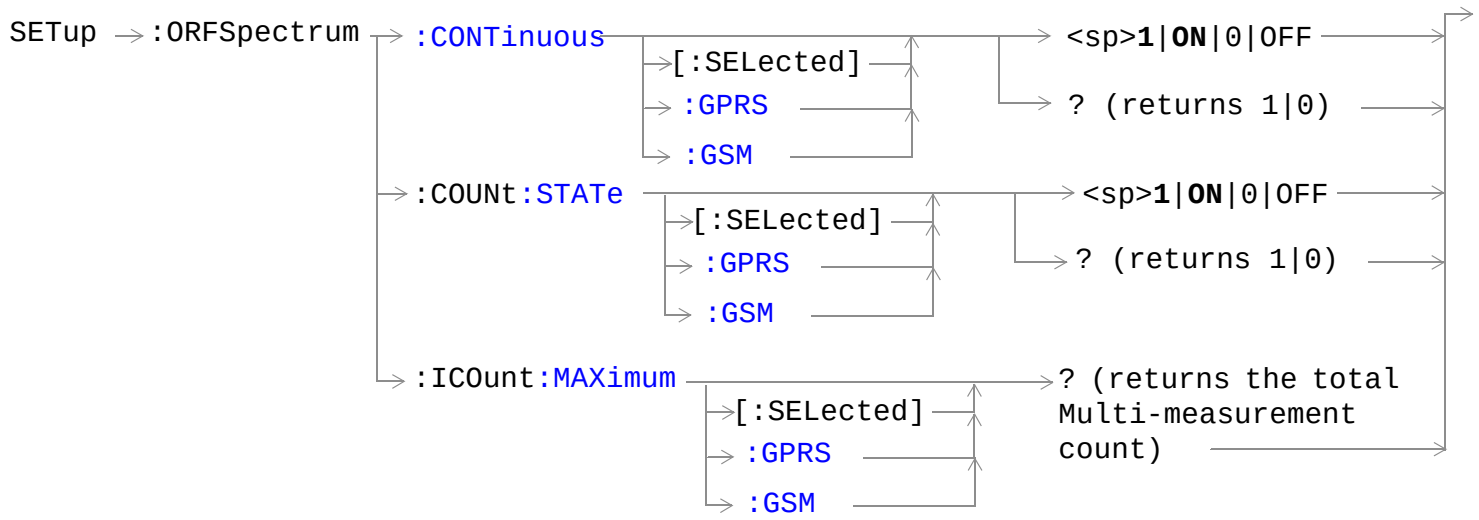
### SETup:IQTuning:TRIGger:SOURce[:SELected]

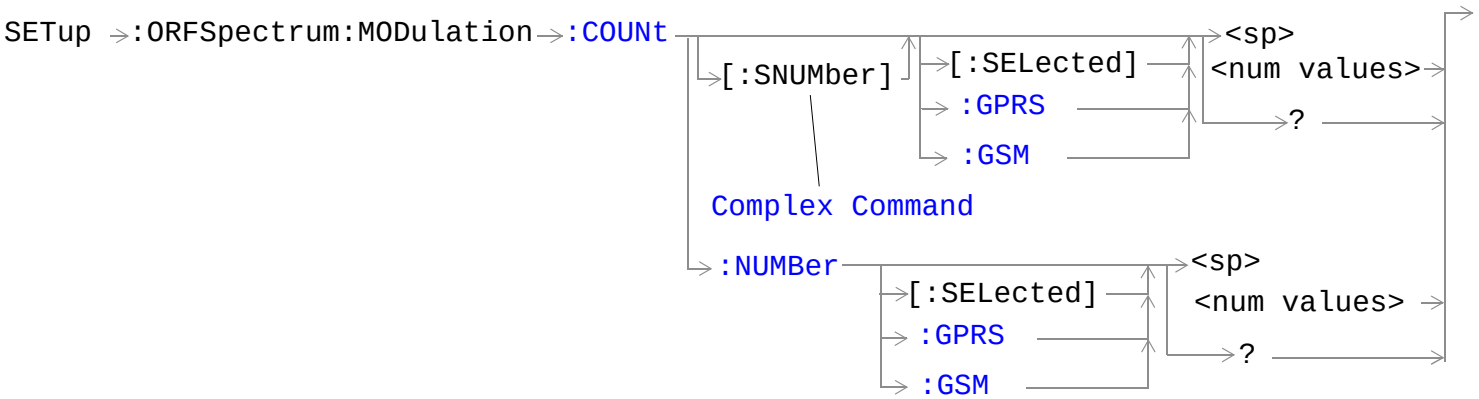
| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger source for an I/Q Tuning measurement in the active (that is the selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | RISE \| IMMediate<br>See "Triggering of Measurements" on page 276. |
| Query | | RISE \| IMM |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE:SELECTED IMMEDIATE"`<br>`!Sets trigger delay source.` | | |

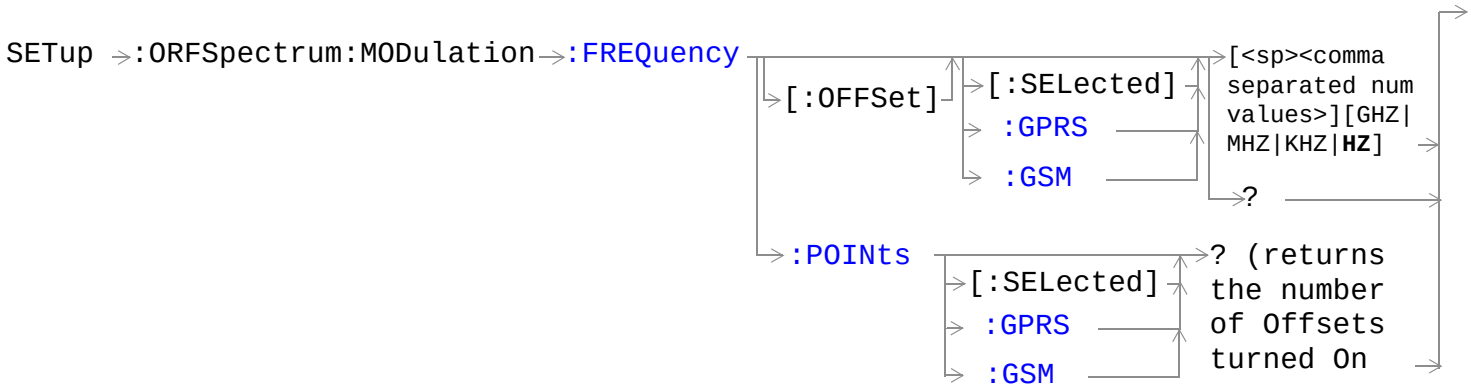
### SETup:IQTuning:TRIGger:SOURce:GSM

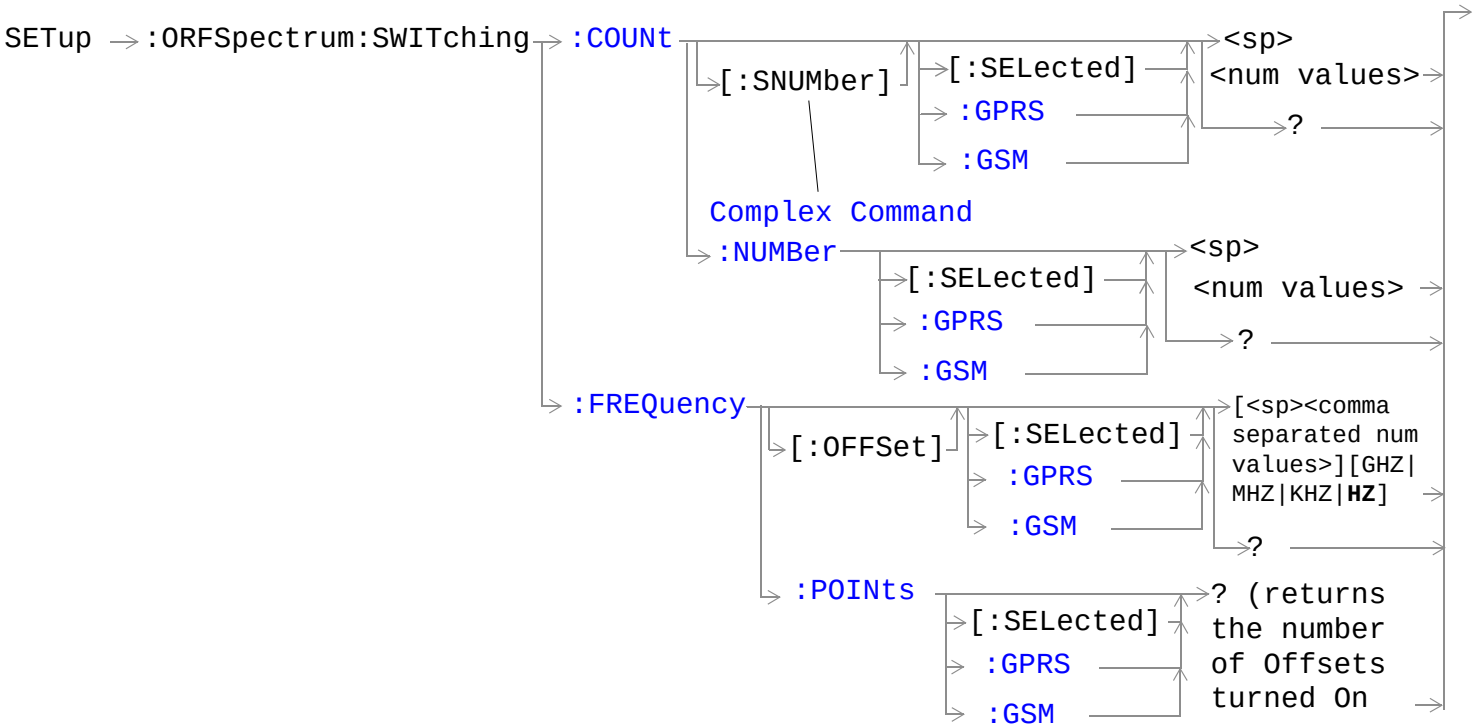
| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger source for an I/Q Tuning measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | RISE \| IMMediate<br>See "Triggering of Measurements" on page 276. |
| Query | | RISE \| IMM |
| *RST Setting | | RISE |
| Programming Example<br>`OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE:GSM IMMEDIATE"`<br>`!Sets trigger delay source.` | | |

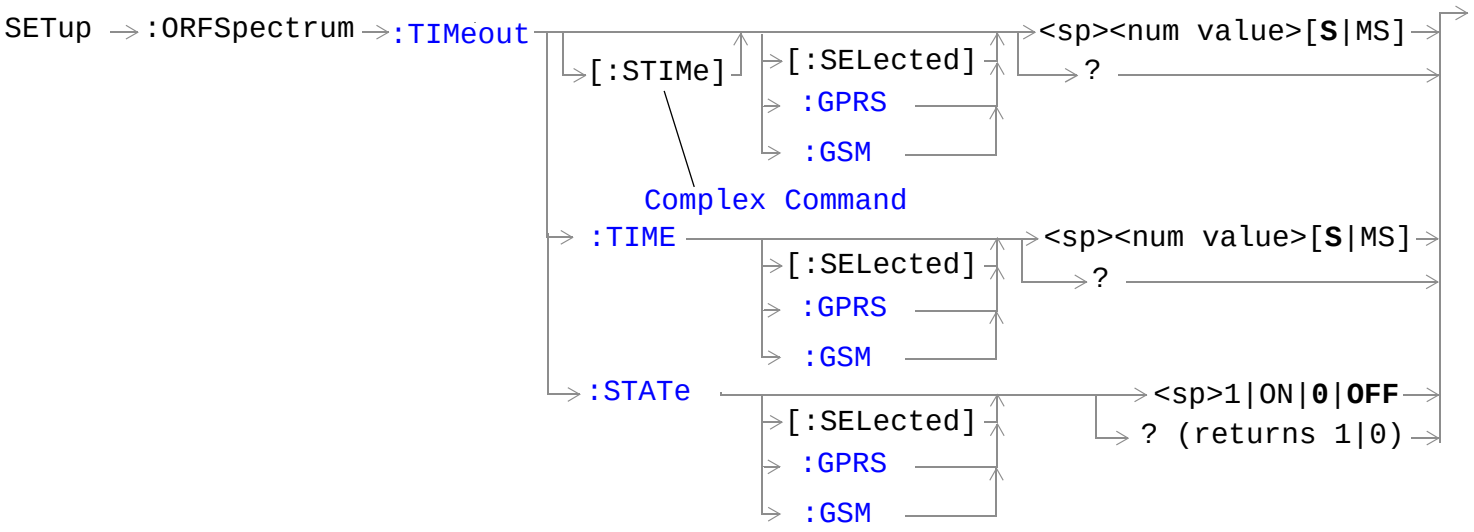
# SETup:ORFSpectrum

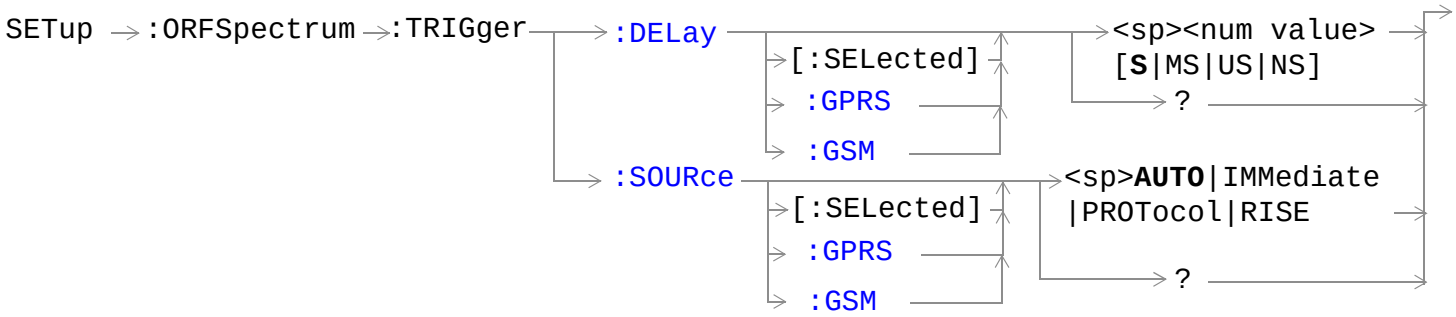



SETup
:ORFSpectrum:SWITching
:COUNt
[:SNUMber]
[:SELected]
:GPRS
:GSM
<sp>
<num values>
?
Complex Command
:NUMBer
[:SELected]
:GPRS
:GSM
<sp>
<num values>
?
:FREQuency
[:OFFSet]
[:SELected]
:GPRS
:GSM
[<sp><comma separated num values>][GHZ|MHZ|KHZ|HZ]
?
:POINts
[:SELected]
:GPRS
:GSM
? (returns the number of Offsets turned On


SETup
:ORFSpectrum
:TIMeout
[:STIMe]
[:SELected]
:GPRS
:GSM
<sp><num value>[S|MS]
?
Complex Command
:TIME
[:SELected]
:GPRS
:GSM
<sp><num value>[S|MS]
?
:STATe
[:SELected]
:GPRS
:GSM
<sp>1|ON|0|OFF
? (returns 1|0)




"Diagram Conventions" on page 323

## SETup:ORFSpecturm:CONTinuous[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command selects/queries the trigger state for output RF spectrum measurements in the active (that is the selected) format. |
| Setting | | Range:<br>• Continuous trigger mode = 1\|ON<br>• Single trigger mode = 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.`<br>`OUTPUT 714;"SETUP:CONTINUOUS OFF" !Sets trigger mode to single for an ORFS measurement.` | | |

### SETup:ORFSpecturm:CONTinuous:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the trigger state for output RF spectrum measurements in the GPRS format whether or not that format is active. |
| Setting | | Range:<br>• Continuous trigger mode = 1\|ON<br>• Single trigger mode = 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.`<br>`OUTPUT 714;"SETUP:CONTINUOUS:GPRS OFF" !Sets trigger mode to single for an ORFS measurement.` | | |

### SETup:ORFSpecturm:CONTinuous:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger state for output RF spectrum measurements in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Continuous trigger mode = 1\|ON<br>• Single trigger mode = 0\|OFF |
| Query | | Range: 1\|0 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.`<br>`OUTPUT 714;"SETUP:CONTINUOUS:GSM OFF" !Sets trigger mode to single for an ORFS measurement.` | | |

### SETup:ORFSpectrum:COUNt:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the ORFS due to switching and modulation multi-measurement count state in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:COUNT:STATE ON"
!Sets count state for both ORFS due to switching and modulation measurements.
```

### SETup:ORFSpectrum:COUNt:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the ORFS due to switching and modulation multi-measurement count state in the GPRS format whether or not that format is active. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 1 (on) |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:COUNT:STATE:GPRS ON"
!Sets count state for both ORFS due to switching and modulation measurements.
```

### SETup:ORFSpectrum:COUNt:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the ORFS due to switching and modulation multi-measurement count state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \| OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 1 (on) |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:COUNT:STATE:GSM ON"
!Sets count state for both ORFS due to switching and modulation measurements.
```

### SETup:ORFSpectrum:ICOunt:MAXimum[:SELected]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command queries the total number of measurements made each time an ORFS measurement is initiated in the active (that is the selected) format. This number will vary depending on the number of offsets and number of multi-measurements that you choose.<br>The total number of measurements is calculated using the following formula:<br>ICO MAX = 1 + M + S<br>*Where:*<br>M= (*the number of modulation offsets*) × (*the number of multi-measurements for ORFS due to modulation*).<br>S= (*the number of switching offsets*) × (*the number of multi-measurements for ORFS due to switching*) .<br>See "Output RF Spectrum Measurement Description" on page 60 for a description of modulation and switching offsets. |
| Query | | Range: 1 to 29971<br>Resolution: 1 |

### SETup:ORFSpectrum:ICOunt:MAXimum:GPRS?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM |
| | GPRS | This command queries the total number of measurements made each time an ORFS measurement is initiated in the GPRS format whether or not that format is active. This number will vary depending on the number of offsets and number of multi-measurements that you choose.<br>The total number of measurements is calculated using the following formula:<br>ICO MAX = 1 + M + S<br>*Where:*<br>M= (*the number of modulation offsets*) × (*the number of multi-measurements for ORFS due to modulation*).<br>S= (*the number of switching offsets*) × (*the number of multi-measurements for ORFS due to switching*) .<br>See "Output RF Spectrum Measurement Description" on page 60 for a description of modulation and switching offsets. |
| Query | | Range: 1 to 29971<br>Resolution: 1 |

## SETup:ORFSpectrum:ICOunt:MAXimum:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the total number of measurements made each time an ORFS measurement is initiated in the GSM format whether or not that format is active. This number will vary depending on the number of offsets and number of multi-measurements that you choose.<br>The total number of measurements is calculated using the following formula:<br>ICO MAX = 1 + M + S<br>*Where:*<br>M= (*the number of modulation offsets*) × (*the number of multi-measurements for ORFS due to modulation*).<br>S= (*the number of switching offsets*) × (*the number of multi-measurements for ORFS due to switching*) .<br>See "Output RF Spectrum Measurement Description" on page 60 for a description of modulation and switching offsets. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 1 to 29971<br>Resolution: 1 |

## SETup:ORFSpectrum:MODulation:COUNt[:SNUMber][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make in the active (that is the selected) format. This command sets the count state to ON. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714"SETUP:ORFSPECTRUM:MODULATION:COUNT:SNUMBER 99"`<br>`!Sets the value to 99 multi-measurements and the state to on.` | | |

### SETup:ORFSpectrum:MODulation:COUNt[:SNUMber]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make in the GPRS format whether or not that format is active. This command sets the count state to ON. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 20 |
| Programming Example<br>`OUTPUT 714"SETUP:ORFSPECTRUM:MODULATION:COUNT:GPRS 99"`<br>`!Sets the value to 99 multi-measurements and the state to on.` | | |

### SETup:ORFSpectrum:MODulation:COUNt[:SNUMber]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make in the GSM format whether or not that format is active. This command sets the count state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 20 |
| Programming Example<br>`OUTPUT 714"SETUP:ORFSPECTRUM:MODULATION:COUNT:GSM 99"`<br>`!Sets the value to 99 multi-measurements and the state to on.` | | |

### SETup:ORFSpectrum:MODulation:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make when the multi-measurement count state is on in the active (that is the selected) format. See "Output RF Spectrum Measurement Description" on page 60. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:COUNT:NUMBER 75"`<br>`!Sets the multi-measurement count number for ORFS due to modulation measurements to 75.` | | |

### SETup:ORFSpectrum:MODulation:COUNt:NUMBer:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make when the multi-measurement count state is on in the GPRS format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60 |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 20 |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:COUNT:NUMBER:GPRS 75"`<br>`!Sets the multi-measurement count number for ORFS due to modulation measurements to 75.` | | |

### SETup:ORFSpectrum:MODulation:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make when the multi-measurement count state is on in the GSM format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 20 |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:COUNT:NUMBER:GSM 75"`<br>`!Sets the multi-measurement count number for ORFS due to modulation measurements to 75.` | | |

### SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the list of ORFS due to modulation frequency offsets in the active (that is the selected) format. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to modulation measurement will not be made. The units (GHZ \| MHZ \| KHZ \| HZ) are optional, if no units are specified than units default to HZ. see "Output RF Spectrum Measurement Description" on page 60. |
| Setting | | Range: 0 to 22 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| Query | | Range: 0 to 22 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to modulation measurement offsets and sets
!them to 400 kHz and 700 kHz offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET 700 KHZ"
!Turns on the first ORFS due to modulation measurement offset and sets it to  A 700 kHz
!offset. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET"
!Turns all offsets for ORFS due to modulation measurement to the off state.
```

## SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the list of ORFS due to modulation frequency offsets in the GPRS format whether or not that format is active. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to modulation measurement will not be made. The units (GHZ\|MHZ\|KHZ\|HZ) are optional, if no units are specified than units default to HZ. see "Output RF Spectrum Measurement Description" on page 60 |
| Setting | | Range: 0 to 22 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| Query | | Range: 0 to 22 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| *RST Setting | | Offset 1: 400.0 kHz<br>Offset 2: 600.0 kHz<br>Offsets 3 to 22: off |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET:GPRS 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to modulation measurement offsets and sets
!them to 400 kHz and 700 kHz offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET:GPRS 700 KHZ"
!Turns on the first ORFS due to modulation measurement offset and sets it to  A 700 kHz
!offset. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET:GPRS"
!Turns all offsets for ORFS due to modulation measurement to the off state.
```

## SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the list of ORFS due to modulation frequency offsets in the GSM format whether or not that format is active. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to modulation measurement will not be made. The units (GHZ\|MHZ\|KHZ\|HZ) are optional, if no units are specified than units default to HZ. see "Output RF Spectrum Measurement Description" on page 60 |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 22 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| Query | | Range: 0 to 22 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| *RST Setting | | Offset 1: 400.0 kHz<br>Offset 2: 600.0 kHz<br>Offsets 3 to 22: off |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET:GSM 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to modulation measurement offsets and sets
!them to 400 kHz and 700 kHz offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET:GSM 700 KHZ"
!Turns on the first ORFS due to modulation measurement offset and sets it to  A 700 kHz
!offset. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET:GSM"
!Turns all offsets for ORFS due to modulation measurement to the off state.
```

## SETup:ORFSpectrum:MODulation:FREQuency:POINts[:SELected]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command queries the number of frequency offsets currently on during an ORFS due to modulation measurement in the active (that is the selected) format. See "Output RF Spectrum Measurement Description" on page 60. |
| Query | | Range: 0 to 22<br>Resolution: 1 |

### SETup:ORFSpectrum:MODulation:FREQuency:POINts:GPRS?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command queries the number of frequency offsets currently on during an ORFS due to modulation measurement in the GPRS format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| Query | | Range: 0 to 22<br>Resolution: 1 |

### SETup:ORFSpectrum:MODulation:FREQuency:POINts:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the number of frequency offsets currently on during an ORFS due to modulation measurement in the GSM format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| | GPRS | This command is not applicable to GPRS |
| Query | | Range: 0 to 22<br>Resolution: 1 |

### SETup:ORFSpectrum:SWITching:COUNt[:SNUMber][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the ORFS due to switching multi-measurement count value and turns the state on in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:SNUMBER 55"`<br>`!Sets the multi-measurment value to 10 and the state to on.` | | |

### SETup:ORFSpectrum:SWITching:COUNt[:SNUMber]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the ORFS due to switching multi-measurement count value and turns the state on in the GPRS format whether or not that format is active. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:SNUMBER:GPRS 55"`<br>`!Sets the multi-measurment value to 10 and the state to on.` | | |

### SETup:ORFSpectrum:SWITching:COUNt[:SNUMber]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the ORFS due to switching multi-measurement count value and turns the state on in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:SNUMBER:GSM 55"`<br>`!Sets the multi-measurment value to 10 and the state to on.` | | |

### SETup:ORFSpectrum:SWITching:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the ORFS due to switching multi-measurement count value in the active (that is the selected) format. See "Output RF Spectrum Measurement Description" on page 60. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:NUMBER 15"`<br>`!Sets the multi-measurement count number for ORFS due to switching to 15.` | | |

### SETup:ORFSpectrum:SWITching:COUNt:NUMBer:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM |
| | GPRS | This command sets/queries the ORFS due to switching multi-measurement count value in the GPRS format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60 |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:NUMBER:GPRS 15"`<br>`!Sets the multi-measurement count number for ORFS due to switching to 15.` | | |

### SETup:ORFSpectrum:SWITching:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the ORFS due to switching multi-measurement count value in the GSM format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60 |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:NUMBER:GSM 15"
!Sets the multi-measurement count number for ORFS due to switching to 15.
```

### SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the list of ORFS due to switching frequency offsets in the active (that is the selected) format. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to switching measurement will not be made. The units (GHZ \| MHZ \| KHZ \| HZ) are optional, if no units are specified than units default to HZ. See "Output RF Spectrum Measurement Description" on page 60. |
| Setting | | Range: 0 to 8 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| Query | | Range: 0 to 8 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to switching measurement offsets and sets them
!to 400 kHz and 700 kHz offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET 700 KHZ"
!Turns on the first ORFS due to switching measurement offset and sets it to 700 kHz
!offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET"
!Turns all of the ORFS due to switching measurements offsets to off.
```

## SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the list of ORFS due to switching frequency offsets in the GPRS format whether or not that format is active. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to switching measurement will not be made. The units (GHZ\|MHZ\|KHZ\|HZ) are optional, if no units are specified than units default to HZ. See "Output RF Spectrum Measurement Description" on page 60. |
| Setting | | Range: 0 to 8 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| Query | | Range: 0 to 8 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| *RST Setting | | Offset 1 = 400.0 kHz<br>Offset 2 = 600.0 kHz<br>Offsets 3 to 8 off |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:GPRS 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to switching measurement offsets and sets them
!to 400 kHz and 700 kHz offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:GPRS 700 KHZ"
!Turns on the first ORFS due to switching measurement offset and sets it to 700 kHz
!offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:GPRS"
!Turns all of the ORFS due to switching measurements offsets to off.
```

## SETup:ORFSpectrum:SWITching:FREQuency[:OFFSet]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the list of ORFS due to switching frequency offsets in the GSM format whether or not that format is active. Each offset listed in the command is turned on by default. If no frequency offsets (null list) are sent, the output RF spectrum due to switching measurement will not be made. The units (GHZ\|MHZ\|KHZ\|HZ) are optional, if no units are specified than units default to HZ. See "Output RF Spectrum Measurement Description" on page 60. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 8 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| Query | | Range: 0 to 8 comma-separated values ranging from –1.8 MHz to –10 Hz, and +10 Hz to +1.8 MHz<br>Resolution: 10 Hz |
| *RST Setting | | Offset 1 = 400.0 kHz<br>Offset 2 = 600.0 kHz<br>Offsets 3 to 8 off |

Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:GSM 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to switching measurement offsets and sets them
!to 400 kHz and 700 kHz offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:GSM 700 KHZ"
!Turns on the first ORFS due to switching measurement offset and sets it to 700 kHz
!offsets. All other offsets are in the off state.

OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET:GSM"
!Turns all of the ORFS due to switching measurements offsets to off.
```

## SETup:ORFSpectrum:SWITching:FREQuency:POINts[:SELected]?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command queries the number of frequency offsets currently on during an ORFS due to switching measurement in the active (that is the selected) format. See "Output RF Spectrum Measurement Description" on page 60. |
| Query | | Range: 0 to 8<br>Resolution: 1 |

### SETup:ORFSpectrum:SWITching:FREQuency:POINts:GPRS?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command queries the number of frequency offsets currently on during an ORFS due to switching measurement in the GPRS format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| Query | | Range: 0 to 8<br>Resolution: 1 |

### SETup:ORFSpectrum:SWITching:FREQuency:POINts:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the number of frequency offsets currently on during an ORFS due to switching measurement in the GSM format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 8<br>Resolution: 1 |

### SETup:ORFSpectrum:TIMeout:TIME[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command selects/queries the timeout value in seconds that will be used for ORFS measurements when the "SETup:ORFSpectrum:TIMeout:STATe[:SELected]" is ON in the active (that is the selected) format. The units (S \| MS) are optional. If no units are specified than units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:TIME 15"`<br>`!Sets the timeout value to 15 seconds.` | | |

### SETup:ORFSpectrum:TIMeout:TIME:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the timeout value in seconds that will be used for ORFS measurements when the "SETup:ORFSpectrum:TIMeout:STATe[:SELected]" is ON in the GPRS format whether or not that format is active. The units (S \| MS) are optional. If no units are specified than units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:TIME:GPRS 15"`<br>`!Sets the timeout value to 15 seconds.` | | |

### SETup:ORFSpectrum:TIMeout:TIME:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeout value in seconds that will be used for ORFS measurements when the "SETup:ORFSpectrum:TIMeout:STATe[:SELected]" is ON in the GSM format whether or not that format is active. The units (S \| MS) are optional. If no units are specified than units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:TIME:GSM 15"`<br>`!Sets the timeout value to 15 seconds.` | | |

## SETup:ORFSpectrum:TIMeout[:STIMe][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the timeout value in seconds that will be used for ORFS measurements and turns the timeout state on in the active (that is the selected) format. The units (S \| MS) are optional. If no units are specified than units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STIME 12"`<br>`!Sets the timeout value to 12 seconds and the state to on.` | | |

## SETup:ORFSpectrum:TIMeout[:STIMe]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds that will be used for ORFS measurements and turns the timeout state on in the GPRS format whether or not that format is active. The units (S \| MS) are optional. If no units are specified than units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STIME:GPRS 12"`<br>`!Sets the timeout value to 12 seconds and the state to on.` | | |

### SETup:ORFSpectrum:TIMeout[:STIMe]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that will be used for ORFS measurements and turns the timeout state on in the GSM format whether or not that format is active. The units (S\|MS) are optional. If no units are specified than units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STIME:GSM 12"`<br>`!Sets the timeout value to 12 seconds and the state to on.` | | |

### SETup:ORFSpectrum:TIMeout:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command selects/queries the ORFS measurement timeout state in the active (that is the selected) format. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STATE ON" !Sets timeout state to on.` | | |

### SETup:ORFSpectrum:TIMeout:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM |
| | GPRS | This command selects/queries the ORFS measurement timeout state in the GPRS format whether or not the format is active. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STATE:GPRS ON" !Sets timeout state to on.` | | |

### SETup:ORFSpectrum:TIMeout:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the ORFS measurement timeout state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STATE:GSM ON" !Sets timeout state to on.` | | |

### SETup:ORFSpectrum:TRIGer:DELay[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the trigger delay for ORFS measurements in the active (that is the selected) format. The units (S\|MS\|US\|NS) are optional, if no units are specified than units default to S. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:DELAY 1MS"`<br>`!Sets the trigger delay value to 1 millisecond.` | | |

### SETup:ORFSpectrum:TRIGer:DELay:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger delay for ORFS measurements in the GPRS format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified than units default to S. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| *RST Setting | | 0 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:DELAY:GPRS 1MS"`<br>`!Sets the trigger delay value to 1 millisecond.` | | |

### SETup:ORFSpectrum:TRIGer:DELay:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger delay for ORFS measurements in the GSM format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified than units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 nanoseconds whichever is greater |
| *RST Setting | | 0 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:DELAY:GSM 1MS"`<br>`!Sets the trigger delay value to 1 millisecond.` | | |

## SETup:ORFSpectrum:TRIGger:SOURce[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger source for ORFS measurements in the active (that is the selected) format. See "Output RF Spectrum Measurement Description" on page 60. |
| | GPRS | |
| Setting | | Range: AUTO \| IMMediate \| PROTocol \| RISE<br>See "Triggering of Measurements" on page 276. |
| Query | | Range: AUTO \| IMM \| PROT \| RISE |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO"`<br>`!Sets the trigger source to automatic.` | | |

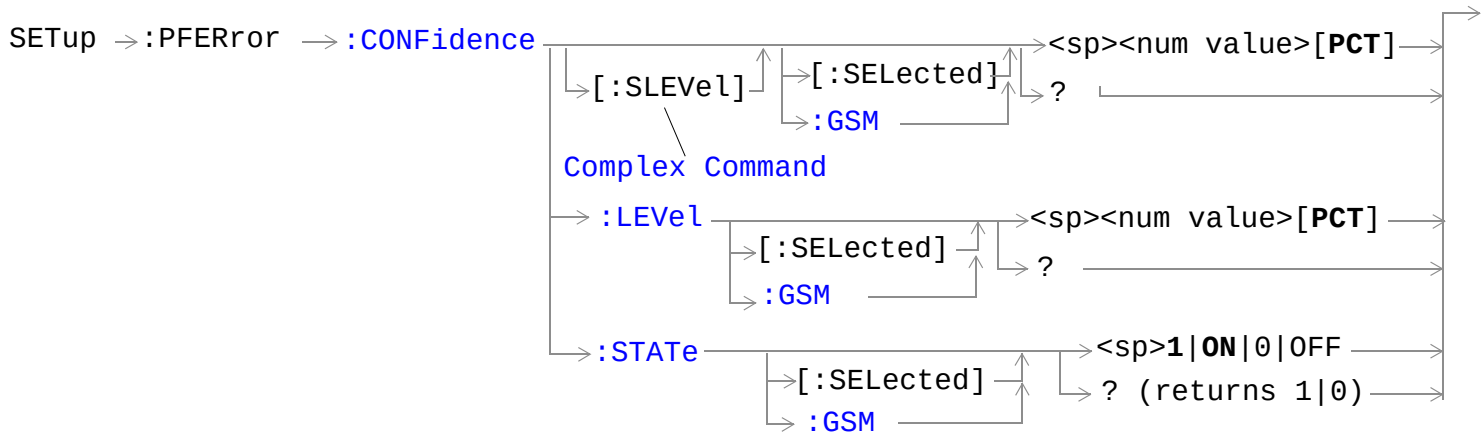
## SETup:ORFSpectrum:TRIGger:SOURce:GPRS

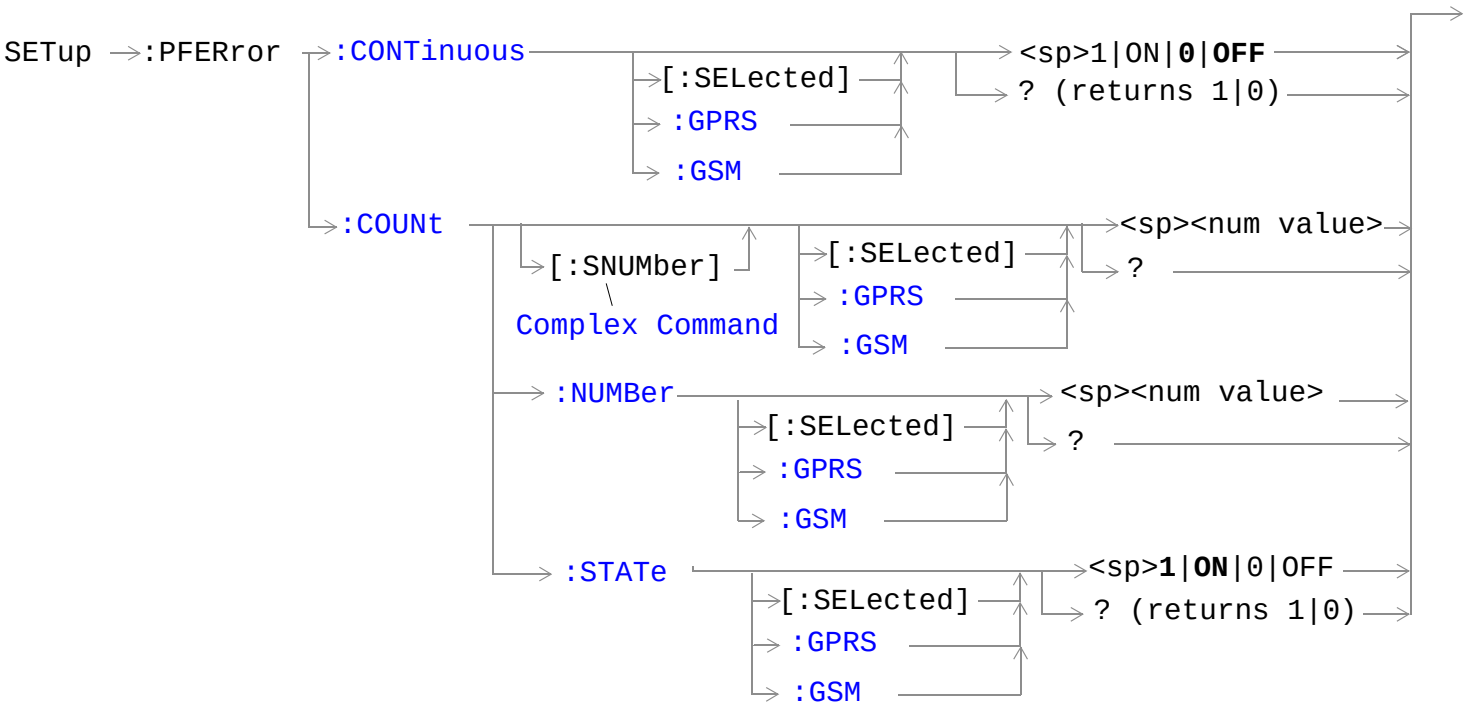
| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the trigger source for ORFS measurements in the GPRS format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| Setting | | Range: AUTO \| IMMediate \| PROTocol \| RISE<br>See "Triggering of Measurements" on page 276. |
| Query | | Range: AUTO \| IMM \| PROT \| RISE |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE:GPRS AUTO"`<br>`!Sets the trigger source to automatic.` | | |

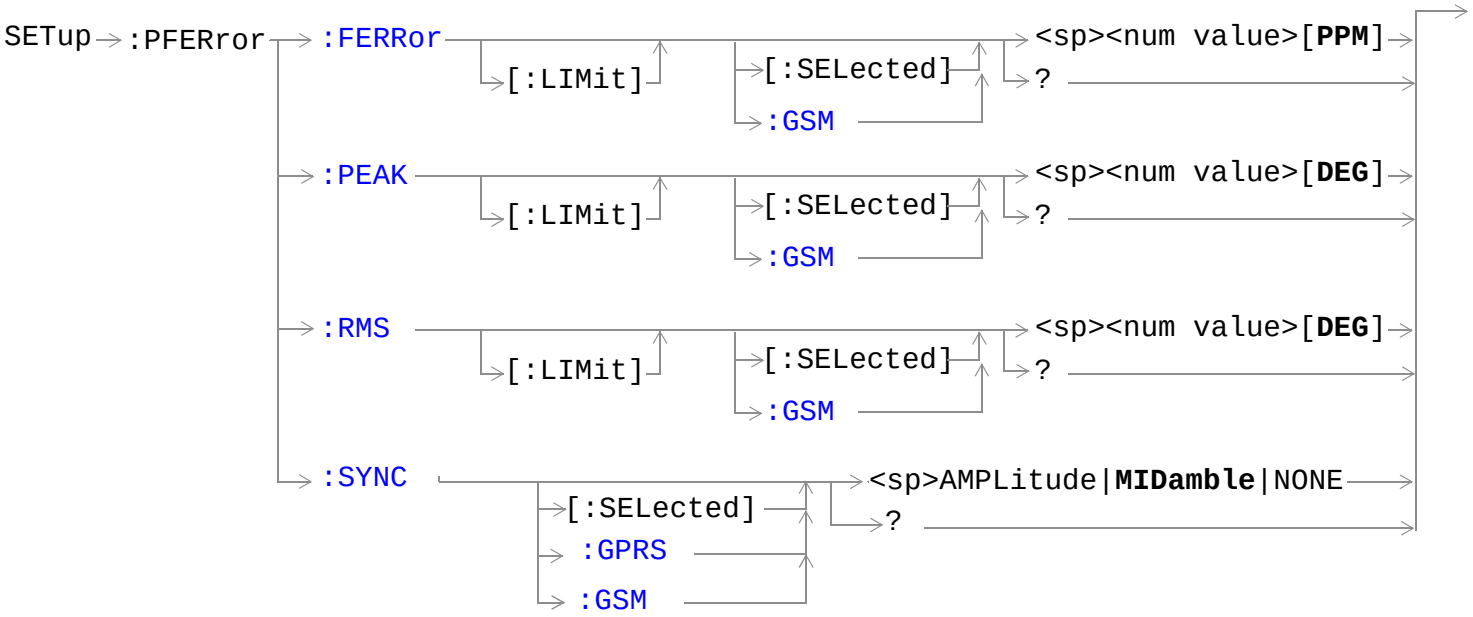
## SETup:ORFSpectrum:TRIGger:SOURce:GSM

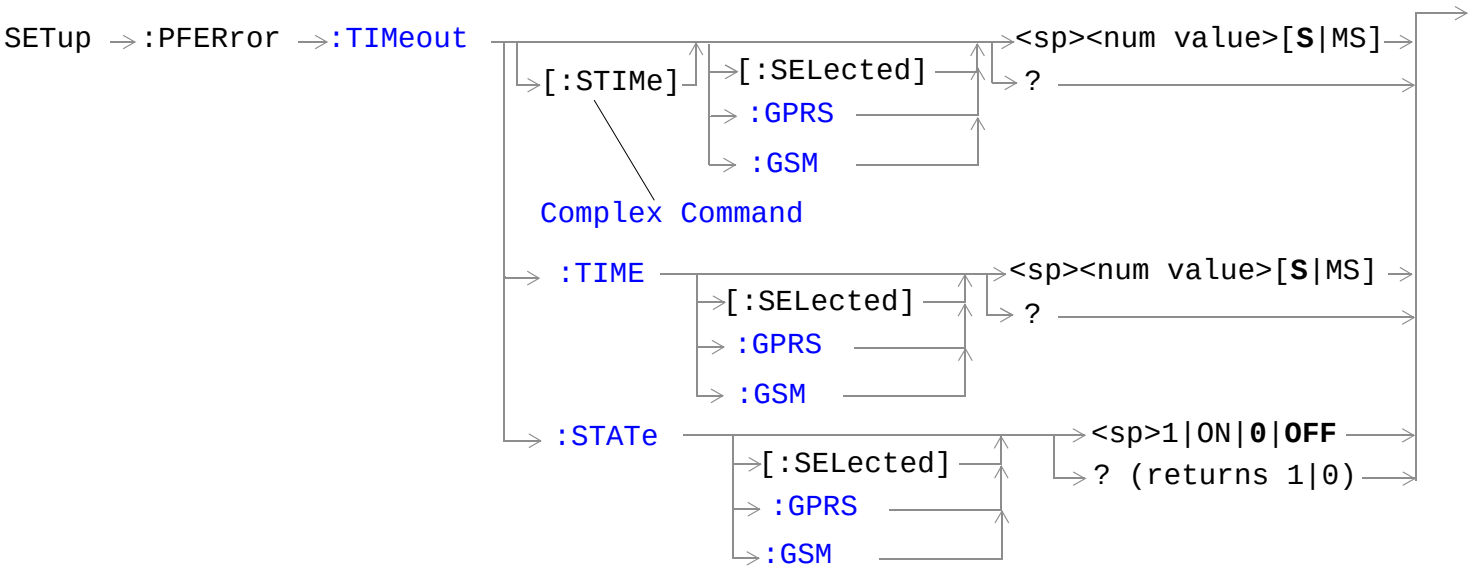
| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger source for ORFS measurements in the GSM format whether or not that format is active. See "Output RF Spectrum Measurement Description" on page 60. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: AUTO \| IMMediate \| PROTocol \| RISE<br>See "Triggering of Measurements" on page 276. |
| Query | | Range: AUTO \| IMM \| PROT \| RISE |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE:GSM AUTO"`<br>`!Sets the trigger source to automatic.` | | |

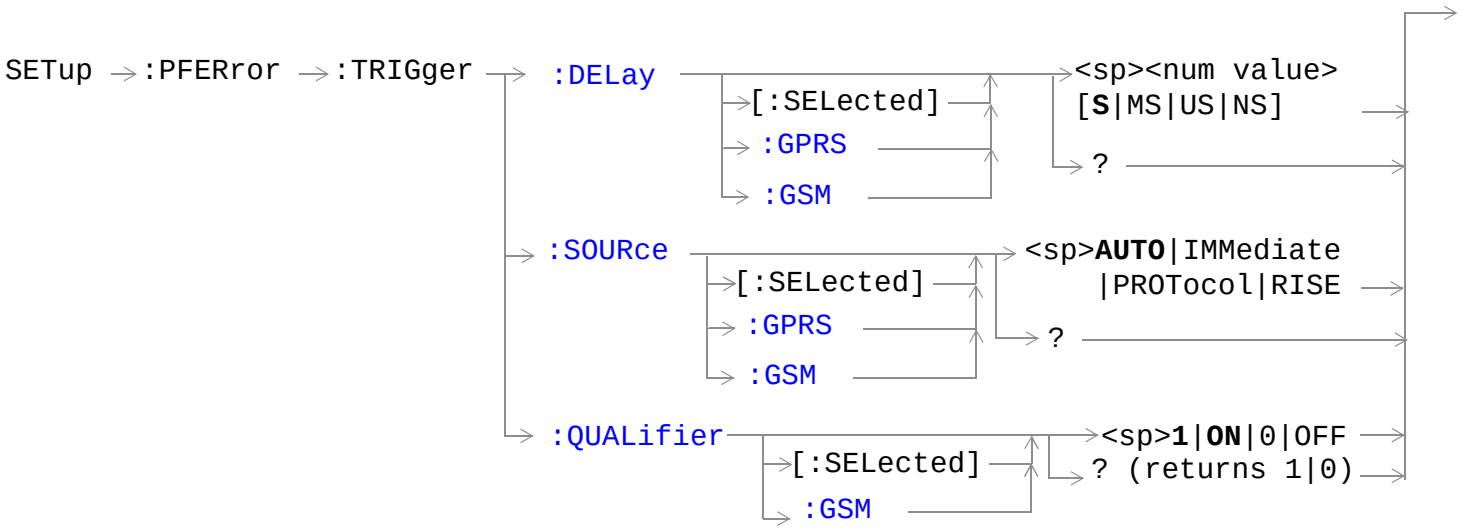
# SETup:PFERror




SETup
:PFERror
:FERRor
[:LIMit]
[:SELected]
:GSM
<sp><num value>[PPM]
?
:PEAK
[:LIMit]
[:SELected]
:GSM
<sp><num value>[DEG]
?
:RMS
[:LIMit]
[:SELected]
:GSM
<sp><num value>[DEG]
?
:SYNC
[:SELected]
:GPRS
:GSM
<sp>AMPLitude|MIDamble|NONE
?


SETup
:PFERror
:TIMeout
[:STIMe]
[:SELected]
:GPRS
:GSM
<sp><num value>[S|MS]
?
Complex Command
:TIME
[:SELected]
:GPRS
:GSM
<sp><num value>[S|MS]
?
:STATe
[:SELected]
:GPRS
:GSM
<sp>1|ON|0|OFF
? (returns 1|0)




"Diagram Conventions" on page 323

### SETup:PFERror:CONFidence:LEVel[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the active (that is the selected) format's confidence level (in %) with which to end the measurement early. This level applies to the RMS Phase Error, the Peak Phase Error, and the Frequency Error.<br>For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| Query | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| *RST Setting | | 99.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONFIDENCE:LEVel 90" !Sets the confidence level to 90%.` | | |

### SETup:PFERror:CONFidence:LEVel:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the GSM format's confidence level (in %) with which to end the measurement early, whether or not the GSM format is active. This level applies to the RMS Phase Error, the Peak Phase Error, and the Frequency Error.<br>For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| Query | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| *RST Setting | | 99.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONFIDENCE:LEVEL:GSM 90" !Sets the confidence level to 90%.` | | |

## SETup:PFERror:CONFidence[:SLEVel][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the active (that is the selected) format's confidence level with which to end the measurement early and turns the confidence state on. This level applies to the RMS Phase Error, the Peak Phase Error, and the Frequency Error.<br>This command also turns the multi-measurement state on.<br>For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| Query | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| *RST Setting | | 99.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONFIDENCE 95" !Sets the confidence level to 95% and the state to on.` | | |

## SETup:PFERror:CONFidence[:SLEVel]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the GSM format's confidence level with which to end the measurement early and turns the confidence state on. It does this in the GSM format whether or not that format is active. This level applies to the RMS Phase Error, the Peak Phase Error, and the Frequency Error.<br>This command also turns the multi-measurement state on.<br>For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| Query | | Range: 80.00 to 99.99<br>Resolution: 0.01 |
| *RST Setting | | 99.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONFIDENCE:GSM 90" !Sets the confidence level to 90% and the state to on.` | | |

### SETup:PFERror:CONFidence:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries whether the active (that is the selected) format's confidence level feature for the phase and frequency error measurement is on or off.<br>This command also turns the multi-measurement state on.<br>For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONFIDENCE:STATE 1" !Sets the confidence state on.` | | |

### SETup:PFERror:CONFidence:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries whether the GSM format's confidence level feature for the phase and frequency error measurement is on or off, whether or not that format is active.<br>This command also turns the multi-measurement state on.<br>For more information on using confidence levels refer to "Confidence Levels" on page 1035. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONFIDENCE:STATE:GSM OFF" !Sets the confidence state off.` | | |

### SETup:PFERror:CONTinuous[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger state for phase and frequency error measurements in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range:<br>• Single trigger mode = 0\|OFF<br>• Continuous trigger mode = 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Specifies single trigger mode for !phase/frequency measurements.` | | |

### SETup:PFERror:CONTinuous:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger state for phase and frequency error measurements in the GPRS format whether or not that format is active. |
| Setting | | Range:<br>• Single trigger mode = 0\|OFF<br>• Continuous trigger mode = 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONTINUOUS:GPRS OFF" !Specifies single trigger mode for !phase/frequency measurements.` | | |

### SETup:PFERror:CONTinuous:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger state for phase and frequency error measurements in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Single trigger mode = 0\|OFF<br>• Continuous trigger mode = 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:CONTINUOUS:GSM OFF" !Specifies single trigger mode for !phase/frequency measurements.` | | |

### SETup:PFERror:COUNt[:SNUMber][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the number of phase and frequency error measurements the test set will make and turns the multi-measurement count state on in the active (that is the selected) format. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:SNUMBER 100" !Sets the value to 100 and the state to on.` | | |

### SETup:PFERror:COUNt[:SNUMber]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of phase and frequency error measurements the test set will make and turns the multi-measurement count state on in the GPRS format whether or not that format is active. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:SNUMBER:GPRS 100" !Sets the value to 100 and the state to on.` | | |

### SETup:PFERror:COUNt[:SNUMber]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of phase and frequency error measurements the test set will make and turns the multi-measurement count state on in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 0 \| off |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:SNUMBER:GSM 100" !Sets the value to 100 and the state to on.` | | |

### SETup:PFERror:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of phase and frequency error measurements the Test Set will make when the multi-measurement count state is on in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 55"`<br>`!Sets the multi-measurement count value to 55.` | | |

### SETup:PFERror:COUNt:NUMBer:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of phase and frequency error measurements the Test Set will make when the multi-measurement count state is on in the GPRS format whether or not that format is active. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER:GPRS 55"`<br>`!Sets the multi-measurement count value to 55.` | | |

### SETup:PFERror:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of phase and frequency error measurements the Test Set will make when the multi-measurement count state is on in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER:GSM 55"`<br>`!Sets the multi-measurement count value to 55.` | | |

### SETup:PFERror:COUNt:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the phase and frequency error multi-measurement count state in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:STATE ON"`<br>`!Turns on multi-measurement mode for the phase/frequency measurement.` | | |

### SETup:PFERror:COUNt:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the phase and frequency error multi-measurement count state in the GPRS format whether or not that format is active. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:STATE:GPRS ON"`<br>`!Turns on multi-measurement mode for the phase/frequency measurement.` | | |

### SETup:PFERror:COUNt:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the phase and frequency error multi-measurement count state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:COUNT:STATE:GSM ON"`<br>`!Turns on multi-measurement mode for the phase/frequency measurement.` | | |

### SETup:PFERror:FERRor[:LIMit]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the frequency error limit (in ppm) in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.01 to 0.1<br>Resolution: 0.01 |
| Query | | Range: 0.01 to 0.1<br>Resolution: 0.01 |
| *RST Setting | | 0.1 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:FERROR:GSM 0.05"`<br>`!Sets the frequency error limit to 0.05 ppm.` | | |

### SETup:PFERror:FERRor[:LIMit][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the frequency error limit (in ppm) in the active (that is currently selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.01 to 0.1<br>Resolution: 0.01 |
| Query | | Range: 0.01 to 0.1<br>Resolution: 0.01 |
| *RST Setting | | 0.1 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:FERROR 0.1"`<br>`!Sets the frequency error limit to 0.1 ppm.` | | |

### SETup:PFERror:PEAK[:LIMit]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the peak phase error limit (in degrees) in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.00 to 20.00<br>Resolution: 0.01 |
| Query | | Range: 0.00 to 20.00<br>Resolution: 0.01 |
| *RST Setting | | 20.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:PEAK:GSM 15"`<br>`!Sets the peak phase error to 15 degrees.` | | |

### SETup:PFERror:PEAK[:LIMit][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the peak phase error limit (in degrees) in the active (that is currently selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.00 to 20.00<br>Resolution: 0.01 |
| Query | | Range: 0.00 to 20.00<br>Resolution: 0.01 |
| *RST Setting | | 20.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:PEAK 18"`<br>`!Sets the peak phase error to 18 degrees.` | | |

### SETup:PFERror:RMS[:LIMit]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the RMS phase error limit (in degrees) in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.00 to 5.00<br>Resolution: 0.01 |
| Query | | Range: 0.00 to 5.00<br>Resolution: 0.01 |
| *RST Setting | | 5.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:RMS:GSM 3"`<br>`!Sets the RMS phase error to 3 degrees.` | | |

### SETup:PFERror:RMS[:LIMit][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the RMS phase error limit (in degrees) in the active (that is currently selected) format. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.00 to 5.00<br>Resolution: 0.01 |
| Query | | Range: 0.00 to 5.00<br>Resolution: 0.01 |
| *RST Setting | | 5.00 |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:RMS 3.5"`<br>`!Sets the RMS phase error to 3.5 degrees.` | | |

### SETup:PFERror:SYNC[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the burst synchronization mode for phase and frequency error measurements in the active (that is the selected) format. See "Burst Synchronization of Measurements" on page 280. |
| Setting | | MIDamble\|AMPLitude\|NONE |
| Query | | MID \| AMPL \| NONE |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:SYNC MIDAMBLE"`<br>`!Selects burst synchronization to midamble for power versus time measurements.` | | |

### SETup:PFERror:SYNC:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the burst synchronization mode for phase and frequency error measurements in the GPRS format whether or not that format is active. See "Burst Synchronization of Measurements" on page 280. |
| Setting | | MIDamble\|AMPLitude\|NONE |
| Query | | MID \| AMPL \| NONE |
| *RST Setting | | MID |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:SYNC:GPRS MIDAMBLE"`<br>`!Selects burst synchronization to midamble for GPRS power versus time measurements.` | | |

### SETup:PFERror:SYNC:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the burst synchronization mode for phase and frequency error measurements in the GSM format whether or not that format is active. See "Burst Synchronization of Measurements" on page 280. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | MIDamble\|AMPLitude\|NONE |
| Query | | MID \| AMPL \| NONE |
| *RST Setting | | MID |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:SYNC:GSM MIDAMBLE"`<br>`!Selects burst synchronization to midamble for GSM power versus time measurements.` | | |

### SETup:PFERror:TIMeout[:STIMe][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the phase and frequency error measurement timeout value in seconds and sets the timeout state to on in the active (that is the selected) format. The units (S\|MS) are optional, if no units are specified then unit default to S (seconds). |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STIME 3"`<br>`!Sets the timeout state to on and the timeout value to 3 seconds.` | | |

### SETup:PFERror:TIMeout[:STIMe]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the phase and frequency error measurement timeout value in seconds and sets the timeout state to on in the GPRS format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then unit default to S (seconds). |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |

Programming Example

```
OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STIME:GPRS 3"
!Sets the timeout state to on and the timeout value to 3 seconds.
```

### SETup:PFERror:TIMeout[:STIMe]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the phase and frequency error measurement timeout value in seconds and sets the timeout state to on in the GSM format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then unit default to S (seconds). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |

Programming Example

```
OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STIME:GSM 3"
!Sets the timeout state to on and the timeout value to 3 seconds.
```

### SETup:PFERror:TIMeout:TIME[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that will be used for phase and frequency error measurements when the timeout state is ON in the active (that is the selected) format. The units (S \| MS) are optional, if no units are specified then unit default to S (seconds). |
| | GPRS | |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:TIME 4" !Sets the timeout value to 4 seconds.` | | |

### SETup:PFERror:TIMeout:TIME:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds that will be used for phase and frequency error measurements when the timeout state is ON in the GPRS format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then unit default to S (seconds). |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:TIME:GPRS 4" !Sets the timeout value to 4 seconds.` | | |

### SETup:PFERror:TIMeout:TIME:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that will be used for phase and frequency error measurements when the timeout state is ON in the GSM format whether or not that format is active. The units (S\|MS) are optional, if no units are specified then unit default to S (seconds). |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:TIME:GSM 4" !Sets the timeout value to 4 seconds.` | | |

### SETup:PFERror:TIMeout:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command selects/queries the timeout state for a phase and frequency error measurement in the active (that is the selected) format. |
| Setting | | 0\|OFF \| 1\|ON |
| Query | | 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STATE ON"`<br>`!Sets the timeout state to on for a Phase/Frequency measurement.` | | |

### SETup:PFERror:TIMeout:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the timeout state for a phase and frequency error measurement in the GPRS format whether or not that format is active. |
| Setting | | 0\|OFF \| 1\|ON |
| Query | | 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STATE:GPRS ON"`<br>`!Sets the timeout state to on for a Phase/Frequency measurement.` | | |

### SETup:PFERror:TIMeout:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeout state for a phase and frequency error measurement in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | 0\|OFF \| 1\|ON |
| Query | | 0\|1 |
| *RST Setting | | 0\|OFF |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STATE:GSM ON"`<br>`!Sets the timeout state to on for a Phase/Frequency measurement.` | | |

### SETup:PFERror:TRIGger:DELay[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the trigger delay time in seconds for a phase and frequency error measurement in the active (that is the selected) format. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S (seconds).<br>See "Phase and Frequency Error Measurement Description" on page 63. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:DELAY 1.2MS"`<br>`!Sets trigger delay time to 1.2 milliseconds` | | |

## SETup:PFERror:TRIGger:DELay:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger delay time in seconds for a phase and frequency error measurement in the GPRS format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S (seconds).<br>See "Phase and Frequency Error Measurement Description" on page 63. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | 0 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:DELAY:GPRS 1.2MS"`<br>`!Sets trigger delay time to 1.2 milliseconds` | | |

## SETup:PFERror:TRIGger:DELay:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger delay time in seconds for a phase and frequency error measurement in the GSM format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S (seconds).<br>See "Phase and Frequency Error Measurement Description" on page 63. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | 0 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:DELAY:GSM 1.2MS"`<br>`!Sets trigger delay time to 1.2 milliseconds` | | |

### SETup:PFERror:TRIGer:SOURce[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger source for phase and frequency error measurements in the active (that is the selected) format. See "Phase and Frequency Error Measurement Description" on page 63. |
| | GPRS | |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate<br>See "Triggering of Measurements" on page 276. |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Sets trigger source to automatic.` | | |

### SETup:PFERror:TRIGer:SOURce:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger source for phase and frequency error measurements in the GPRS format whether or not that format is active. See "Phase and Frequency Error Measurement Description" on page 63. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate<br>See "Triggering of Measurements" on page 276. |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE:GPRS AUTO" !Sets trigger source to automatic.` | | |

### SETup:PFERror:TRIGer:SOURce:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger source for phase and frequency error measurements in the GSM format whether or not that format is active. See "Phase and Frequency Error Measurement Description" on page 63. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate<br>See "Triggering of Measurements" on page 276. |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE:GSM AUTO" !Sets trigger source to automatic.` | | |

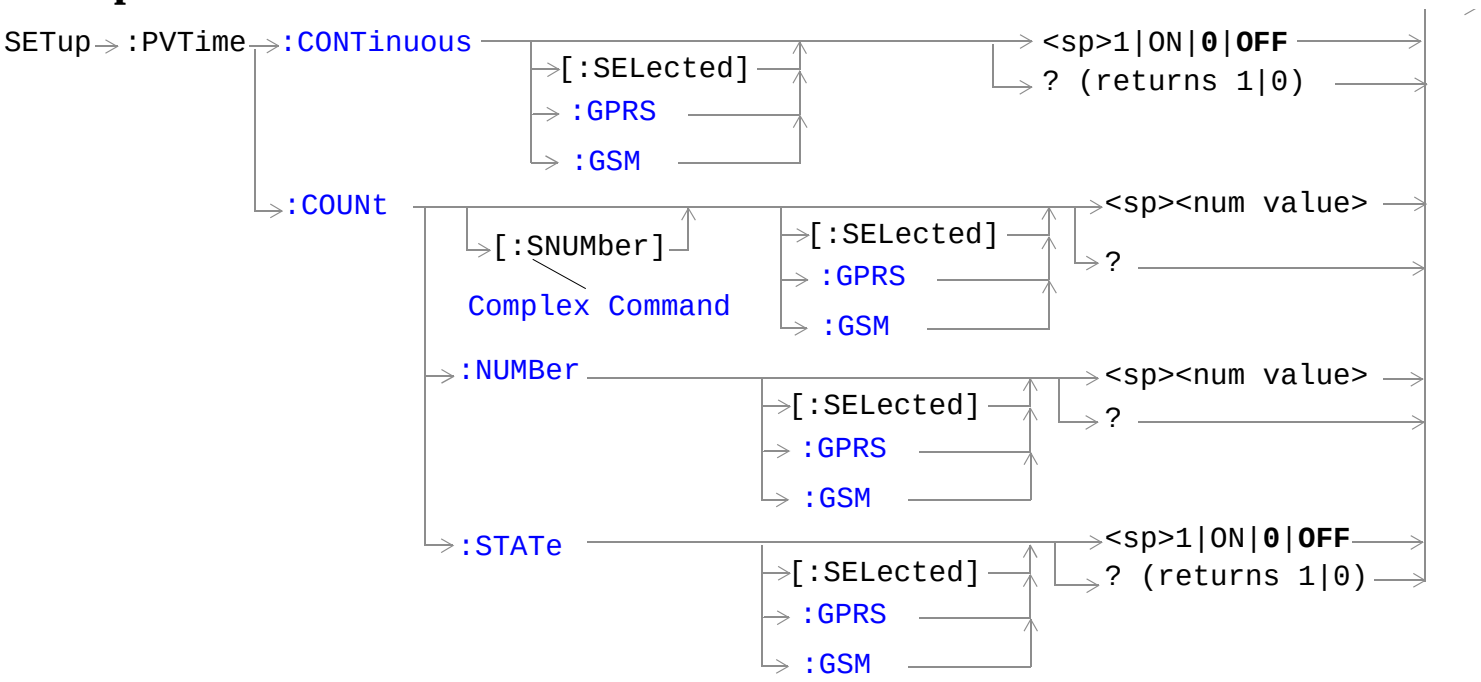
## SETup:PFERror:TRIGger:QUALifier[:SELected]

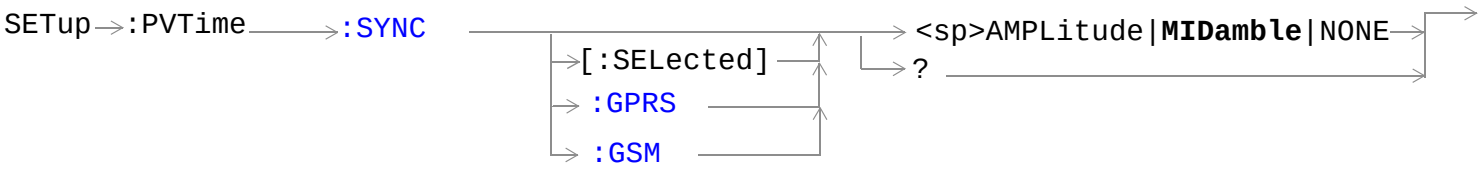
| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger qualifier for phase and frequency error measurements. See "Trigger Qualifier Description" on page 279. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:QUALIFIER OFF" !Sets trigger qualifier state to off.` | | |

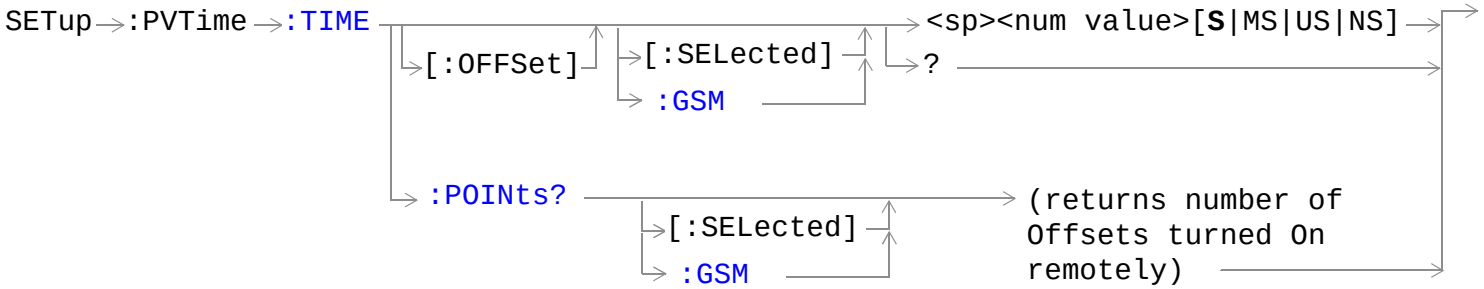
## SETup:PFERror:TRIGger:QUALifier:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger qualifier for phase and frequency error measurements in the GSM format whether or not that format is active. See "Trigger Qualifier Description" on page 279. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 1\|ON |
| Programming Example<br>`OUTPUT 714;"SETUP:PFERROR:TRIGGER:QUALIFIER:GSM OFF" !Sets trigger qualifier state to off.` | | |

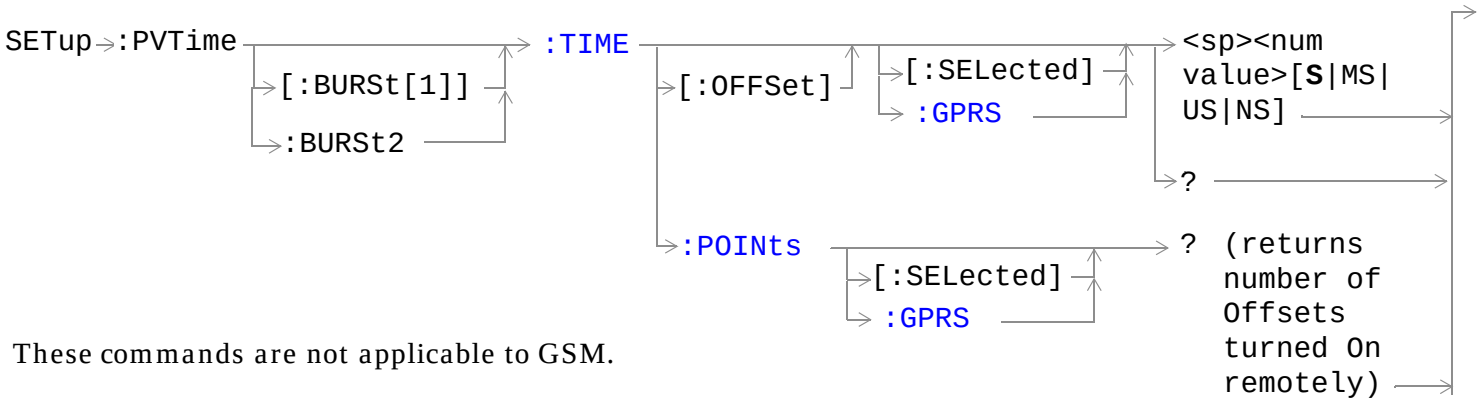
# SETup:PVTime



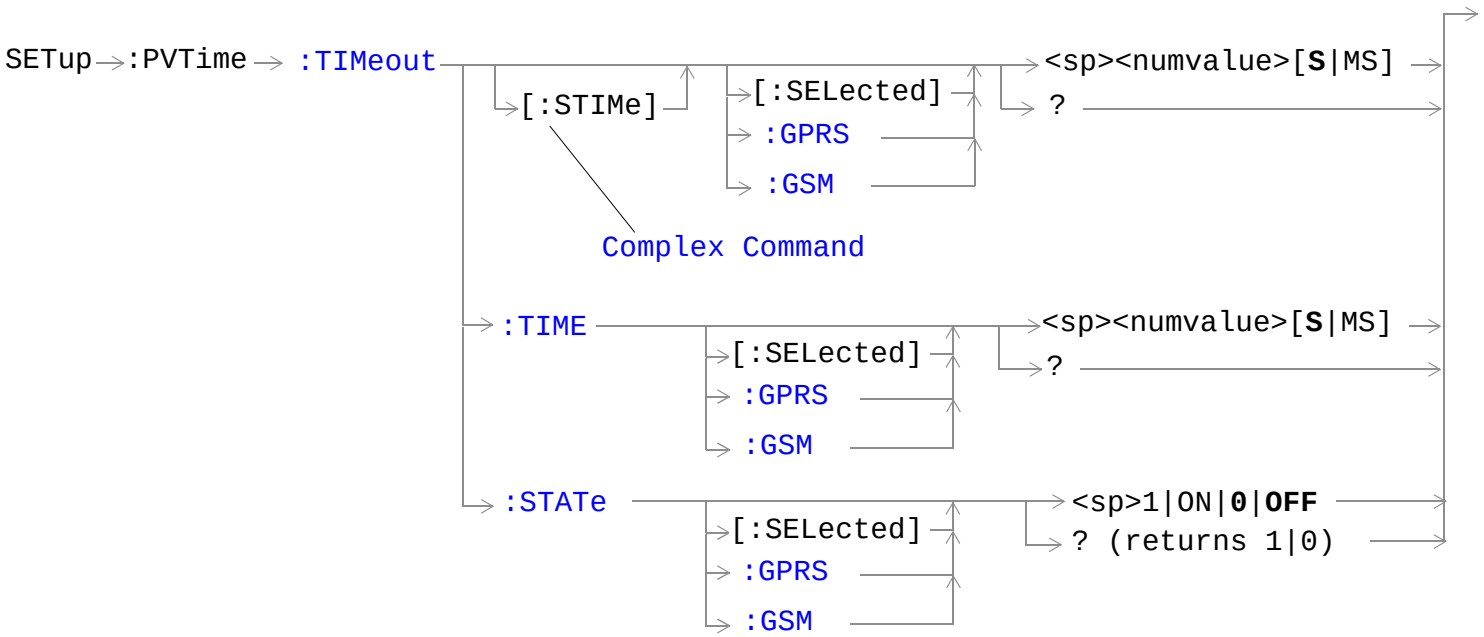



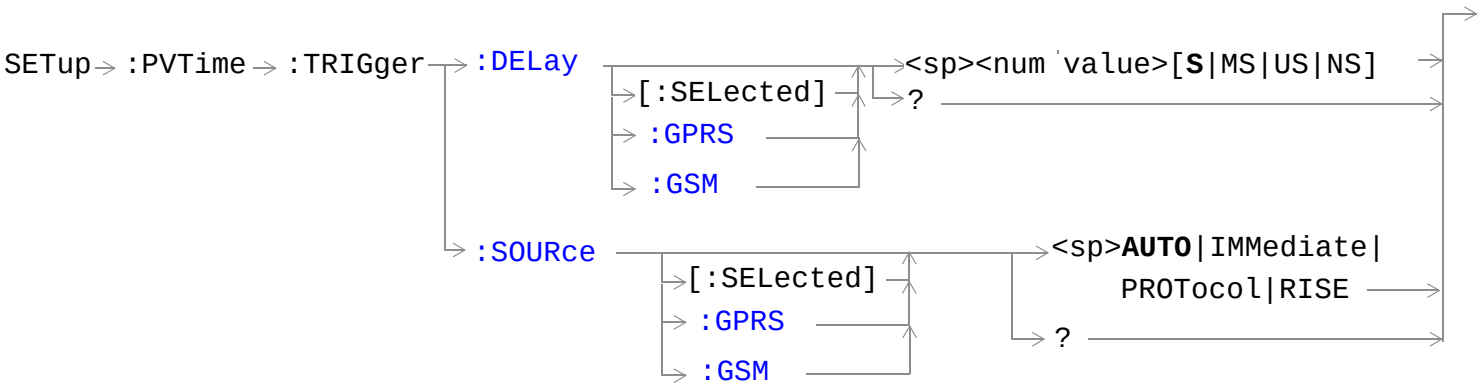



These commands are not applicable to GPRS.




These commands are not applicable to GSM.






"Diagram Conventions" on page 323

### SETup:PVTime:CONTinuous[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the trigger state for power versus time measurements in the active (that is the selected) format. See "Measurement States" on page 278. |
| Setting | | Range:<br>• Single trigger mode = 0 \| OFF<br>• Continuous trigger mode = 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF"`<br>`!Specifies single trigger mode for power versus time measurements.` | | |

## SETup:PVTime:CONTinuous:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger state for power versus time measurements in the GPRS format whether or not that format is active. See "Measurement States" on page 278. |
| Setting | | Range:<br>• Single trigger mode = 0 \| OFF<br>• Continuous trigger mode = 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:CONTINUOUS:GPRS OFF"`<br>`!Specifies single trigger mode for the GPRS power versus time measurements.` | | |

## SETup:PVTime:CONTinuous:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger state for power versus time measurements in the GSM format whether or not that format is active. See "Measurement States" on page 278. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Single trigger mode = 0 \| OFF<br>• Continuous trigger mode = 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:CONTINUOUS:GSM OFF"`<br>`!Specifies single trigger mode for the GSM power versus time measurements.` | | |

### SETup:PVTime:COUNt[:SNUMber][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of power versus time measurements the test set makes in the active (that is the selected) format. This command sets the count state to on. |
| | GPRS | |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:SNUMBER 25"`<br>`!Sets the state to on and the multi-measurement count value to 25.` | | |

### SETup:PVTime:COUNt[:SNUMber]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of power versus time measurements the test set makes in the GPRS format whether or not that format is active. This command sets the count state to ON. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:SNUMBER:GPRS 25"`<br>`!Sets the GPRS count state to on and the multi-measurement count value to 25.` | | |

### SETup:PVTime:COUNt[:SNUMber]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of power versus time measurements the test set makes in the GSM format whether or not that format is active. This command sets the count state to ON. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:GSM 25"`<br>`!Sets the GSM count state to on and the multi-measurement count value to 25.` | | |

### SETup:PVTime:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of Power vs. Time measurements the test set makes in the active (that is the selected) format. The multi-measurement count state must be on. |
| | GPRS | |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 20" !Sets multi-measurement count value to 20.` | | |

### SETup:PVTime:COUNt:NUMBer:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of Power vs. Time measurements the test set makes in the GPRS format whether or not that format is active. The multi-measurement count state must be on. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER:GPRS 20" !Sets the GPRS multi-measurement count value to 20.` | | |

### SETup:PVTime:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of Power vs. Time measurements the test set makes in the GSM format whether or not that format is active. The multi-measurement count state must be on. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER:GSM 20" !Sets the GSM multi-measurement count value to 20.` | | |

### SETup:PVTime:COUNt:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the power versus time multi-measurement count state in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\| ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:STATE ON" !Sets multi-measurement count state to on.` | | |

### SETup:PVTime:COUNt:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the power versus time multi-measurement count state in the GPRS format whether or not that format is active. |
| Setting | | Range: 0\|OFF \| 1\| ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:STATE:GPRS ON" !Sets the GPRS power vs time multi-measurement count state to on.` | | |

### SETup:PVTime:COUNt:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the power versus time multi-measurement count state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\| ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:COUNT:STATE:GSM ON" !Sets the GSM power versus time multi-measurement count state to on.` | | |

### SETup:PVTime:SYNC[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the burst synchronization mode for power versus time measurements in the active (that is the selected) format. See "Burst Synchronization of Measurements" on page 280. |
| | GPRS | |
| Setting | | MIDamble\|AMPLitude\|NONE |
| Query | | MID \| AMPL \| NONE |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:SYNC MIDAMBLE"`<br>`!Selects burst synchronization to midamble for GPRS power versus time measurements.` | | |

### SETup:PVTime:SYNC:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the burst synchronization mode for power versus time measurements in the GPRS format whether or not that format is active. See "Burst Synchronization of Measurements" on page 280. |
| Setting | | MIDamble\|AMPLitude\|NONE |
| Query | | MID \| AMPL \| NONE |
| *RST Setting | | MID |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:SYNC:GPRS MIDAMBLE"`<br>`!Selects burst synchronization to midamble for GPRS power versus time measurements.` | | |

### SETup:PVTime:SYNC:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the burst synchronization mode for power versus time measurements in the GSM format whether or not that format is active. See "Burst Synchronization of Measurements" on page 280. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | MIDamble\|AMPLitude\|NONE |
| Query | | MID \| AMPL \| NONE |
| *RST Setting | | MID |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:SYNC:GSM MIDAMBLE"`<br>`!Selects burst synchronization to midamble for GSM power versus time measurements.` | | |

## SETup:PVTime:TIME[:OFFSet][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time offsets in seconds for power vs time power measurement, (not the mask measurement) in the active (that is the selected) format.<br><br>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see "Power versus Time Measurement Description" on page 67. These values are referenced to the occurrence of bit 0 in a normal burst.<br><br>The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 12 comma-separated values ranging from: –50 us to 593 µs<br><br>Resolution: 1 ns |
| Query | | Range: 1 to 12 comma-separated values ranging from: –50 us to 593 µs and 9.91E+37 (NAN) if no offsets are specified<br><br>Resolution: 1 ns |
| *RST Setting | | Time offsets 1 through 12 are on and set to these values:<br><br>time offset 1 = –28 us<br>time offset 2 = –18 us<br>time offset 3 = –10 us<br>time offset 4 = 0 us<br>time offset 5 = 321.2 us<br>time offset 6 = 331.2 us<br>time offset 7 = 339.2 us<br>time offset 8 = 349.2 us<br>time offset 9 = 542.8 us<br>time offset 10 = 552.8 us<br>time offset 11 = 560.8 us<br>time offset 12 =570.8 us |

Programming Example

```
OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0US, -18.0US, -10.0US, 0"

!Configures the first four time offset points and turns the remaining eight off.
!Using the query form of this command would return four time offset values

OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0US"  !Configures the first time offset
                                               !point and turns the remaining
                                               !eleven off. Using the query form
                                               !of this command would return one
                                                !time offset value

OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET" !Turns all 12 offset points off. Using the
                                      !query form of this command would return
                                      !9.91E+37 (NAN)
```

## SETup:PVTime:TIME[:OFFSet]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the time offsets in seconds for power vs time power measurement, (not the mask measurement) in the GSM format whether or not that format is active.<br><br>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see "Power versus Time Measurement Description" on page 67. These values are referenced to the occurrence of bit 0 in a normal burst.<br><br>The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 12 comma-separated values ranging from: –50 us to 593 µs<br><br>Resolution: 1 ns |
| Query | | Range: 1 to 12 comma-separated values ranging from: –50 us to 593 µs and 9.91E+37 (NAN) if no offsets are specified<br><br>Resolution: 1 ns |
| *RST Setting | | Time offsets 1 through 12 are on and set to these values:<br><br>time offset 1 = –28 us<br>time offset 2 = –18 us<br>time offset 3 = –10 us<br>time offset 4 = 0 us<br>time offset 5 = 321.2 us<br>time offset 6 = 331.2 us<br>time offset 7 = 339.2 us<br>time offset 8 = 349.2 us<br>time offset 9 = 542.8 us<br>time offset 10 = 552.8 us<br>time offset 11 = 560.8 us<br>time offset 12 =570.8 us |

Programming Example

```
OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET:GSM -28.0US, -18.0US, -10.0US, 0"

!Configures the first four time offset points and turns the remaining eight off.
!Using the query form of this command would return four time offset values

OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET:GSM -28.0US"  !Configures the first time offset
                                                   !point and turns the remaining
                                                   !eleven off. Using the query form
                                                   !of this command would return one
                                                   !time offset value

OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET:GSM" !Turns all 12 offset points off. Using the
                                          !query form of this command would return
                                          !9.91E+37 (NAN)
```

## SETup:PVTime[:BURSt[1]]:TIME[:OFFSet][:SELected]
## SETup:PVTime:BURSt2:TIME[:OFFSet][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the time offsets (for the specified burst of the multislot configuration) for the power vs time power measurement, (not the mask measurement) in the active (that is the selected) format.<br>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see "Power versus Time Measurement Description" on page 67. These values are referenced to the occurrence of bit 0 in a normal burst.<br>The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0 to 12 comma-separated values ranging from: –50 us to 593 µs<br>Note that there is a further restriction on this range to ensure that a valid result is returned when testing a GPRS mobile which supports a multislot configuration with two uplink timeslots. For more details, see "Time Offset Range Restrictions for GPRS Mobiles" on page 965.<br>Resolution: 1 ns |
| Query | | Range: 1 to 12 comma-separated values ranging from: –50 us to 593 µs and 9.91E+37 (NAN) if no offsets are specified<br>Resolution: 1 ns |
| *RST Setting | | Time offsets 1 through 12 are on and set to these values: |

| **Burst 1** | **Burst 2** |
|---|---|
| time offset 1 = –28 us | time offset 1 = 0 us |
| time offset 2 = –18 us | time offset 2 = 0 us |
| time offset 3 = –10 us | time offset 3 = 0 us |
| time offset 4 = 0 us | time offset 4 = 0 us |
| time offset 5 = 321.2 us | time offset 5 = 321.2 us |
| time offset 6 = 331.2 us | time offset 6 = 331.2 us |
| time offset 7 = 339.2 us | time offset 7 = 339.2 us |
| time offset 8 = 349.2 µs | time offset 8 = 349.2 us |
| time offset 9 = 542.8 us | time offset 9 = 542.8 us |
| time offset 10 = 552.8 us | time offset 10 = 552.8 us |
| time offset 11 = 560.8 us | time offset 11 = 560.8 us |
| time offset 12 = 570.8 us | time offset 12 = 570.8 us |

Programming Example

```
OUTPUT 714;"SETUP:PVTIME:BURSt2:TIME:OFFSET 0US, 0US, 0US, 0US, 321.2.0US, 331.2US"

!Configures the first six time offset points and turns the remaining six off for burst 2.
!Using the query form of this command would return six time offset values.
```

## SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]:GPRSSETup:PVTime:BURSt2:TIME[:OFFSet]:GPRS

<table>
<tr><td rowspan="2">Function</td><td>GSM</td><td>This command is not applicable to GSM.</td></tr>
<tr><td>GPRS</td><td>This command sets/queries the time offsets (for the specified burst of the multislot configuration) for the power vs time power measurement, (not the mask measurement) in the GPRS format whether or not that format is active.<br><br>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see “Power versus Time Measurement Description” on page 67. These values are referenced to the occurrence of bit 0 in a normal burst.<br><br>The units (S | MS | US | NS) are optional, if no units are specified then units default to S.</td></tr>
<tr><td colspan="2">Setting</td><td>Range: 0 to 12 comma-separated values ranging from: –50 us to 593 µs<br><br>Note that there is a further restriction on this range to ensure that a valid result is returned when testing a GPRS mobile which supports a multislot configuration with two uplink timeslots. For more details, see “Time Offset Range Restrictions for GPRS Mobiles” on page 965.<br><br>Resolution: 1 ns</td></tr>
<tr><td colspan="2">Query</td><td>Range: 1 to 12 comma-separated values ranging from: –50 us to 593 µs and 9.91E+37 (NAN) if no offsets are specified<br><br>Resolution: 1 ns</td></tr>
<tr><td colspan="2">*RST Setting</td><td>Time offsets 1 through 12 are on and set to these values:<br><br>Burst 1<br><br>time offset 1 = –28 us<br>time offset 2 = –18 us<br>time offset 3 = –10 us<br>time offset 4 = 0 us<br>time offset 5 = 321.2 us<br>time offset 6 = 331.2 us<br>time offset 7 = 339.2 us<br>time offset 8 = 349.2 µs<br>time offset 9 = 542.8 us<br>time offset 10 = 552.8 us<br>time offset 11 = 560.8 us<br>time offset 12 = 570.8 us<br><br>Burst 2<br><br>time offset 1 = 0 us<br>time offset 2 = 0 us<br>time offset 3 = 0 us<br>time offset 4 = 0 us<br>time offset 5 = 321.2 us<br>time offset 6 = 331.2 us<br>time offset 7 = 339.2 us<br>time offset 8 = 349.2 us<br>time offset 9 = 542.8 us<br>time offset 10 = 552.8 us<br>time offset 11 = 560.8 us<br>time offset 12 = 570.8 us</td></tr>
<tr><td colspan="3">Programming Example<br><br><code>OUTPUT 714;"SETUP:PVTIME:BURSt2:TIME:OFFSET:GPRS 0US, 0US, 0US, 0US, 321.2.0US, 331.2US"<br><br>!Configures the first six time offset points and turns the remaining six off for burst 2.<br>!Using the query form of this command would return six time offset values.</code></td></tr>
</table>

## SETup:PVTime:TIME:POINts[:SELected]?

| | | |
|---|---|---|
| Function | GSM | This command queries the number of Measurement Offset points that are turned on during a power versus time measurement in the active (that is the selected) format.<br>This command is useful for determining how many time values are returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet][:SELected]" query is sent, and how many power values are returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 581 command is sent. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 12<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

## SETup:PVTime:TIME:POINts:GSM?

| | | |
|---|---|---|
| Function | GSM | This command queries the number of Measurement Offset points that are turned on during a power versus time measurement in the GSM format whether or not that format is active.<br>This command is useful for determining how many time values are returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet][:SELected]" query is sent, and how many power values are returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 581 command is sent. |
| | GPRS | This command is not applicable to GPRS. |
| Query | | Range: 0 to 12<br>Resolution: 1 |
| *RST Setting | | 12 |

### SETup:PVTime[BURSt[1]]:TIME:POINts[:SELected]?
### SETup:PVTime:BURSt2:TIME:POINts[:SELected]?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command queries the number of the specified burst's Measurement Offset points that are turned on during a power versus time measurement in the active (that is the selected) format.<br>This command is useful for determining how many time values are returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet][:SELected]" query is sent, and how many power values are returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 581 command is sent. |
| Query | | Range: 0 to 12<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

### SETup:PVTime[BURSt[1]]:TIME:POINts:GPRS?
### SETup:PVTime:BURSt2:TIME:POINts:GPRS?

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command queries the number of the specified burst's Measurement Offset points that are turned on during a power versus time measurement in the GPRS format whether or not that format is active.<br>This command is useful for determining how many time values are returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet][:SELected]" query is sent, and how many power values are returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 581 command is sent. |
| Query | | Range: 0 to 12<br>Resolution: 1 |
| *RST Setting | | 12 |

## SETup:PVTime:TIMeout[:STIMe][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the timeout value in seconds that is used for power versus time measurements in the active (that is the selected) format. This command also sets the timeout state to on. The units (S \| MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STIME 4" !Sets the state to on and the timeout`<br>`!value to 4 seconds.` | | |

## SETup:PVTime:TIMeout[:STIMe]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds that is used for power versus time measurements in the GPRS format whether or not that format is active. This command also sets the timeout state to on. The units (S \| MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STIME:GPRS 4" !Sets the GPRS PvT state to on and the`<br>`!timeout value to 4 seconds.` | | |

### SETup:PVTime:TIMeout[:STIMe]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that is used for power versus time measurements in the GSM format whether or not that format is active. This command also sets the timeout state to on. The units (S \| MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STIME:GSM 4" !Sets the GSM PvT state to on and the timeout !value to 4 seconds.` | | |

### SETup:PVTime:TIMeout:TIME[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the timeout value in seconds that will be used for power versus time measurements in the active (that is the selected) format. The units (S \| MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:TIME 6" !Sets the timeout value to 6 seconds.` | | |

### SETup:PVTime:TIMeout:TIME:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds that will be used for power versus time measurements in the GPRS format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:TIME:GPRS 6" !Sets the GPRS PvT timeout value to 6 seconds.` | | |

### SETup:PVTime:TIMeout:TIME:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that will be used for power versus time measurements in the GSM format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:TIME:GSM 6" !Sets the GSM PvT timeout value to 6 seconds.` | | |

### SETup:PVTime:TIMeout:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries power versus time timeout state in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0 \|OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STATE ON" !Sets timeout state to on.` | | |

### SETup:PVTime:TIMeout:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries power versus time timeout state in the GPRS format whether or not that format is active. |
| Setting | | Range: 0 \|OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STATE:GPRS ON" !Sets the GPRS PvT timeout state to on.` | | |

### SETup:PVTime:TIMeout:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries power versus time timeout state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 \|OFF \| 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STATE:GSM ON" !Sets the GSM PvT timeout state to on.` | | |

## SETup:PVTime:TRIGger:DELay[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger delay in seconds for power versus time measurements in the active (that is the selected) format. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| | GPRS | |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY 1.1MS" !Sets trigger delay value to 1.1
                                              !milli-seconds.
```

## SETup:PVTime:TRIGger:DELay:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the trigger delay in seconds for power versus time measurements in the GPRS format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | 0 seconds |

Programming Example

```
OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY:GPRS 1.1MS" !Sets the GPRS PvT trigger delay value to
                                                   !1.1 milli-seconds.
```

### SETup:PVTime:TRIGger:DELay:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger delay in seconds for power versus time measurements in the GSM format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | 0 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY:GSM 1.1MS" !Sets the GSM PvT trigger delay value to !1.1 milli-seconds.` | | |

### SETup:PVTime:TRIGger:SOURce[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command selects/queries the trigger source for power versus time measurements in the active (that is the selected) format. See "Triggering of Measurements" on page 276. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Sets trigger source to automatic.` | | |

### SETup:PVTime:TRIGger:SOURce:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the trigger source for power versus time measurements in the GPRS format whether or not that format is active. See "Triggering of Measurements" on page 276. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE:GPRS AUTO" !Sets the trigger source for the GPRS PvT measurement to automatic.` | | |

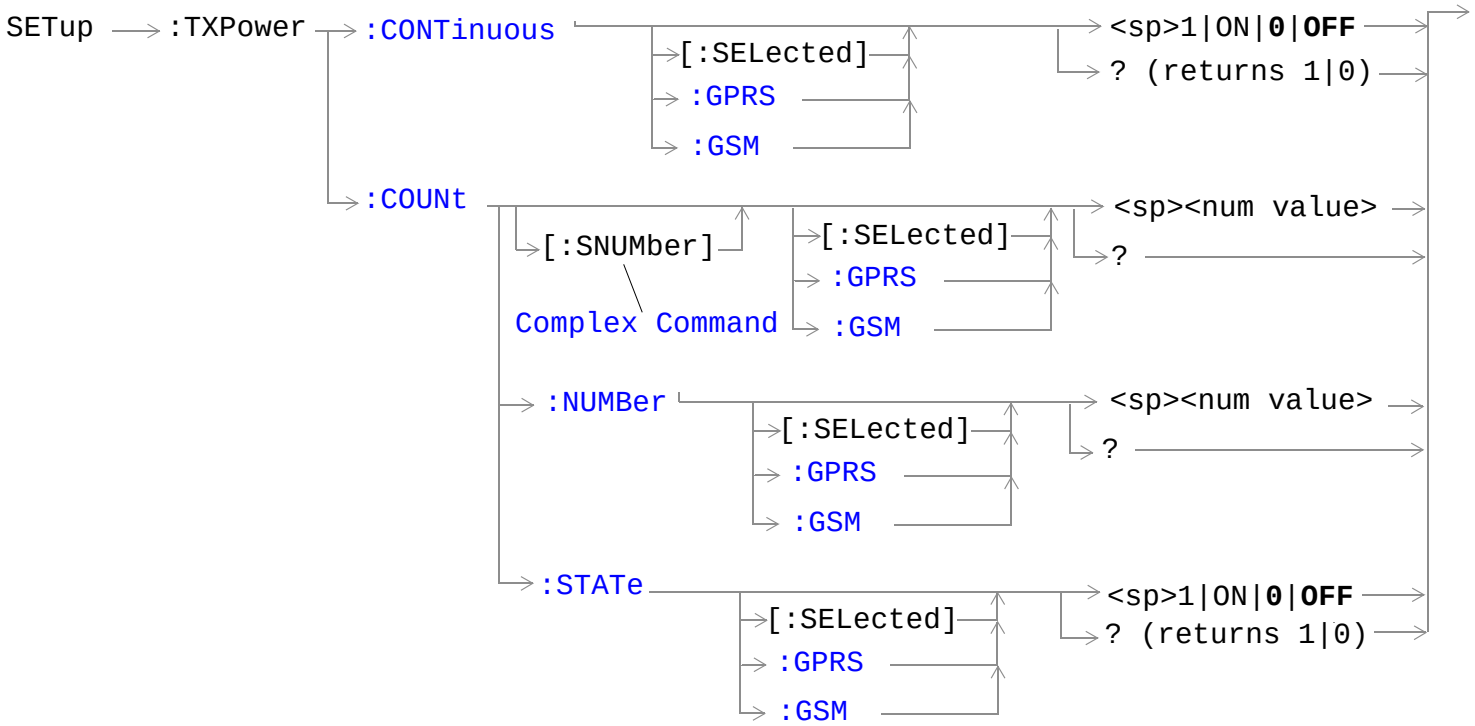
## SETup:PVTime:TRIGger:SOURce:GSM

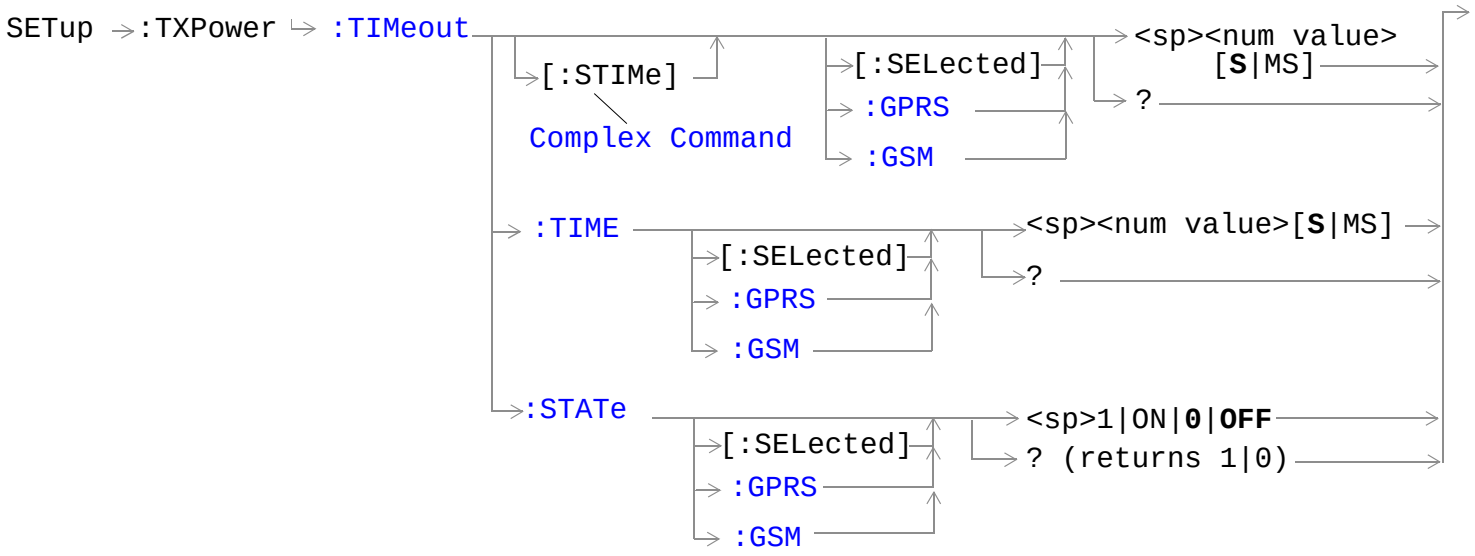
| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger source for power versus time measurements in the GSM format whether or not that format is active. See "Triggering of Measurements" on page 276. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | AUTO |

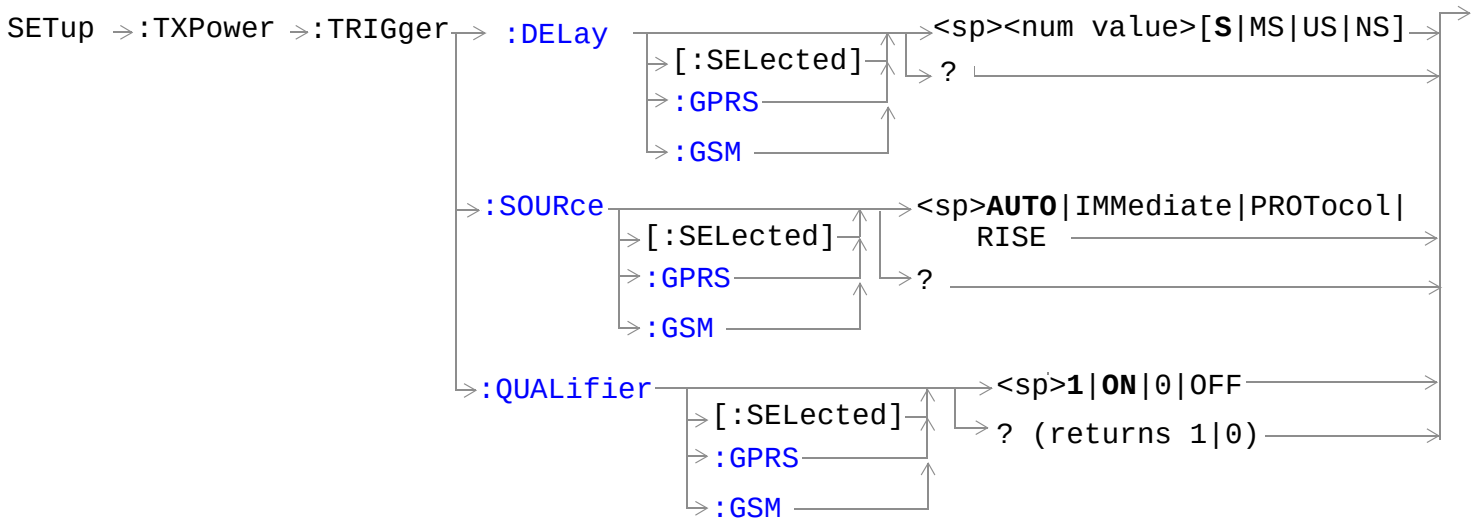
Programming Example

```
OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Sets the trigger source for the GSM PvT
measurement to automatic.
```

# SETup:TXPower






"Diagram Conventions" on page 323

### SETup:TXPower:CONTinuous[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the trigger state for TX carrier power measurements in the active (that is the selected) format. |
| Setting | | Range:<br>• Single trigger mode = 0\|OFF<br>• Continuous trigger mode = 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Specifies single trigger mode for TX carrier power measurements.` | | |

### SETup:TXPower:CONTinuous:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger state for TX carrier power measurements in the GPRS format whether or not that format is active. |

| | |
|---|---|
| Setting | Range:<br>• Single trigger mode = 0 \| OFF<br>• Continuous trigger mode = 1 \| ON |
| Query | Range: 0 \| 1 |
| *RST Setting | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS:GPRS OFF"` !Specifies single trigger mode for GPRS TX carrier power measurements. | |

### SETup:TXPower:CONTinuous:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger state for TX carrier power measurements in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range:<br>• Single trigger mode = 0 \| OFF<br>• Continuous trigger mode = 1 \| ON |
| Query | | Range: 0 \| 1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS:GSM OFF" !Specifies single trigger mode for GSM TX carrier power measurements.` | | |

### SETup:TXPower:COUNt[:SNUMber][:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of TX carrier power measurements the test set makes in the active (that is the selected) format. This command sets the count state to on. |
| | GPRS | |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:SNUMBER 99"`<br>`!Sets the state to on and the multi-measurement count value to 99.` | | |

### SETup:TXPower:COUNt[:SNUMber]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of TX carrier power measurements the test set makes in the GPRS format whether or not that format is active. This command sets the count state to on. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:SNUMBER:GPRS 99"`<br>`!Sets the state to on and the multi-measurement count value to 99.` | | |

### SETup:TXPower:COUNt[:SNUMber]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of TX carrier power measurements the test set makes in the GSM format whether or not that format is active. This command sets the count state to on. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:SNUMBER:GSM 99"`<br>`!Sets the state to on and the multi-measurement count value to 99.` | | |

### SETup:TXPower:COUNt:NUMBer[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of TX power measurements the test set makes in the active (that is the selected) format. The multi-measurement count state must be on. |
| | GPRS | |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 5"`<br>`!Sets the TX Power multi-measurementcount number to 5.` | | |

### SETup:TXPower:COUNt:NUMBer:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the number of TX power measurements the test set makes in the GPRS format whether or not that format is active. The multi-measurement count state must be on. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER:GPRS 5"`<br>`!Sets the TX Power multi-measurementcount number to 5.` | | |

### SETup:TXPower:COUNt:NUMBer:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the number of TX power measurements the test set makes in the GSM format whether or not that format is active. The multi-measurement count state must be on. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 1 to 999<br>Resolution: 1 |
| Query | | Range: 1 to 999<br>Resolution: 1 |
| *RST Setting | | 10 |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER:GSM 5"`<br>`!Sets the TX Power multi-measurementcount number to 5.` | | |

### SETup:TXPower:COUNt:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the TX power multi-measurement count state in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE ON" !Sets the multi-measurement count state to on.` | | |

### SETup:TXPower:COUNt:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the TX power multi-measurement count state in the GPRS format whether or not that format is active. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE:GPRS ON" !Sets the multi-measurement count state to on.` | | |

### SETup:TXPower:COUNt:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the TX power multi-measurement count state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE:GSM ON" !Sets the multi-measurement count state to on.` | | |

### SETup:TXPower:TIMeout[:STIMe][:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the TX carrier power measurement timeout value in the active (that is the selected) format. This command also sets the count state to on. The units (S\|MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:STIME 20"`<br>`!Sets the state to on and the timeout value to 20 seconds.` | | |

### SETup:TXPower:TIMeout[:STIMe]:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the TX carrier power measurement timeout value in the GPRS format whether or not that format is active. This command also sets the count state to on. The units (S \| MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:STIME:GPRS 20"`<br>`!Sets the state to on and the timeout value to 20 seconds.` | | |

### SETup:TXPower:TIMeout[:STIMe]:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the TX carrier power measurement timeout value in the GSM format whether or not that format is active. This command also sets the count state to on. The units (S \| MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:STIME:GSM 20"`<br>`!Sets the state to on and the timeout value to 20 seconds.` | | |

### SETup:TXPower:TIMeout:TIME[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that will be used for TX power measurements in the active (that is the selected) format. The units (S \| MS) are optional, if no units are specified then units default to S. |
| | GPRS | |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME 20"
!Sets the TX power measurement timeout to 20 seconds.
```

### SETup:TXPower:TIMeout:TIME:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the timeout value in seconds that will be used for TX power measurements in the GPRS format whether or not that format is active. The units (S \| MS) are optional, if no units are specified then units default to S. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |

Programming Example

```
OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME:GPRS 20"
!Sets the GPRS TX power measurement timeout to 20 seconds.
```

### SETup:TXPower:TIMeout:TIME:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the timeout value in seconds that will be used for TX power measurements in the GSM format whether or not that format is active. The units (S\|MS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| Query | | Range: 0.1 to 999 seconds<br>Resolution: 0.1 seconds |
| *RST Setting | | 10 seconds |

Programming Example

```
OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME:GSM 20"
!Sets the GSM TX power measurement timeout to 20 seconds.
```

### SETup:TXPower:TIMeout:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries TX carrier power measurement timeout state in the active (that is the selected) format. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |

Programming Example

```
OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE 1"
!Turns the TX carrier power timeout state on.
```

### SETup:TXPower:TIMeout:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries TX carrier power measurement timeout state in the GPRS format whether or not that format is active. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE:GPRS 1"`<br>`!Turns the GPRS TX carrier power timeout state on.` | | |

### SETup:TXPower:TIMeout:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries TX carrier power measurement timeout state in the GSM format whether or not that format is active. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE:GSM 1"`<br>`!Turns the GSM TX carrier power timeout state on.` | | |

### SETup:TXPower:TRIGger:DELay[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | This command sets/queries the trigger delay in seconds for TX carrier power measurements in the active (that is the selected) format. The units (S\|MS\|US\|NS) are optional, if no units are specified then units default to S. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:DELAY 1.5MS" !Set trigger delay time to 1.5 milliseconds` | | |

### SETup:TXPower:TRIGger:DELay:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger delay in seconds for TX carrier power measurements in the GPRS format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | zero seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:DELAY:GPRS 1.5MS" !Set trigger delay time to 1.5 milliseconds` | | |

### SETup:TXPower:TRIGger:DELay:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger delay in seconds for TX carrier power measurements in the GSM format whether or not that format is active. The units (S \| MS \| US \| NS) are optional, if no units are specified then units default to S. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| Query | | Range: –2.31 ms to +2.31 ms<br>Resolution: 5 significant digits or 100 ns, whichever is greater |
| *RST Setting | | zero seconds |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:DELAY:GSM 1.5MS" !Set trigger delay time to 1.5 milliseconds` | | |

### SETup:TXPower:TRIGger:SOURce[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger source for TX carrier power measurements in the active (that is the selected) format. See "Triggering of Measurements" on page 276. |
| | GPRS | |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Sets trigger source to automatic.` | | |

### SETup:TXPower:TRIGger:SOURce:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries the trigger source for TX carrier power measurements in the GPRS format whether or not that format is active. See "Triggering of Measurements" on page 276. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE:GPRS AUTO" !Sets trigger source to automatic.` | | |

### SETup:TXPower:TRIGger:SOURce:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the trigger source for TX carrier power measurements in the GSM format whether or not that format is active. See "Triggering of Measurements" on page 276. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | AUTO \| PROTocol \| RISE \| IMMediate |
| Query | | AUTO \| PROT \| RISE \| IMM |
| *RST Setting | | AUTO |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE:GSM AUTO" !Sets trigger source to automatic.` | | |

### SETup:TXPower:TRIGger:QUALifier[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger qualification for TX carrier power measurements in the active (that is the selected) format. When ON, an automatic trigger re-arm occurs if a measurement is triggered when no valid signal (burst) is present. See "Trigger Qualifier Description" on page 279. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | The *RST value of this command depends on the format that is currently active. For example, if the GSM format is currently active, the *RST value for this command is the same value as the equivalent command containing the :GSM format identifier. |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:QUALIFIER ON" !Sets trigger qualifier state to on.` | | |

### SETup:TXPower:TRIGger:QUALifier:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the trigger qualification for TX carrier power measurements in the GPRS format whether or not that format is active. When ON, an automatic trigger re-arm occurs if a measurement is triggered when no valid signal (burst) is present. See "Trigger Qualifier Description" on page 279. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:QUALIFIER:GPRS ON" !Sets trigger qualifier state to on.` | | |

## SETup:TXPower:TRIGger:QUALifier:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the trigger qualification for TX carrier power measurements in the GSM format whether or not that format is active. When ON, an automatic trigger re-arm occurs if a measurement is triggered when no valid signal (burst) is present. See "Trigger Qualifier Description" on page 279. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SETUP:TXPOWER:TRIGGER:QUALIFIER:GSM ON" !Sets trigger qualifier state to on.` | | |

# STATus Subsystem Description

## 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 784

"STATus:PRESet" on page 809

"STATus:QUEStionable" on page 810

"Standard Event Status Register" on page 834

"Status Byte Register" on page 833


#### Status Register Bit Definitions


"Status Byte Register Bit Assignments" on page 833

"Standard Event Status Register Bit Assignment" on page 835

"STATus:QUEStionable Condition Register Bit Assignment" on page 817

"STATus:QUEStionable:CALL Condition Register Bit Assignment" on page 818

"STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment" on page 822

"STATus:QUEStionable:ERRors Condition Register Bit Assignment" on page 824

"STATus:QUEStionable:ERRors:GSM Condition Register Bit Assignment" on page 829

"STATus:QUEStionable:HARDware Condition Register Bit Assignment" on page 832

"STATus:OPERation Condition Register Bit Assignment" on page 790

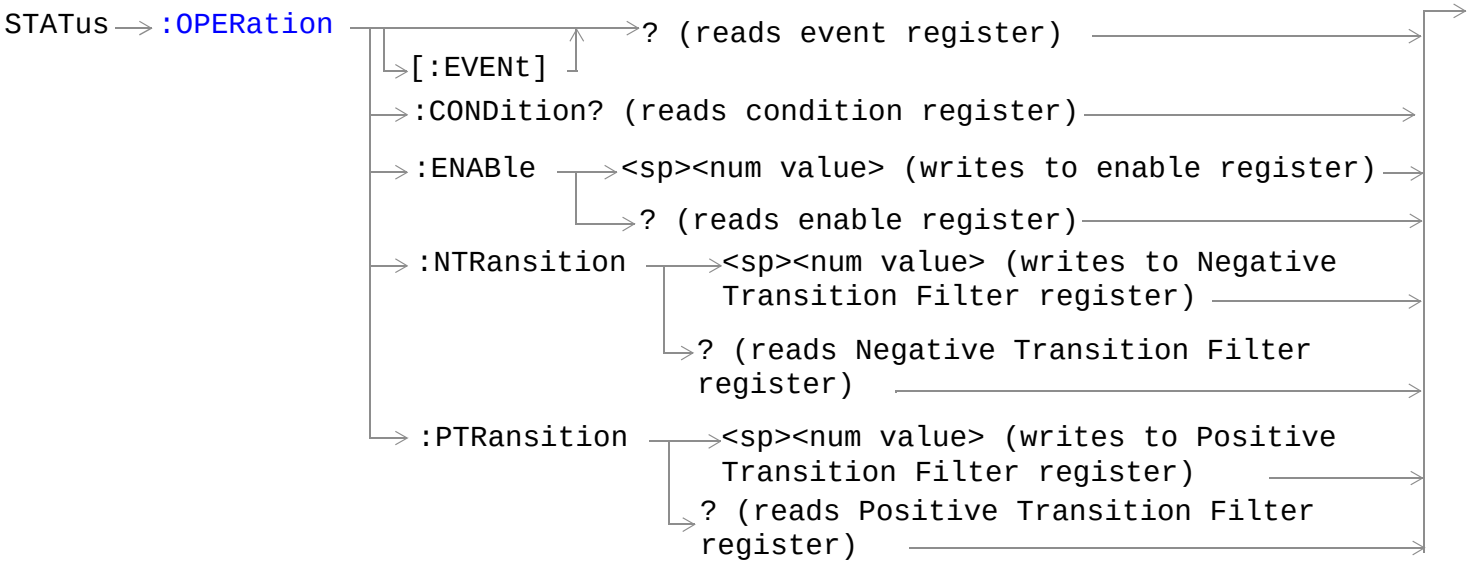
"STATus:OPERation:CALL Condition Register Bit Assignment" on page 792

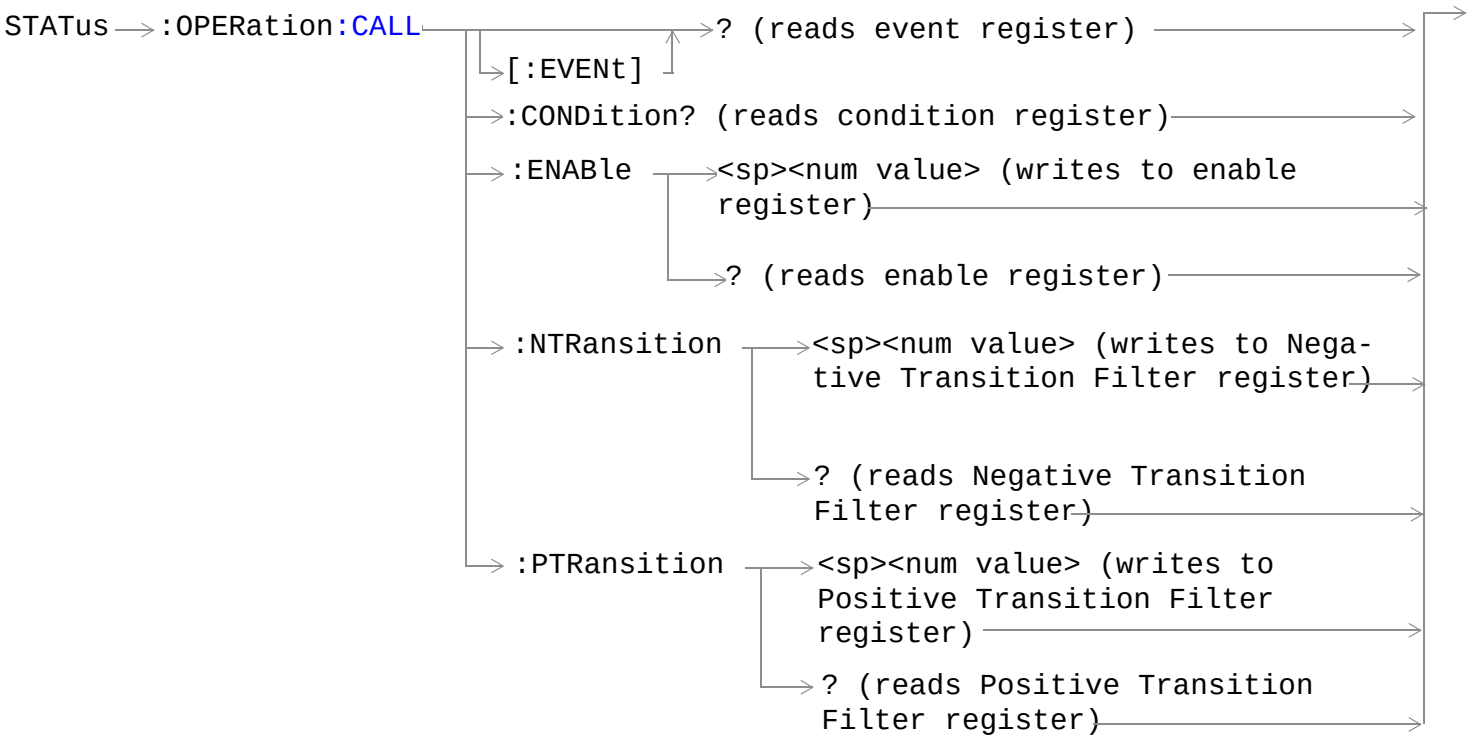
"STATus:OPERation:CALL:GSM Condition Register Bit Assignment" on page 796

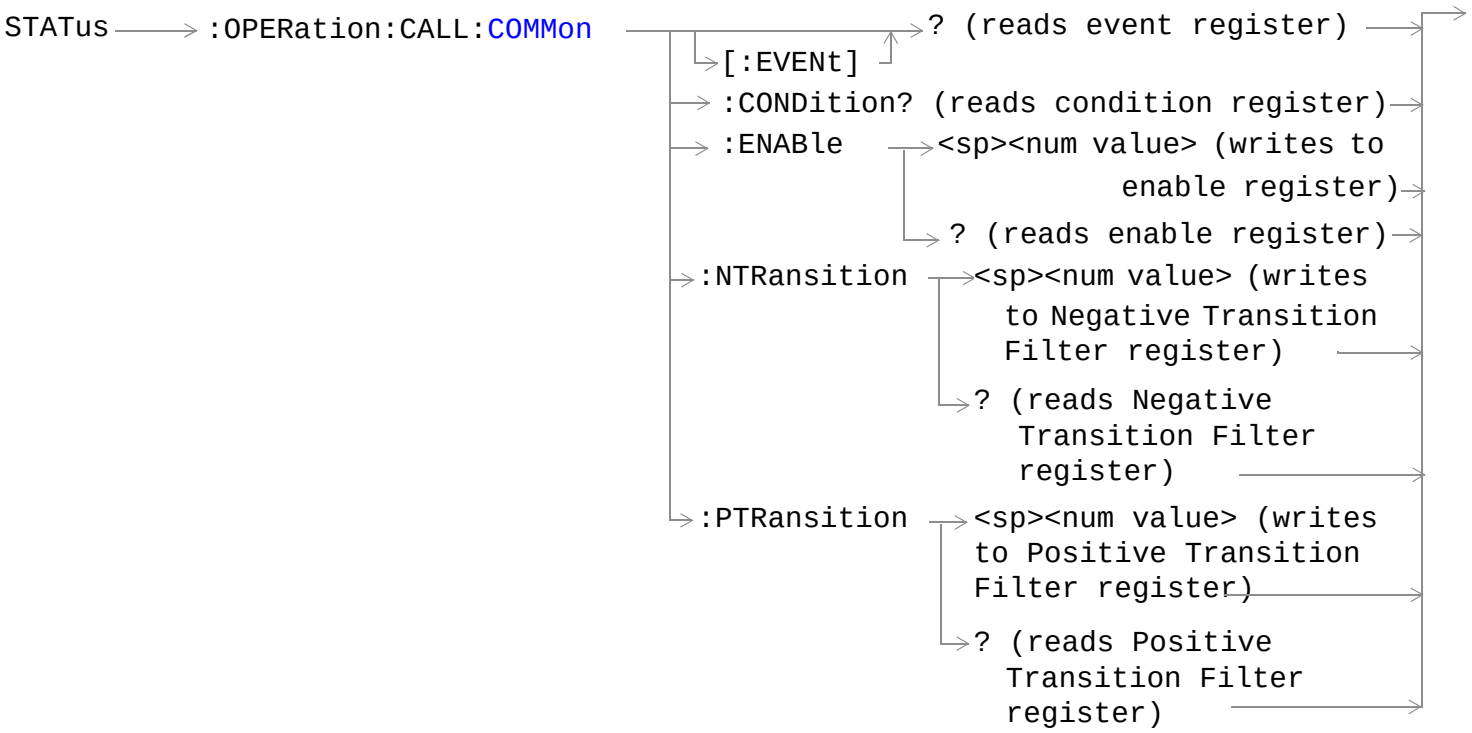
"STATus:OPERation:NMRReady Condition Register Bit Assignment" on page 800

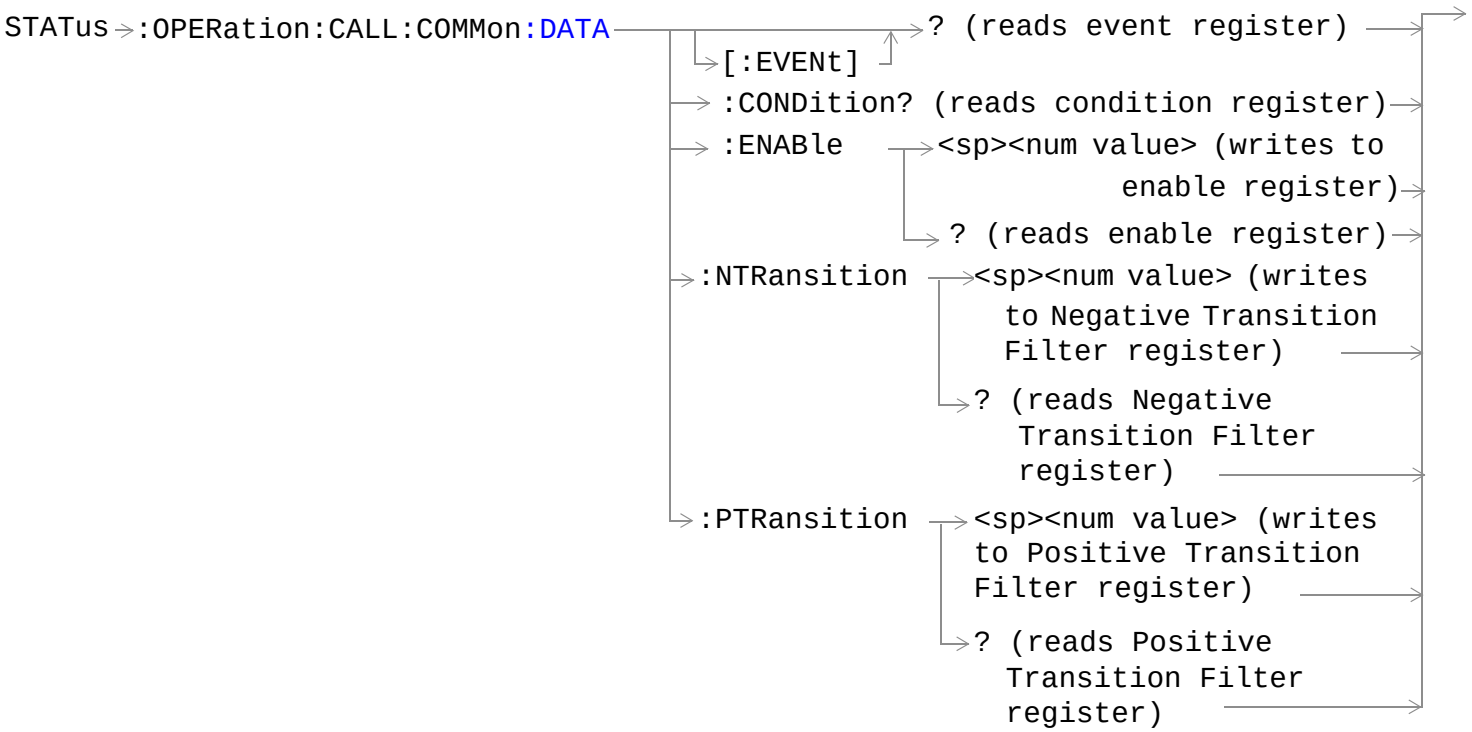
"STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment" on page 806

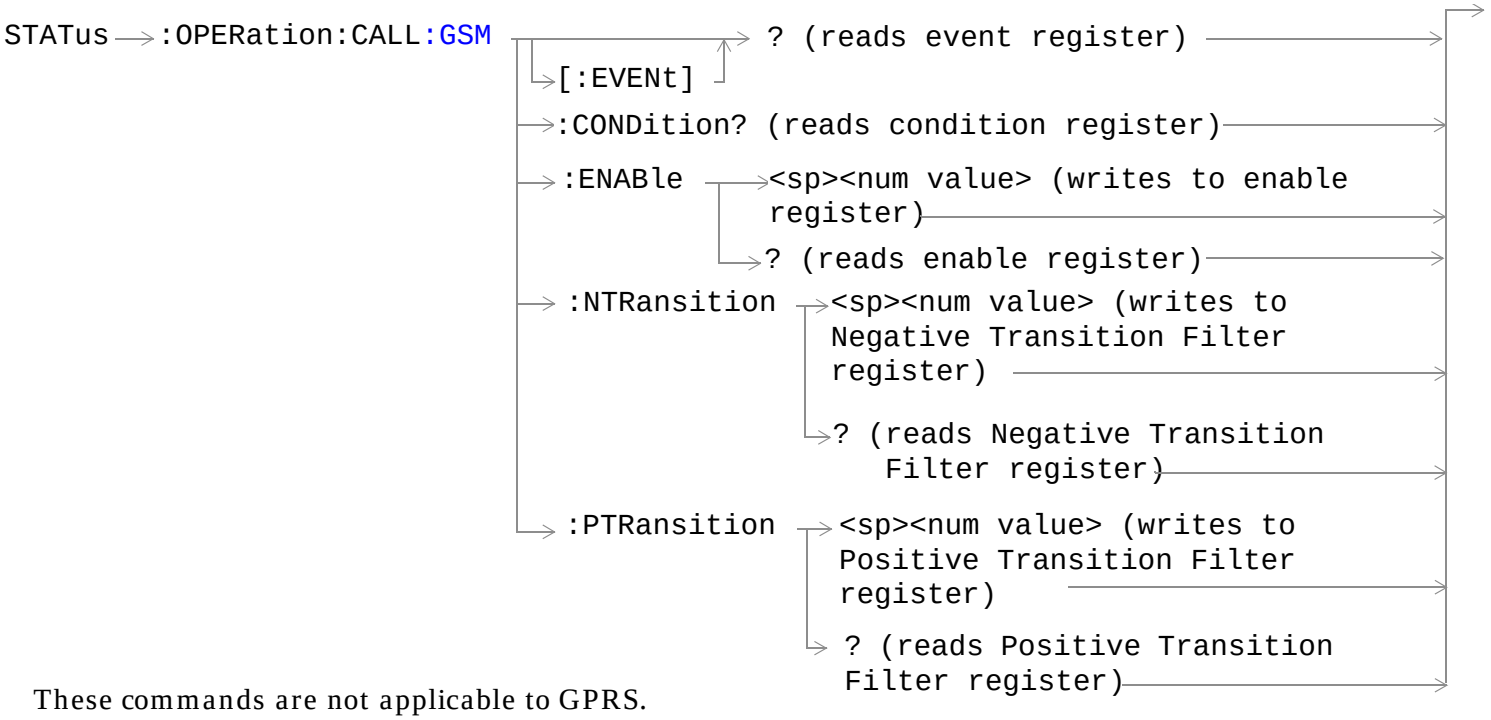
# STATus:OPERation



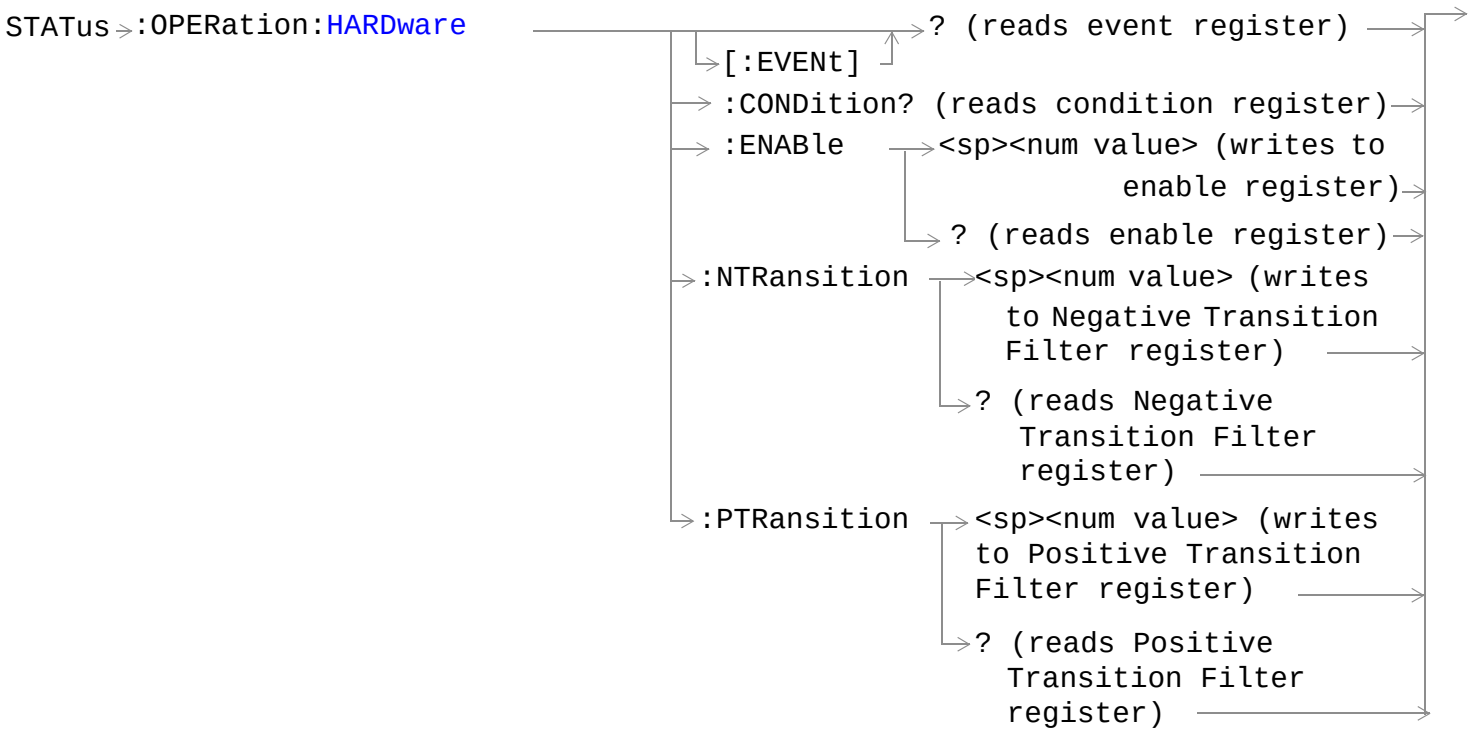



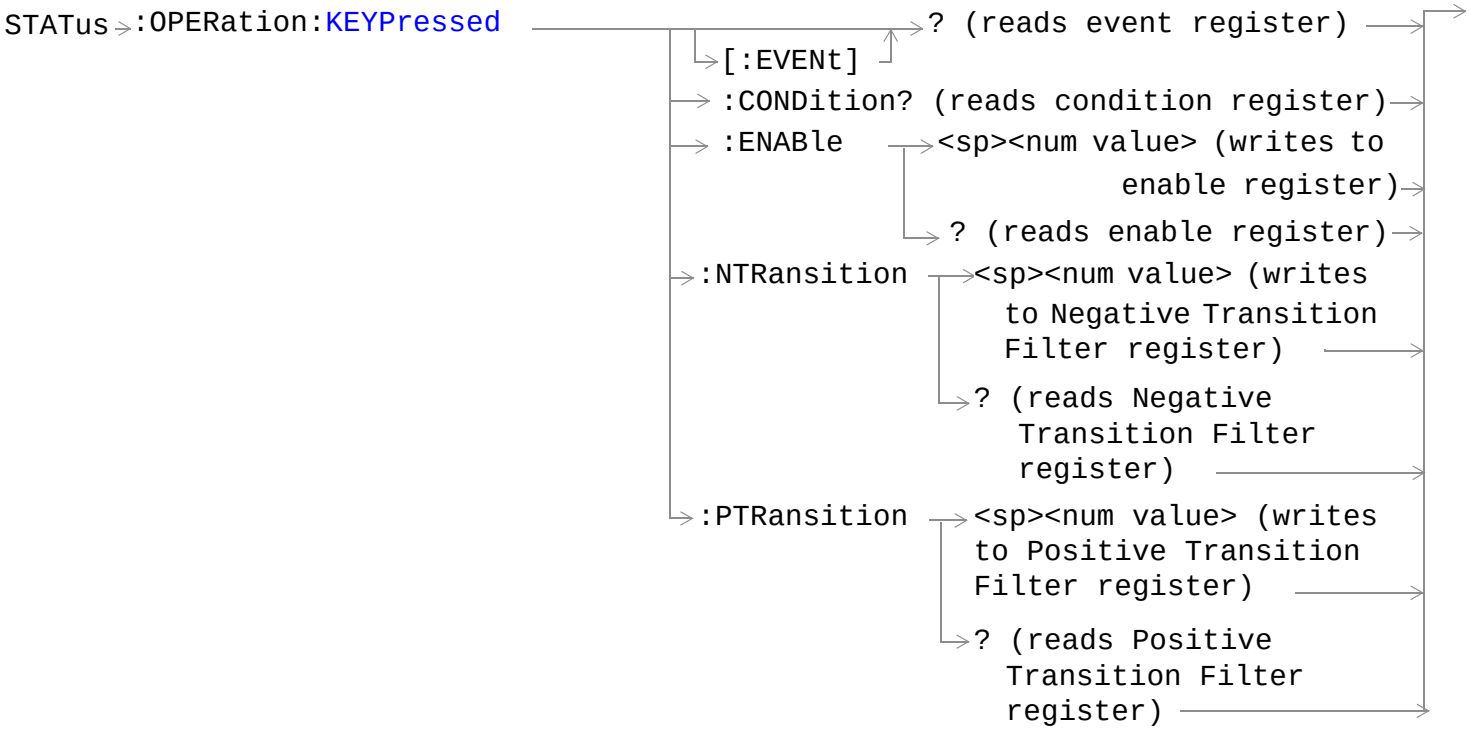

STATus
:OPERation:CALL:COMMon
? (reads event register)
[:EVENt]
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)

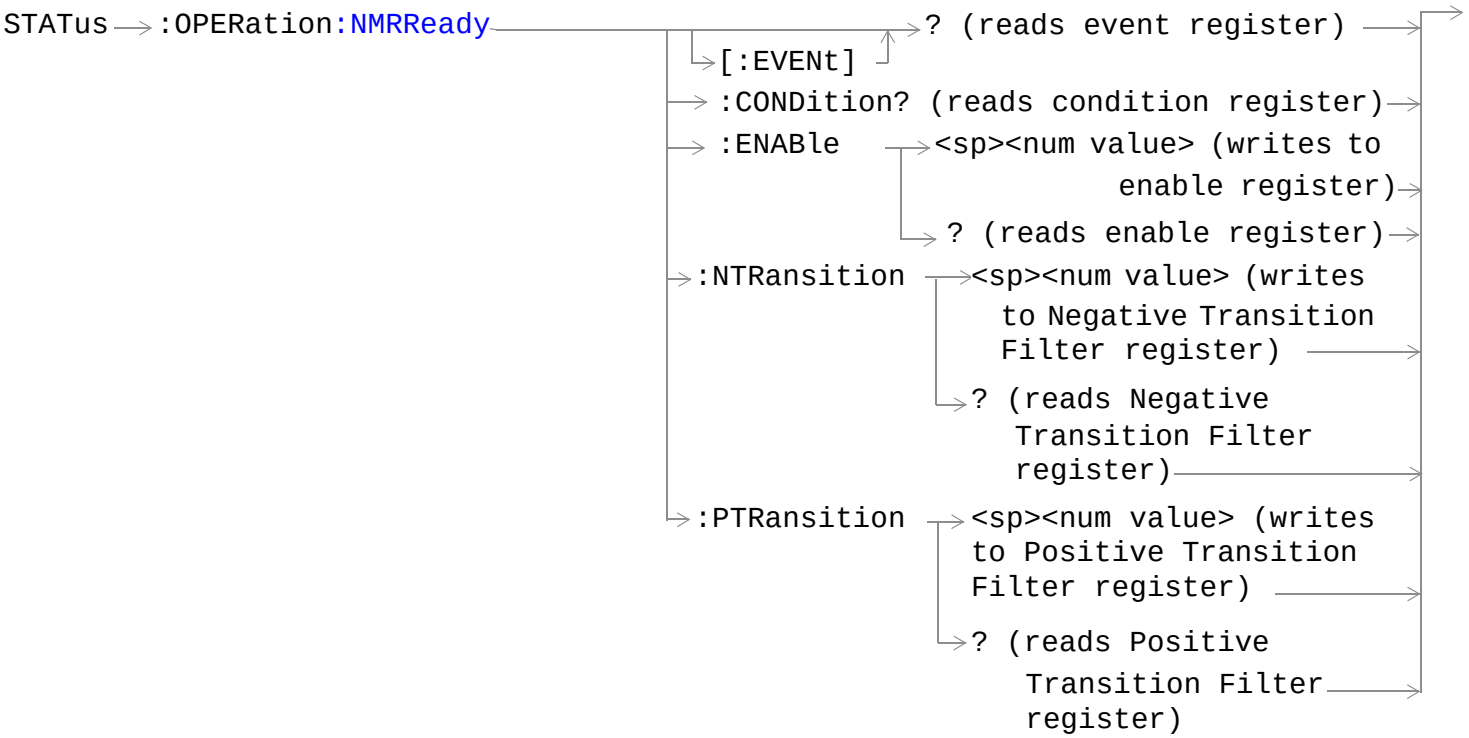

STATus
:OPERation:CALL:COMMon:DATA
? (reads event register)
[:EVENt]
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)

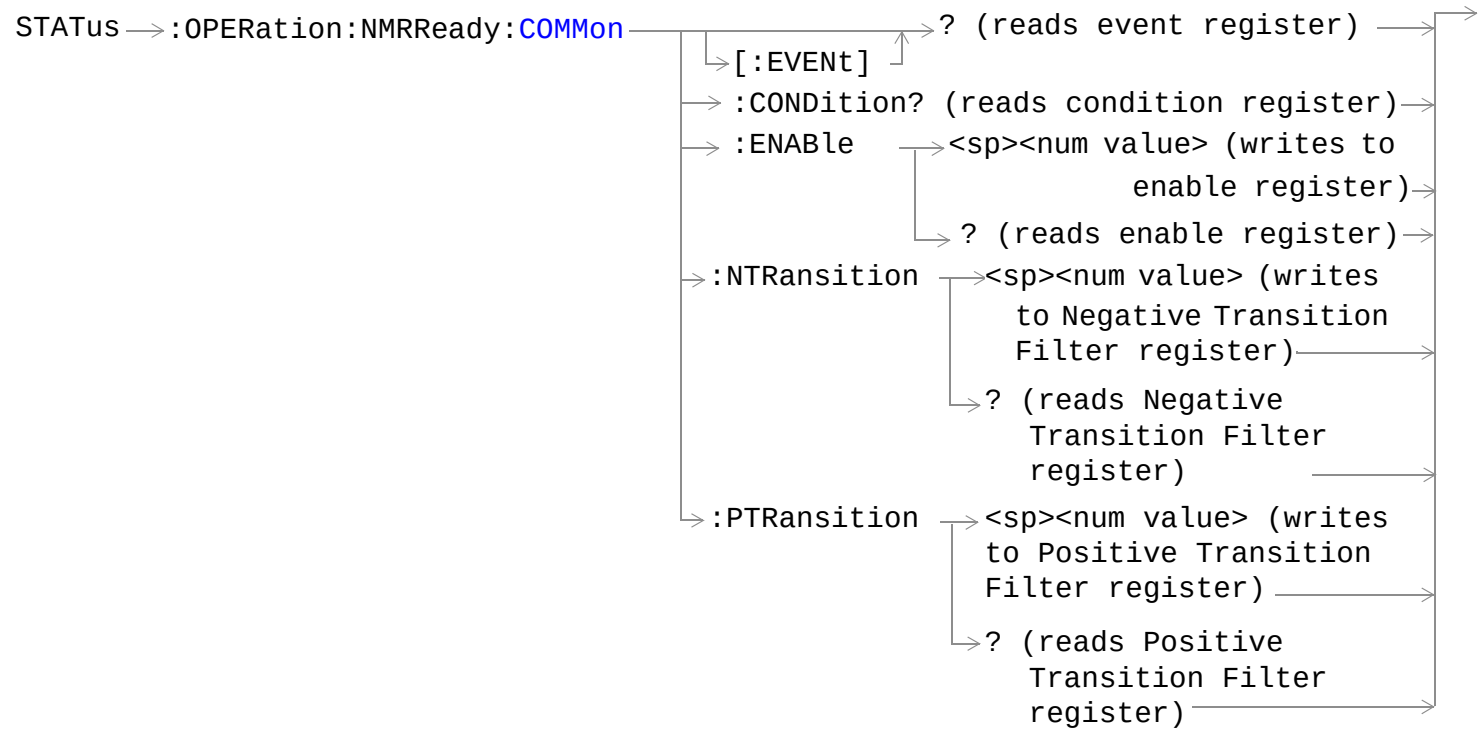


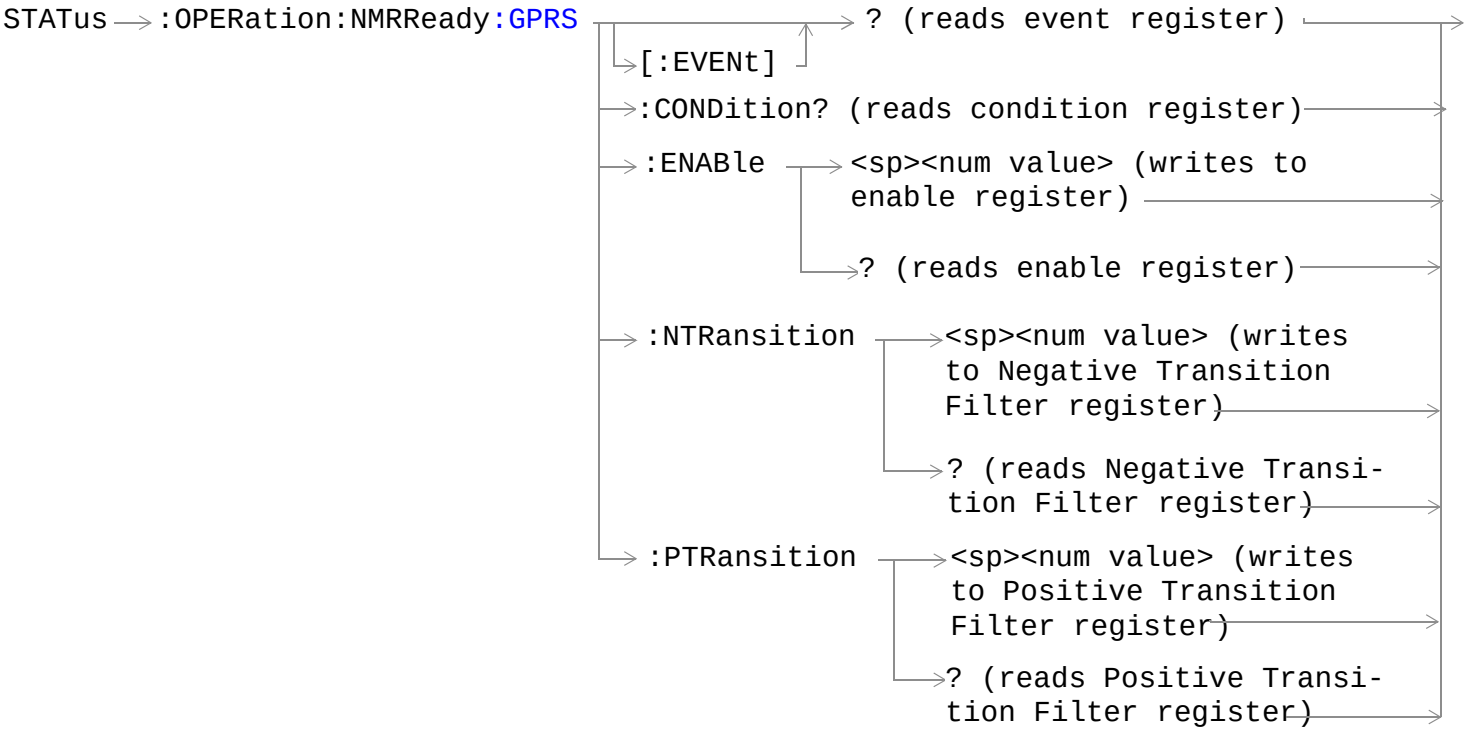

These commands are not applicable to GPRS.



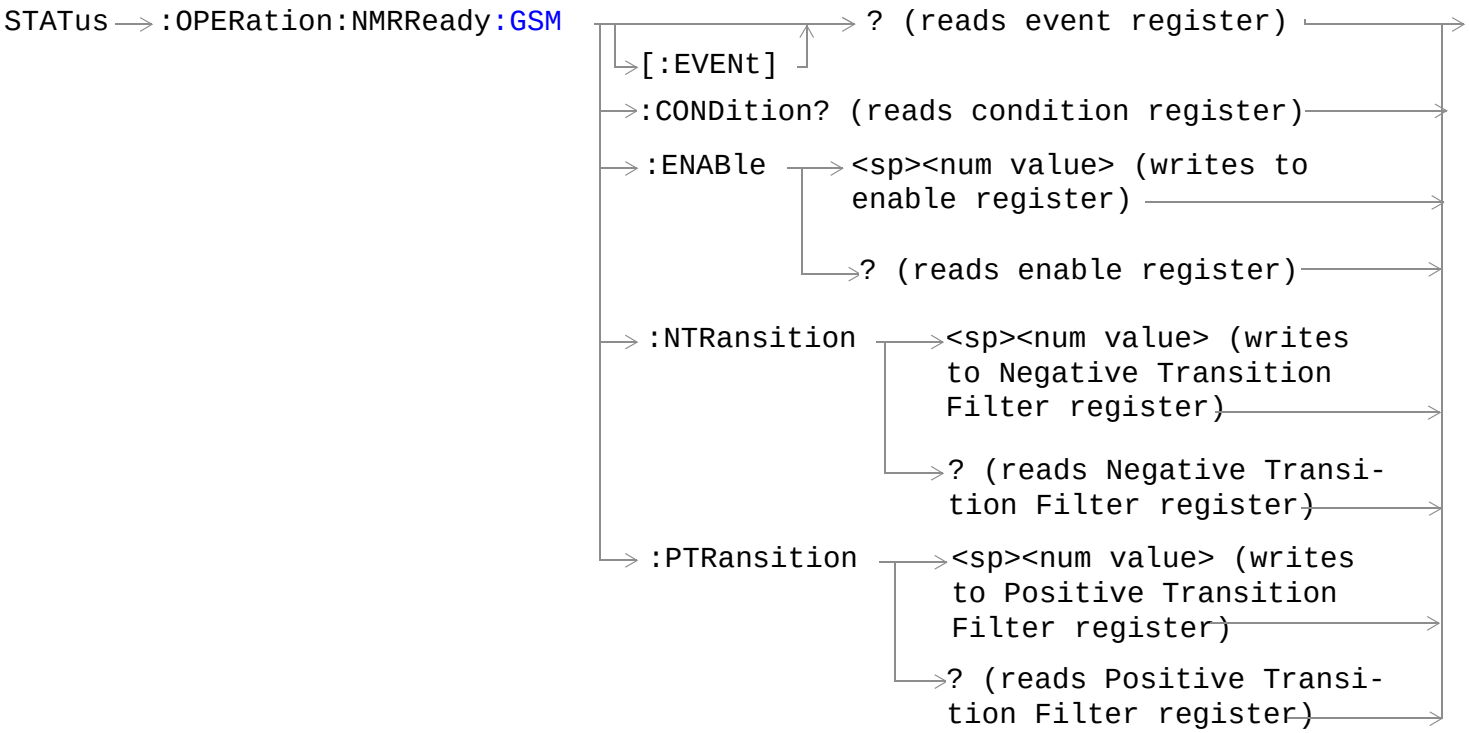

STATus:OPERation:KEYPressed
[:EVENt]
? (reads event register)
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)


STATus:OPERation:NMRReady
[:EVENt]
? (reads event register)
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)




These commands are not applicable to GSM.




These commands are not applicable to GPRS.

"Diagram Conventions" on page 323

## 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 | Processing SYSTem:SYNChronized Command | This condition bit is "pulsed" by the SYSTem:SYNChronized command. This allows 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 bit for the STATus:OPERation:CALL register. |
| 9 | 512 | NMRReady (New Measurement Result Ready) Summary | This bit is the summary bit for the STATus:OPERation:NMRReady register. |
| 8 | 256 | Reserved for future use. | This bit is always 0. |
| 7 | 128 | Reserved for future use. | This bit is always 0. |
| 6 | 64 | Reserved for future use. | This bit is always 0. |
| 5 | 32 | Reserved for future use. | This bit is always 0. |
| 4 | 16 | Reserved for future use. | This bit is always 0. |
| 3 | 8 | Reserved for future use. | This bit is always 0. |
| 2 | 4 | Reserved for future use. | This bit is always 0. |
| 1 | 2 | Reserved for future use. | This bit is always 0. |
| 0 | 1 | Extension Bit | This bit is always 0. |

## Program Examples - STATus:OPERation

```
OUTPUT 714;”STATUS:OPERATION:EVENT?” !Queries and clears the Operation
                                     !Event Register
OUTPUT 714;”STATUS:OPERATION:CONDITION?” !Queries and clears the Operation
                                        !Condition Register
OUTPUT 714;”STATUS:OPERATION:ENABLE 1024” !Sets the Operation
                                          !Enable
                                          !Register for bit 10
OUTPUT 714;”STATUS:OPERATION:NTRANSITION 2” !Sets the Operation
                                            !Negative Transition
                                            !Filter Register for bit 1
OUTPUT 714;”STATUS:OPERATION:PTRANSITION 2” !Sets the Operation
                                            !Positive Tranasition
                                            !Filter Register for bit 1
```

## 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 | GPRS Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:GPRS register. |
| 11 | 2048 | WCDMa Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:WCDMa register. |
| 10 | 1024 | FDD Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:FDD register. |
| 9 | 512 | TA2000 Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:TA2000 register. |
| 8 | 256 | CDMA Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:CDMA register. |
| 7 | 128 | DIGital2000 Summary bit. | This bit is the summary bit for the STATus:OPERation:CALL:DIGital2000 register. |
| 6 | 64 | DIGital95 Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:DIGital95 register. |
| 5 | 32 | TA136 Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:TA136 register. |
| 4 | 16 | DIGital136 Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:GSM register. |
| 1 | 2 | COMMon Summary bit | This bit is the summary bit for the STATus:OPERation:CALL:COMMon register. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Examples - STATus:OPERation:CALL

```
OUTPUT 714;"STATUS:OPERATION:CALL:EVENT?" !Queries and clears the Operation Call Event
                                          !Register
OUTPUT 714;"STATUS:OPERATION:CALL:CONDITION?" !Queries and clears 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 Filter
                                         !Register for bit 2
OUTPUT 714;"STATUS:OPERATION:CALL:PTR 256" !Sets the Positive Transition Filter
                                           !Register for bit 8
```

### STATus:OPERation:CALL:COMMon Condition Register Bit Assignment

The STATus:OPERation:CALL:COMMon 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 bit for the STATus:QUEStionable:CALL:GSM:DATA register. |
| 13 | 8192 | Call Control Status Access Probe | This bit is a 1 when the test set is in the call control status access probe state. |
| 12 | 4096 | Call Control Status Set Up Request | This bit is a 1 when the test set is in the call control status set up request state. |
| 11 | 2048 | Call Control Status Releasing | This bit is a 1 when the test set is in the call control status releasing state. |
| 10 | 1024 | Call Control Status Paging | This bit is a 1 when the test set is in the call control status paging state. |
| 9 | 512 | Registering (BS initiated) | This bit is set to a 1 when the Base Station initiates registration. |
| 8 | 256 | Reserved for future use. | This bit is always 0. |
| 7 | 128 | BS Originating | This bit is a 1 when:<br>• Active Cell mode - the call processing state leaves the idle state<br>• Test mode - the test set has noted a base station origination. |
| 6 | 64 | Call Control Status Changing | This bit is set to a 1 when the call control status change detector has been armed. |
| 5 | 32 | Reserved for future use. | This bit is always 0. |
| 4 | 16 | Reserved for future use. | This bit is always 0. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 3 | 8 | Call Control Status Alerting | This bit is a 1 when the test set is in the call alerting state (ringing). |
| 2 | 4 | Call Control Status Connected | This bit is a 1 when the test set is in the call connected state. |
| 1 | 2 | Call Control Status 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 and clears the Operation
                                                 !Call
                                                 !Common Event Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:CONDITION?" !Queries and clears the Operation
                                                     !Call
                                                     !Common Condition Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:ENABLE 1024" !Sets the Operation
                                                      !Call
                                                      !Common Enable
                                                      !Register for bit 10
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:NTRANSITION 2" !Sets the Operation
                                                        !Call
                                                        !Common Negative Transition
                                                        !Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:PTRANSITION 2" !Set the Operation
                                                        !Call
                                                        !Common Positive Transition
                                                        !Filter Register for bit 1
```

### STATus:OPERation:CALL:COMMon:DATA Condition Register Bit Assignment

The STATus:OPERation:CALL:COMMon:DATA register bits are used to indicate status of processes that occur during normal data connection processing operations.

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit is always 0. |
| 14 | 16384 | Reserved for future use. | This bit is always 0. |
| 13 | 8192 | Reserved for future use. | This bit is always 0. |
| 12 | 4096 | Reserved for future use. | This bit is always 0. |
| 11 | 2048 | Reserved for future use. | This bit is always 0. |
| 10 | 1024 | Reserved for future use. | This bit is always 0. |
| 9 | 512 | Reserved for future use. | This bit is always 0. |
| 8 | 256 | PDP Active state | This bit is a 1 when the PDP is active, zero when inactive. |
| 7 | 128 | Starting Data Connection | This bit is a 1 when:<br>• Active Cell mode - the data connection status leaves the idle state<br>• Test mode - the test set has noted a base station origination. |
| 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
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:CALL:GSM Condition Register Bit Assignment

The STATus:OPERation:CALL:GSM register bits are used to indicate status of processes that occur during normal GSM call processing operations. These register bits are not applicable to GPRS.

| 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 | BS Disconnecting | This bit is a 1 when:<br>• Active Cell mode - the call processing state reaches (or is in) the idle state<br>• Test mode - the test set has noted a base station termination. |
| 7 | 128 | BS Originating | This bit is a 1 when:<br>• Active Cell mode - the call processing state leaves the idle state<br>• Test mode - the test set has noted a base station origination. |
| 6 | 64 | Call Control Status Changing | This bit is set to a 1 when the call control status change detector has been armed. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 5 | 32 | TCH Assignment in Progress | This bit is a 1 when:<br>• The channel assignment is successfully completed (when a call is established).<br>• The test set notes a change in the TCH ARFCN, cell band, TCH timeslot, or mobile station timing advance.<br>• An error message is generated. |
| 4 | 16 | BCH Changing | This bit is a 1 when:<br>• The downlink signal is transmitting on the new broadcast channel.<br>• The test set has noted a change in cell band. |
| 3 | 8 | Call Control Status Alerting | This bit is a 1 when the test set is in the call alerting state (ringing). |
| 2 | 4 | Call Control Status Connected | This bit is a 1 when the test set is in the call connected state. |
| 1 | 2 | Call Control Status 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:GSM

```
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:EVENT?" !Queries and clears the Operation
                                              !Call GSM Event Register
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:CONDITION?" !Queries and clears the Operation
                                                  !Call GSM Condition Register
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:ENABLE 1024" !Sets the Operation
                                                   !Call GSM Enable
                                                   !Register for bit 10
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:NTRANSITION 2" !Sets the Operation
                                                     !Call GSM Negative Transition
                                                     !Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:PTRANSITION 2" !Sets the Operation
                                                     !Call GSM Positive Tranasition
                                                     !Filter Register for bit 1
```

### STATus:OPERation:HARDware Register Bit Assignments

The STATus:OPERation:HARDware register bits indicate information about the test set's hardware during 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 | Reserved for future use. | This bit is always 0. |
| 11 | 2048 | Reserved for future use. | This bit is always 0. |
| 10 | 1024 | Reserved for future use. | This bit is always 0. |
| 9 | 512 | Reserved for future use. | This bit is always 0. |
| 8 | 256 | Reserved for future use. | This bit is always 0. |
| 7 | 128 | Reserved for future use. | This bit is always 0. |
| 6 | 64 | Reserved for future use. | This bit is always 0. |
| 5 | 32 | Reserved for future use. | This bit is always 0. |
| 4 | 16 | Reserved for future use. | This bit is always 0. |
| 3 | 8 | Reserved for future use. | This bit is always 0. |
| 2 | 4 | Reserved for future use. | This bit is always 0. |
| 1 | 2 | External Timebase in use | This bit is a 1 if a suitable external timebase is connected to the test set's 10 MHz REF IN connector on the rear panel of the test set. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Examples - STATus:OPERation:HARDware

```
OUTPUT 714;"STATUS:OPERATION:HARDWARE:EVENT?" !Queries the Hardware Event Register.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:CONDITION?" !Queries the Hardware Condition Register.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:ENABLE 16" !Sets New Measurement Results Hardware for
bit 16.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:NTR 2" !Sets the Hardware Negative Transition
                                              !Register for bit 4.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:PTR 4" !Sets the Hardware Positive Transition
                                              !Register for bit 4.
```

### 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 F12 softkey has been pressed. |
| 10 | 1024 | F11 softkey | This bit is a 1 when the F11 softkey has been pressed. |
| 9 | 512 | F10 softkey | This bit is a 1 when the F10 softkey has been pressed. |
| 8 | 256 | F9 softkey | This bit is a 1 when the F9 softkey has been pressed. |
| 7 | 128 | F8 softkey | This bit is a 1 when the F8 softkey has been pressed. |
| 6 | 64 | F7 softkey | This bit is a 1 when the F7 softkey has been pressed. |
| 5 | 32 | F6 softkey | This bit is a 1 when the F6 softkey has been pressed. |
| 4 | 16 | F5 softkey | This bit is a 1 when the F5 softkey has been pressed. |
| 3 | 8 | F4 softkey | This bit is a 1 when the F4 softkey has been pressed. |
| 2 | 4 | F3 softkey | This bit is a 1 when the F3 softkey has been pressed. |
| 1 | 2 | F2 softkey | This bit is a 1 when the F2 softkey has been pressed. |
| 0 | 1 | F1 softkey | This bit is a 1 when the F1 softkey has been pressed. |

### Program Examples - STATus:OPERation:KEYPressed

```
OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:EVENT?" !Queries the Keypressed Event Register.
```

### 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 | GPRS Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:GPRS register. |
| 11 | 2048 | WCDMa Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:WCDMa register. |
| 10 | 1024 | FDD Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:FDD register. |
| 9 | 512 | TA2000 Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:TA2000 register. |
| 8 | 256 | CDMA Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:CDMA register. |
| 7 | 128 | DIGital2000 Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:DIGital2000 register. |
| 6 | 64 | DIGital95 Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:DIGital95 register. |
| 5 | 32 | TA136 Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:TA136 register. |
| 4 | 16 | DIGital136 Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:GSM register. |
| 1 | 2 | COMMon Summary bit | This bit is the summary bit for the STATus:OPERation:NMRReady:COMMon register. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Examples - STATus:OPERation:NMRReady

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:EVENT?" !Queries and clears the New Measurement
                                              !Results Ready Event Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:CONDITION?" !Queries and clears the New Measurement
                                                  !Results Ready
                                                  !Condition Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:ENABLE 16" !Sets New Measurement Results
                                                 !Ready Enable Regigter
                                                 !for bit 4
OUTPUT 714;"STATUS:OPERATION:NMRREADY:NTR 2" !Sets the New Measurement Results
                                             !Ready Negative Transition Filter
                                             !Register for bit 1
OUTPUT 714;"STATUS:OPERATION:NMRREADY:PTR 4" !Sets the New Measurement
                                             !Results Ready Positive
                                             !Transition Filter 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 | Reserved for future use. | This bit is always 0. |
| 1 | 2 | Audio Analyzer | This is the summary 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 and clears the Operation
                                                     !New Measurement Results Ready
                                                     !Common Event Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:CONDITION?" !Queries and clears the Operation
                                                         !New Measurement Results Ready
                                                         !Common Condition Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:ENABLE 1024" !Sets the Operation
                                                          !New Measurement Results Ready
                                                          !Common Enable
                                                          !Register for bit 10
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:NTRANSITION 2" !Sets the Operation
                                                            !New Measurement Results Ready
                                                            !Common Negative Transition
                                                            !Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:NMRREADY:COMMON:PTRANSITION 2" !Set the Operation
                                                            !New Measurement Results Ready
                                                            !Common Positive Tranasition
                                                            !Filter Register for bit 1
```

### STATus:OPERation:NMRReady:GPRS Condition Register Bit Assignment

The STATus:OPERation:NMRReady:GPRS register bits indicate when a GPRS 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 | GBERror New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 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 | ORFSpectrum New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 3 | 8 | PFERror New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 2 | 4 | PVTime New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 1 | 2 | TXPower New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Examples - STATus:OPERation:NMRReady:GPRS

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GPRS:EVENT?" !Queries and clears the Operation
                                                   !New Measurement Results Ready
                                                   !GPRS Event Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GPRS:CONDITION?" !Queries and clears the Operation
                                                       !New Measurement Results Ready
                                                       !GPRS Condition Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GPRS:ENABLE 1024" !Sets the Operation
                                                        !New Measurement Results Ready
                                                        !GPRS Enable
                                                        !Register for bit 10
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GPRS:NTRANSITION 2" !Sets the Operation
                                                          !New Measurement Results Ready
                                                          !GPRS Negative Transition
                                                          !Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GPRS:PTRANSITION 2" !Sets the Operation
                                                          !New Measurement Results Ready
                                                          !GPRS Positive Tranasition
                                                            !Filter Register for bit 1
```

### STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment

The STATus:OPERation:NMRReady:GSM register bits indicate when a GSM 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 | DPOWer New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 9 | 512 | I/Q Tuning New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 8 | 256 | BERRor New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 7 | 128 | FBERror New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 6 | 64 | DAUDio New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 5 | 32 | AAUDio New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 4 | 16 | ORFSpectrum New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 3 | 8 | PFERror New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 2 | 4 | PVTime New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 1 | 2 | TXPower New Measurement Result Ready | This bit is a 1 if the measurement has been completed and has produced new results.<br>This bit is a zero at power on, after a preset and while a measurement is in Measuring States. See "Triggering of Measurements" on page 276. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Examples - STATus:OPERation:NMRReady:GSM

```
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:EVENT?" !Queries and clears the Operation
                                                  !New Measurement Results Ready
                                                  !GSM Event Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:CONDITION?" !Queries and clears the Operation
                                                      !New Measurement Results Ready
                                                      !GSM Condition Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:ENABLE 1024" !Sets the Operation
                                                       !New Measurement Results Ready
                                                       !GSM Enable
                                                       !Register for bit 10
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:NTRANSITION 2" !Sets the Operation
                                                         !New Measurement Results Ready
                                                         !GSM Negative Transition
                                                         !Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:PTRANSITION 2" !Sets the Operation
                                                         !New Measurement Results Ready
                                                         !GSM Positive Tranasition
                                                         !Filter Register for bit 1
```

## Related Topics

“Triggering of Measurements” on page 276

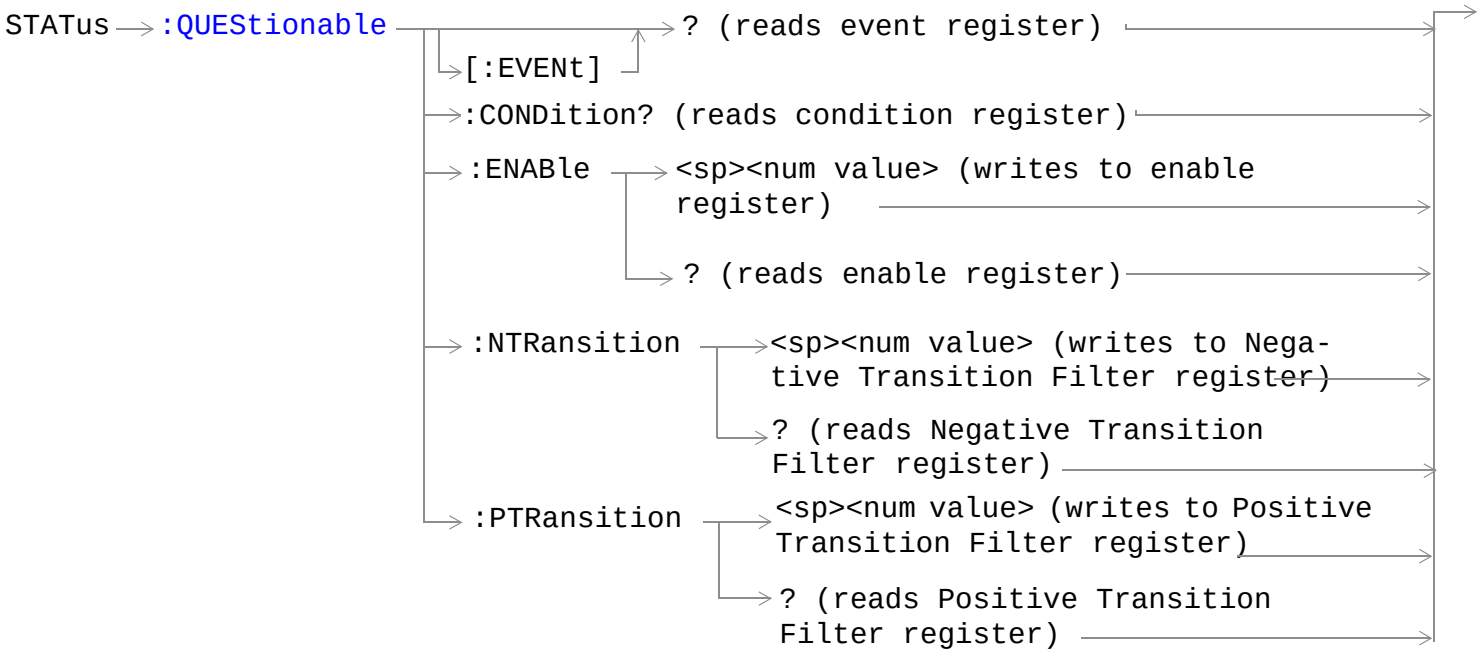
# STATus:PRESet

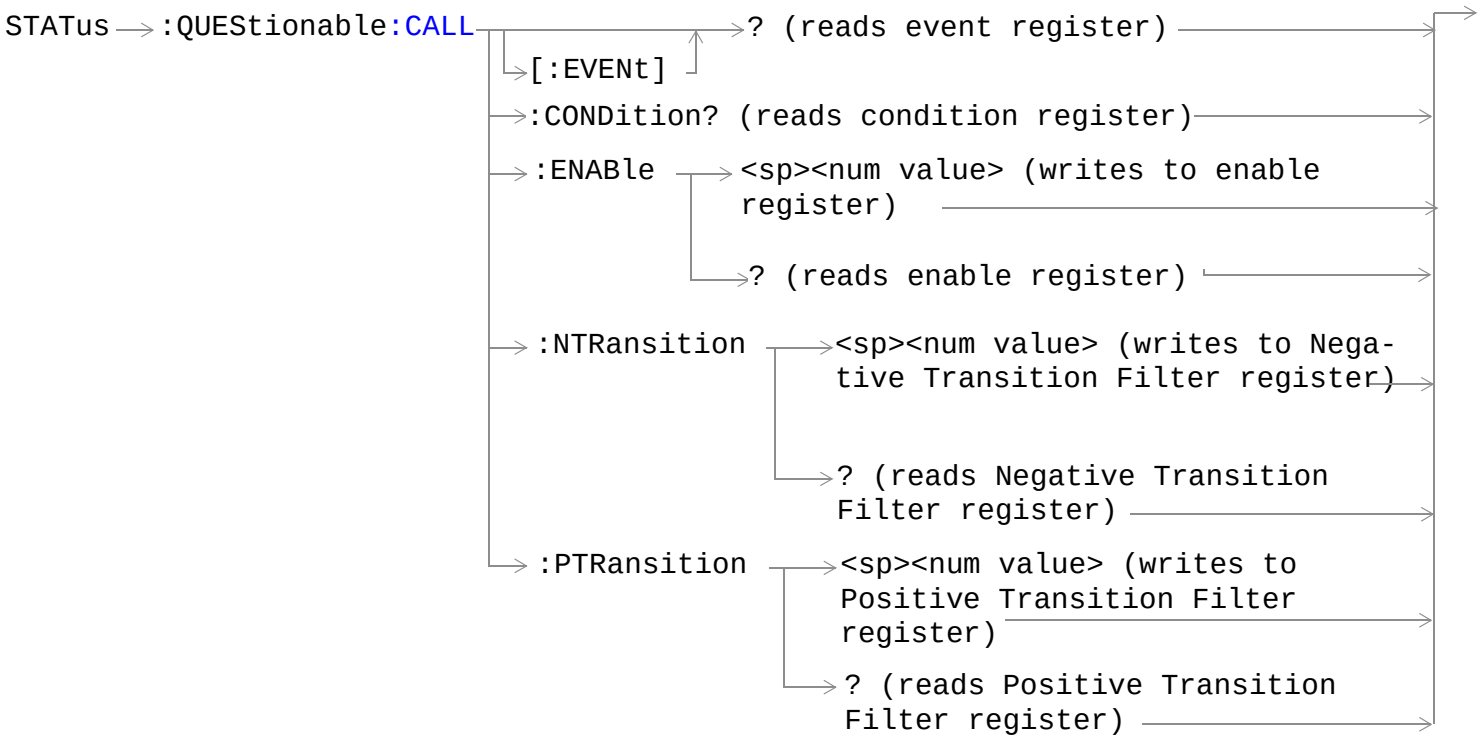
"Diagram Conventions" on page 323

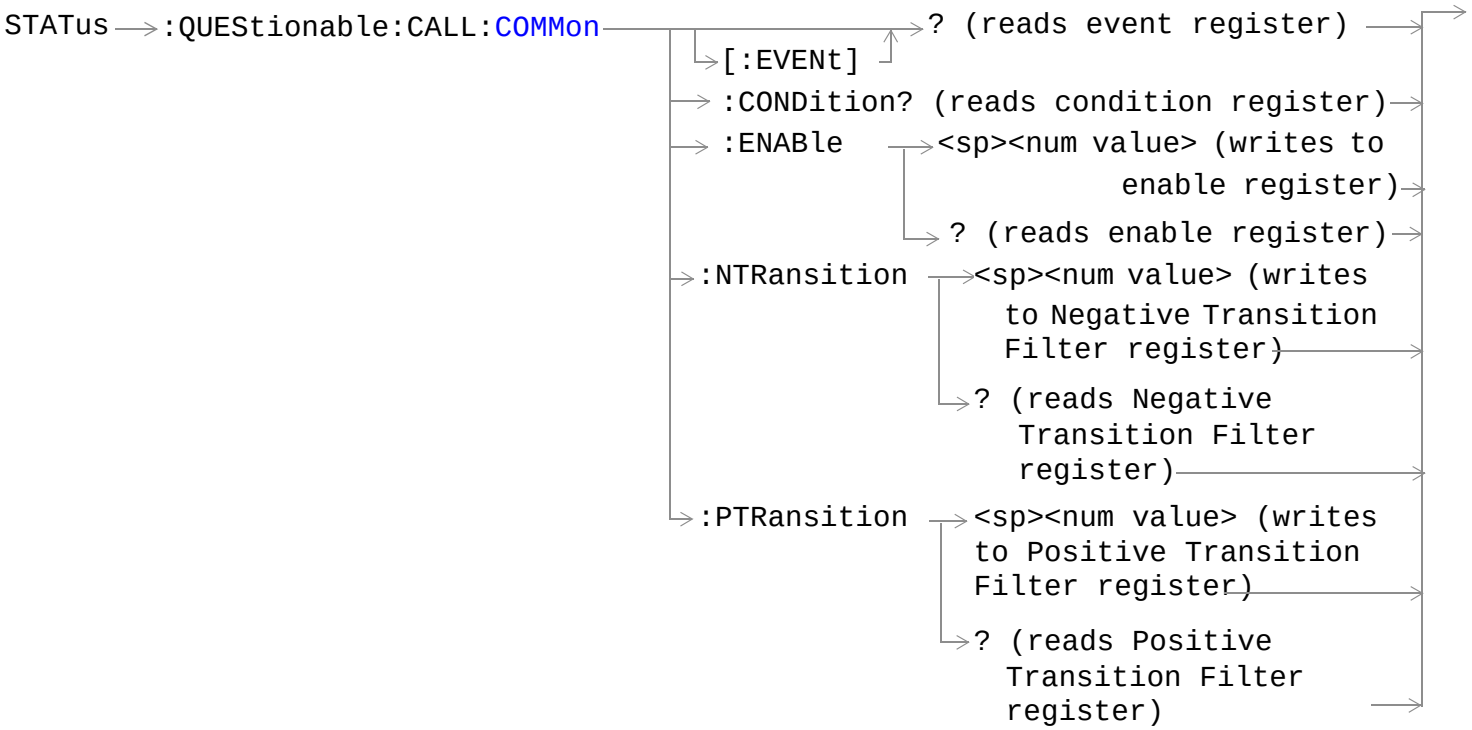
### STATus:PRESet

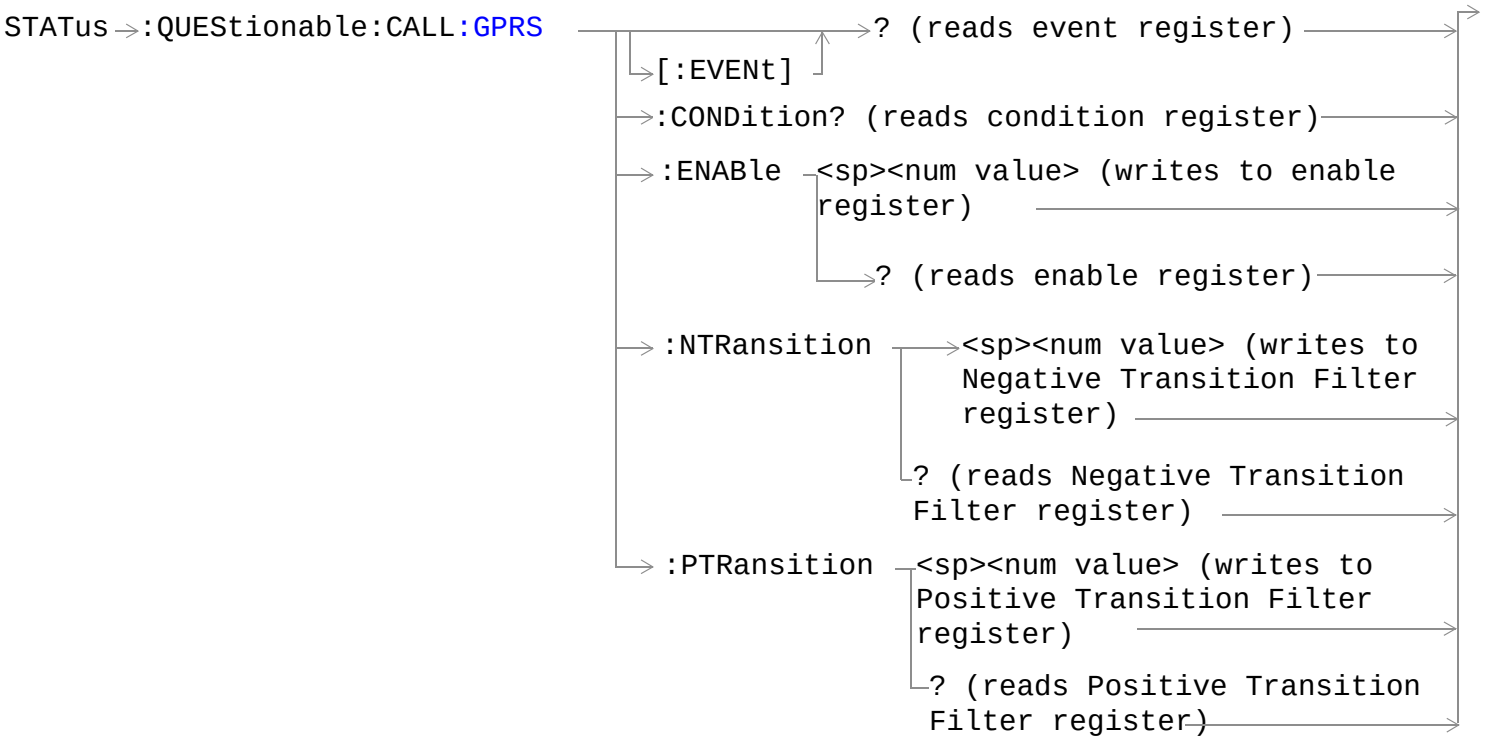
| | | |
|---|---|---|
| Function | GSM | Presets the Status Subsystem<br>Sets all Enable Registers to 0 (not enabled). |
| | GPRS | Sets all Positive Transition Registers (PTR) to 1 (positive transitions enabled).<br>Sets all Negative Transition Registers (NTR) to 0 (negative transitions disabled). |

# STATus:QUEStionable

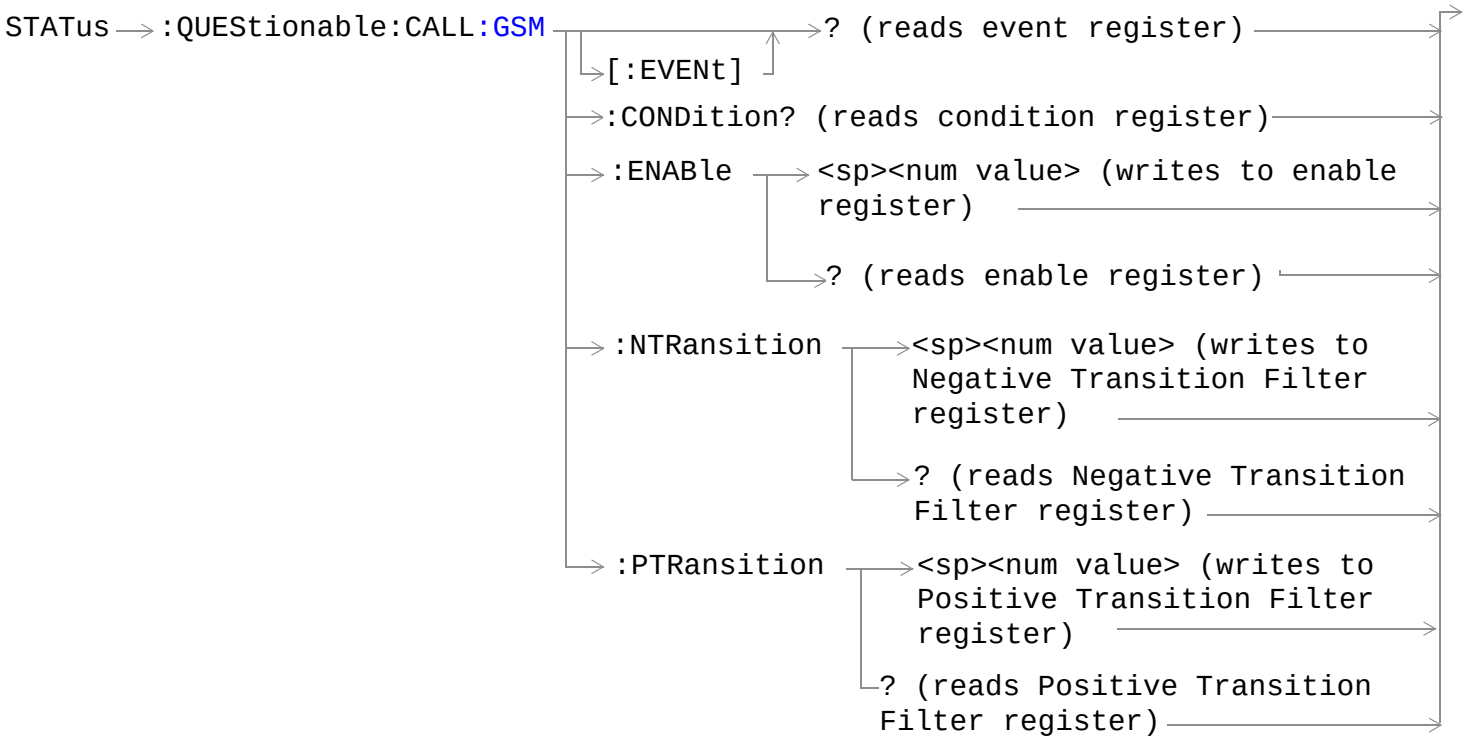


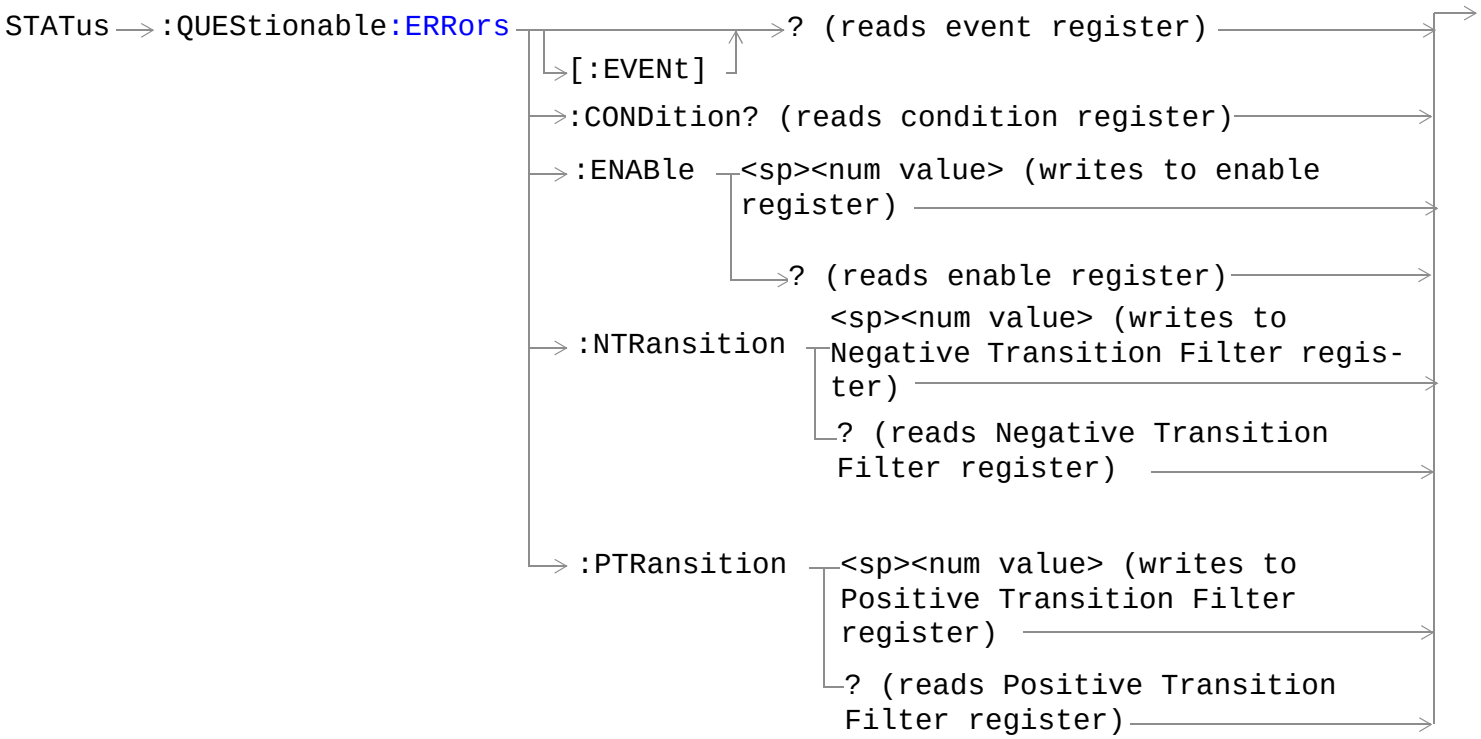



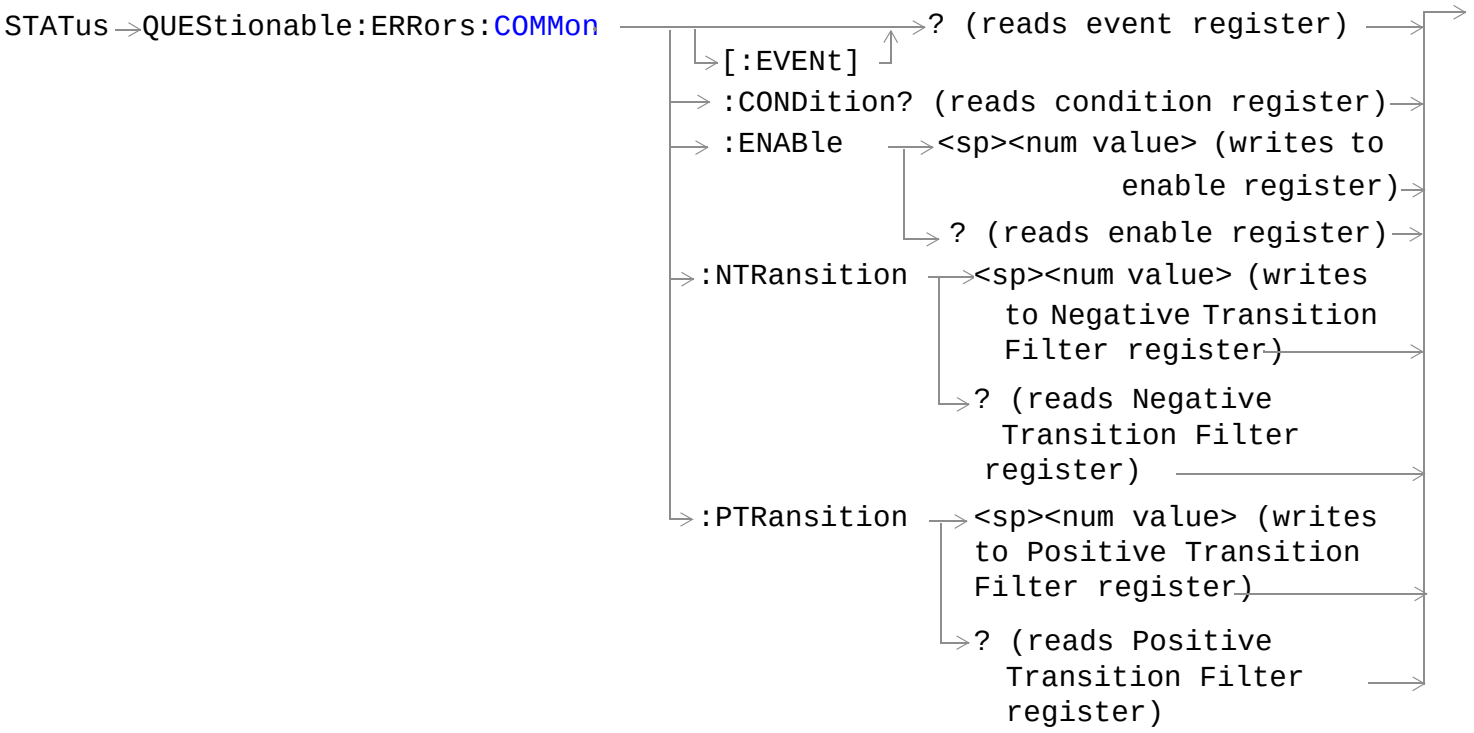

STATus
:QUEStionable:CALL:COMMon
[:EVENt]
? (reads event register)
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)

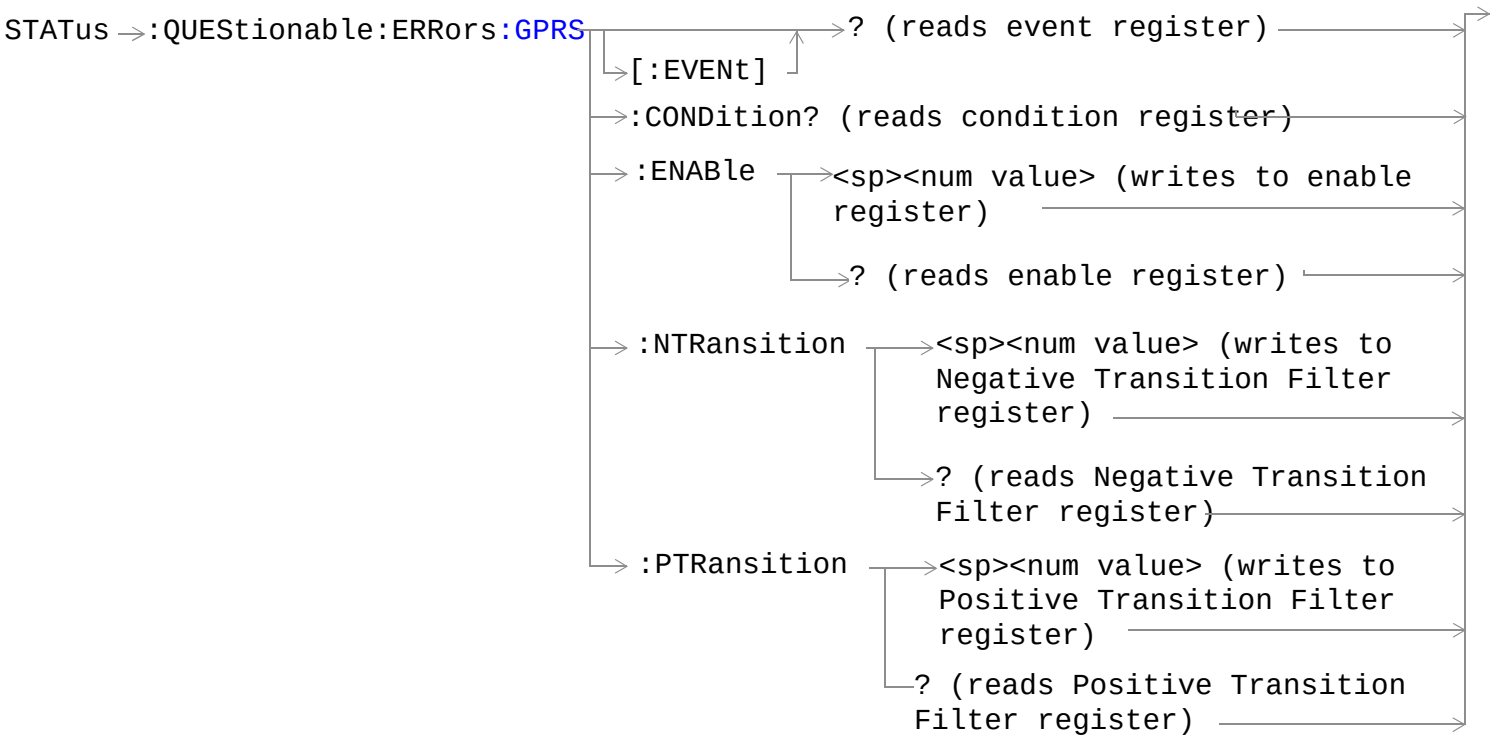



These commands are not applicable to GSM.

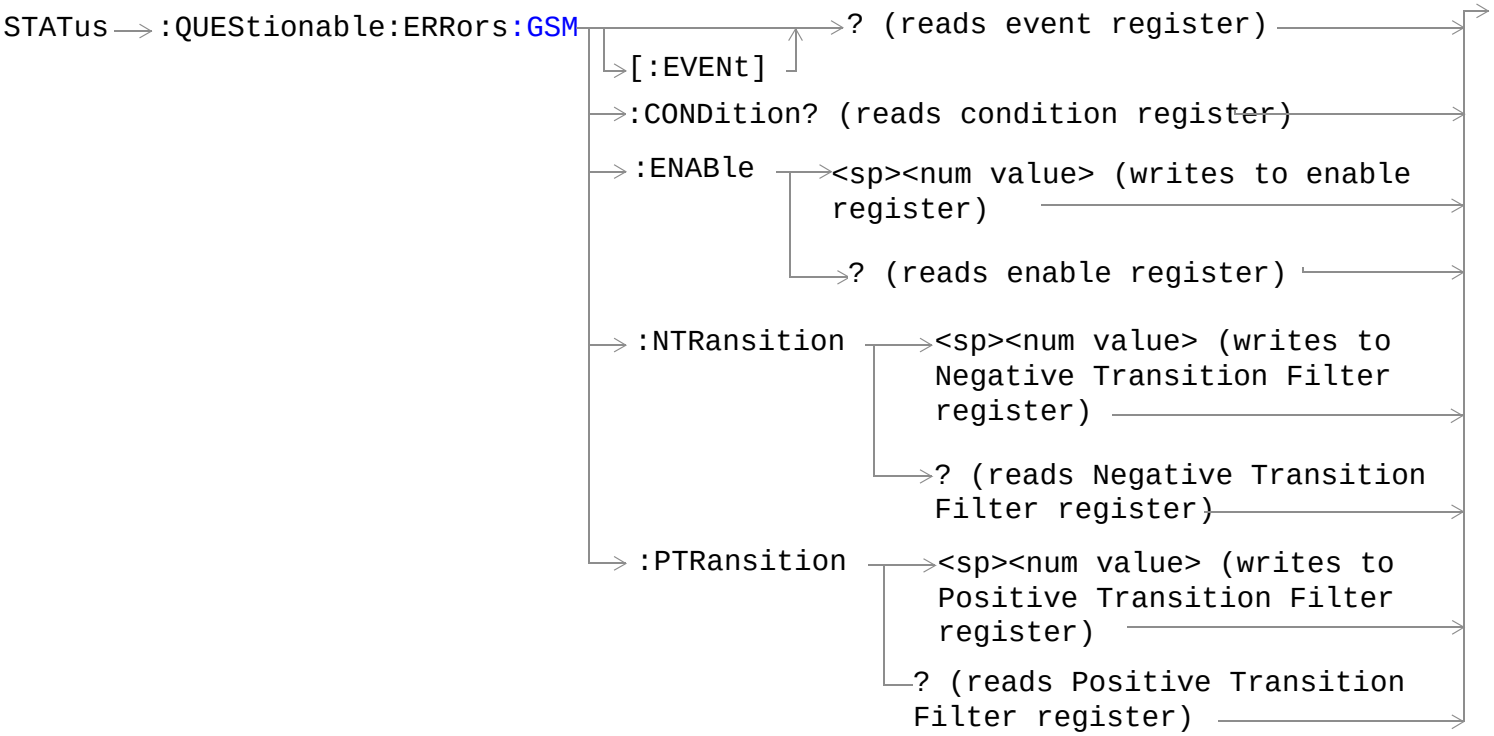

STATus
:QUEStionable:CALL:GSM
[:EVENt]
? (reads event register)
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)


STATus
:QUEStionable:ERRors
[:EVENt]
? (reads event register)
:CONDition? (reads condition register)
:ENABle
<sp><num value> (writes to enable register)
? (reads enable register)
:NTRansition
<sp><num value> (writes to Negative Transition Filter register)
? (reads Negative Transition Filter register)
:PTRansition
<sp><num value> (writes to Positive Transition Filter register)
? (reads Positive Transition Filter register)

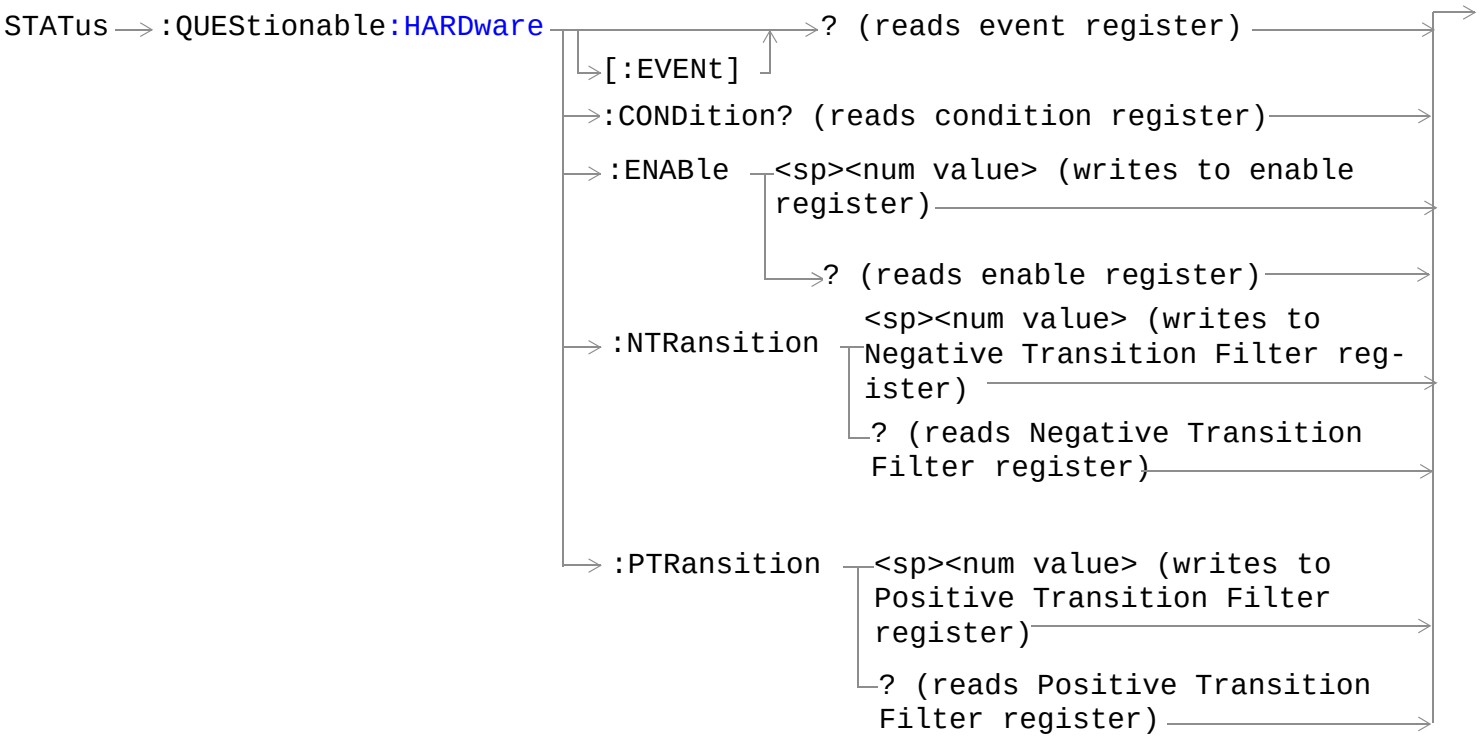



These commands are not applicable to GSM.




These commands are not applicable to GPRS.




“Diagram Conventions” on page 323

### STATus:QUEStionable Condition Register Bit Assignment

The STATus:QUEStionable register contains bits which give an indication that the data currently being acquired or generated is of questionable quality due to some condition affecting the functionality associated with that bit.

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit is always 0. |
| 14 | 16384 | Reserved for future use. | This bit is always 0. |
| 13 | 8192 | Reserved for future use. | This bit is always 0. |
| 12 | 4096 | Reserved for future use. | This bit is always 0. |
| 11 | 2048 | QUEStionable:HARDware summary | This bit is the summary bit for the STATus:QUEStionable:HARDware register. |
| 10 | 1024 | QUEStionable:CALL summary | This bit is the summary bit for the STATus:QUEStionable:CALL register. |
| 9 | 512 | Reserved for future use. | This bit is always 0. |
| 8 | 256 | Reserved for future use. | This bit is always 0. |
| 7 | 128 | Reserved for future use. | This bit is always 0. |
| 6 | 64 | Reserved for future use. | This bit is always 0. |
| 5 | 32 | Reserved for future use. | This bit is always 0. |
| 4 | 16 | Reserved for future use. | This bit is always 0. |
| 3 | 8 | Reserved for future use. | This bit is always 0. |
| 2 | 4 | Reserved for future use. | This bit is always 0. |
| 1 | 2 | QUEStionable:ERRors summary | This bit is the summary bit for the STATus:QUEStionable:ERRors register. |
| 0 | 1 | Reserved for future use. | This bit is always 0. |

### Program Example - STATus:QUEStionable 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 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 | GPRS Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:GPRS register. |
| 11 | 2048 | WCDMa Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:WCDMa register. |
| 10 | 1024 | FDD Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:FDD register. |
| 9 | 512 | TA2000 Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:TA2000 register. |
| 8 | 256 | CDMA Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:CDMA register. |
| 7 | 128 | DIGital2000 Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:DIGital2000 register. |
| 6 | 64 | DIGital95 Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:DIGital95 register. |
| 5 | 32 | TA136 Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:TA136 register. |
| 4 | 16 | DIGital136 Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:GSM register. |
| 1 | 2 | COMMon Summary bit | This bit is the summary bit for the STATus:QUEStionable:CALL:COMMon register. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Example - STATus:QUEStionable:CALL Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:EVENT?"
  !Queries and clears the Questionable Call Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CONDITION?"
  !Queries and clears the Questionable Call Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:ENABLE 1024"
  !Sets the Questionable Call Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:NTRANSITION 2"
  !Sets the Questionable Call Negative Transition Filter Registerfor bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:PTRANSITION 2"
  !Sets the Questionable Call Positive Transition Filter Register for bit 1
```

### STATus:QUEStionable:CALL:COMMon Condition Register Bit Assignment

The STATus:QUEStionable:CALL:COMMon registers contain information about which event(s) occurred during normal call processing that indicate why the call processing procedure failed.

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit is always 0. |
| 14 | 16384 | Reserved for future use. | This bit is always 0. |
| 13 | 8192 | Reserved for future use. | This bit is always 0. |
| 12 | 4096 | Reserved for future use. | This bit is always 0. |
| 11 | 2048 | Reserved for future use. | This bit is always 0. |
| 10 | 1024 | Reserved for future use. | This bit is always 0. |
| 9 | 512 | Reserved for future use. | This bit is always 0. |
| 8 | 256 | Reserved for future use. | This bit is always 0. |
| 7 | 128 | Reserved for future use. | This bit is always 0. |
| 6 | 64 | Reserved for future use. | This bit is always 0. |
| 5 | 32 | Reserved for future use. | This bit is always 0. |
| 4 | 16 | Reserved for future use. | This bit is always 0. |
| 3 | 8 | Reserved for future use. | This bit is always 0. |
| 2 | 4 | Reserved for future use. | This bit is always 0. |
| 1 | 2 | Reserved for future use. | This bit is always 0. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Example - STATus:QUEStionable:CALL:COMMon Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:EVENT?" !Queries and clears the Questionable
                                                    !Call Common Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:CONDITION?" !Queries and clears the Questionable
                                                        !Call Common Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:ENABLE 1024" !Sets the Questionable Call Common
                                                         !Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:NTRANSITION 2" !Sets the Questionable Call
                                                           !Common Negative Transition
                                                           !Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:PTRANSITION 2" !Sets the Questionable Call
                                                        !Common Positive Transition
                                                        !Filter Register for bit 1
```

### STATus:QUEStionable:CALL:GPRS Condition Register Bit Assignment

The STATus:QUEStionable:CALL:GPRS registers contain information about which event(s) occurred during GSM call processing, relating to a data connection, that indicate why the call processing procedure failed. These register bits are not applicable to GSM.

| 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 | End Data Connection Failure | This bit is a 1 if the test set timed out waiting for the data connection to end. |
| 9 | 512 | MS Unexpectedly Ended TBF | This bit is a 1 if the mobile station unexpectedly ended the TBF (temporary block flow). |
| 8 | 256 | Downlink Immediate Assignment Failure | This bit is a 1 if the mobile station did not respond to the downlink immediate assignment. |
| 7 | 128 | Uplink Immediate Assignment Failure | This bit is a 1 if the mobile station did not respond to the uplink immediate assignment. |
| 6 | 64 | Downlink Timed Out | This bit is a 1 if the mobile station timed out ACK (Acknowledged) or NACK (Not Acknowledged) exchanges and released the TBF (temporary block flow). |
| 5 | 32 | No Data Received Recently | This bit is a 1 if no data was received from the mobile station in the allowed time. |
| 4 | 16 | Start Data Connection Failure | This bit is a 1 if the GPRS test application was unable to start the data connection with the DUT (Device Under Test). |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 3 | 8 | Routing Area Update Failure | This bit is a 1 if the Routing Area Update procedure failed after five attempts. The Data Connection Status will not be changed. |
| 2 | 4 | Detach Failure | This bit is a 1 if the Detach procedure failed after five attempts. The Data Connection Status is set to Idle. |
| 1 | 2 | Attach Failure | This bit is a 1 if the Attach procedure failed after five attempts. The Data Connection Status is set to Idle. |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Example - STATus:QUEStionable:CALL:GPRS Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GPRS:EVENT?" !Queries and clears the Questionable
                                                  !Call GPRS Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GPRS:CONDITION?" !Queries and clears the
                                                      !Questionable Call GPRS
                                                      !Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GPRS:ENABLE 1024" !Sets the Questionable Call GPRS
                                                       !Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GPRS:NTRANSITION 2" !Sets the Questionable Call
                                                         !GPRS Negative Transition Filter
                                                         !Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GPRS:PTRANSITION 2" !Sets the  Questionable Call GPRS
                                                           !Positive Transition Filter
                                                             !Register for bit 1
```

### STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment

The STATus:QUEStionable:CALL:GSM registers contain information about which event(s) occurred during GSM call processing that indicate why the call processing procedure failed.

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit is always 0. |
| 14 | 16384 | Reserved for future use. | This bit is always 0. |
| 13 | 8192 | Reserved for future use. | This bit is always 0. |
| 12 | 4096 | Reserved for future use. | This bit is always 0. |
| 11 | 2048 | Reserved for future use. | This bit is always 0. |
| 10 | 1024 | Reserved for future use. | This bit is always 0. |
| 9 | 512 | Call disconnected: Channel Mode not supported | This bit is a 1 if the mobile station is not capable of supporting the selected channel mode. |
| 8 | 256 | Identification failure | This bit is a 1 if the identity request timer (T3270) has expired. The timer expires if the mobile does not respond to identity request message, within 5 seconds. |
| 7 | 128 | Channel Assignment exceeded specified number of frames | This bit is a 1 if the channel assignment exceeded the specified number of frames. |
| 6 | 64 | Call disconnected: No Response to Page | This bit is a 1 if the paging timer (T3113) has expired. The timer expires if the mobile does not respond to a paging request message, within 5 seconds. |
| 5 | 32 | Call disconnected: Handover Failure | This bit is a 1 if the physical information timer (T3105) has expired. The timer expires if the mobile does not respond to a physical information message, within 50 ms.<br>If the timer has expired and correctly decoded data or a TCH frame has not been received, newly allocated channels are released. |
| 4 | 16 | Call disconnected: Channel Assignment Failure | This bit is a 1 if the channel assignment timer (T3107) has expired. The timer expires if the mobile does not respond to an assignment command message within 3 seconds. |
| 3 | 8 | Call disconnected: Immediate Assignment Failure | This bit is a 1 if the immediate assignment timer (T3101) has expired. The timer expires after 1 second if a signaling link is not established when an immediate assignment or immediate assignment extended message is sent.<br>If the timer expires, newly allocated channels are released. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 2 | 4 | Call disconnected: Radio Link Failure | This bit is a 1 if the radio link time out (T100) has expired. The timer expires if a radio link is not detected within four SACCH mulitframes (1.92 seconds if no SACCH is present). |
| 1 | 2 | Call disconnected: Data Link Failure | This bit is a 1 if the data link timer (T200) has expired. This timer is used for retransmission on the data link. The expiration period of the timer depends on the message type (for FACCH, 155 ms). |
| 0 | 1 | Extension Bit | This bit is always 0. |

### Program Example - STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:EVENT?" !Queries and clears the Questionable
                                                 !Call GSM Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:CONDITION?" !Queries and clears the Questionable
                                                     !Call GSM Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:ENABLE 1024" !Sets the Questionable
                                                      !Call GSM Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:NTRANSITION 2" !Sets the Questionable Call
                                                        !GSM Negative Transition Filter Register
                                                           !for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:PTRANSITION 2" !Sets the Questionable Call
                                                        !GSM Positive Transition Filter Register
                                                           !for bit 1
```

### STATus:QUEStionable:ERRors Condition Register Bit Assignment

The STATus:QUEStionable:ERRors register bits are 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 | GPRS Summary bit | This bit is the summary bit for the QUEStionable:ERRors:GPRS register. |
| 11 | 2048 | WCDMa Summary bit | This bit is the summary bit for the QUEStionable:ERRors:WCDMa register. |
| 10 | 1024 | FDD Summary bit | This bit is the summary bit for the QUEStionable:ERRors:FDD register. |
| 9 | 512 | TA2000 Summary bit | This bit is the summary bit for the QUEStionable:ERRors:TA2000 register. |
| 8 | 256 | CDMA Summary bit | This bit is the summary bit for the QUEStionable:ERRors:CDMA register. |
| 7 | 128 | DIGital2000 Summary bit | This bit is the summary bit for the QUEStionable:ERRors:DIGital2000 register. |
| 6 | 64 | DIGital95 Summary bit | This bit is the summary bit for the QUEStionable:ERRors:DIGital95 register. |
| 5 | 32 | TA136 Summary bit | This bit is the summary bit for the QUEStionable:ERRors:TA136 register. |
| 4 | 16 | DIGital136 Summary bit | This bit is the summary bit for the QUEStionable:ERRors:DIGital136 register. |
| 3 | 8 | AMPS Summary bit | This bit is the summary bit for the QUEStionable:ERRors:AMPS register. |
| 2 | 4 | GSM Summary bit | This bit is the summary bit for the QUEStionable:ERRors:GSM register. |
| 1 | 2 | COMMon Summary bit | This bit is the summary bit for the QUEStionable:ERRors:COMMon register. |
| 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 are used to indicate information about the COMMon test set device-specific errors (positive error numbers).

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 15 | 32768 | Not Used. Defined by SCPI. | This bit is always 0. |
| 14 | 16384 | RUI Maskable Messages. | This bit is a 1 when a Maskable Message occurs. |
| 13 | 8192 | Reserved for future use. | This bit is always 0. |
| 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. |

| 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: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 Tranasition
                                                             !Register for bit 1
```

### STATus:QUEStionable:ERRors:GPRS Condition Register Bit Assignment

The STATus:QUEStionable:ERRors:GPRS register bits are used to indicate information about GPRS 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 may 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 may 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 may query the Event Register to find out which of these errors occurred. |
| 6 | 64 | +600 Errors | The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may 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 may query the Event Register to find out which of these errors occurred. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 4 | 16 | +400 Errors | The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may 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 may 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 may 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 may 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:GPRS Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GPRS:EVENT?" !Queries and clears the Questionable
                                                    !Errors GPRS Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GPRS:CONDITION?" !Queries and clears the Questionable
                                                        !Errors Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GPRS:ENABLE 1024" !Sets the Questionable
                                                         !Errors Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GPRS:NTRANSITION 2" !Sets the Questionable Errors
                                                          !GPRS Negative Transition Filter Register
                                                           !for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GPRS:PTRANSITION 2" !Sets the Questionable Errors
                                                          !GPRS Positive Transition Filter Register
                                                               !for bit 1
```

### STATus:QUEStionable:ERRors:GSM Condition Register Bit Assignment

The STATus:QUEStionable:ERRors:GSM register bits are used to indicate information about GSM 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 may 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 may 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 may query the Event Register to find out which of these errors occurred. |
| 6 | 64 | +600 Errors | The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may 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 may query the Event Register to find out which of these errors occurred. |

| Bit Number | Binary Weighting | Condition | Description |
|---|---|---|---|
| 4 | 16 | +400 Errors | The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may 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 may 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 may 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 may 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:GSM Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:EVENT?" !Queries and clears the Questionable
                                                   !Errors GSM Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:CONDITION?" !Queries and clears the Questionable
                                                       !Errors Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:ENABLE 1024" !Sets the Questionable
                                                        !Errors Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:NTRANSITION 2" !Sets the Questionable Errors
                                                          !GSM Negative Transition Filter Register
                                                              !for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:PTRANSITION 2" !Sets the Questionable Errors
                                                          !GSM 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 is 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
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?

**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

Note that only certain bit numbers in the Status Byte Register are applicable to GPRS as indicated in the "Description" column in the table below.

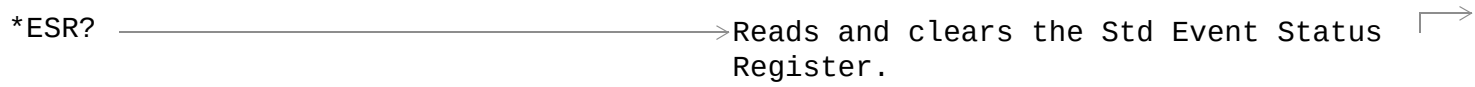
| Bit Number | Binary Weighting | Label | Description |
|---|---|---|---|
| 7 | 128 | STATus: OPERation | This bit number is not applicable to GPRS.<br>Summarizes the STATus: OPERation Status Register, which fans out to the NMRReady and CALL Status Registers. |
| 6 | 64 | RQS (SRQ TRUE?)/Master Summary Status | RQS is read by a serial poll (SPOLL).<br>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 | This bit number is not applicable to GPRS.<br>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

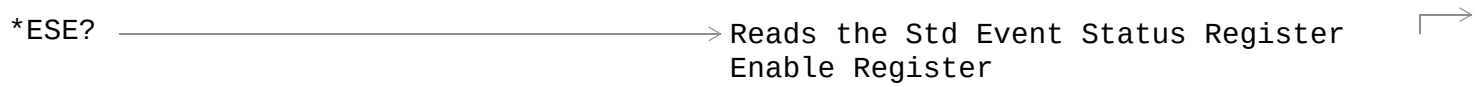
```
OUTPUT 714;"*STB?" !Queries the Status Byte.
```

# Standard Event Status Register

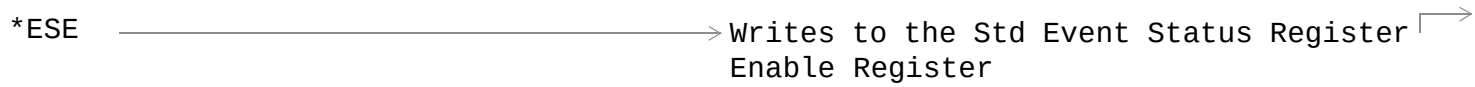
***ESR?**




***ESE?**




***ESE**




“Diagram Conventions” on page 323

## 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:<br>• An IEEE 488.2 syntax error. The test set received a message that did not follow the syntax defined by the standard.<br>• A semantic error. For example the test set received an incorrectly spelled command.<br>• The test set received a group execution trigger (GET) inside a program message |
| 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:<br>• A <PROGRAM DATA> 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.<br>• The test set could not execute a valid command due to some test set hardware/firmware condition. |
| 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. |

| 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:<br>• An attempt is made to read data from the output queue when no data is present or is pending.<br>• Data in the output queue has been lost. An example of this would be an output queue overflow. |
| 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 performs system level configuration functions of the test set.

## Syntax Diagrams and Command Descriptions

"SYSTem:APPLication" on page 838

"SYSTem:BEEPer" on page 845

"SYSTem:COMMunicate" on page 847

"SYSTem:CONFigure" on page 846

"SYSTem:CORRection" on page 850

"SYSTem:CURRent:TA" on page 856

"SYSTem:DATE" on page 857

"SYSTem:ERRor?" on page 858

"SYSTem:FTRigger" on page 859

"SYSTem:MEASurement" on page 864

"SYSTem:PRESet" on page 865

"SYSTem:ROSCillator" on page 867

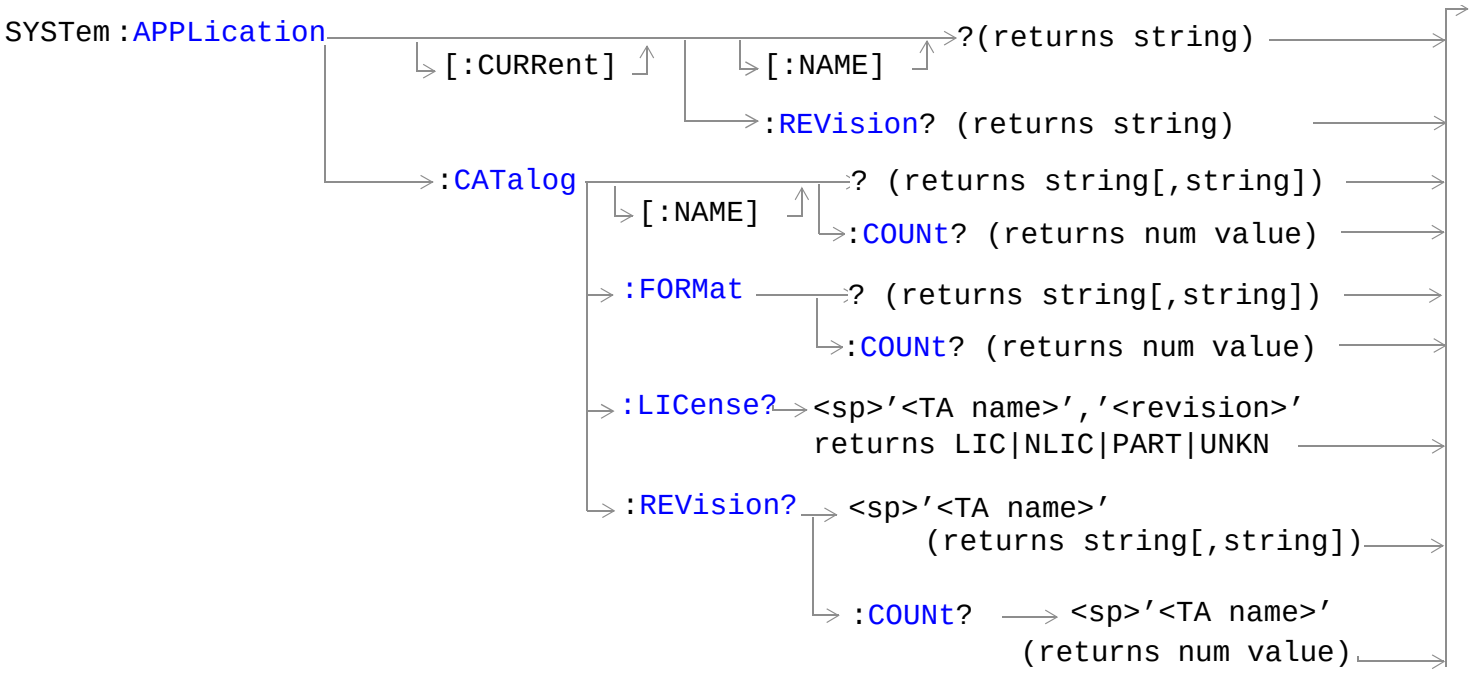
"SYSTem:SYNChronized" on page 868

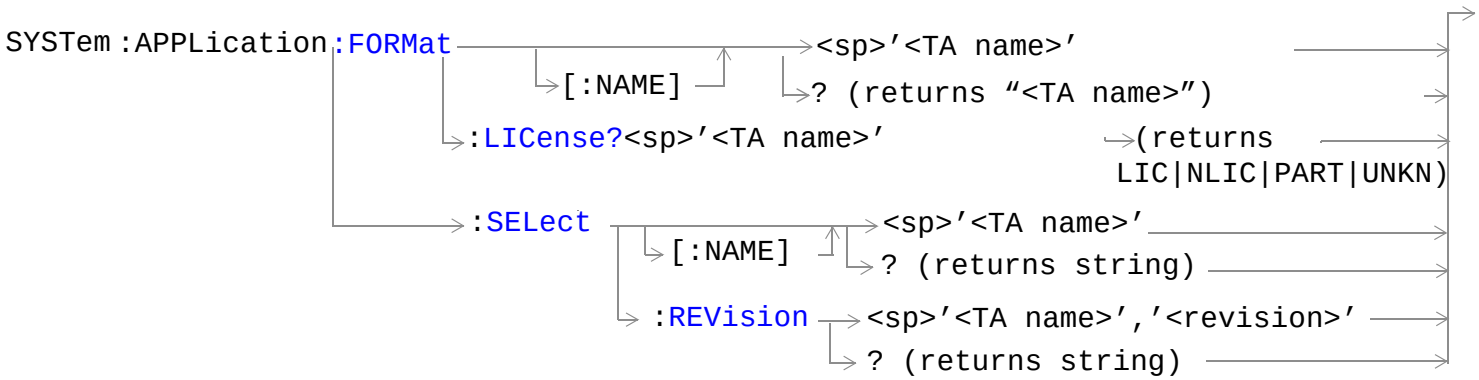
"SYSTem:TIME" on page 869

"SYSTem:TZONe" on page 870

"SYSTem:UTC" on page 871

# SYSTem:APPLication




"Diagram Conventions" on page 323

### SYSTem:APPLication[:CURRent][:NAME]?

| | | |
|---|---|---|
| Function | GSM | Queries the test set for the name of the currently running test application. |
| | GPRS | |
| Query | | Range: A string up to 25 characters including null. See "SYSTem:APPLication:CATalog[:NAME]?" on page 839. |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:NAME?"` | | |

### SYSTem:APPLication[:CURRent]:REVision?

| | | |
|---|---|---|
| Function | GSM | Queries the test set for the currently running test application revision number. |
| | GPRS | |
| Query | | Range: Any string up to 20 characters including null. A typical example would be A.01.01 for a licensed version. |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"` | | |

### SYSTem:APPLication:CATalog[:NAME]?

| | | |
|---|---|---|
| Function | GSM | Queries the test set for all of the names of the test applications stored on the hard drive.<br>This query returns one or more strings, each string is separated by a comma. |
| | GPRS | |
| Query | | Range:<br>• AMPS/136 Mobile Test<br>• CDMA 2000 Mobile Test<br>• GSM Mobile Test<br>• GSM/GPRS Mobile Test<br>• GSM_AMPS/136_GPRS Mobile<br>• WCDMA Mobile Test |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"` | | |

### SYSTem:APPLication:CATalog[:NAME]:COUNt?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries 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<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"` | | |

### SYSTem:APPLication:CATalog:FORMat?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | 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.<br>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.<br>• "GSM"<br>• "AMPS/136"<br>• "GPRS"<br>• "IS-2000/IS-95/AMPS"<br>• "WCDMA" |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:FORMAT?"` | | |

### SYSTem:APPLication:CATalog:FORMat:COUNt?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | 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<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:FORMAT:COUNT?"` | | |

### SYSTem:APPLication:CATalog:LICense? '<test application name>','<revision>'

| | | |
|---|---|---|
| Function | GSM | Queries the license status for a selected revision.<br>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.<br>The returned values are:<br>• "LIC" indicates this is a licensed test application.<br>• "NLIC" indicates this is not a licensed test application.<br>• "PART" only part of the test application with multiple radio formats is licensed<br>• "UNKN" indicates that license status is unknown. |
| | GPRS | |
| Query | | Range: LIC\|NLIC\|PART\|UNKN |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.00'"` | | |

### SYSTem:APPLication:CATalog:REVision? '<test application name>'

| | | |
|---|---|---|
| Function | GSM | Queries the test set for all of the revision numbers stored on the test set's hard drive. You must specify a test application.<br>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. |
| | GPRS | |
| Query | | Range: One or more comma separated strings or a null string |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'AMPS/136 MOBILE TEST'"` | | |

### SYSTem:APPLication:CATalog:REVision:COUNt? '<test application name>'

| | | |
|---|---|---|
| Function | GSM | Queries 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.<br>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. |
| | GPRS | |
| Query | | Range: 0 through 30 |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? 'AMPS/136 MOBILE TEST'"` | | |

### 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.<br>Queries the test set for the name of the currently active format. This string is not case sensitive. |
| Setting | Range:<br>• 'GSM'<br>• 'AMPS/136'<br>• 'GPRS'<br>• 'IS-2000/IS-95/AMPS'<br>• 'WCDMA' |
| Query | Range: A string up to 25 characters, or the null string.<br>• "GSM"<br>• "AMPS/136"<br>• "GPRS"<br>• "IS-2000/IS-95/AMPS"<br>• "WCDMA" |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME 'GSM'"`<br>`OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME?"` | |

### SYSTem:APPLication:FORMat:LICense? '<format name>'

| | |
|---|---|
| Function | Queries the test set for the license status of the fast switching test application.<br>The returned values are:<br>• LIC indicates this is a licensed test application.<br>• NLIC indicates this is not a licensed test application.<br>• PART indicates that only part of the test application with multiple formats is licensed.<br>• UNKN indicates that license status is unknown. |
| Query | Range: LIC \| NLIC \| PART \| UNKN |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:LICENSE? 'AMPS/136'"` | |

### SYSTem:APPLication:SELect[:NAME] '<test application name>'

| | | |
|---|---|---|
| Function | GSM<br>GPRS | 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.<br>Queries the test set for the test application that is selected and will run after the next reboot of the test set.<br>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.<br>**NOTE** 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. |
| Setting | | Range: See "SYSTem:APPLication:CATalog[:NAME]?" on page 839. |
| Query | | Range: See "SYSTem:APPLication:CATalog[:NAME]?" on page 839. |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'AMPS/136 MOBILE TEST'"`<br>`OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME?"` | | |

### SYSTem:APPLication:SELect:REVision '<test application name>','<revision>'

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Selects a test application revision and a test application.<br>The revision does not need to be set in order to switch test applications. The only time you select revisions is to change revisions.<br>Queries the test set for the revision of a specified test application.<br>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.<br>**NOTE** 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. You will need to reload a revision that has test application switching following the download process for upgrading firmware. |
| 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. |
| Programming Example<br>`OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM MOBILE TEST','A.04.00'"`<br>`OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? 'GSM MOBILE TEST'"` | | |

## Related Topics

“Test Application Switching” on page 1040

“Test Application Revisions and Licenses” on page 1042

“Test Application Name” on page 1044

# SYSTem:BEEPer

"Diagram Conventions" on page 323

## SYSTem:BEEPer:STATe

| | | |
|---|---|---|
| Function | GSM | Sets/queries the beeper state of the test set. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 1 (on) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:BEEPER:STATE OFF" !Sets beeper state to off.` | | |

# SYSTem:CONFigure

"Diagram Conventions" on page 323

### SYSTem:CONFigure:INFormation:HARDware:VERBose?

| | | |
|---|---|---|
| Function | GSM | Queries 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. For an example of how to use this command, see "Hardware Configuration Report" on page 1011. |
| | GPRS | |
| *RST Setting | | Resets have no effect on this information. The information is gathered during the power up cycle. |

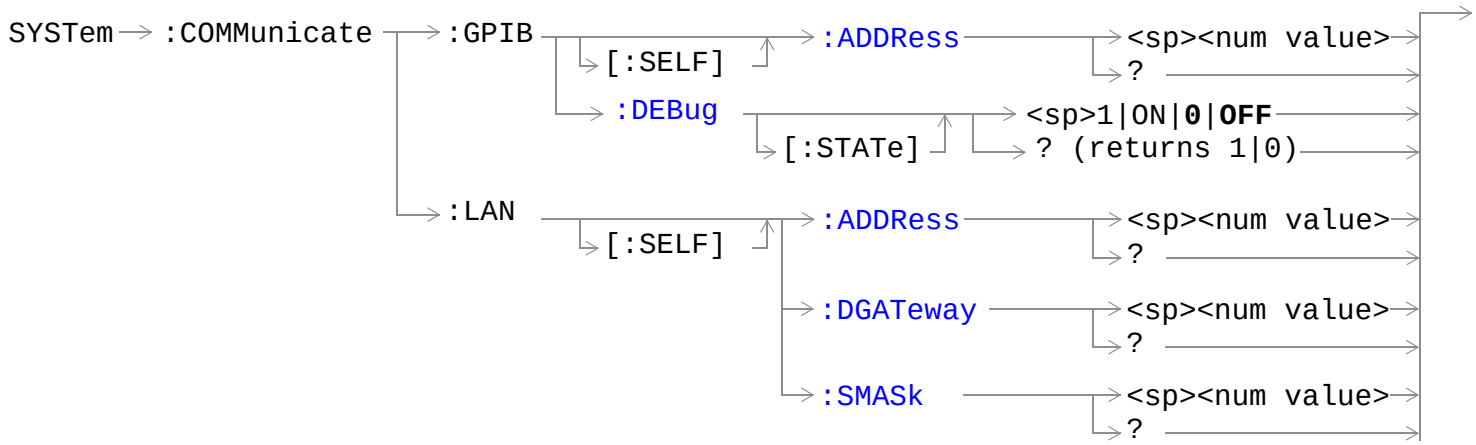
## Related Topics

"Hardware Configuration Report" on page 1011

"SYSTem:CURRent:TA" on page 856

"Obtaining Identification Information *IDN?" on page 1010

# SYSTem:COMMunicate




"Diagram Conventions" on page 323

### SYSTem:COMMunicate:GPIB:[:SELF]:ADDRess

| | | |
|---|---|---|
| Function | GSM | Sets/queries the test set's GPIB address. |
| | GPRS | |
| Setting | | Range: 0 to 30<br>Resolution: 1 |
| Query | | Range: 0 to 30<br>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 HIDDEN |
| Programming Example<br>`OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:SELF:ADDRESS 14" !Sets the GPIB address to 14.` | | |

## SYSTem:COMMunicate:GPIB:DEBug[:STATe]

| | | |
|---|---|---|
| Function | GSM | Sets/queries the test set's SCPI debugger state. |
| | GPRS | When the state is on, enhanced error messages (generated from GPIB commands with syntax errors) are shown on the test set display.<br>The error message is printed along with the syntax. <ERR> is displayed at the end of the incorrect node. Non-printable characters will be replaced with the $ symbol. See "Error Messages" on page 970 for a list of the errors.<br>The debugger state should be set to on only during GPIB code development. Test times will increase if the debugger state is left on. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:DEBUG:STATE ON" !Sets debugger to on.` | | |

## SYSTem:COMMunicate:LAN[:SELF]:ADDRess

| | | |
|---|---|---|
| Function | GSM | 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 849. |
| | GPRS | 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) |
| *Related Topics* | | "LAN IP Address" on page 1032 |
| Programming Example<br>`OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:ADDRESS '130.015.156.255'" !Sets the !LAN IP !address.` | | |

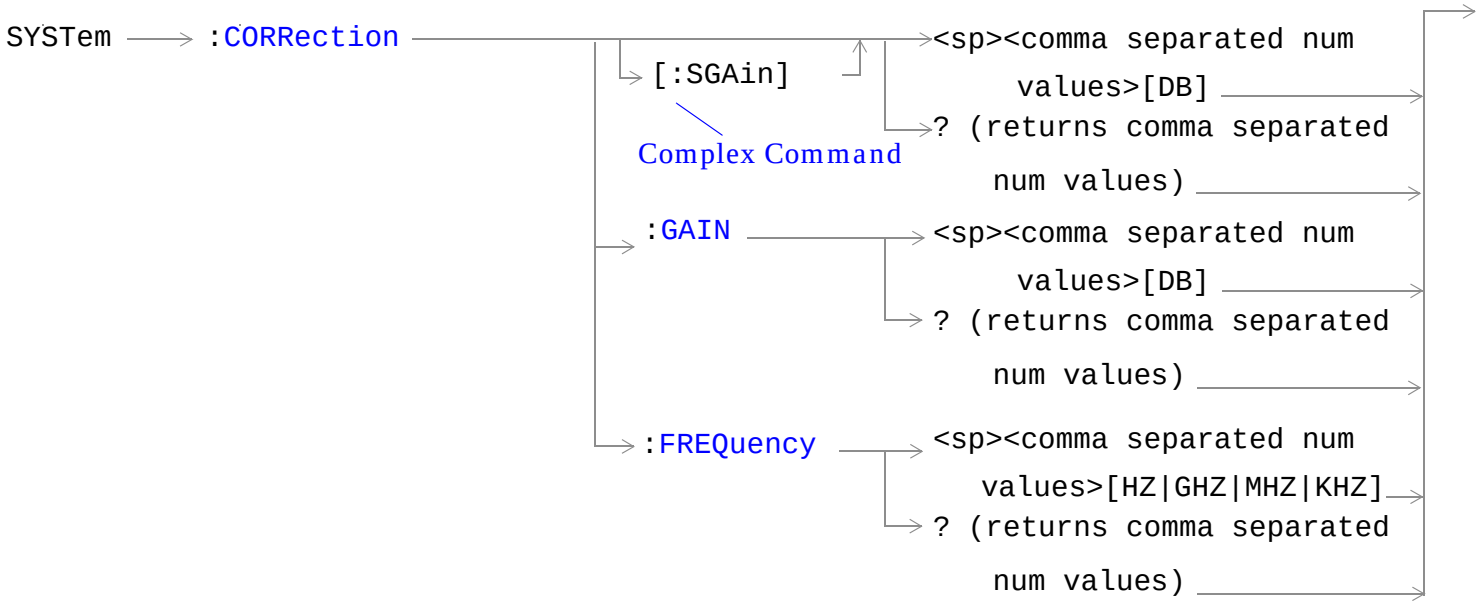
### SYSTem:COMMunicate:LAN[:SELF]:DGATeway

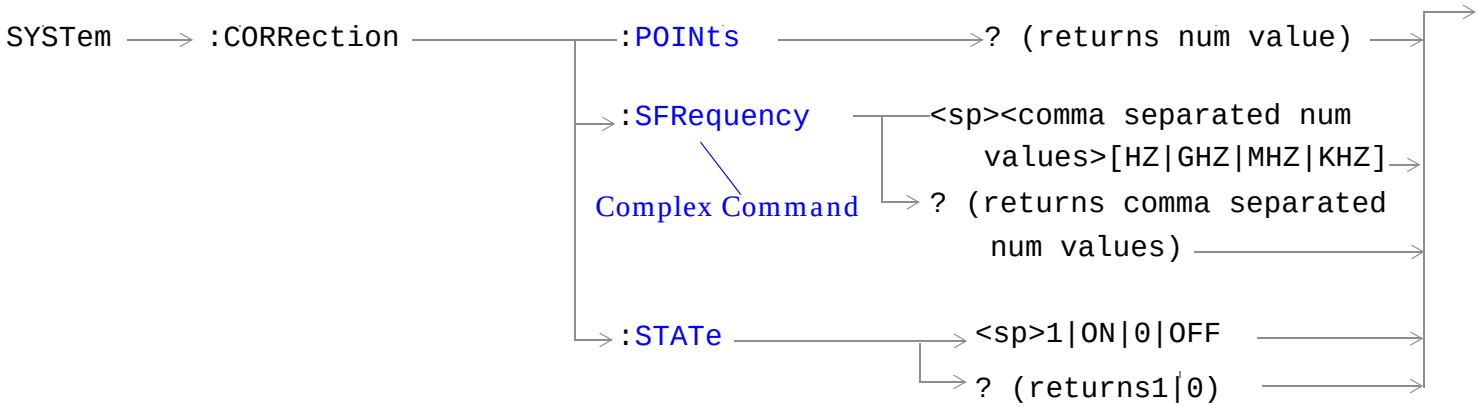
| | | |
|---|---|---|
| Function | GSM | Sets/queries the LAN IP router/gateway address for the test set. |
| | GPRS | |
| Setting | | Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces), blank field |
| Query | | Range: 15 characters formatted as 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) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:DGATEWAY '130.2.6.200'"` | | |

### SYSTem:COMMunicate:LAN[:SELF]:SMASk

| | | |
|---|---|---|
| Function | GSM | 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.<br>If A is less than or equal to 127, the subnet mask is 255.0.0.0.<br>If A is greater than 127 and less or equal to 191, the subnet mask is 222.255.0.0.<br>If A is grater than 191, the subnet mask is 255.255.255.0.<br>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. |
| | GPRS | |
| 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) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:SMASK '255.2.6.200''"` | | |

# SYSTem:CORRection




"Diagram Conventions" on page 323

## SYSTem:CORRection:[:SGAin]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Sets/queries the up to 20 comma separated offset values in dB. This command sets the state to On.<br>See "Amplitude Offset" on page 90.<br>The units, dB, are optional. If no units are specified then units default to dB.<br>Sending a null list (no values) sets the state of all offsets to Off. |
| Setting | | Range: 0 to 20 values between –100 to +100<br>Resolution: 0.01 |
| Query | | Range: 1 to 20 values between –100 to +100, and NAN (9.91E+37)<br>Resolution: 0.01 |
| Factory Setting | | Offsets 1 through 20, are set to 0.00 dB, state is set to Off |

Programming Example

```
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
```

## SYSTem:CORRection:FREQuency

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Sets/queries up to 20 comma separated frequency values in MHz.<br>The units, (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to Hz.<br>See "Amplitude Offset" on page 90.<br>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<br>Resolution: 1 Hz |
| Query | | Range: 1 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz, and NAN (9.91E+37)<br>Resolution: 1 HZ |
| Factory Setting | | 1. 800.00 MHz Off<br>2. 810.00 MHz Off<br>3. 820.00 MHz Off<br>4. 830.00 MHz Off<br>5. 840.00 MHz Off<br>6. 850.00 MHz Off<br>7. 860.00 MHz Off<br>8. 870.00 MHz Off<br>9. 880.00 MHz Off<br>10. 890.00 MHz Off<br>11. 900.00 MHz Off<br>12. 910.00 MHz Off<br>13. 920.00 MHz Off<br>14. 930.00 MHz Off<br>15. 940.00 MHz Off<br>16. 950.00 MHz Off<br>17. 960.00 MHz Off<br>18. 970.00 MHz Off<br>19. 980.00 MHz Off<br>20. 990.00 MHz Off |

Programming Example

```
OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY 1784.8 MHZ,1879.8 MHZ"
!Sets up to 20 comma separated frequencies


OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY"
!Sets the state for all frequencies and offsets to Off
```

### SYSTem:CORRection:GAIN

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Sets/queries the up to 20 comma separated offset values in dB.<br>See "Amplitude Offset" on page 90.<br>The units, dB, are optional. If no units are specified, units default to dB.<br>Sending a null list (no values) sets the state of all offsets to Off. |
| Setting | | Range: 0 to 20 values between –100 to +100<br>Resolution: 0.01 |
| Query | | Range: 1 to 20 values between –100 to +100, and NAN (9.91E+37)<br>Resolution: 0.01 |
| Factory Setting | | Offsets 1 through 20, are set to 0.00 dB, state is set to off |

Programming Example

```
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
```

### SYSTem:CORRection:POINts

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the number of offsets that are in their On state when the RF IN/OUT Amplitude Offset State is also set to On.<br>See "Amplitude Offset" on page 90. |
| Query | | Range: 1 to 20, and NAN (9.91E+37)<br>Resolution: 1 |

Programming Example

```
OUTPUT 714;"SYSTEM:CORRECTION:POINTS?"
!Returns the number of frequencies and offsets
!with their state set to On
```

## SYSTem:CORRection:SFRequency

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Sets/queries up to 20 comma separated frequency values in MHz. This command sets the state to On.<br>The units (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to MHz.<br>See "Amplitude Offset" on page 90.<br>Sending a null list (no values) sets the state of all frequencies to Off. |
| Setting | | Range: 0 to 20 comma separated values from 292.5 MHz to 2700 MHz<br>Resolution: 1 Hz |
| Query | | Range: 1 to 20 comma separated values from 292.5 MHz to 2700 MHz, and NAN (9.91E+37)<br>Resolution: 1 HZ |
| Factory Setting | | 1. 800.00 MHz Off<br>2. 810.00 MHz Off<br>3. 820.00 MHz Off<br>4. 830.00 MHz Off<br>5. 840.00 MHz Off<br>6. 850.00 MHz Off<br>7. 860.00 MHz Off<br>8. 870.00 MHz Off<br>9. 880.00 MHz Off<br>10. 890.00 MHz Off<br>11. 900.00 MHz Off<br>12. 910.00 MHz Off<br>13. 920.00 MHz Off<br>14. 930.00 MHz Off<br>15. 940.00 MHz Off<br>16. 950.00 MHz Off<br>17. 960.00 MHz Off<br>18. 970.00 MHz Off<br>19. 980.00 MHz Off<br>20. 990.00 MHz Off |

Programming Example

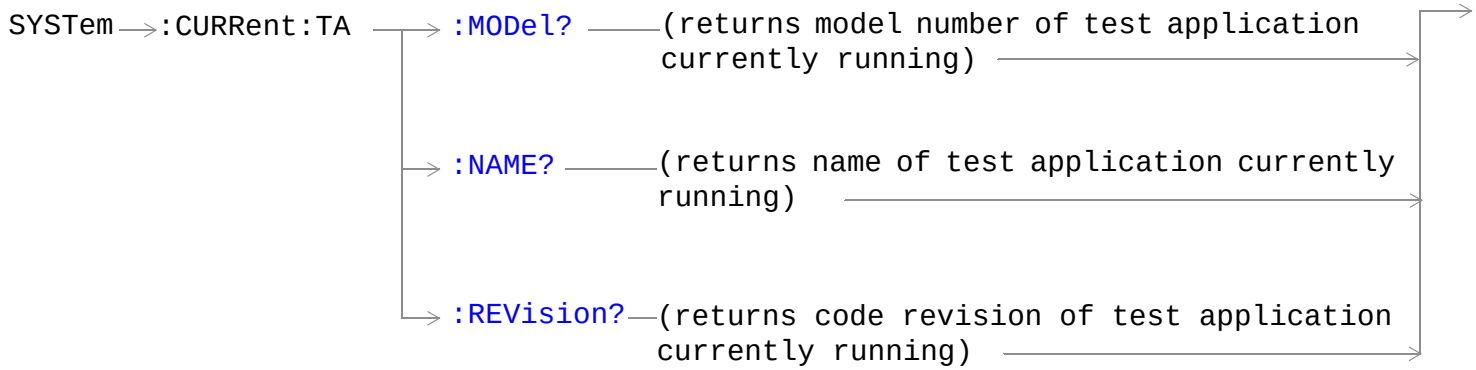
```
OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY 1710.2 MHZ,1805.2 MHZ,1784.8 MHZ,1879.8 MHZ"
!Sets up to 20 comma separated frequencies and sets the state to On for the frequency,
!offset, and RF IN/OUT Amplitude Offset State


OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY"
!Sets the state for all frequencies and offsets to Off
```

## SYSTem:CORRection:STATe

| | | |
|---|---|---|
| Function | GSM<br>GPRS | 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.<br>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.<br>Setting any of the frequency or offset states to On will set the RF IN/OUT Amplitude Offset State to On.<br>See “Amplitude Offset” on page 90. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| Factory Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;”SYSTEM:CORRECTION:STATE ON” !Sets the RF IN/OUT`<br>`!Amplitude Offset State to On` | | |

# SYSTem:CURRent:TA




"Diagram Conventions" on page 323

### SYSTem:CURRent:TA:MODel?

| | | |
|---|---|---|
| Function | GSM | Queries the model number of the test application running. Printable ASCII characters up to a 15 character string. |
| | GPRS | |
| Query | | Range: ASCII codes 32 - 126 decimal excluding comma and semicolon |
| *RST Setting | | non volatile, read from the test set's hard disk |

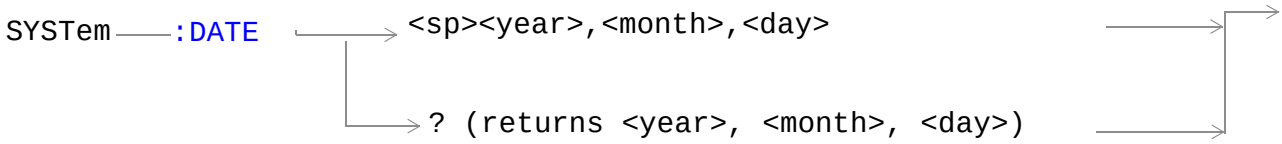
### SYSTem:CURRent:TA:NAME?

| | | |
|---|---|---|
| Function | GSM | Queries the name of the test application running. Printable ASCII characters up to a 25 character string. This is not the recommended command, see "SYSTem:APPLication" on page 838 for the recommended command. |
| | GPRS | |
| 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 | GSM | Queries the coordinated codeware revision for the test application running. Printable ASCII characters up to a 20 character string. This is not the recommended command, see "SYSTem:APPLication" on page 838 for the recommended command. |
| | GPRS | |
| 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 323

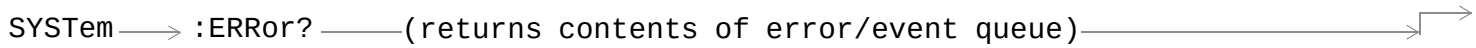
### SYSTem:DATE

| | |
|---|---|
| Function | Sets/queries the date. |
| Setting | Range:<br>• <year> 2000 to 2099<br>• <month> 1 to 12 (the number 1 corresponds to January)<br>• <day> 1 to the number of days in the month specified by the <month> parameter |
| Query | Range:<br>• <year> 2000 to 2099<br>• <month> 1 to 12 (the number 1 corresponds to January)<br>• <day> 1 to the number of days in the month specified by the <month> parameter |
| *RST Setting | This feature is not affected by instrument preset |
| Requirements | GPRS Lab Application: Revision A.01.00 and above |
| Programming Example<br>`OUTPUT 714;"SYSTEM:DATE 2001,9,27" !Sets the date to September 27,2001.`<br>`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?

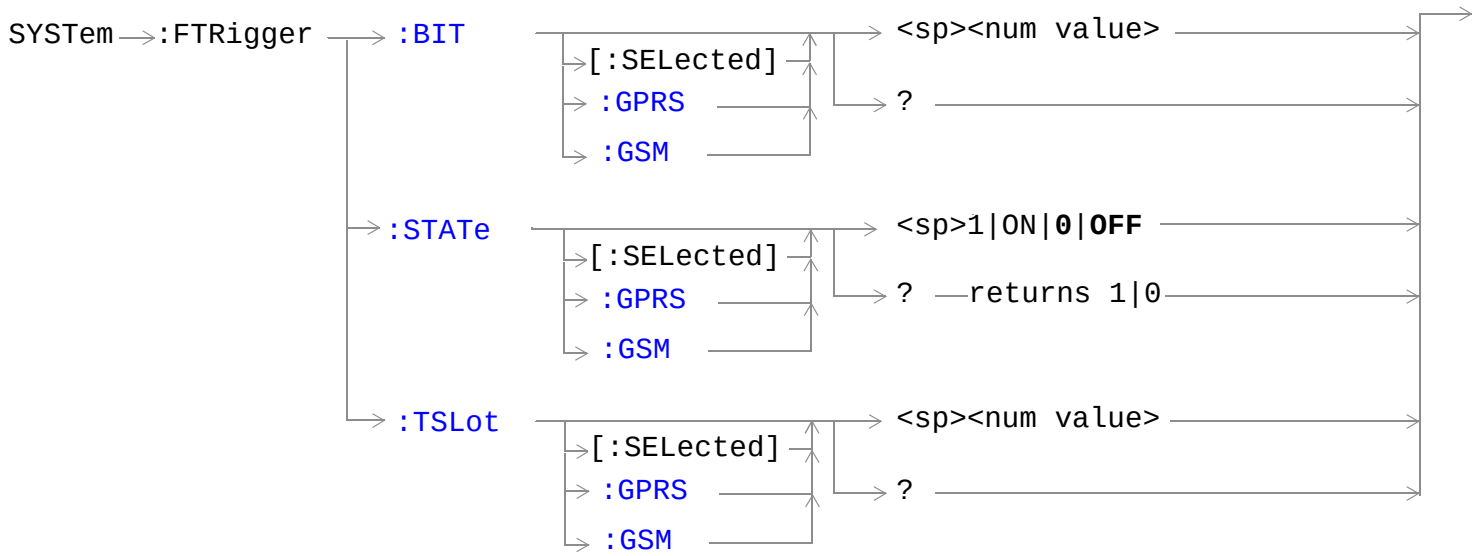



"Diagram Conventions" on page 323

### SYSTem:ERRor?

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Queries the contents of the Error/Event Queue. The Error/Event Queue may contain one or more messages with an error or event description.<br>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 970. |
| Query | | Error/Event Queue<br>• Range: 0 to 100 messages up to 255 characters in length |

# SYSTem:FTRigger




"Diagram Conventions" on page 323

## SYSTem:FTRigger:BIT[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command selects/queries which bit, 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 288 |
| | GPRS | |
| Setting | | Range: 0 to 1250<br>Resolution: 1 |
| Query | | Range: 0 to 1250<br>Resolution: 1 |
| *RST Setting | | zero |

Programming Example

```
OUTPUT 714;"SYSTEM:FRTIGGER:BIT 14"
!Would cause external frame trigger pulses to occur 14 bits after bit 0 of the selected
!timeslot.
```

## SYSTem:FTRigger:BIT:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command selects/queries which bit, after zero, will be used for frame trigger pulse positioning in the GPRS radio format whether or not that format is active. See "Setting Frame Trigger Parameters" on page 288 |
| Setting | | Range: 0 to 1250<br>Resolution: 1 |
| Query | | Range: 0 to 1250<br>Resolution: 1 |
| *RST Setting | | zero |

Programming Example

```
OUTPUT 714;"SYSTEM:FRTIGGER:BIT:GPRS 7"
!Would cause external frame trigger pulses to occur 7 bits after bit 0 of the selected
!timeslot.
```

### SYSTem:FTRigger:BIT:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries which bit, after zero, will be used for frame trigger pulse positioning in the GSM radio format whether or not that format is active. See "Setting Frame Trigger Parameters" on page 288. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 1250<br>Resolution: 1 |
| Query | | Range: 0 to 1250<br>Resolution: 1 |
| *RST Setting | | zero |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:BIT:GSM 12"`<br>`!Would cause external frame trigger pulses to occur 12 bits after bit 0 of the selected !timeslot.` | | |

### SYSTem:FTRigger:STATe[:SELected]

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the frame trigger state in the active (that is the selected) radio format. See "Setting Frame Trigger Parameters" on page 288. |
| | GPRS | |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:STATE ON" !Set frame trigger state to on.` | | |

### SYSTem:FTRigger:STATe:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | This command sets/queries the frame trigger state in the GPRS radio format whether or not that format is active. See "Setting Frame Trigger Parameters" on page 288. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:STATE:GPRS ON" !Set frame trigger state to on.` | | |

### SYSTem:FTRigger:STATe:GSM

| | | |
|---|---|---|
| Function | GSM | This command sets/queries the frame trigger state in the GSM radio format whether or not that format is active. See "Setting Frame Trigger Parameters" on page 288. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0\|OFF \| 1\|ON |
| Query | | Range: 0\|1 |
| *RST Setting | | 0 (off) |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:STATE:GSM ON" !Set frame trigger state to on.` | | |

### SYSTem:FTRigger:TSLot[:SELected]

| | | |
|---|---|---|
| Function | GSM<br>GPRS | 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 288. |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | zero |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:TSLOT 5" !Sets the frame trigger timeslot to 5.` | | |

### SYSTem:FTRigger:TSLot:GPRS

| | | |
|---|---|---|
| Function | GSM | This command is not applicable to GSM. |
| | GPRS | 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 288. |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | zero |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:TSLOT:GPRS 2" !Sets the frame trigger timeslot to 2.` | | |

## SYSTem:FTRigger:TSLot:GSM

| | | |
|---|---|---|
| Function | GSM | This command selects/queries the timeslot for frame trigger pulse positioning in the GSM radio format whether or not that format is active. See "Setting Frame Trigger Parameters" on page 288. |
| | GPRS | This command is not applicable to GPRS. |
| Setting | | Range: 0 to 7<br>Resolution: 1 |
| Query | | Range: 0 to 7<br>Resolution: 1 |
| *RST Setting | | zero |
| Programming Example<br>`OUTPUT 714;"SYSTEM:FRTIGGER:TSLOT:GSM 6" !Sets the frame trigger timeslot to 6.` | | |

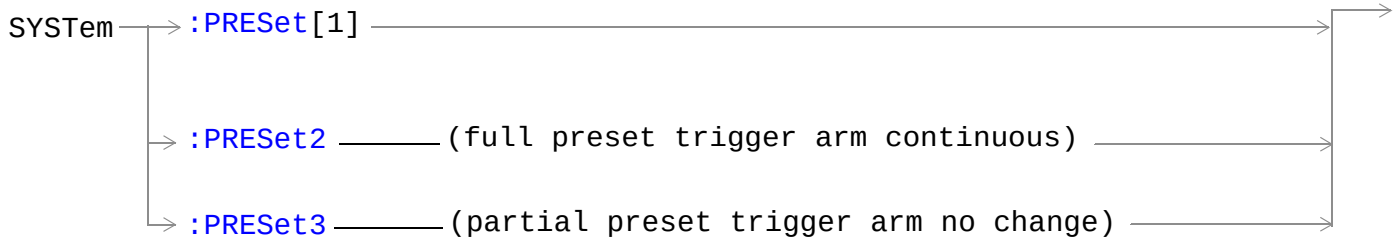
# SYSTem:MEASurement

"Diagram Conventions" on page 323

### SYSTem:MEASurement:RESet

| | | |
|---|---|---|
| Function | GSM | Sets all measurements to abort, if the trigger arm is set to continuous the measurements will begin a new measurement cycle. See "Trigger Arm (Single or Continuous) Description" on page 278. |
| | GPRS | Any measurement results are cleared and the Integrity Indicator is set to 1 (No_Result_Available). See "Integrity Indicator" on page 283. |
| Setting | GSM | These results are set to their default values:<br>• RACH Count<br>• Page Count<br>• Missing Burst Count<br>• Corrupted Burst Count<br>• Channel Decoder Error Count<br>• MS TX Level Reported<br>• TCH Timing Advance Reported<br>• RX Level<br>• RX Qual |
| | GPRS | These results are set to their default values:<br>• Block Error Rate (BLER)<br>• Blocks Tested |
| Programming Example<br>`OUTPUT 714;"SYSTEM:MEASUREMENT:RESET" !Resets current measurements.` | | |

# SYSTem:PRESet




"Diagram Conventions" on page 323

### SYSTem:PRESet[1] (not recommended for use)

| | | |
|---|---|---|
| Function | GSM | Not recommended for use at this time, use the SYSTEM:PRESET3 command for partial preset.<br>Performs a partial preset. This is the recommended command when you want to change from remote operation to manual operation and a partial preset is needed.<br>Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed.<br>A partial preset will not modify any measurement settings including trigger arm. See "Trigger Arm (Single or Continuous) Description" on page 278. |
| | GPRS | |
| Related Topics | | See "Partial Preset" on page 232 for more details |
| Programming Example<br>`OUTPUT 714;"SYSTEM:PRESET" !Partial preset when changing from remote to manual operation.` | | |

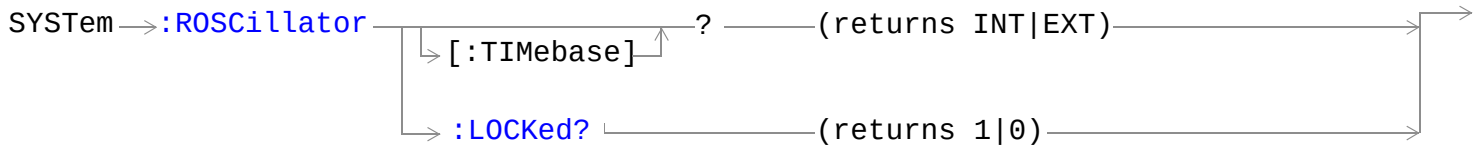
### SYSTem:PRESet2

| | | |
|---|---|---|
| Function | GSM | 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.<br>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 278.<br>The *RST command will set the trigger arm to single. |
| | GPRS | |
| Related Topics | | See "Full Preset" on page 233 for more details. |
| Programming Example<br>`OUTPUT 714;"SYSTEM:PRESET2" !Full preset.` | | |

## SYSTem:PRESet3

| | | |
|---|---|---|
| Function | GSM | Performs a partial preset. This is the recommended command when a partial preset is needed during remote operation of the test set.<br><br>Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed.<br><br>A partial preset will not modify any measurement settings including trigger arm. See "Trigger Arm (Single or Continuous) Description" on page 278. |
| | GPRS | |
| Related Topics | | See "Partial Preset" on page 232 for more details. |
| Programming Example<br><br>`OUTPUT 714;"SYSTEM:PRESET3" !Partial preset when in remote operation.` | | |

# SYSTem:ROSCillator




"Diagram Conventions" on page 323

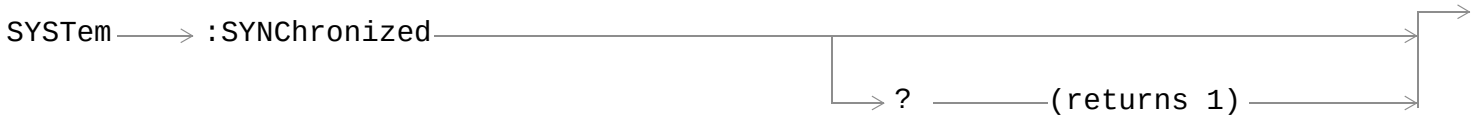
### SYSTem:ROSCillator[:TIMebase]?

| | | |
|---|---|---|
| Function | GSM | Query to indicate if the test set's internal source or a suitable external source has been chosen to drive the test set's time base.<br>A suitable external source must have:<br>• an output level of 0 to +13DBM<br>• frequency of 10 MHZ |
| | GPRS | |
| Query | | Range:<br>• INT = internal source<br>• EXT = external source |

### SYSTem:ROSCillator:LOCKed?

| | | |
|---|---|---|
| Function | GSM | Query the status of the reference oscillator and indicate if it is locked or unlocked. |
| | GPRS | |
| Query | | Range:<br>• 0 = unlocked<br>• 1 = locked |

# SYSTem:SYNChronized




"Diagram Conventions" on page 323

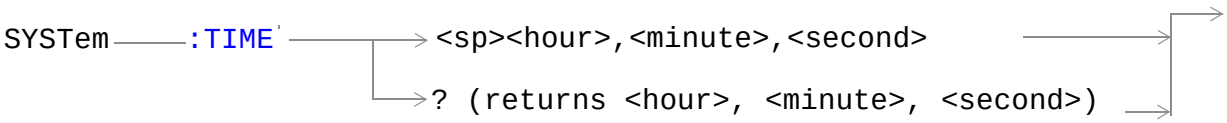
### SYSTem:SYNChronized

| | | |
|---|---|---|
| Function | GSM<br>GPRS | Sets/queries the test set that all prior sequential commands have completed and all prior overlapped commands have started indicating that the input buffer is synchronized. (See "Call Processing Event Synchronization" on page 300 or "Data Connection Processing Event Synchronization" on page 314.) |
| Setting | | Bit 12 of the status operation condition register is pulsed. See "STATus:OPERation:CALL Condition Register Bit Assignment" on page 792. |
| Query | | 1 |
| Related Topics | | See "Status Subsystem Overview" on page 247.<br>See "Call Processing Event Synchronization" on page 300 or "Data Connection Processing Event Synchronization" on page 314. |

Programming Example

```
OUTPUT 714;"SYSTEM:SYNCHRONIZED" !Pulses bit 12 of the status operation
                                 !condition register.
OUTPUT 714;"SYSTEM:SYNCHRONIZED?" !Returns a 1 indicating all prior sequential
                                  !commands have completed and all overlapped
                                  !commands have started.
```

# SYSTem:TIME




"Diagram Conventions" on page 323

### SYSTem:TIME

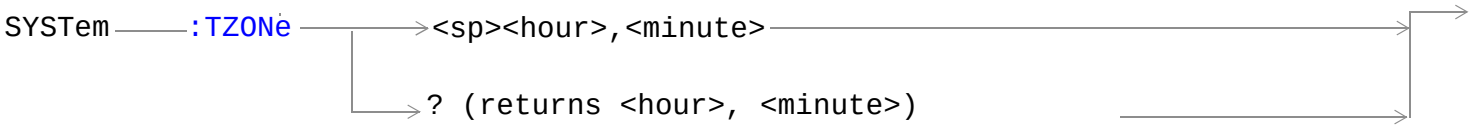
| | |
|---|---|
| Function | Sets/queries the local time of day.<br>UTC time will track changes made directly to local time settings. Also, if new settings are made to UTC time, local time will track UCT time.<br>Changes to time zone will cause changes to local time, but will not directly affect UTC time. |
| Setting | Range:<br>• <hour> 0 to 23<br>• <minute> 0 to 59<br>• <second> 0 to 59<br>**NOTE** The resolution of local 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:<br>• <hour> 0 to 23<br>• <minute> 0 to 59<br>• <second> 0 to 59<br>**NOTE** The resolution of the local 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 | GPRS Lab Application: Revision A.01.00 and above |
| Programming Example<br>`OUTPUT 714;"SYSTEM:TIME 7,30,0" !Sets local time to 7:30`<br>`OUTPUT 714;"SYSTEM:TIME?" !Returns "+7,+30,+0" if local time has been set to 7:30.` | |

## Related Topics

"SYSTem:UTC[:TIME]"

"SYSTem:TZONe"

# SYSTem:TZONe




"Diagram Conventions" on page 323

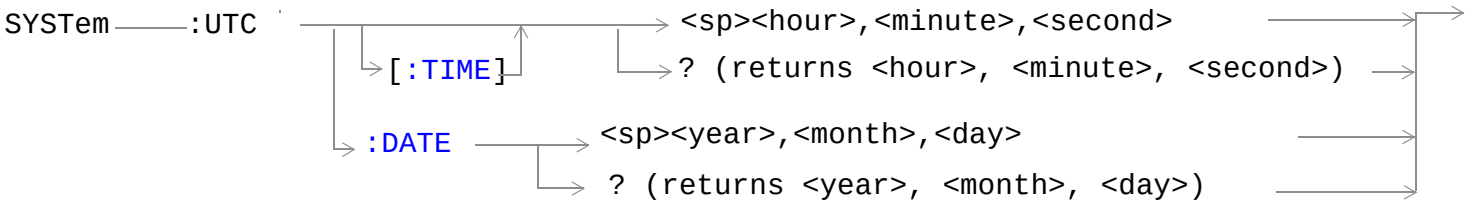
### SYSTem:TZONe

| | |
|---|---|
| Function | Sets/queries the time zone.<br>Changes to time zone will cause changes to local time, but will not directly affect UTC time. |
| Setting | Range:<br>• <hour> -12 to +15<br>• <minute> 0 to 59 |
| Query | Range:<br>• <hour> -12 to +15<br>• <minute> 0 to 59 |
| *RST Setting | This feature is not affected by instrument preset |
| Requirements | GPRS Lab Application: Revision A.01.00 and above |
| Programming Example<br>`OUTPUT 714;"SYSTEM:TZONe 8,0" !Sets time zone to 8 hours and 0 minutes.`<br>`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 323

### 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.)<br>Local time will track UTC time settings. Also, if new settings are made to local time, UTC time will track local time. |
| Setting | Range:<br>• <hour> 0 to 23<br>• <minute> 0 to 59<br>• <second> 0 to 59<br>**NOTE** 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:<br>• <hour> 0 to 23<br>• <minute> 0 to 59<br>• <second> 0 to 59<br>**NOTE** 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 |

Programming Example

```
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 | Range:<br>• <year> 2000 to 2099<br>• <month> 1 to 12 (the number 1 corresponds to January)<br>• <day> 1 to the number of days in the month specified by the <month> parameter |
| Query | Range:<br>• <year> 2000 to 2099<br>• <month> 1 to 12 (the number 1 corresponds to January)<br>• <day> 1 to the number of days in the month specified by the <month> parameter |
| *RST Setting | This feature is not affected by instrument preset |
| Requirements | GPRS Lab Application: Revision A.01.00 and above |
| Programming Example<br>`OUTPUT 714;"SYSTEM:UTC:DATE 2001,9,27" !Sets the UTC date to September 27,2001.`<br>`OUTPUT 714;"SYSTEM:UTC:DATE? !Returns “+2001,+9,+27” if the UTC date has been set to September 27,2001.` | |

## Related Topics

“SYSTem:DATE”

“SYSTem:TIME”

# 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 retuned 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.

## Related Topics

“Call Processing Event Synchronization” on page 300

“Preset Descriptions” on page 232

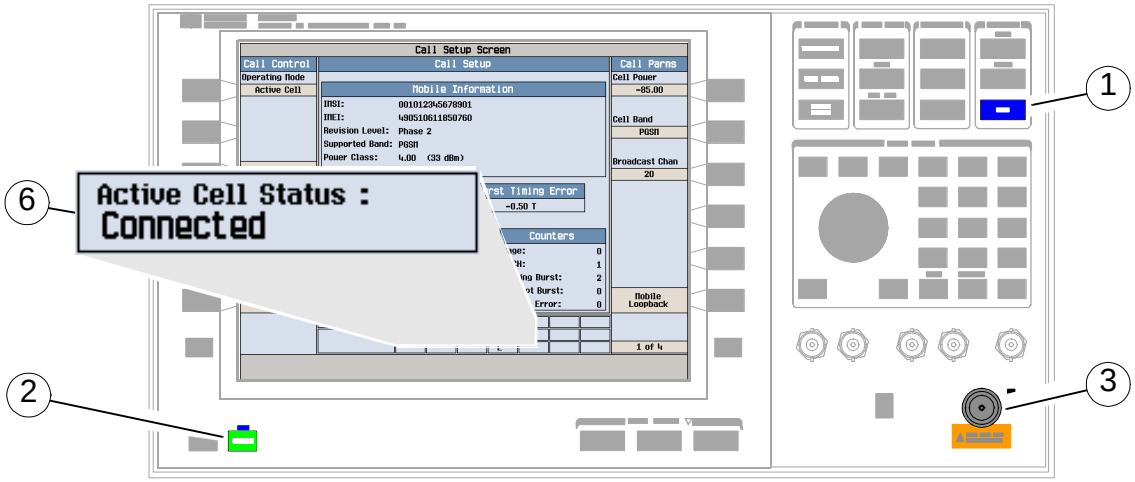
“Obtaining Identification Information *IDN?” on page 1010

# 5 Manual Operation

# GSM Manual Operation

# How Do I Make Measurements on a Mobile?

## A. Establish a call.

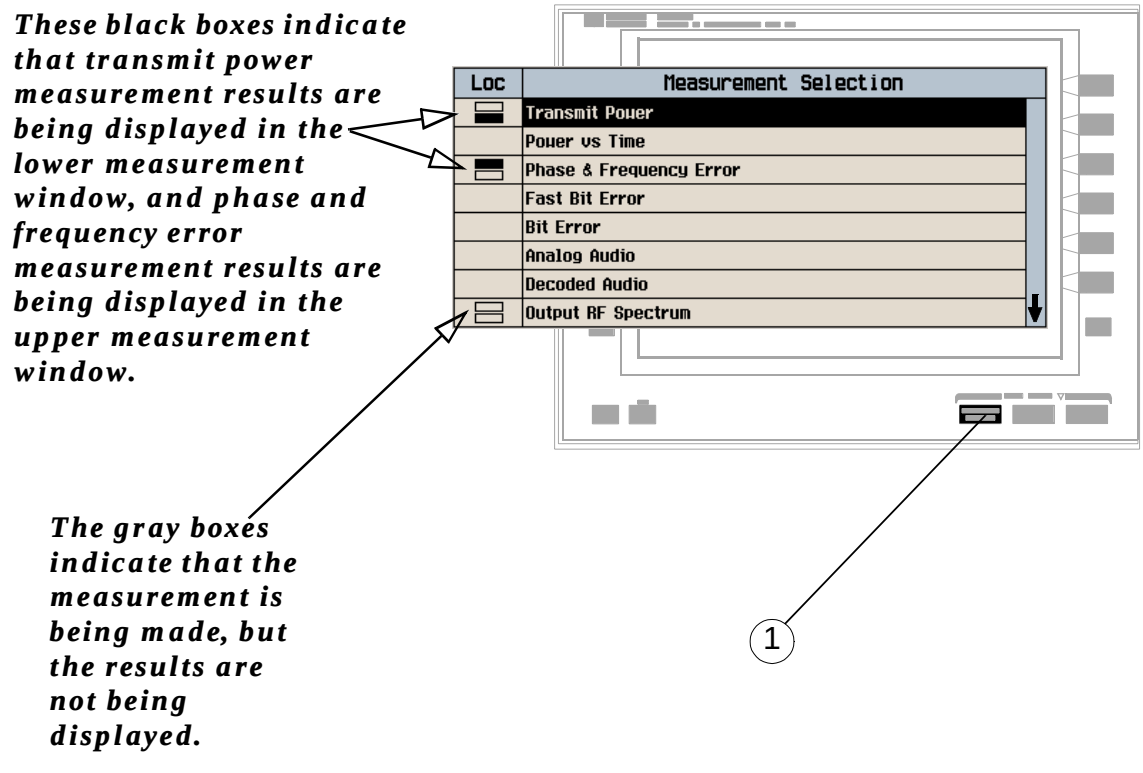



1. Press the blue **SHIFT** key.
2. Press the green **Preset** key.
3. Connect the mobile.
4. Turn on the mobile and wait for it to camp.

**NOTE** If the mobile does not camp check that it is using the test set default PGSM cell band.

5. On the mobile press **1**, **2**, **3**, and then press send.
6. Check for `Connected` in the `Active Cell Status:` field.

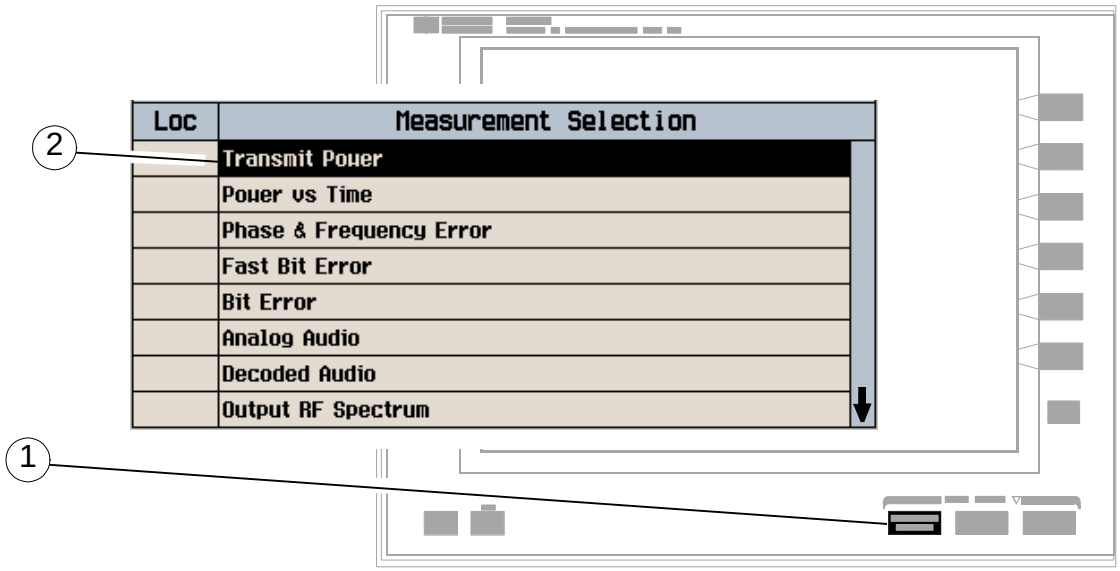
## B. Select measurements.




1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

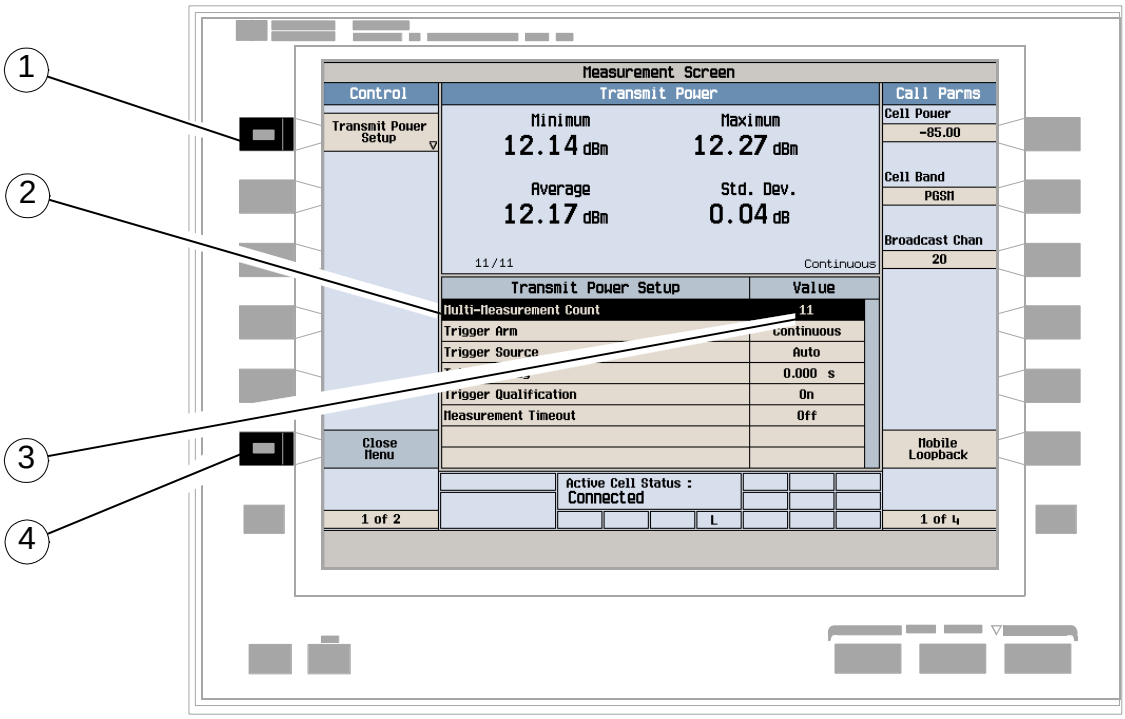
# How Do I Change a Measurement's Setup?

## A. Select a measurement.




1. Press the **Measurement selection** key.
2. Highlight a measurement to set up and press the knob.

## B. Set up the measurement.

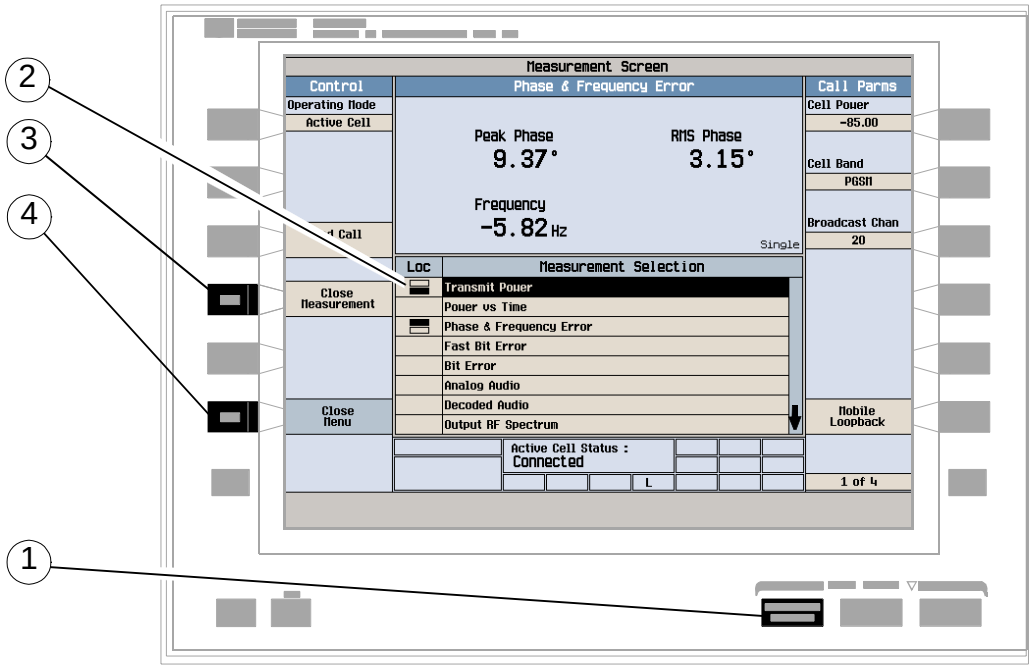



1. Press the measurement's setup key (**F1**).
2. Highlight a parameter and press the knob.
3. Enter a value or make a selection and press the knob.

**NOTE** For statistical measurement results, change the Multi-Measurement Count parameter from `Off` to a number >1.

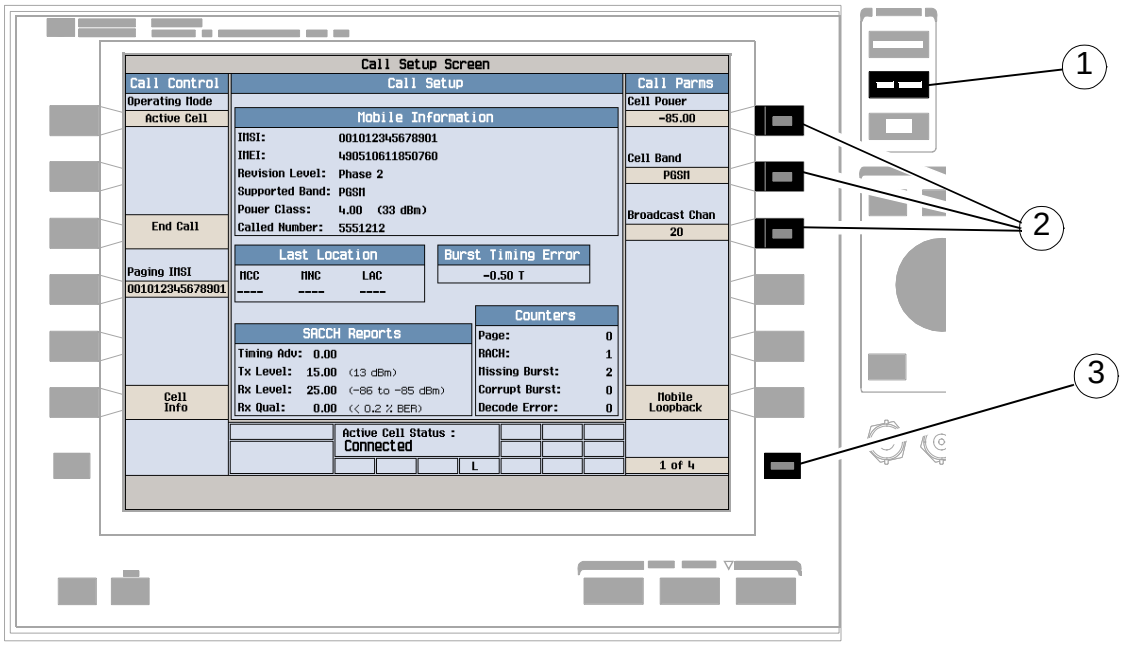
4. Press the Close Menu (**F6**) key.

# 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?

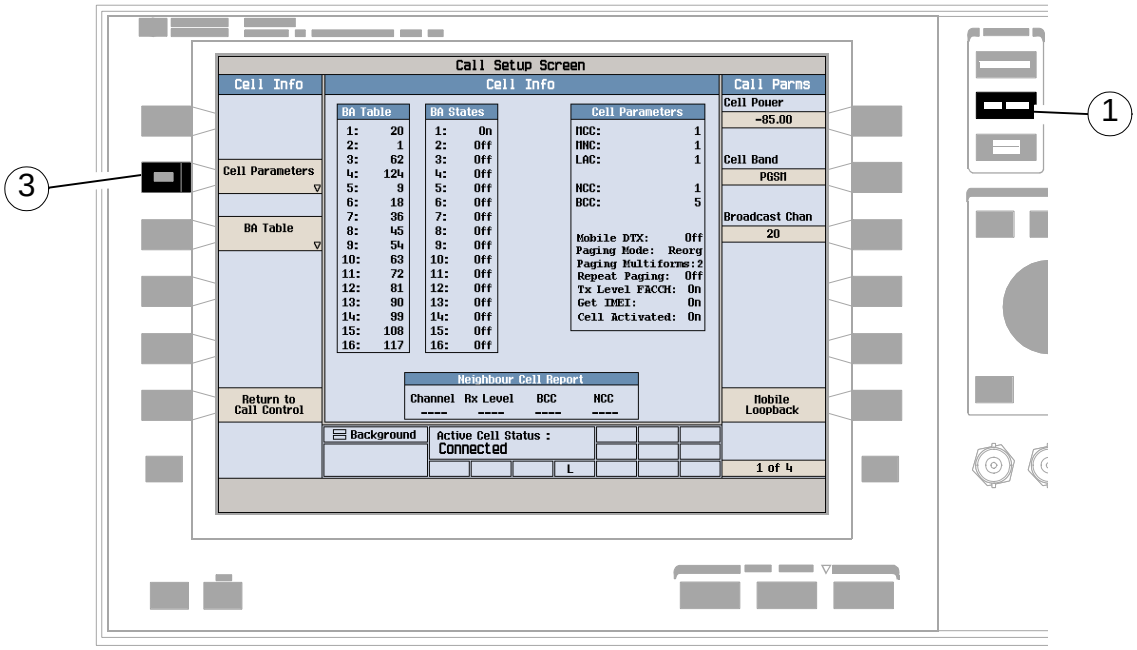



1. Press the **CALL SETUP** key.
2. Press **F7**, **F8**, or **F9**.
3. Enter a value or highlight a selection and press the knob.
4. Press the **More** key for additional call parameters.

**NOTE** For a dual-band handover, change the `Traffic Band` selection (`Call Parms` (**F7**) on menu 2 of 4).

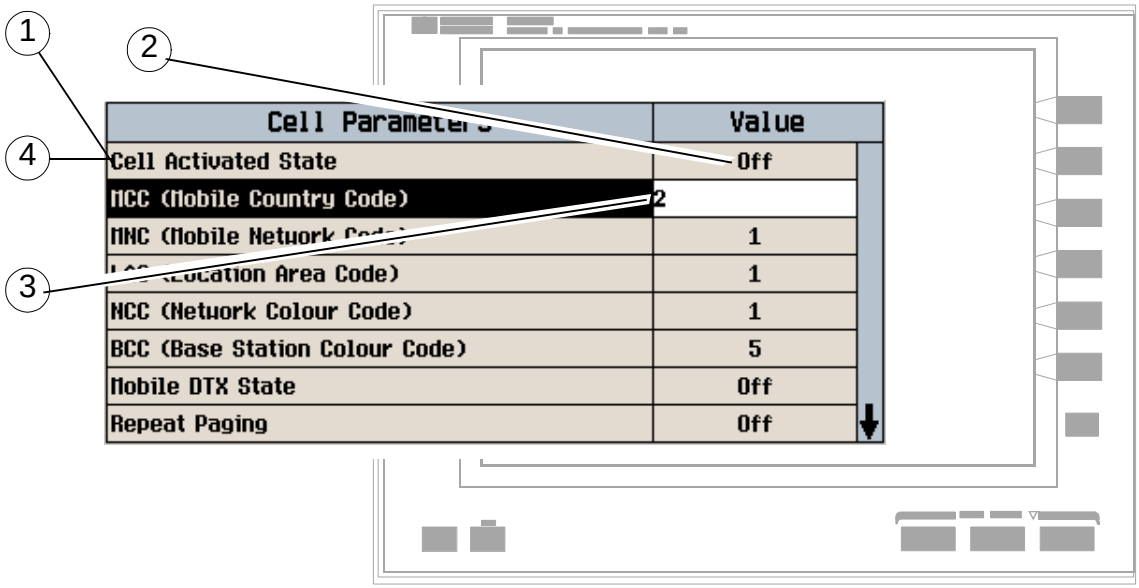
# How Do I Change Cell Parameters?

## A. Select the Cell Parameters menu.




1. Press the **CALL SETUP** key.
2. Press the `Cell Info` (**F5**) key.
3. Press the Cell Parameters (**F2**) key.

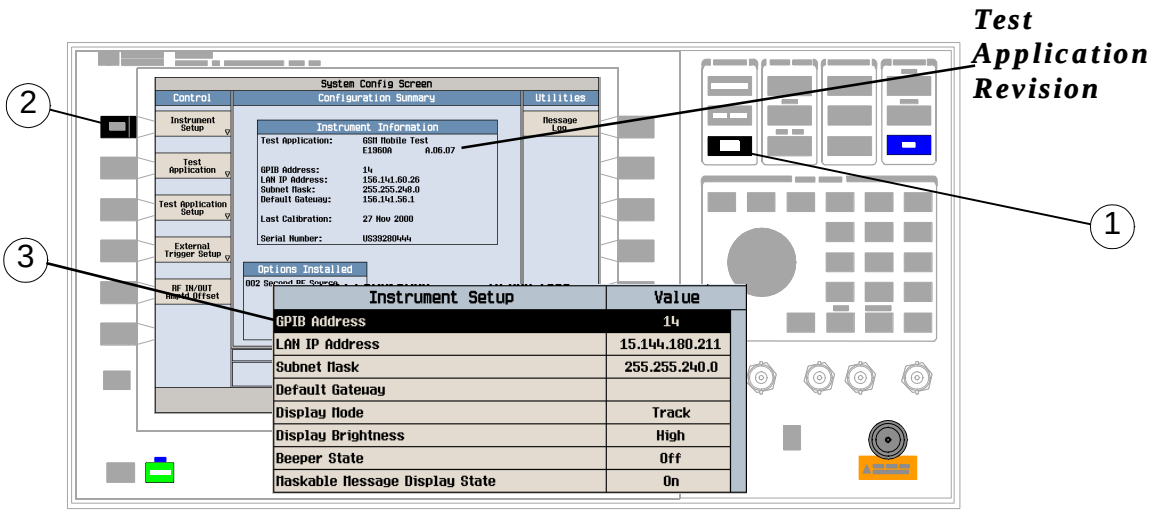
## B. Set a cell parameter.




- To change “network” cell parameters:
  1. Highlight `Cell Activated State` and press the knob.
  2. Set `Cell Activated State` to Off. (Highlight `Off` and press the knob.)
  3. Set network cell parameter to the desired value. (Highlight the parameter, press the knob, enter a value, and press the knob.)
  4. Set `Cell Activated State` to `On`.
- To change all other cell parameters:
  1. Highlight the parameter, press the knob, enter a value, and press the knob.

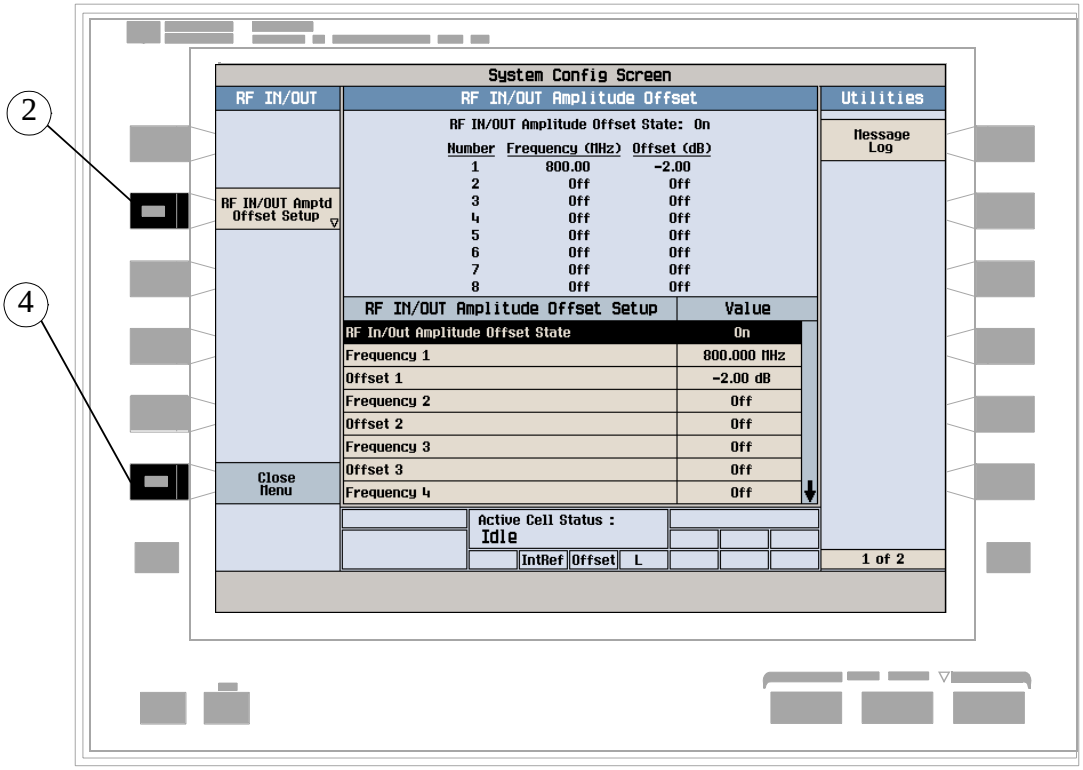
# How Do I Configure the Test Set for My Test System?

## A. Configure instrument information and setup.



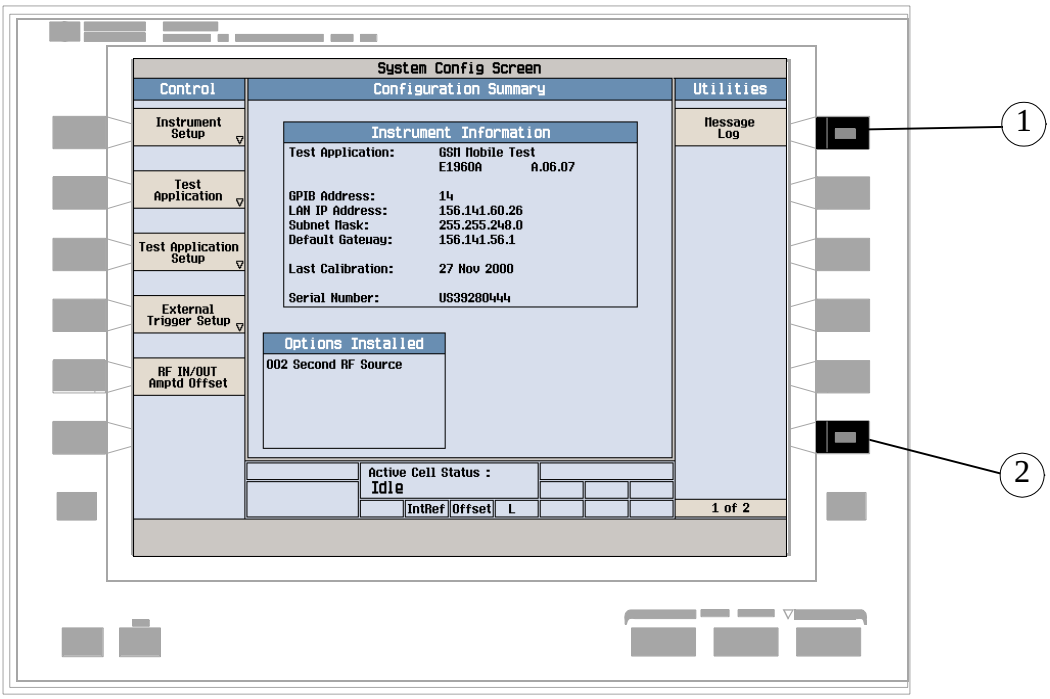

1. Press the **SYSTEM CONFIG** key.
2. Press the `Instrument Setup` (**F1**) key.
3. Adjust an instrument setting and then press the `Close Menu` (**F6**) key.

## B. Set amplitude offsets.



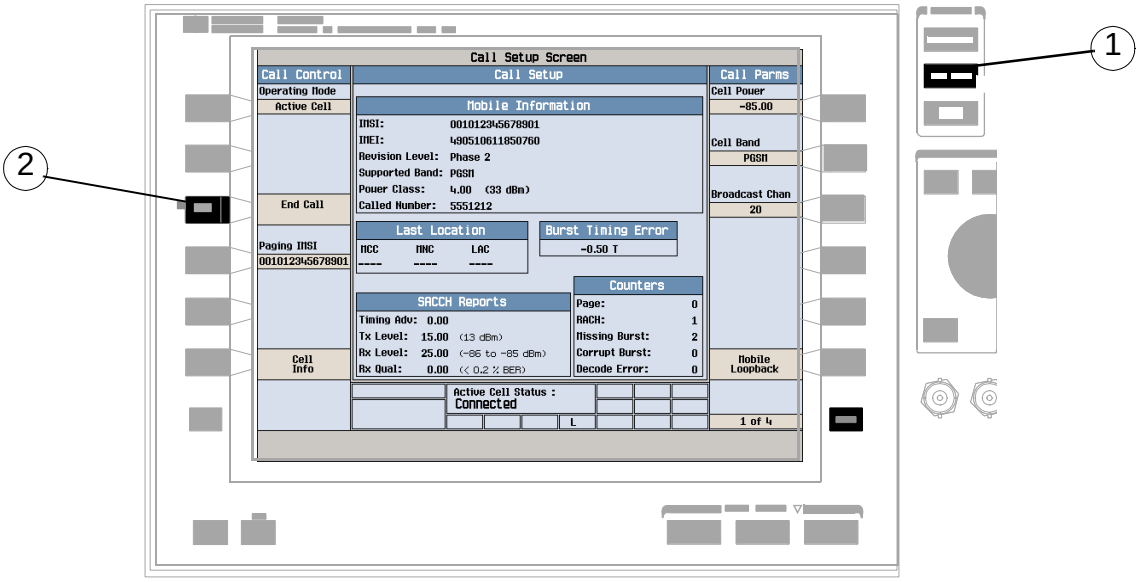

1. On the Configuration Summary screen, press the `RF IN/OUT Amptd Offset` (**F5**) key.
2. On the RF IN/OUT Amplitude Offset screen, press the `RF IN/OUT Amptd Offset Setup` (**F2**) key.
3. Enter the amplitude offsets for the test frequencies you use.
4. Press the `Close Menu` (**F6**) key.
5. Press the `Return` (**F6**) key to return to the Configuration Summary screen.

## C. Check the message log.




1. Press the `Message Log` (**F7**) key and view the message log.
2. Press the `Return` (**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.

# GSM Mobile Measurements

The following step-by-step procedures explain how to perform specific measurements available on the GSM 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 (http://www.agilent.com/find/8960support/).

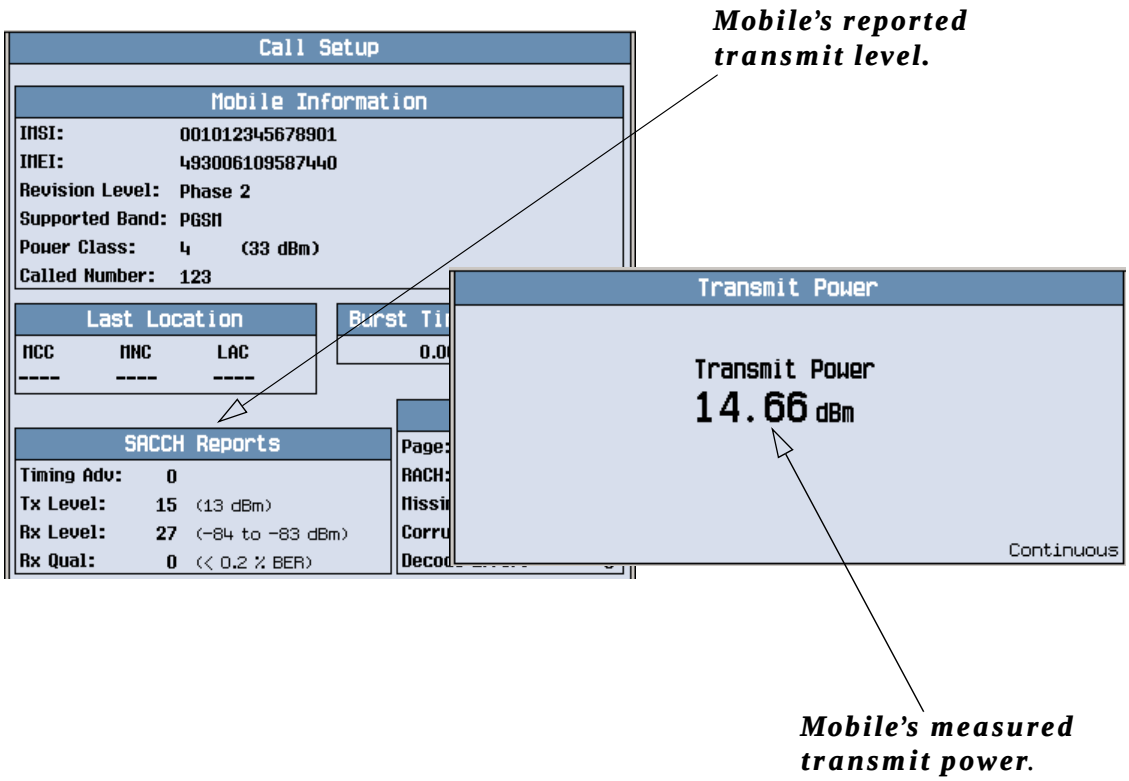
*Setup parameters for each measurement are assumed to be set to their default (Full preset) values unless otherwise stated.*

The following measurement procedures are provided:


- "Measuring Transmit Power" on page 890
- "Measuring Power versus Time" on page 891
- "Measuring Phase and Frequency Error" on page 896
- "Measuring Fast Bit Error" on page 899
- "Measuring Bit Error" on page 900
- "Measuring Output RF Spectrum" on page 901
- "Measuring IQ Tuning" on page 905

## Measuring Transmit Power

1. Establish a call with the mobile.
2. Press the **Measurement selection** key.
3. Select the `Transmit Power` measurement.
4. Press the `Transmit Power Setup` (**F1**) key.
5. Set the measurement parameters as needed for your measurement situation, including:
   `Measurement Timeout = 5.0 s`

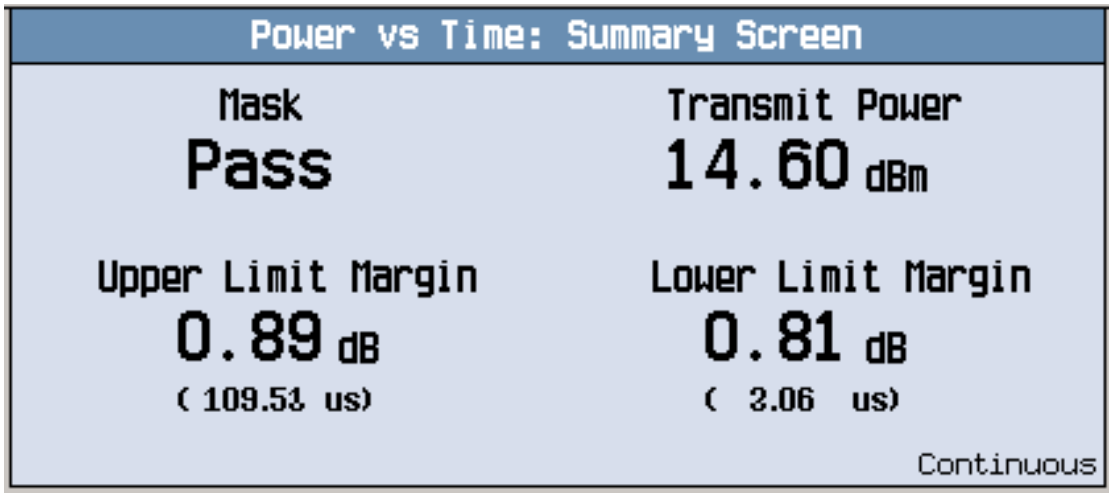



A typical measurement result is shown above.

Press the **CALL SETUP** key and using the `SACCH Reports` window, compare the mobile's reported `Tx Level` with the real measured `Transmit Power`.

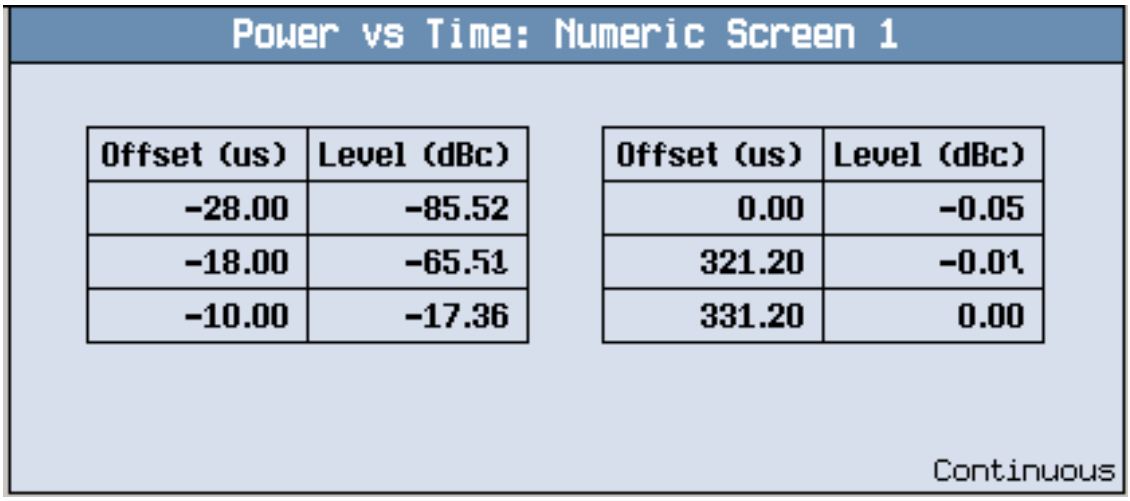
## Measuring Power versus Time

1. Establish a call with the mobile.
2. Press the **Measurement selection** key.
3. Select the `Power vs Time` measurement.
4. Press the `Power vs Time Setup` (**F1**) key.
5. Press the `Measurement Setup` (**F1**) key.
6. Set the measurement parameters as needed for your measurement situation, including:
   `Measurement Timeout = 10 s`
7. Press the `Measurement Offsets` (**F2**) key.
   Note: For statistical analysis the test set allows you to set up to 12 time markers. These markers *do not* define the mask but allow you to obtain measurement results from specified points on the mask.
8. Enter the required time offset values.
   Note: Offsets are referenced to bit zero in a normal burst. To obtain results from measurement points before bit zero, enter negative offset values.
9. Press the `Close Menu` (**F6**) key.



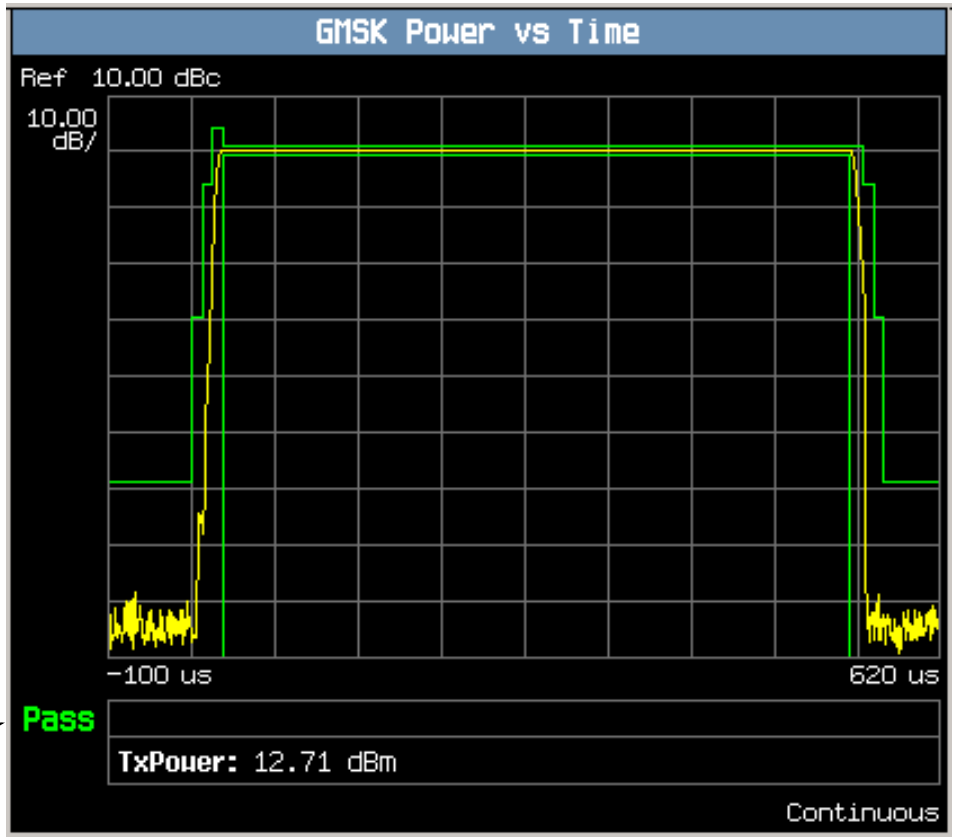

The displayed screen shows whether the burst is within the `Mask` (Pass or Fail), broad-band carrier `Transmit Power`, the `Upper Limit Margin`, and the `Lower Limit Margin`.

10. Press the `Return to PvT Control` (**F6**) key.
11. Press the `Change View` (**F2**) key.
12. Press the `Numeric 1 of 2` (**F2**) key to view the measurement results for offsets 1 through 6, or `Numeric 2 of 2` (**F3**) key to view measurement results for offsets 7 through 12.




A typical numeric measurement results screen for offsets 1 through 6 is shown above.

13. Press the Graph (**F4**) key to access the full graph of the uplink burst.

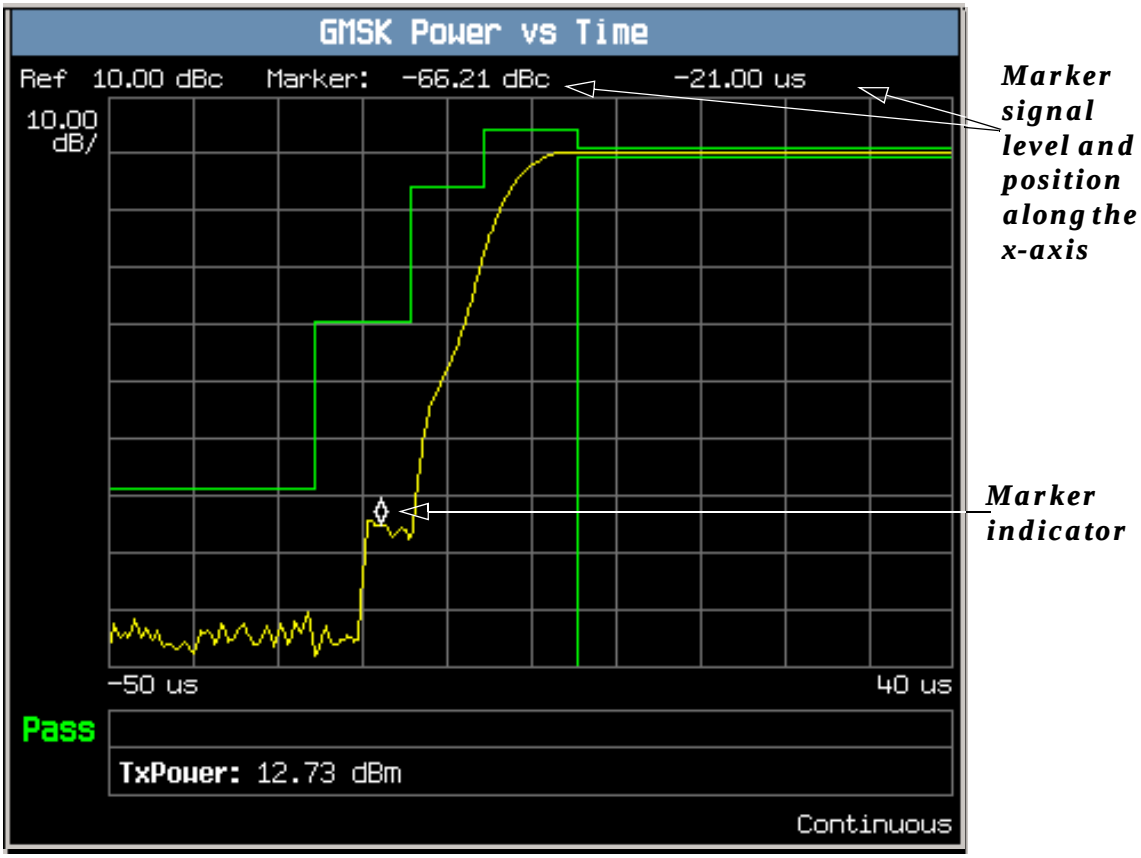



***Overall Pass/Fail indicator***

A typical full graph view of the burst is shown above. An overall pass/fail indicator is positioned in the bottom left corner of the display:

- The text “Pass” is shown in a green-colored font if the measurement has passed the entire mask.
- The text “Fail” is shown in a red-colored font if the measurement has failed any part of the mask.

You can zoom in to individual sections of the graph by pressing the Full (**F1**), Rising Edge (**F2**), Falling Edge (**F3**), or Useful (**F4**) keys. In addition, you can control a marker or change axis values by pressing the Graph Control (**F5**) key.

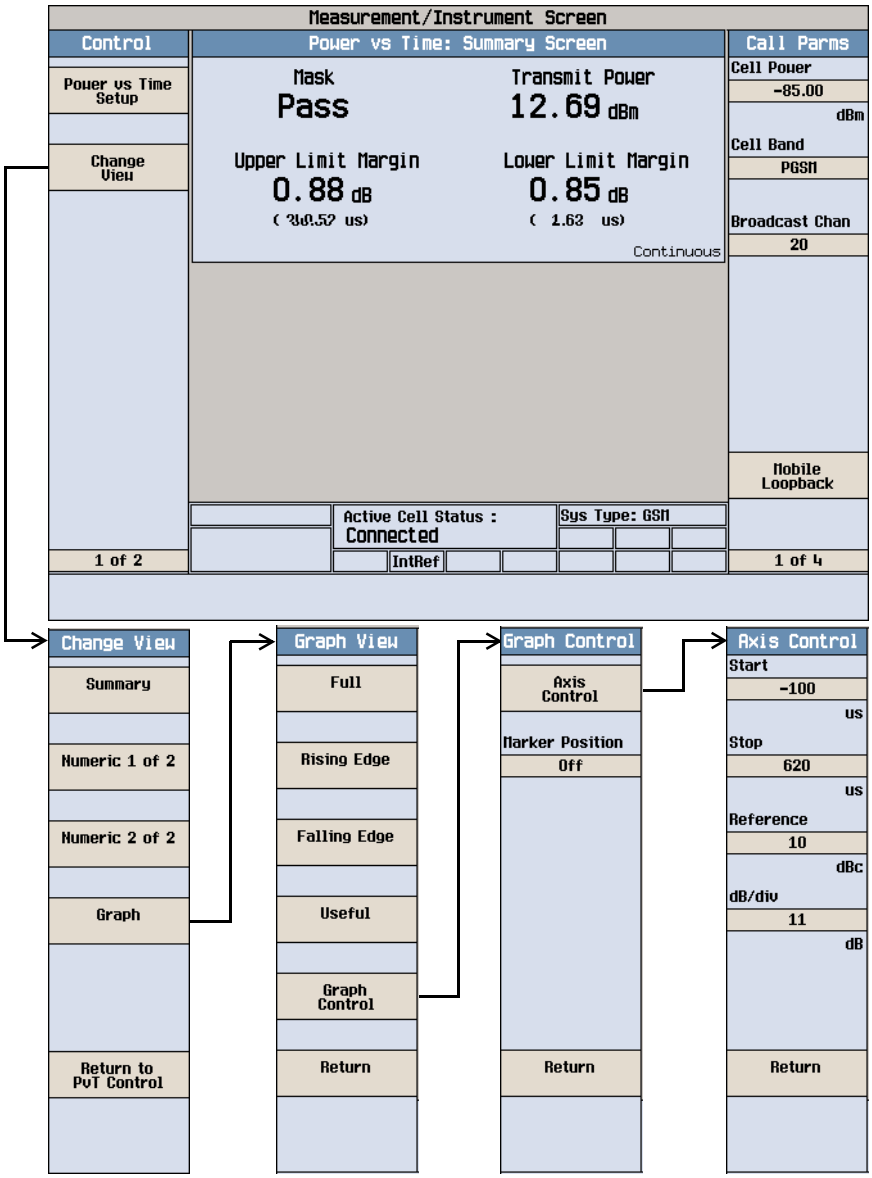



A typical graph view of the rising edge of the burst is shown above. You can access this view by pressing the Rising Edge (**F2**) key.

In this case, the marker is turned on and positioned on the rising edge. The marker can be turned on by pressing the Graph Control (**F5**) key then the Marker Position (**F2**) key. Set the required marker position using the knob or the numeric entry keys. The signal level at the marker and its position along the x-axis are shown at the top of the display above the graph.

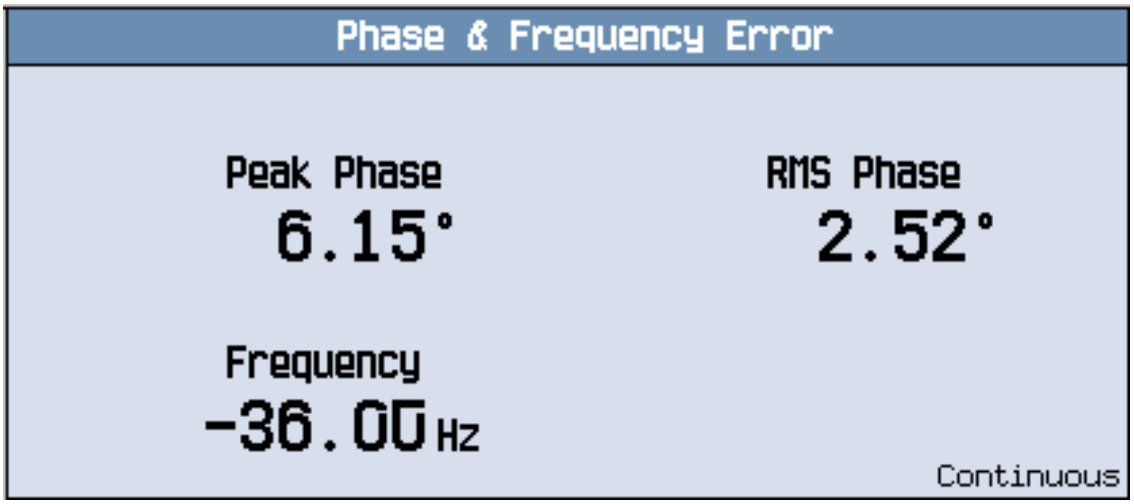
If you require details on how to navigate through the Power versus Time graph menus, see "Power versus Time Graph Menus" on page 895.

# Power versus Time Graph Menus



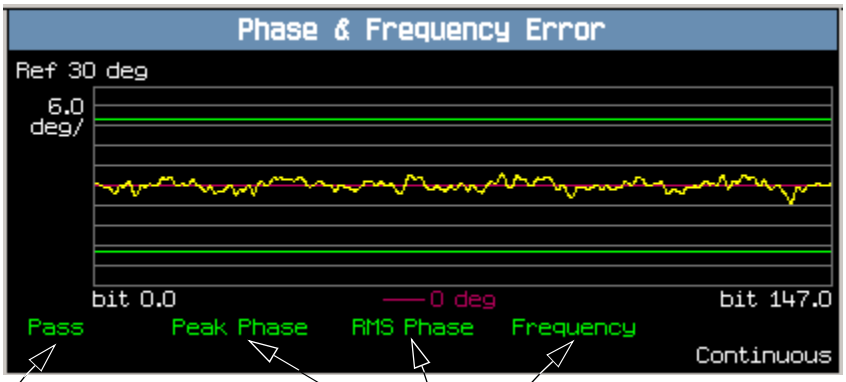
## Measuring Phase and Frequency Error

1. Establish a call with the mobile.
2. Press the **Measurement selection** key.
3. Select the `Phase & Frequency Error` measurement.
4. Press the `Phase & Freq. Setup` (**F1**) key.
5. Set the measurement parameters as needed for your measurement situation, including:
   `Measurement Timeout = 10 s`




A typical phase and frequency error measurement result is shown above.

6. Press the `Change View` (**F2**) key.
7. Press the `Graph` (**F2**) key to access the peak phase error graph.




***Overall Pass/Fail indicator***

***Pass/Fail indicators for the peak phase error, RMS phase error and frequency error***

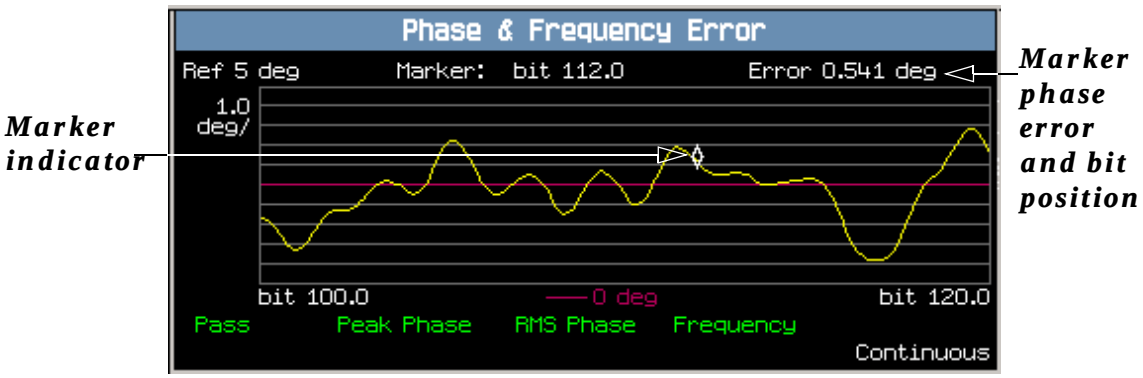
A typical peak phase error graph is shown above.

Two types of pass/fail results are provided:

- An overall measurement pass/fail indicator is positioned in the bottom left corner of the display:
  - — The text “Pass” is shown in a green-colored font if the all of the phase and frequency error measurements (peak phase error, RMS phase error, and frequency error) have passed.
  - — The text “Fail” is shown in a red-colored font if any of the phase and frequency error measurements have failed.
- Individual pass/fail indicators are provided for the peak phase error, RMS phase error, and frequency error. On the display, text labels corresponding to these measurements change color to indicate a pass or fail (green indicates a pass; red indicates a fail).

**NOTE** When the Multi-Measurement Count parameter is set to a number greater than 1, it is possible for some, or all of the individual pass/fail indicators to show a pass while the overall pass/fail indicator shows a fail. This is because the individual pass/fail indicators relate to the last of the multi-measurements made, whereas the overall measurement pass/fail indicator is an accumulative result from all the multi-measurements made.

The marker can be turned on by pressing the `Graph Control` (**F5**) key then the `Marker Position` (**F2**) key. Set the required marker position using the knob or the numeric entry keys. In addition, the axis values can be changed by pressing the `Axis Control` (**F1**) key. This allows you to zoom in or out to look at particular sections of the graph in more detail.

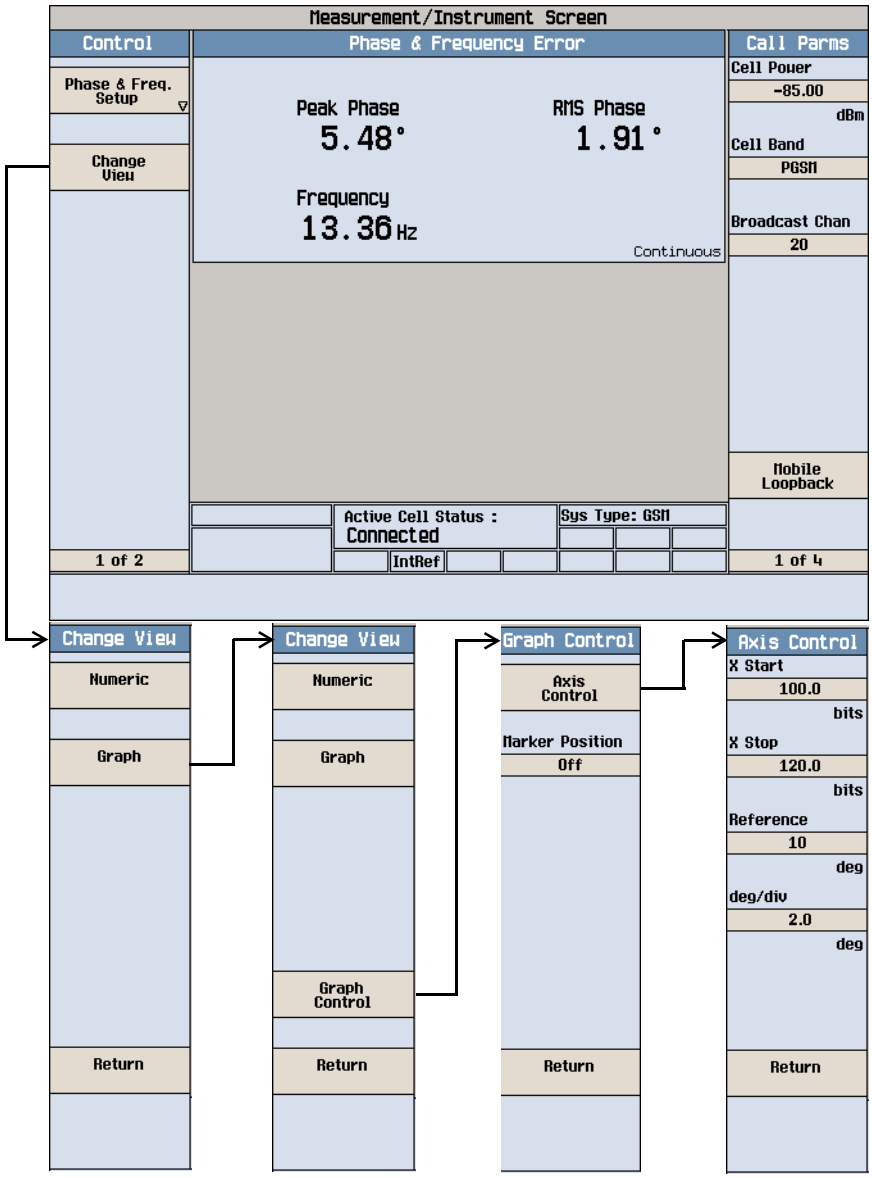



A typical peak phase error graph is shown above. This graph is zoomed in to show bits ranging from 100.0 to 120.0 at a 1.0 degrees per division setting. The Y-axis reference point is changed to 5.0 degrees.

In this case, the marker is turned on and positioned at bit 112. The phase error at the marker and its bit position are shown at the top of the display above the graph.

If you require details on how to navigate through the phase and frequency error graph menus, see “Phase and Frequency Error Graph Menus” on page 898.

# Phase and Frequency Error Graph Menus



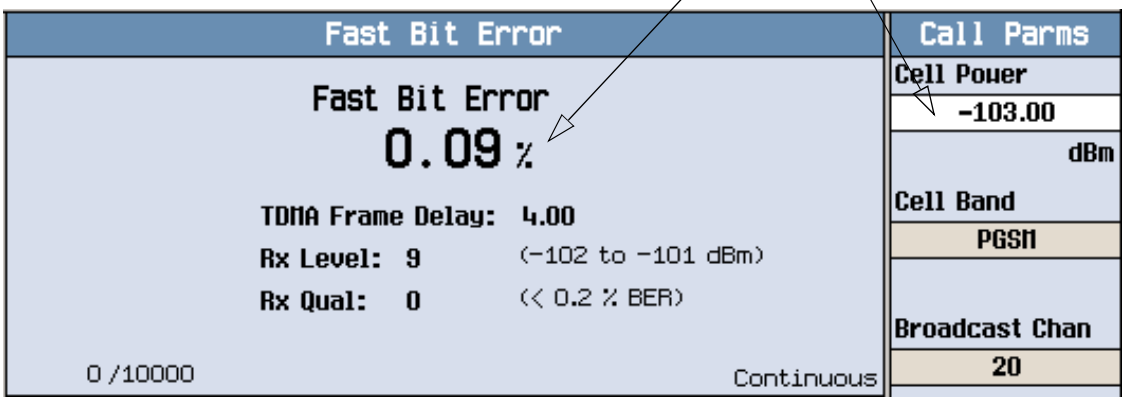
## Measuring Fast Bit Error

**NOTE** To make fast bit error measurements your mobile must be fitted with a Test SIM card.

1. Establish a call with the mobile.
2. Press the **Measurement selection** key.
3. Select the `Fast Bit Error` measurement.

   You should hear a warbling sound from the mobile's loudspeaker. This is the PRBS-15 data which the test set sends to the mobile.
4. Press the `Fast Bit Error Setup` (**F1**) key.
5. Set the measurement parameters as needed for your measurement, including:
   `Measurement Timeout = 13.0 s`

***Observe how reducing the cell power affects the fast bit error rate.***

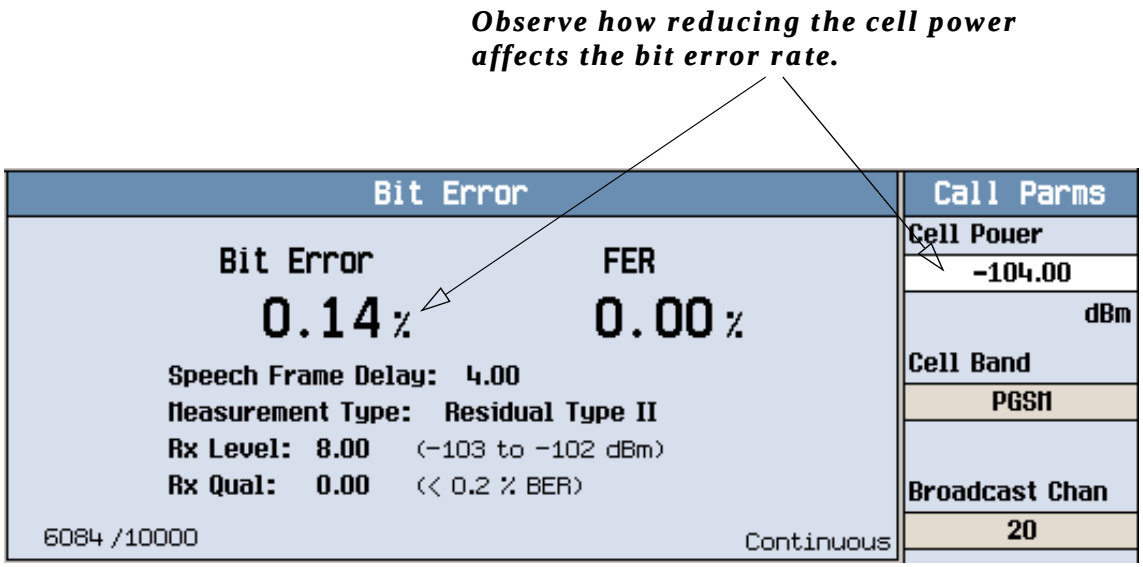



To see the effect of cell power on fast bit error rate, press the Cell Power (**F7**) key and slowly reduce the power while observing Fast Bit Error display.

# Measuring Bit Error

**NOTE** To make bit error measurements your mobile must be fitted with a Test SIM card.

1. Establish a call with the mobile.
2. Press the **Measurement selection** key.
3. Select the `Bit Error` measurement.
4. Press the `Bit Error Setup` (**F1**) key.
5. Set the measurement parameters as needed for your measurement situation, including:
   `Measurement Timeout = 13.0 s`

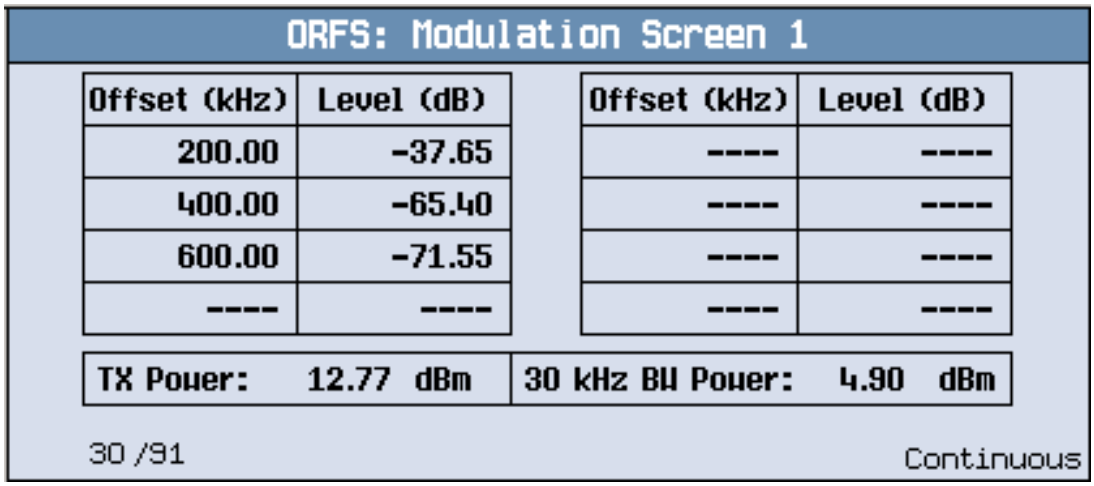



The display shows the bit error rate measurement and depending on the loopback type selected (A residual or B non-residual), either a frame erasure (FER) or cyclic redundancy check (CRC) measurement.

To see the effect of cell power on Bit Error Rate, press the `Cell Power` (**F7**) key and slowly reduce the power while observing the Bit Error display.

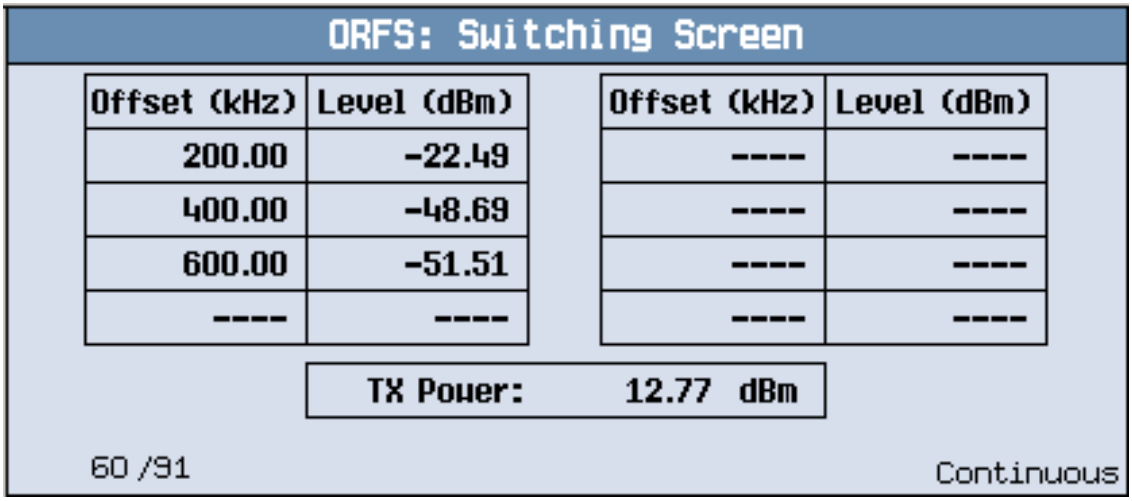
## Measuring Output RF Spectrum

1. Establish a call with the mobile.
2. Press the **Measurement selection** key.
3. Select the `Output RF Spectrum` measurement.
4. Press the `ORFS Setup` (**F1**) key.
5. Press the `Measurement Setup` (**F1**) key.
6. Set the measurement parameters as needed for your measurement, including:
   `Measurement Timeout = 20 s.`
7. Press the `Modulation Frequencies` (**F2**) key and set up your required offset frequencies for ORFS due to modulation.
8. Press the `Switching Frequencies` (**F3**) key and set up your required offset frequencies for ORFS due to Switching.
9. Press the `Close Menu` (**F6**) key.
10. Press the `Return to ORFS Control` (**F6**) key.
11. Press the `Change View` (**F2**) key.
12. Press the `Modulation Numeric 1 of 3` (**F1**) key.



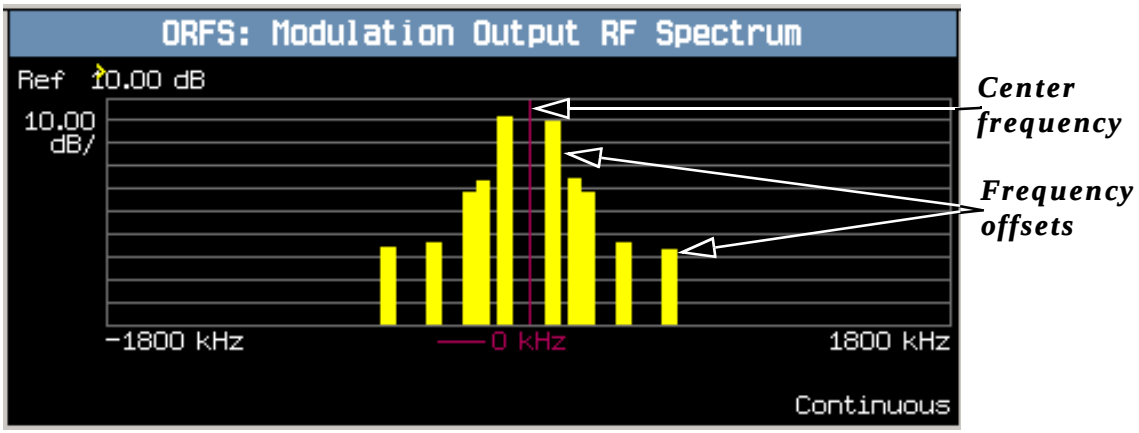

The measurement results for the first eight positions in the ORFS due to modulation table are displayed. You can view the results for the remaining 14 positions by pressing the `Modulation Numeric 2 of 3` (**F2**) key or the `Modulation Numeric 3 of 3` (**F3**) key. Note that the results are in dB relative to the 30 kHz BW Power shown on the screen.

13.Press the Switching Numeric (**F4**) key to display the measurement results for ORFS due to switching.



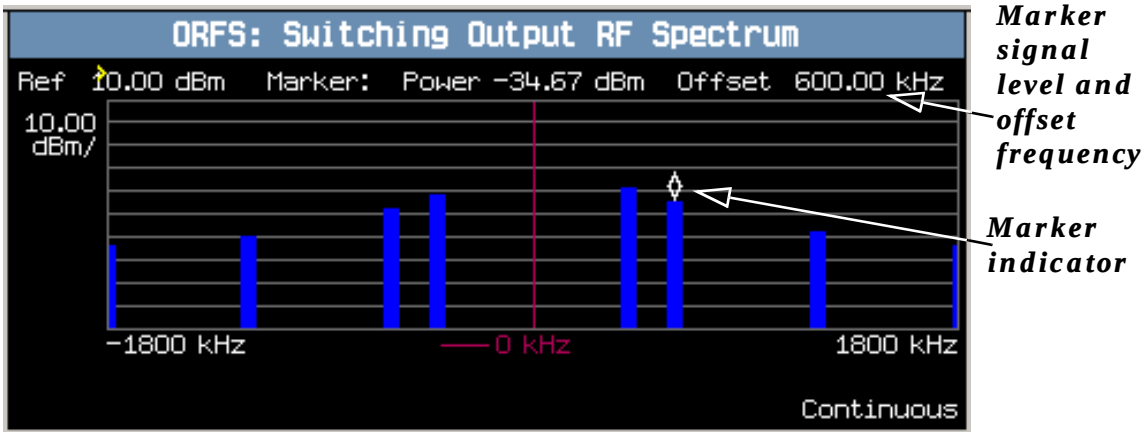

A typical measurement results screen for ORFS due to switching is shown above.

14.Press the Graph (**F5**) key then the Modulation (**F1**) key to access the ORFS due to modulation bar graph.




A typical ORFS due to modulation graph is shown above. On the display, the bar representing each offset is shown in yellow and the center frequency is indicated by a red vertical line.

15.Press the Switching (**F2**) key to access the ORFS due to switching bar graph.

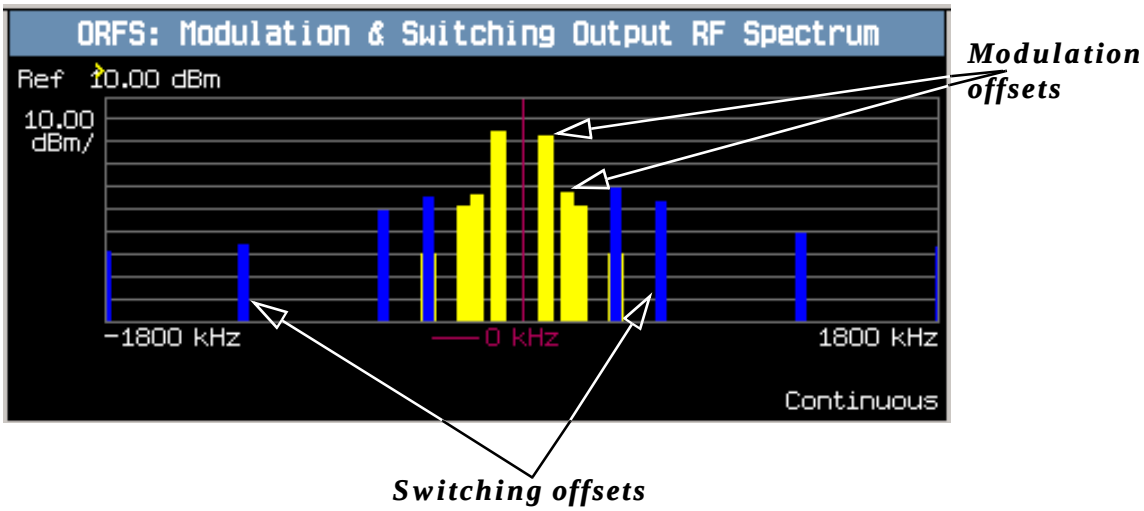


A typical ORFS due to switching graph is shown above. On the display, the bar representing each offset is shown in blue and the center frequency is indicated by a red vertical line.

In this case, the marker is turned on and positioned at the 600 kHz offset. The signal level and frequency of the offset where the marker is positioned, are shown at the top of the display above the graph.

The marker can be turned on by pressing the `Graph Control` (**F5**) key then the `Marker Position` (**F2**) key. Set the required marker position using the knob or the numeric entry keys. In addition, the axis values can be changed by pressing the `Axis Control` (**F1**) key. This allows you to zoom in or out to look at particular sections of the graph in more detail.

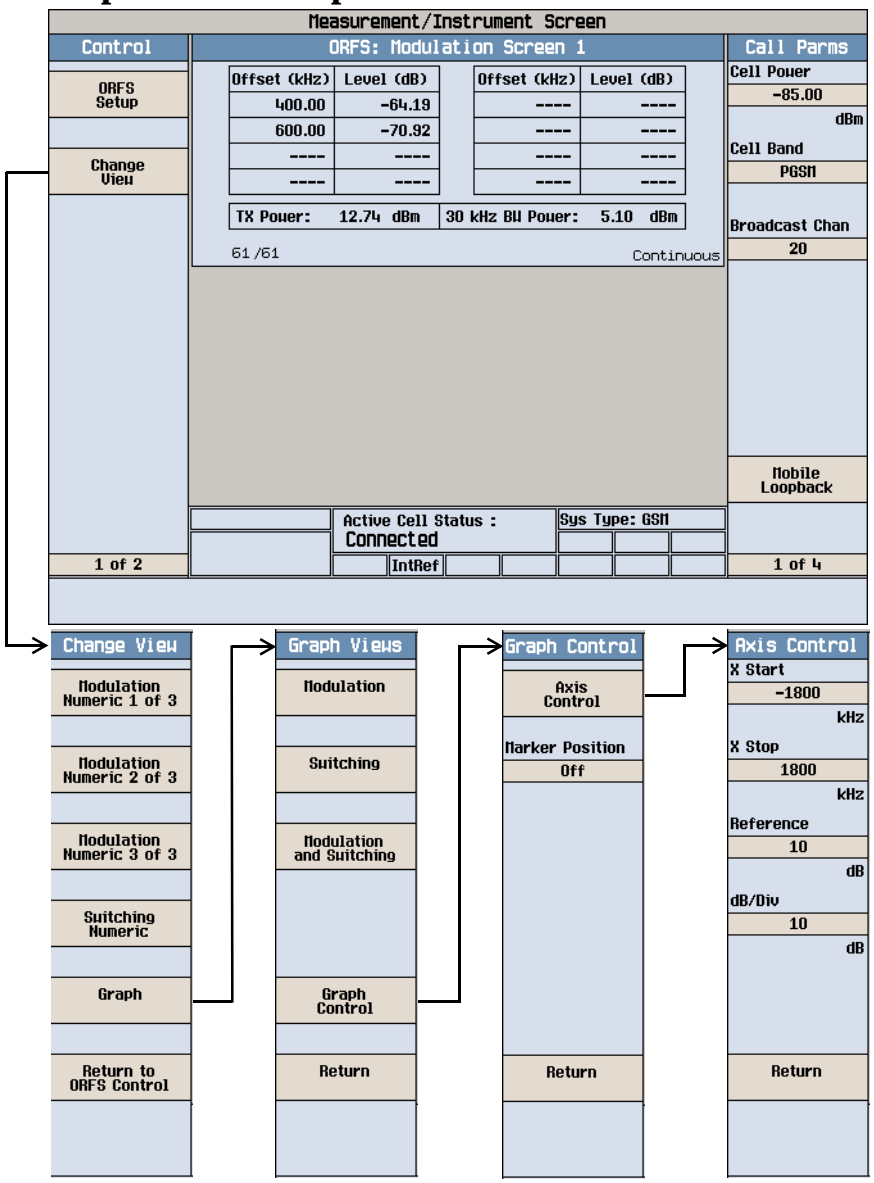
16. Press the `Modulation and Switching` (**F3**) key to access the combined ORFS bar graph.




A typical combined ORFS due to modulation and switching graph is shown above. On the display, modulation offsets are shown in yellow, switching offsets are shown in blue, and the center frequency is indicated by a red vertical line.

If you require details on how to navigate through the Output RF Spectrum graph menus, see "Output RF Spectrum Graph Menus" on page 904.

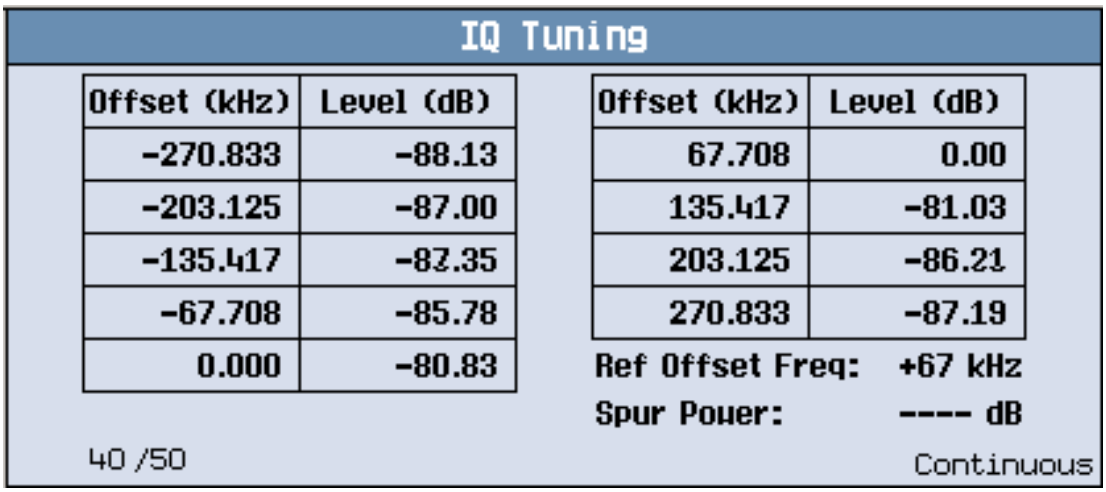
# Output RF Spectrum Graph Menus



## Measuring IQ Tuning

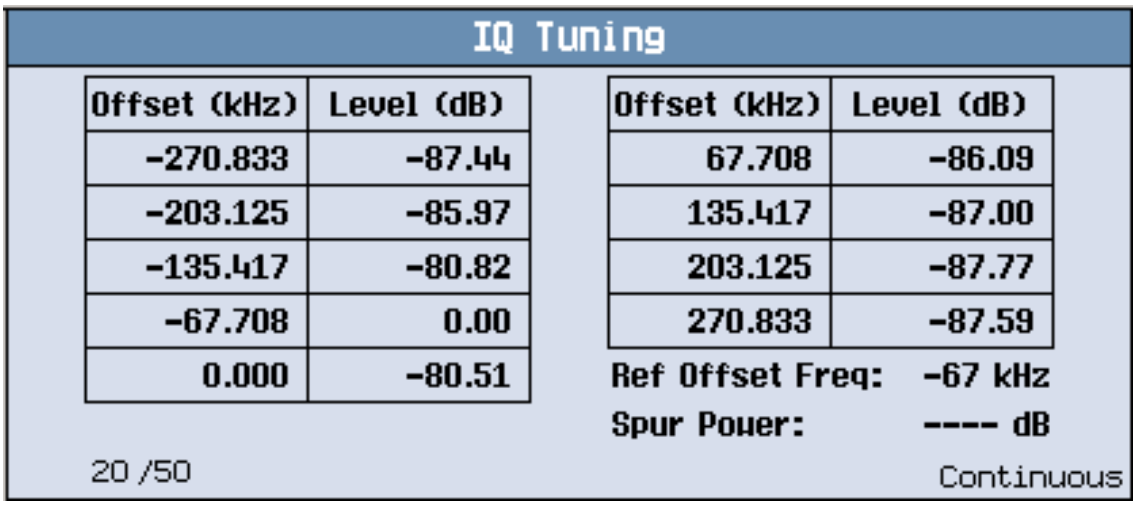
**NOTE** This measurement can only be performed with your mobile in test mode and transmitting either all ones or all zeros.

1. Press the **Measurement selection** key.
2. Select the `IQ Tuning` measurement.
3. Press the **More** key (bottom right) to obtain the Call Parms (3 of 4) screen.
4. Press the `Receiver Control` (**F7**) key and select `Manual`.
5. Press the (**F11**) key and set the expected power level from your mobile.
6. Press the `IQ Tuning Setup` (**F1**) key.
7. Set the measurement parameters as needed for your measurement, including:
   `Multi-Measurement Count = 50`
   `Trigger Source = Immediate`
8. Switch on your mobile and set it to transmit a series of all zeros.



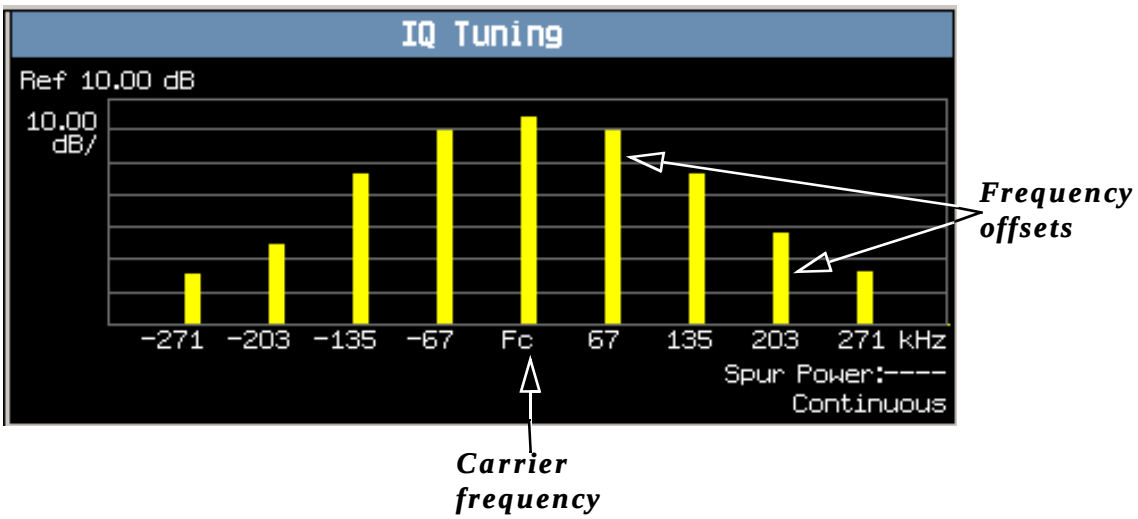

The results are displayed on the IQ Tuning screen. Notice that when the mobile is transmitting a series of all zeros the carrier offset is at +67.708 kHz.

9. Change the settings on the mobile to transmit a series of all ones.




The results are displayed on the IQ Tuning screen. Notice that when the mobile is transmitting a series of all ones the carrier offset is at -67.708 kHz.

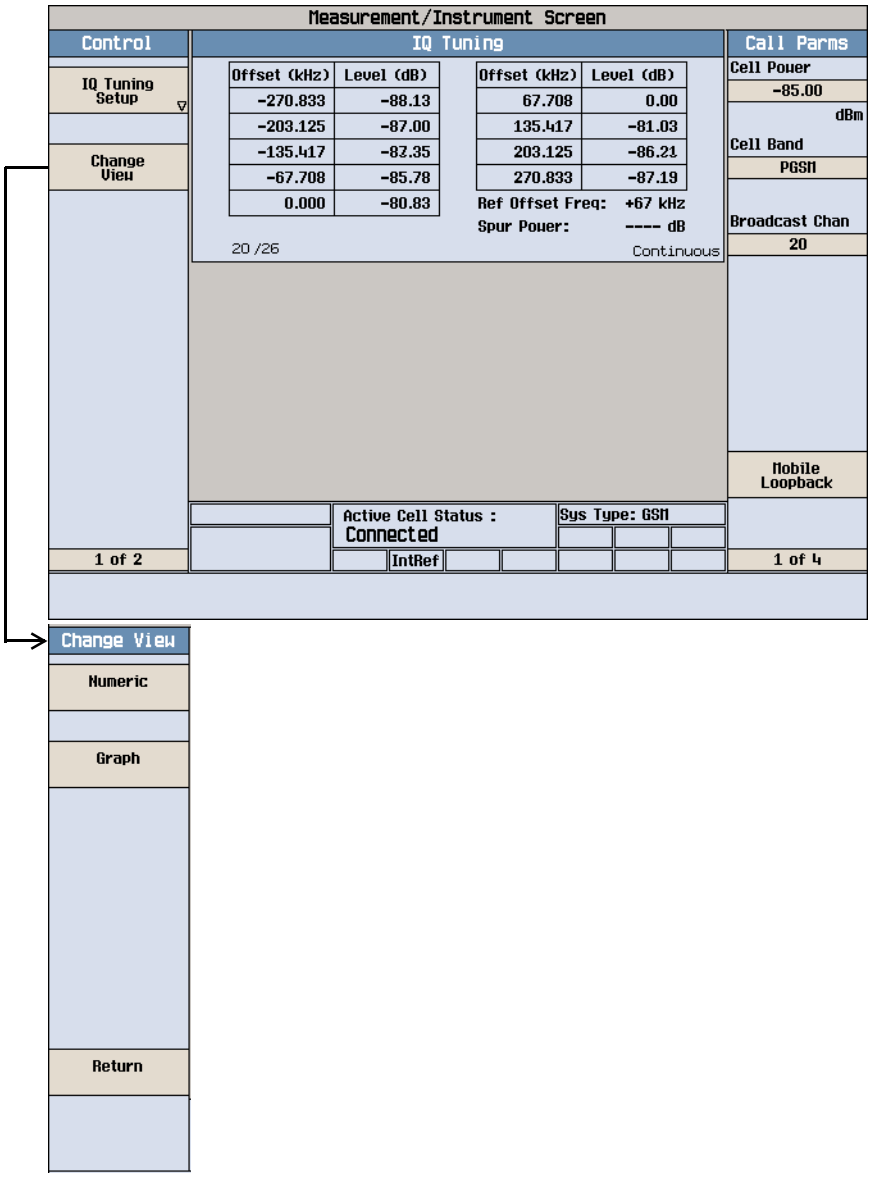
10. Press the Graph (**F2**) key to access the IQ Tuning bar graph.




A typical IQ Tuning graph is shown above. On the display, the bar representing each offset and the carrier frequency (Fc) is shown in yellow.

If you require details on how to navigate through the Output RF Spectrum graph menus, see "IQ Tuning Graph Menus" on page 907.

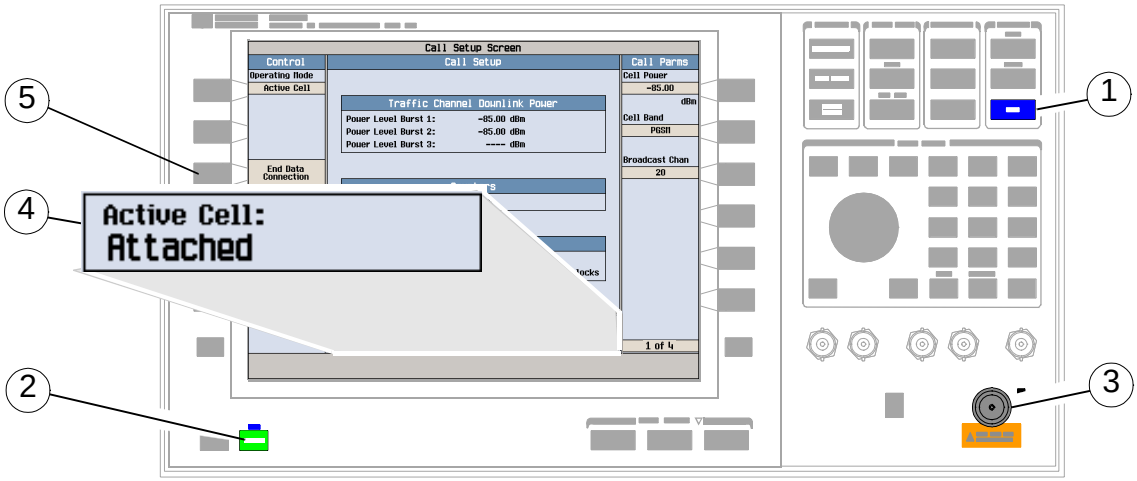
# IQ Tuning Graph Menus



# GPRS Manual Operation

# How Do I Make Measurements on a Mobile?

## A. Establish a data connection.



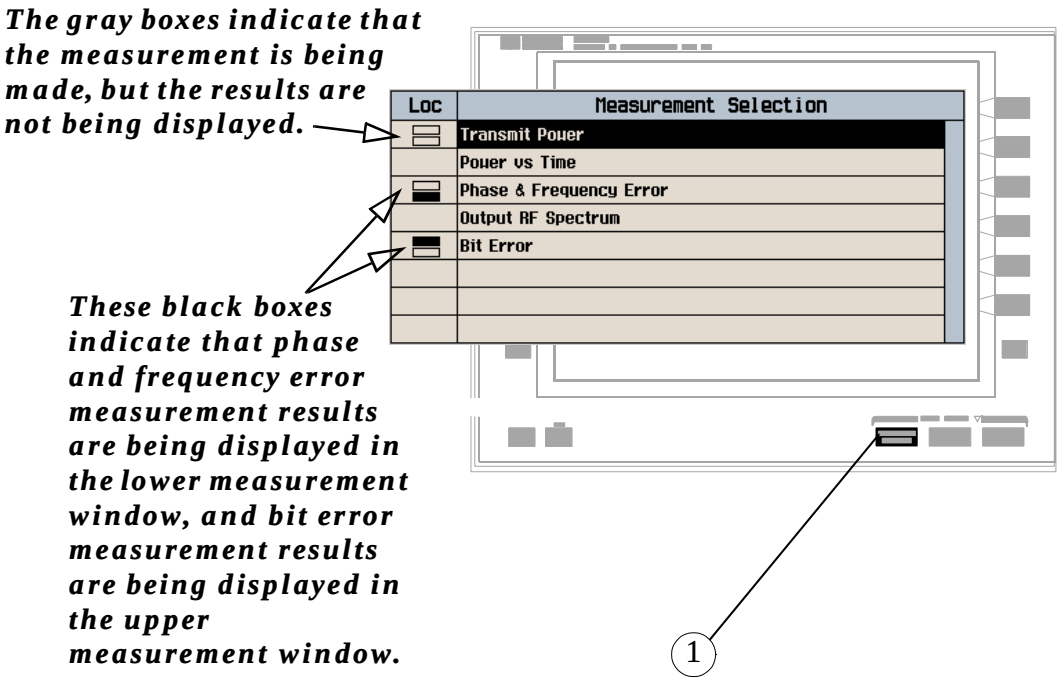

1. Press the blue **SHIFT** key.
2. Press the green **Preset** key.
3. Connect the mobile.
4. Turn the mobile on and wait for `Attached` in the `Active Cell:` field.

**NOTE** For mobiles that don't perform GPRS attach automatically, set the mobile to data mode.

5. Press the `Start Data Connection` (**F3**) key and watch for the `Active Cell:` field changing to `Transferring`.

**NOTE** If you have problems establishing a data connection using the default BLER Data Connection Type (that is, `Data Conn Type` (**F4**) is set to BLER), you may want to change the setting of the `LLC Frame Check Sequence` or the `BLER Block Polling Interval`. To change these settings, press the **More** key to access `Call Parms` menu (`4 of 4`), then press the `Connection Parameters` (**F7**) key. Select a parameter and change its setting.

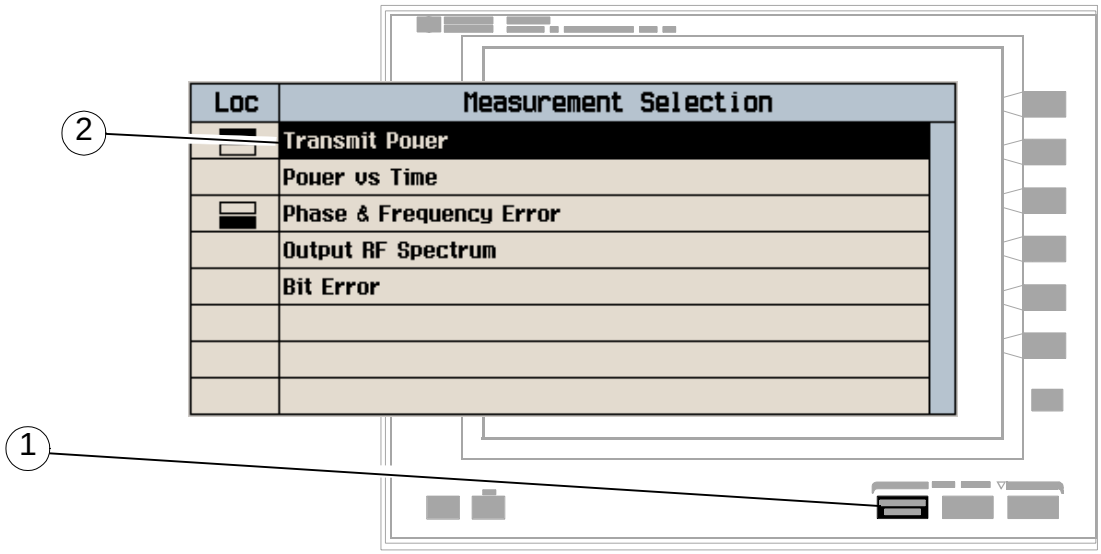
## B. Select measurements.




1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

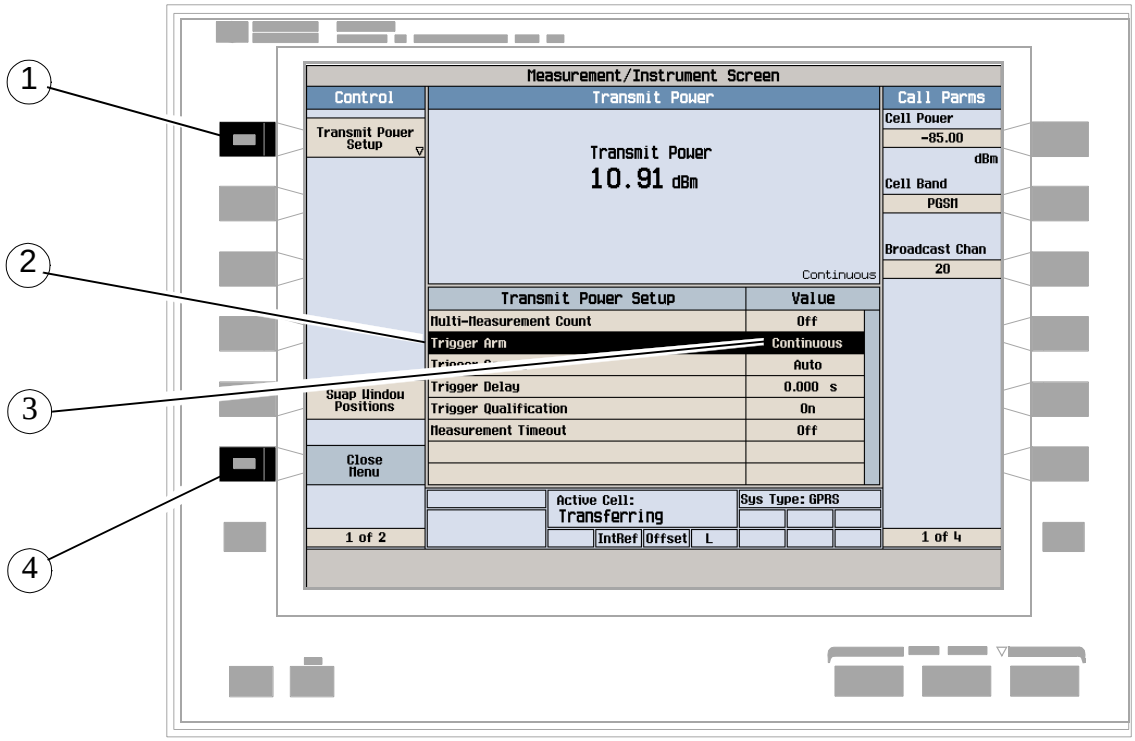
# How Do I Change Measurement Setup?

## A. Select a measurement.




1. Press the **Measurement selection** key.
2. Highlight a measurement to set up and press the knob.

## B. Set up the measurement.




1. Press the measurement's setup (**F1**) key.
2. Highlight a parameter and press the knob.
3. Enter a value or make a selection and press the knob.

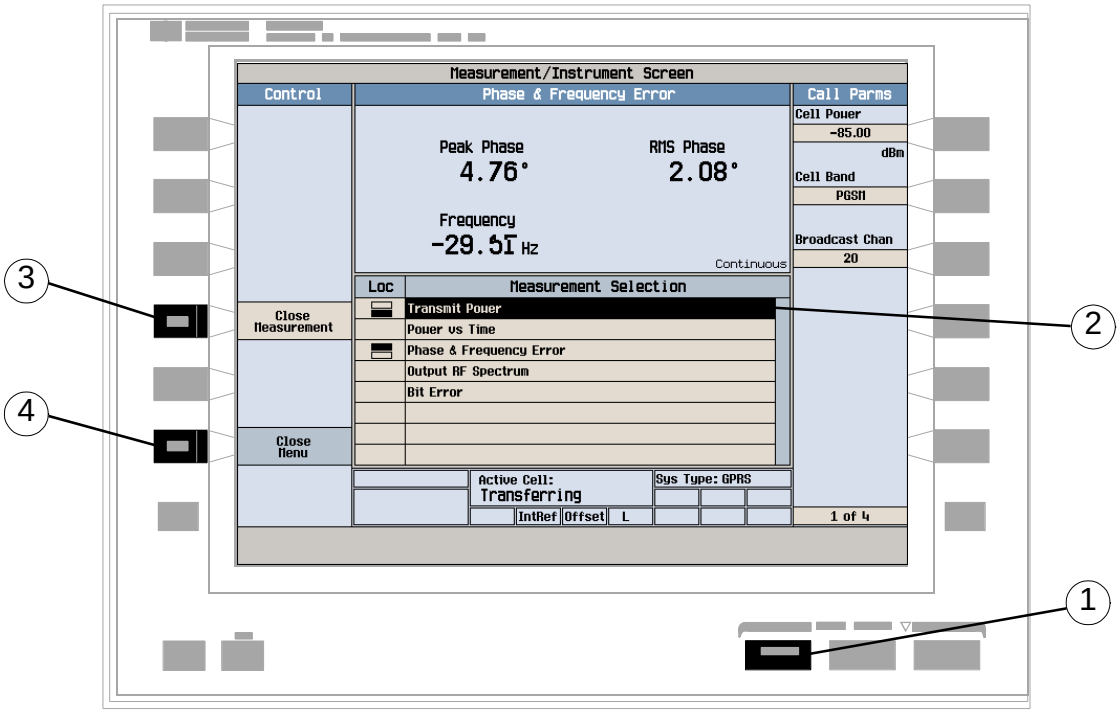
---

**NOTE** For Statistical measurement results, change the `Multi-Measurement Count` parameter from `Off` to a number >1.

---

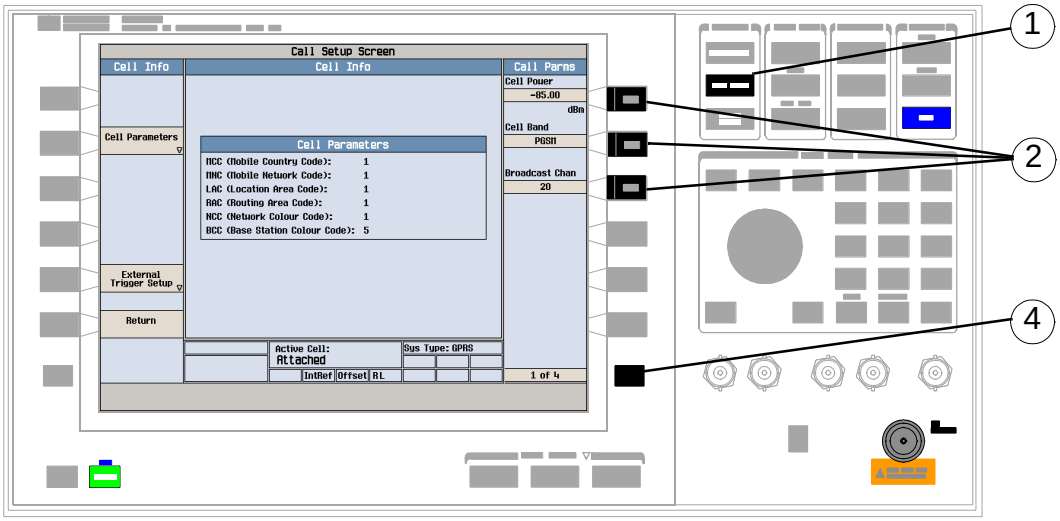
4. Press the `Close Menu` (**F6**) key.

# 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.

---

**NOTE** When the mobile is transferring data (`Active Cell:` field is `Transferring`) some call parameters cannot be changed.

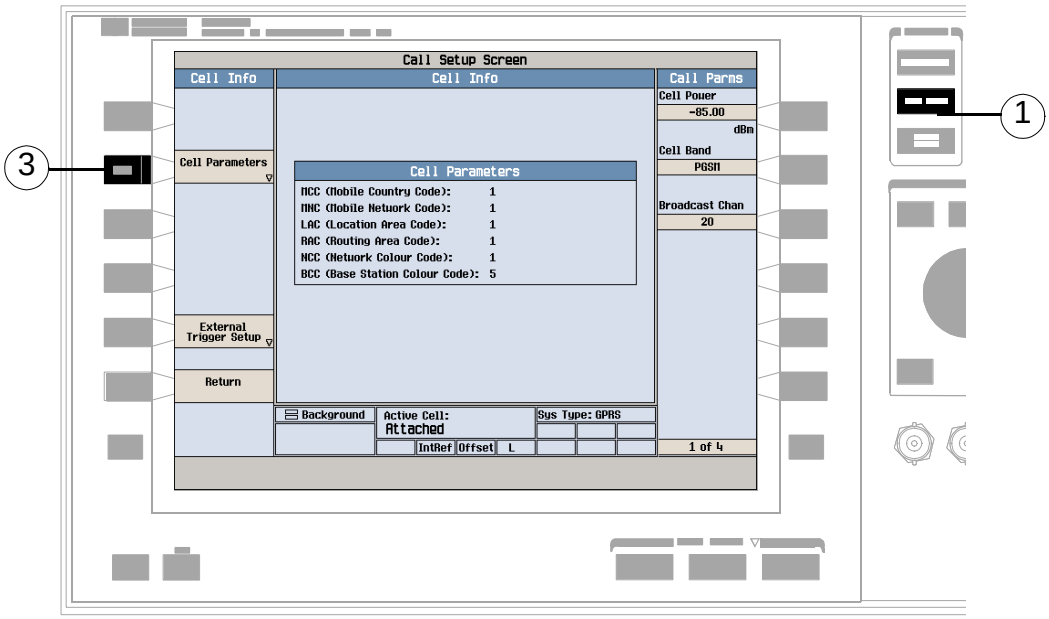
---

2. On the Call Parms menu (1 of 4) press **F7**, **F8** or **F9**.
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?

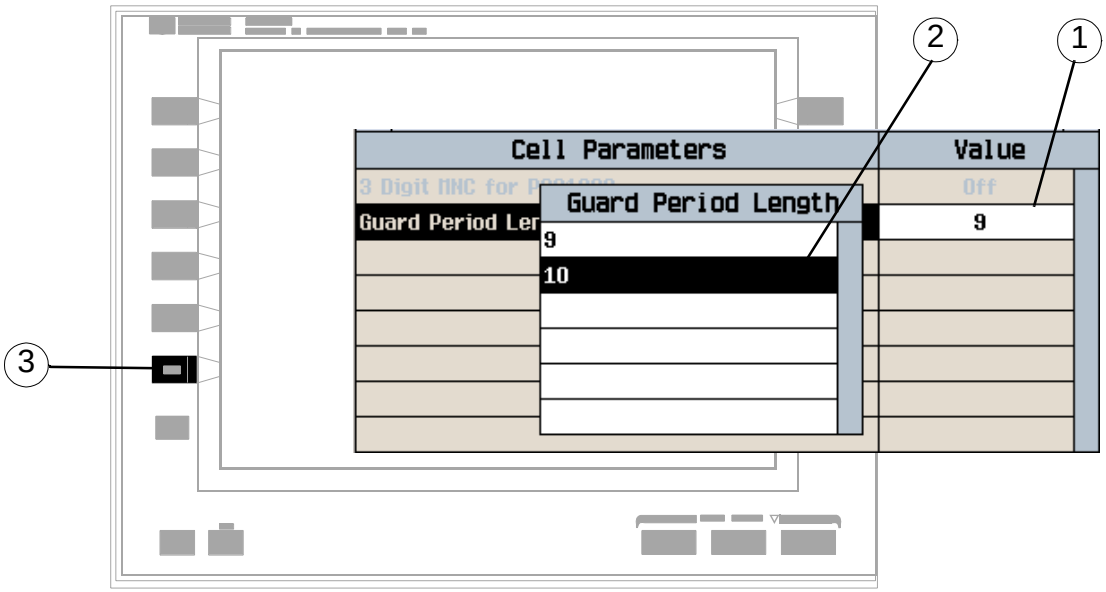
**NOTE** You can only change two cell parameters - 3 Digit MNC for PCS1900 and Guard Period Length. Other cell parameters such as MCC, MNC, and LAC are fixed. To change the 3 digit MNC for PCS1900 the cell must be set to off by pressing the **CALL SETUP** key, then `Operating Mode` (**F1**), and then selecting `Cell Off`.

## A. Select the Cell Parameters menu.



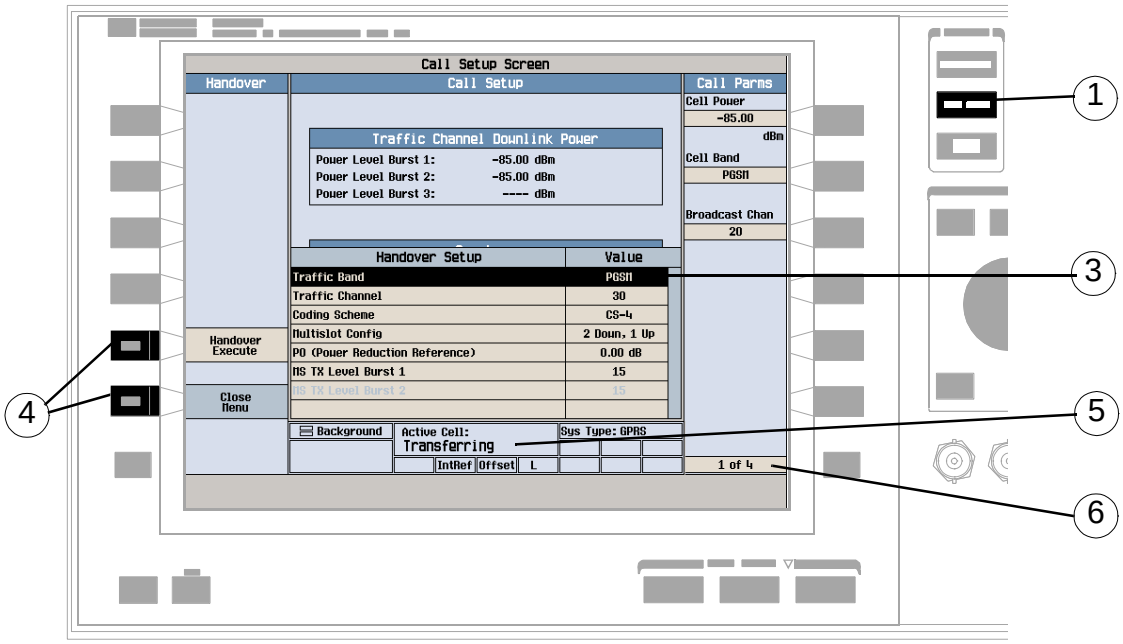

1. Press the **CALL SETUP** key.
2. Press the `Cell Info` (**F6**) key.
3. Press the `Cell Parameters` (**F2**) key.

## B. Set a cell parameter.




1. Highlight a parameter and press the knob.
2. Enter a value or selection and press the knob.
3. Press the `Close Menu` (**F6**) key.

# How Do I Perform a Handover?




1. Press the **CALL SETUP** key.
2. Press the `Handover Setup` (**F5**) key.
3. Change the various parameters, for example `Traffic Band`.
4. Press the `Handover Execute` (**F5**) key to complete the handover, or press the `Close Menu` (**F6**) key to abort the handover.
5. Check for `Transferring` in the `Active Cell:` field.
6. Press the **More** key to check that the changes have been implemented on the Call Parms menus (2 of 4) and (3 of 4).

# How Do I Change the MS TX Level?

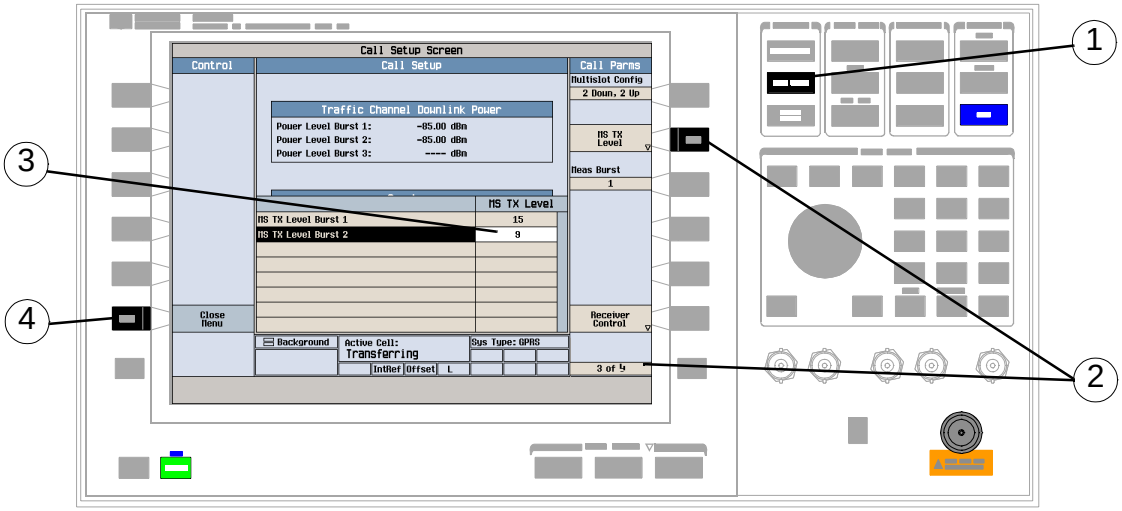
There are two ways to change the MS TX Level:

A. Change the level immediately

B. Change the level during a handover

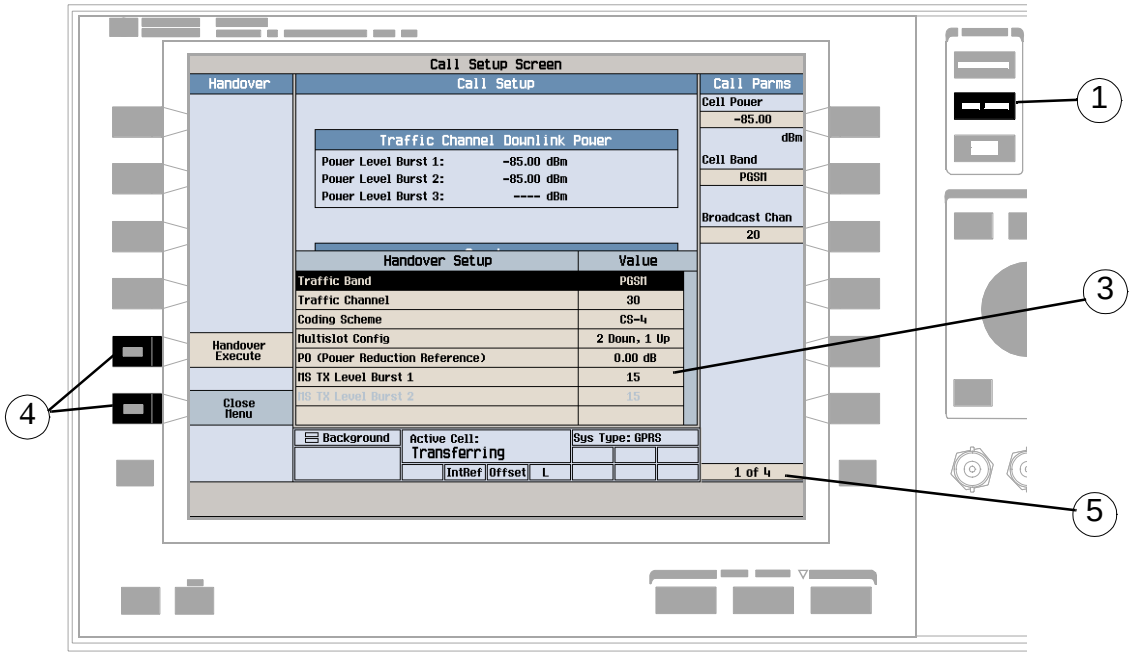
Both are explained below.

## A. Change the MS TX level immediately.




1. Press the **CALL SETUP** key.
2. On the Call Parms menu (3 of 4) press the `MS TX Level` (**F8**) key.
3. Set a new MS TX level and press the knob.
4. Press the `Close Menu` (**F6**) key.

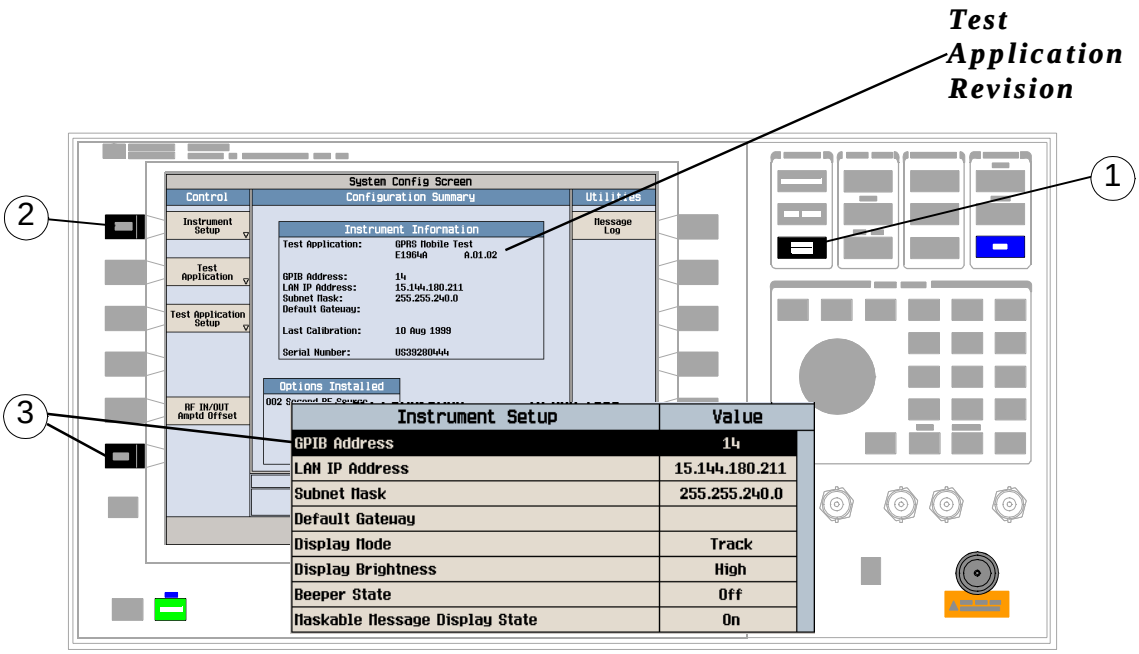
## B. Change the MS TX level during a handover.




1. Press the **CALL SETUP** key.
2. On Control menu, press the `Handover Setup` (**F5**) key.
3. Select and change the `MS TX Level`.
4. Press the `Handover Execute` (**F5**) key to change the MS TX level, or press the `Close Menu` (**F6**) key to leave the level unchanged.
5. Use the **More** key to check that the MS TX level has been changed on the Call Parms menu (3 of 4).

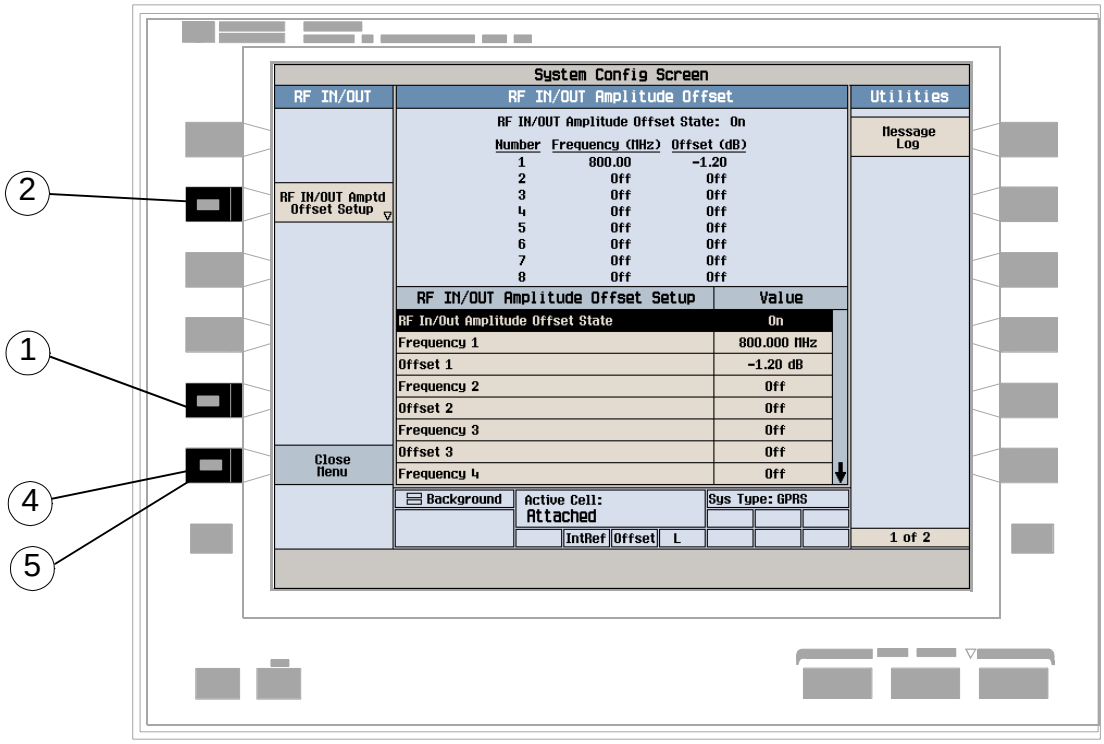
# How Do I Configure the Test Set for My Test System?

## A. Configure instrument information and setup.



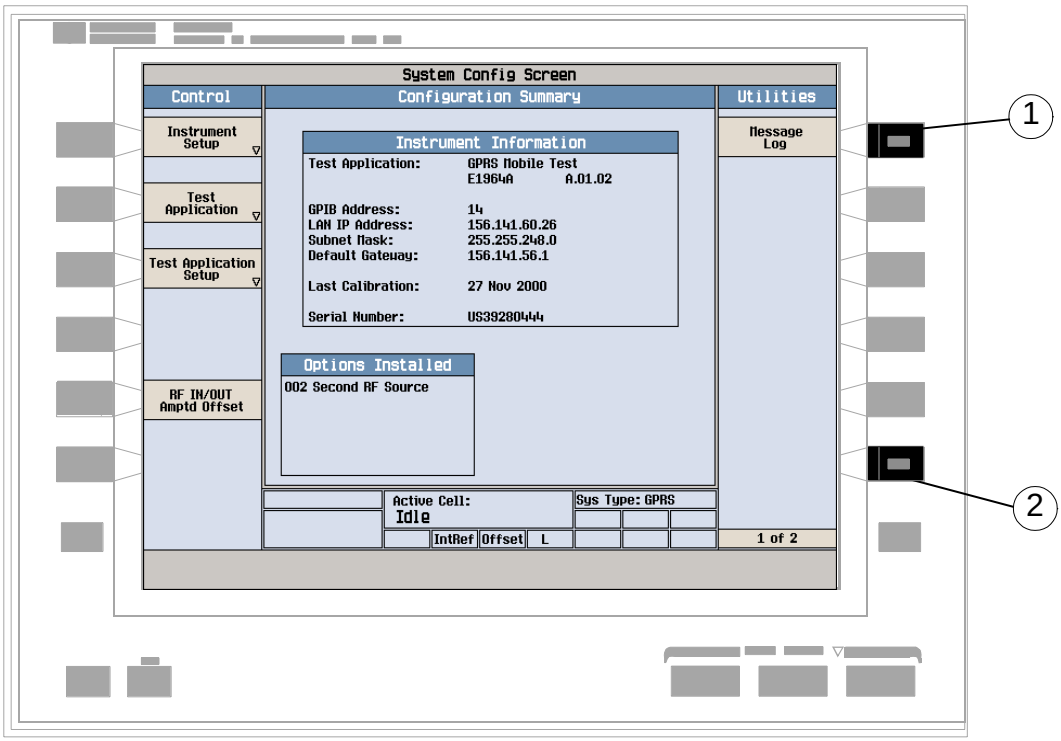

1. Press the **SYSTEM CONFIG** key.
2. Press the `Instrument Setup` (**F1**) key.
3. Adjust an instrument setting and then press the `Close Menu` (**F6**) key.

## B. Set amplitude offsets.



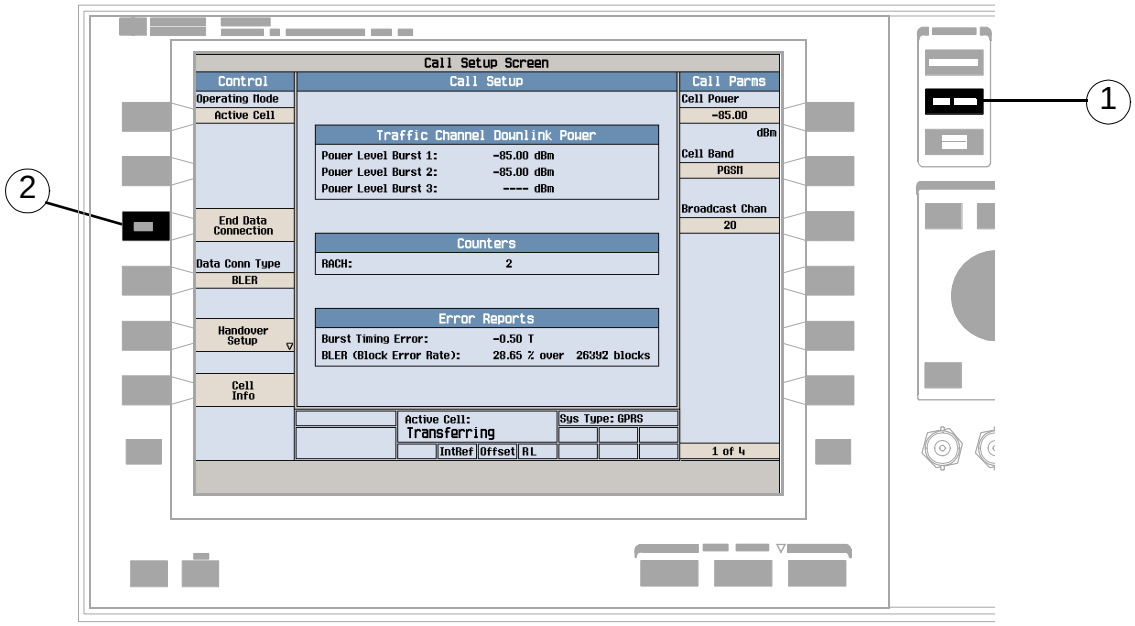

1. On the Configuration Summary screen, press the `RF IN/OUT Amptd Offset` (**F5**) key.
2. On the RF IN/OUT Amplitude Offset screen, press the `RF IN/OUT Amptd Offset Setup` (**F2**) key.
3. Enter the amplitude offsets for the test frequencies you use.
4. Press the `Close Menu` (**F6**) key.
5. Press the `Return` (**F6**) key to return to the Configuration Summary screen.

## C. Check the message log.




1. Press the `Message Log` (**F7**) key and view the message log.
2. Press the `Return` (**F12**) key.

# How Do I End the Data Connection?




1. Press the **CALL SETUP** key.
2. Press the `End Data Connection` (**F3**) key, or end the data connection from the mobile.
3. To ensure the data connection has ended check for `Attached` in the `Active Cell:` field.

# GPRS Mobile Measurements

The following step-by-step procedures explain how to perform specific measurements available on the GPRS 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 (http://www.agilent.com/find/8960support/).

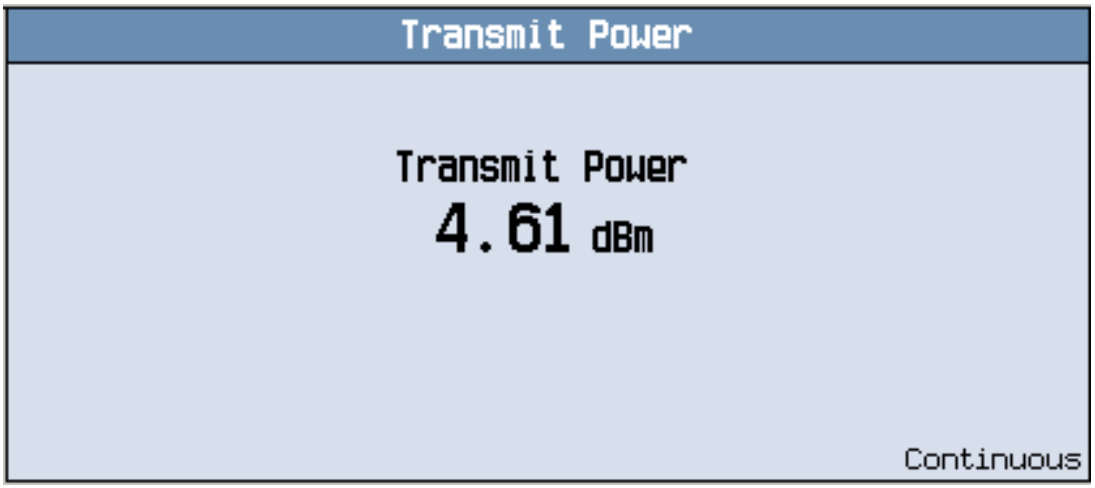
*Setup parameters for each measurement are assumed to be set to their default (Full preset) values unless otherwise stated.*

The following measurement procedures are provided:


- "Measuring Transmit Power" on page 925
- "Measuring Power versus Time" on page 926
- "Measuring Phase and Frequency Error" on page 932
- "Measuring Output RF Spectrum" on page 936
- "Measuring Bit Error" on page 941

## Measuring Transmit Power

1. Connect the mobile.
2. Turn the mobile on and wait for `Attached` in the `Active Cell:` field.
   Note: For mobiles that don't perform a GPRS attach automatically, set the mobile to data mode.
3. Press the `Start Data Connection` (**F3**) key and watch for the `Active Cell:` field changing to `Transferring`.
4. Press the **Measurement selection** key.
5. Select the `Transmit Power` measurement.
6. Press the `Transmit Power Setup` (**F1**) key.
7. Set the measurement parameters as needed for your measurement situation, including:
   `Measurement Timeout = 5.0 s`




A typical measurement result is shown above.

## Measuring Power versus Time

**NOTE** This measurement procedure assumes that your mobile supports two adjacent uplink timeslots.

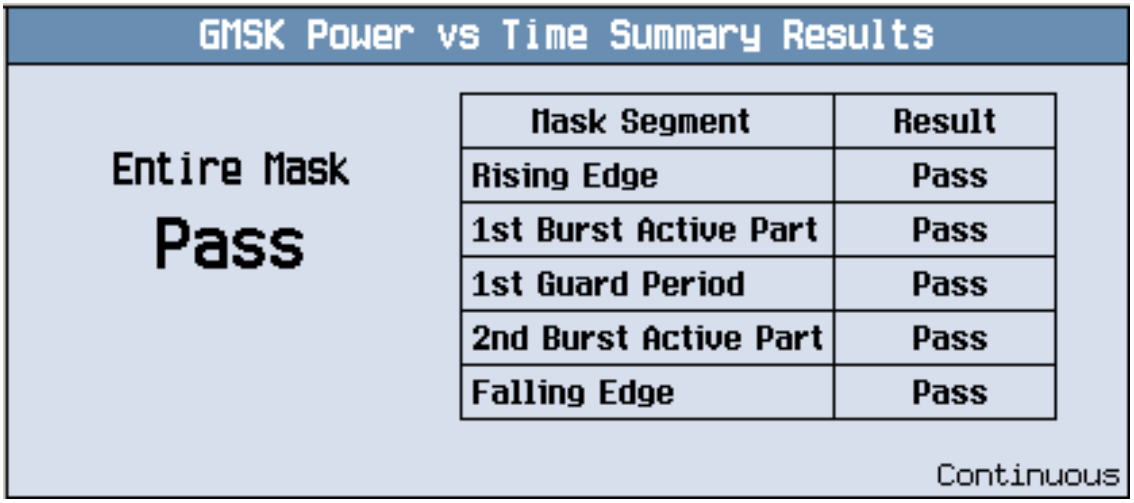
1. Press the **CALL SETUP** key.
2. Press the **More** key (bottom right) to obtain the Call Parms (3 of 4) screen.
3. Press the `Multislot Config` (**F7**) key and select `2 down, 2 up`.
4. Connect the mobile.
5. Turn the mobile on and wait for `Attached` in the `Active Cell:` field.
   Note: For mobiles that don't perform a GPRS attach automatically, set the mobile to data mode.
6. Press the `Start Data Connection` (**F3**) key and watch for the `Active Cell:` field changing to `Transferring`.
7. Press the **Measurement selection** key.
8. Select the `Power vs Time` measurement.
9. Press the `Power vs Time Setup (F1)` key.
10. Press the `Measurement Setup (F1)` key.
11. Set the measurement parameters as needed for your measurement situation, including:
    `Measurement Timeout = 10 s`
12. Press the `Burst1 Meas Offsets` (**F2**) key and set up your required time offset values for burst 1.

**NOTE** For statistical analysis the test set allows you to set up to 12 time markers. These markers *do not* define the mask but allow you to obtain measurement results from specified points on the mask.

13. Press the `Burst2 Meas Offsets` (**F3**) key and set up your required time offset values for burst 2.

**NOTE** Offsets are referenced to bit zero in a normal burst. To obtain results from measurement points before bit 0, enter negative offset values.

14.Press the Close Menu (**F6**) key.

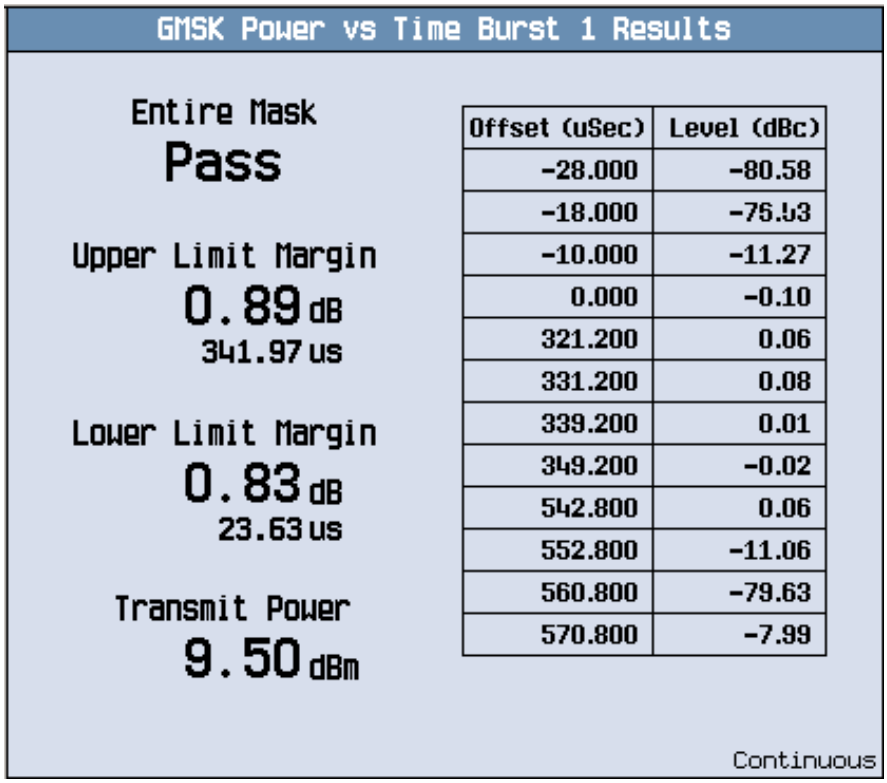



A typical summary results screen is shown above.

15.Press the Return (**F6**) key.

16.Press the Change View (**F2**) key.

17.Press the Burst 1 numeric Results (**F2**) key to view the offset measurement results for burst 1.



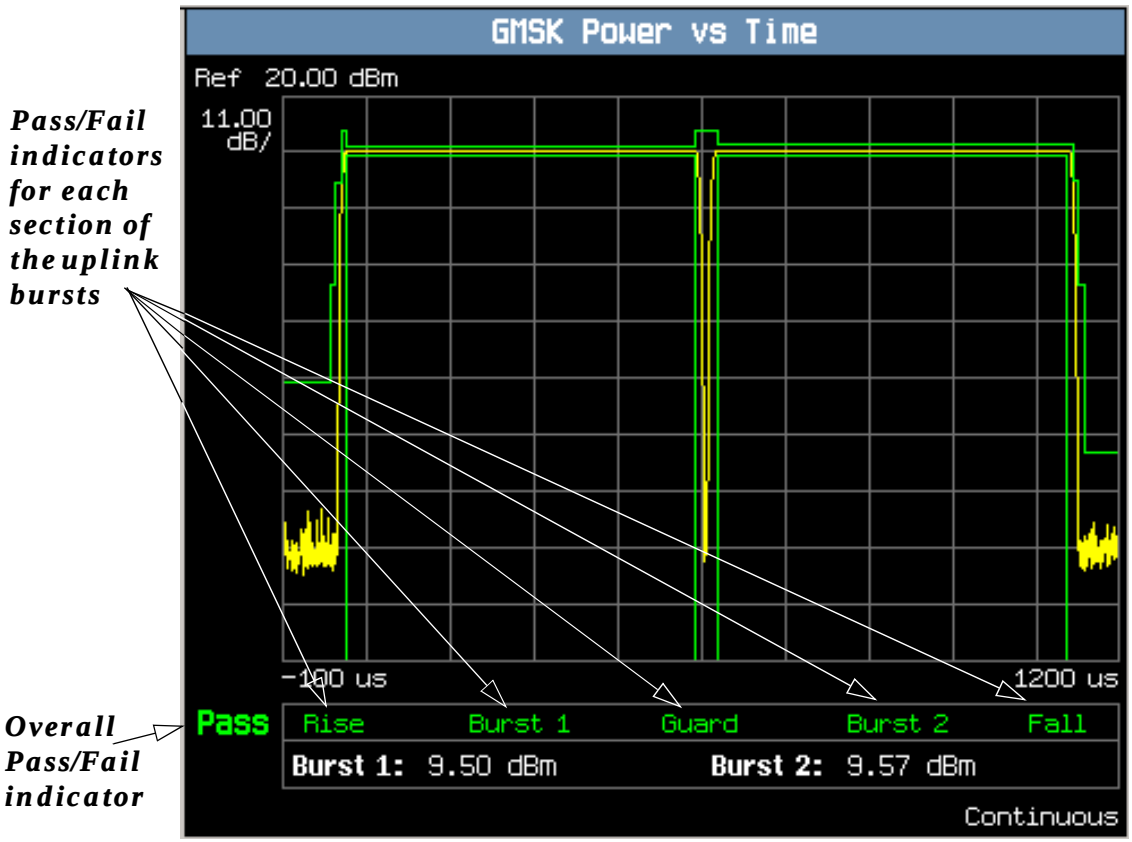

A typical numeric measurement results screen for offsets is shown above.

18.Press the Burst 2 numeric Results (**F3**) key to view the offset measurement results for burst 2.

19. Press the Graph (**F4**) key to access the full graph view of the two adjacent uplink bursts.

    The structure of the Power versus Time graph menus are slightly different depending on the number of uplink bursts in the multislot configuration. If you require details on how to navigate through the Power versus Time graph menus, see either:

    - "Power versus Time Graph Menus (one uplink burst)" on page 931, or
    - "Power versus Time Graph Menus (two uplink bursts)" on page 932.




A typical full graph view of two adjacent uplink bursts is shown above.

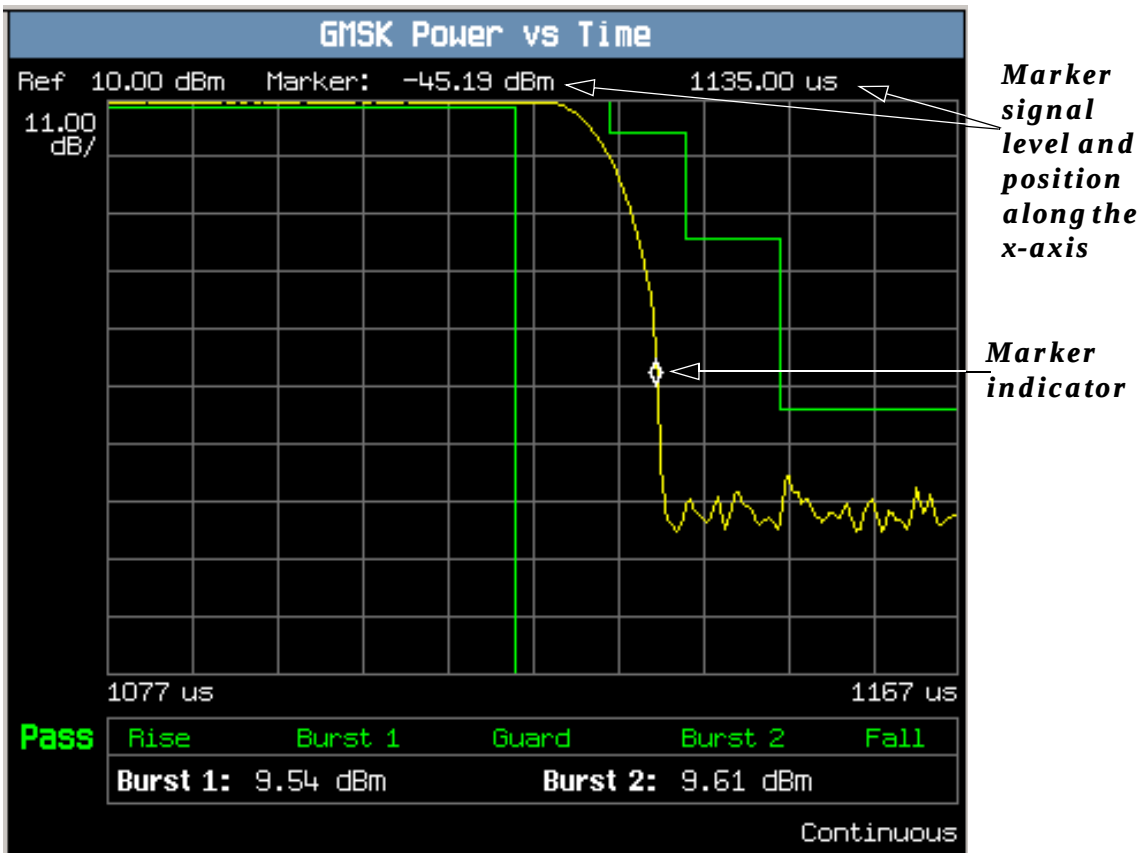
Two types of pass/fail results are provided:

- An overall measurement pass/fail indicator is positioned in the bottom left corner of the display:
  - — The text “Pass” is shown in a green-colored font if the measurement has passed the entire mask.
  - — The text “Fail” is shown in a red-colored font if the measurement has failed any part of the mask.
- Individual pass/fail indicators are provided for each section of the mask. On the display, text labels corresponding to the following sections change color to indicate a pass or fail (green indicates a pass; red indicates a fail):
  - — *Rise* section of burst 1
  - — Active (useful) section of *Burst 1*
  - — *Guard* period between burst 1 and 2 (Note: this indicator is only available if you are measuring two uplinks)
  - — Active (useful) portion of *Burst 2* (Note: this is only available if you are measuring two uplinks)
  - — *Fall* section

**NOTE** When the Multi-Measurement Count parameter is set to a number greater than 1, it is possible for some, or all of the individual pass/fail indicators to show a pass while the overall pass/fail indicator shows a fail. This is because the individual pass/fail indicators relate to the last of the multi-measurements made, whereas the overall mask pass/fail indicator is an accumulative result from all the multi-measurements made.

You can zoom in to individual sections of the graph by pressing the `Guard Period` (**F2**), `Burst 1 Views` (**F3**), or `Burst 2 Views` (**F4**) keys. In addition, you can control a marker or change axis values by pressing

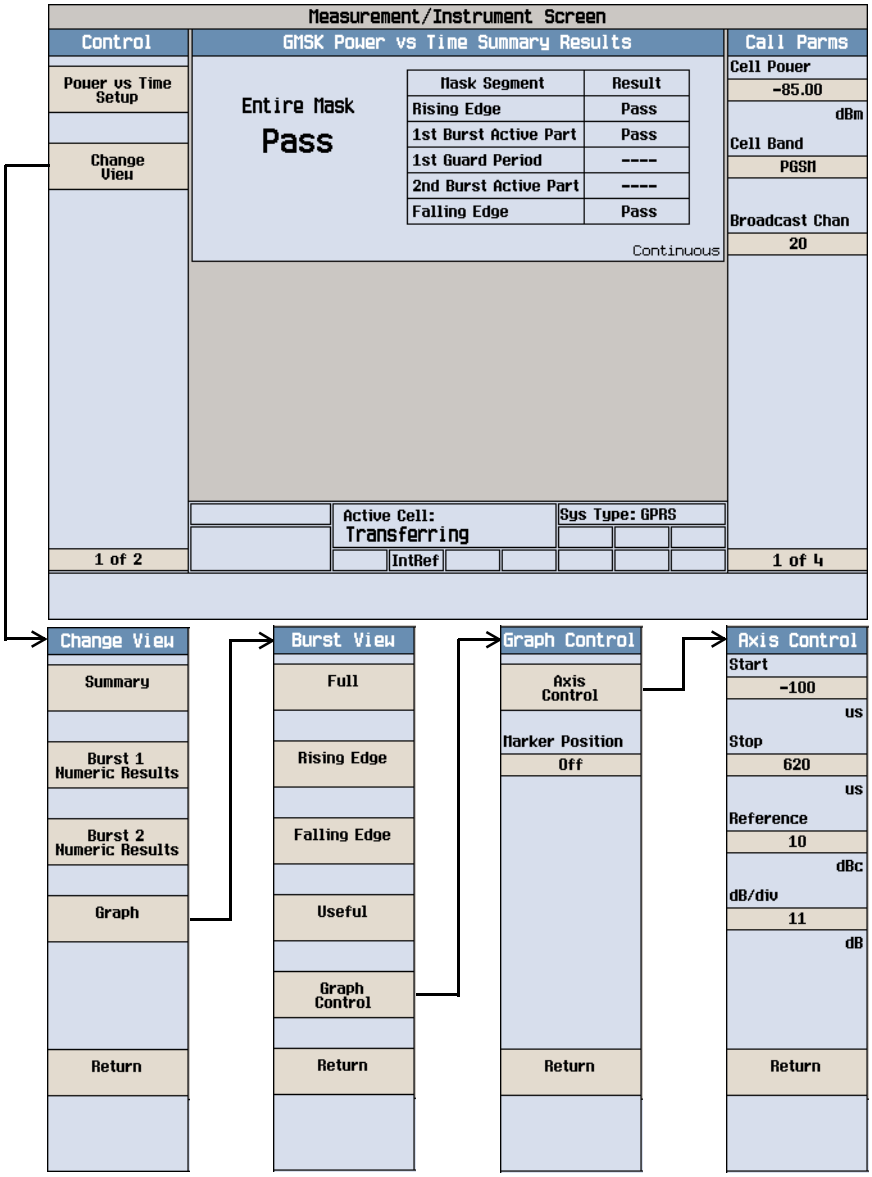
the Graph Control (**F5**) key.



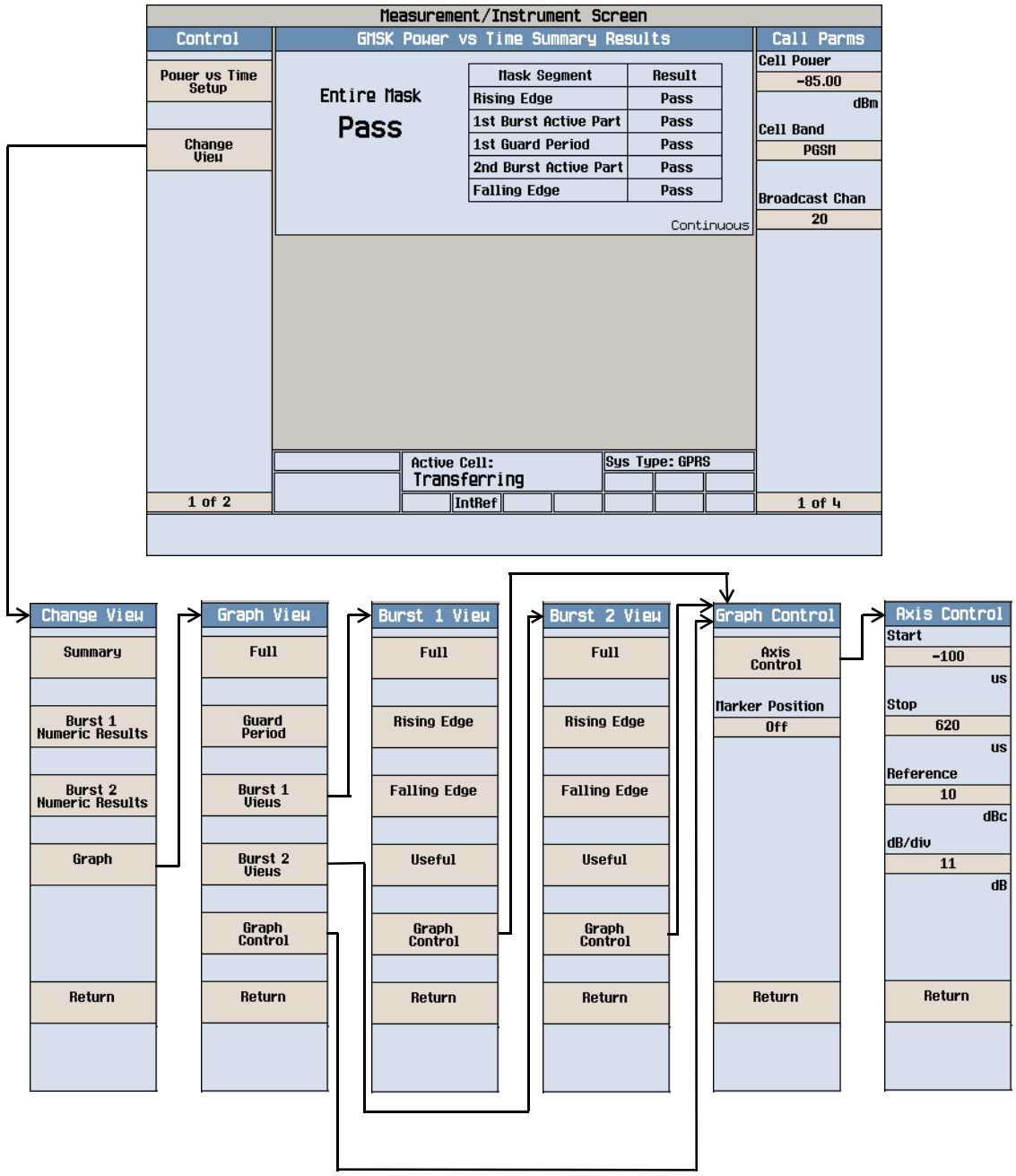

A typical graph view of the falling edge of burst 2 is shown above. You can access this view by pressing the Burst 2 Views (**F4**) key then the Falling Edge (**F3**) key.

In this case, the marker is turned on and positioned on the falling edge. The marker can be turned on by pressing the Graph Control (**F5**) key then the Marker Position (**F2**) key. Set the required marker position using the knob or the numeric entry keys. The signal level at the marker and its position along the x-axis are shown at the top of the display above the graph.

## Power versus Time Graph Menus (one uplink burst)



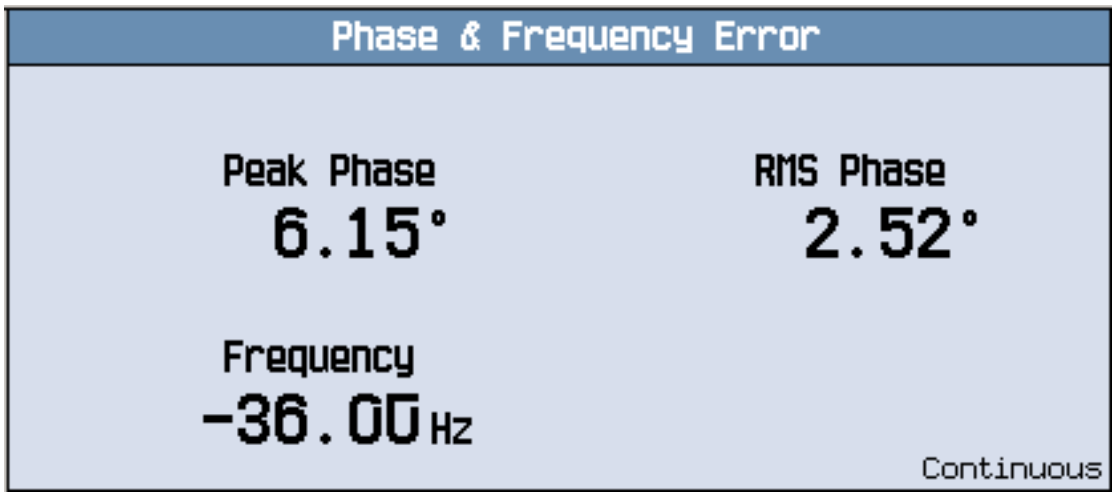
### Power versus Time Graph Menus (two uplink bursts)




## Measuring Phase and Frequency Error

1. Connect the mobile.
2. Turn the mobile on and wait for `Attached` in the `Active Cell:` field.
   Note: For mobiles that don't perform a GPRS attach automatically, set the mobile to data mode.
3. Press the `Start Data Connection` (**F3**) key and watch for the `Active Cell:` field changing to `Transferring`.

4. Press the **Measurement selection** key.
5. Select the `Phase & Frequency Error` measurement.
6. Press the `Phase & Freq. Setup` (**F1**) key.
7. Set the measurement parameters as needed for your measurement situation, including:
   `Measurement Timeout = 10 s`



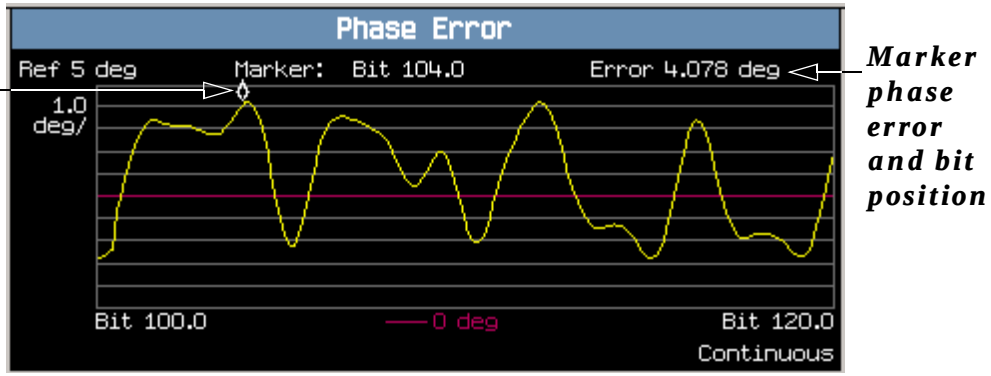

A typical phase and frequency error measurement result is shown above.

8. Press the `Change View` (**F2**) key.
9. Press the `Graph` (**F2**) key to access the peak phase error graph.

A typical peak phase error graph is shown above.

The marker can be turned on by pressing the `Graph Control` (**F5**) key then the `Marker Position` (**F2**) key. Set the required marker position using the knob or the numeric entry keys. In addition, the axis values can be changed by pressing the `Axis Control` (**F1**) key. This allows you to zoom in or out to look at particular

sections of the graph in more detail.

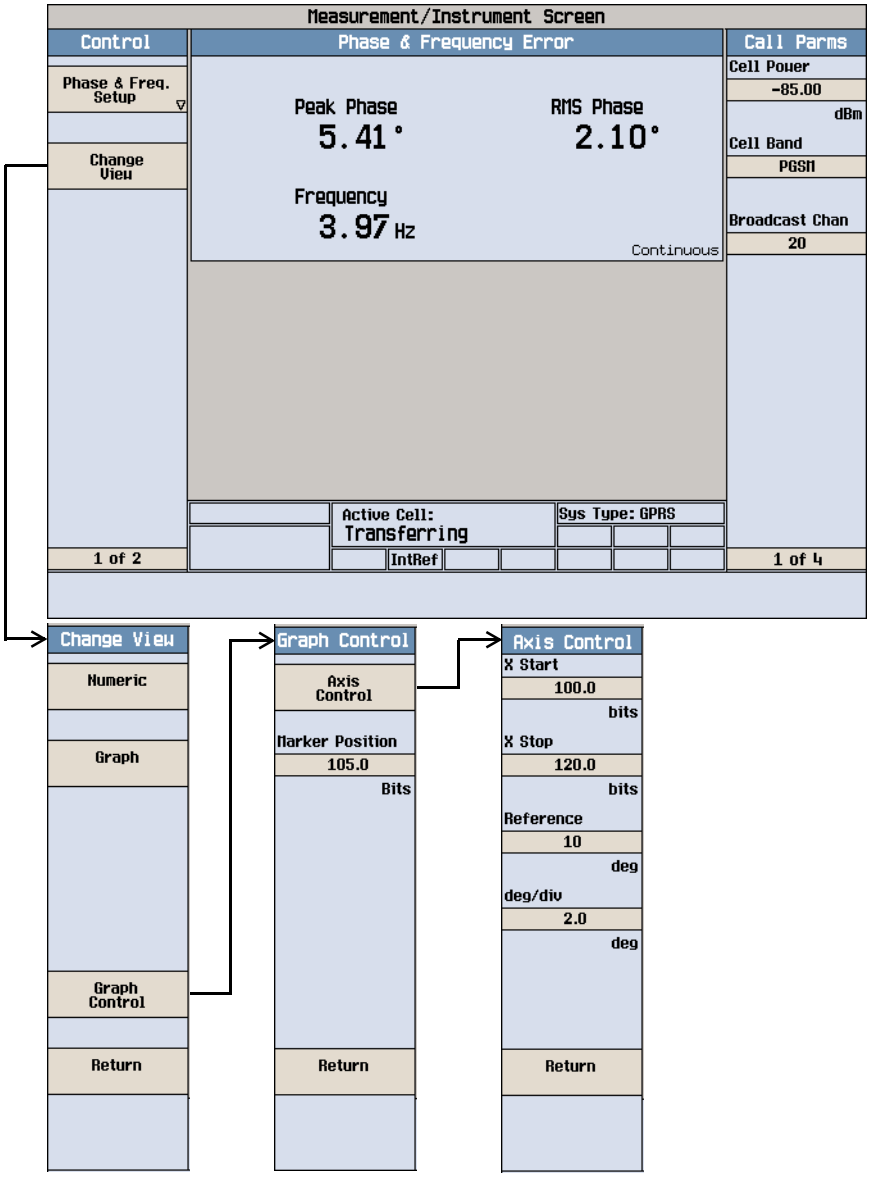



A typical peak phase error graph is shown above. This graph is zoomed in to show bits ranging from 100.0 to 120.0 at a 1.0 degrees per division setting. The Y-axis reference point is changed to 5.0 degrees.

In this case, the marker is turned on and positioned at bit 104. The phase error at the marker and its bit position are shown at the top of the display above the graph.

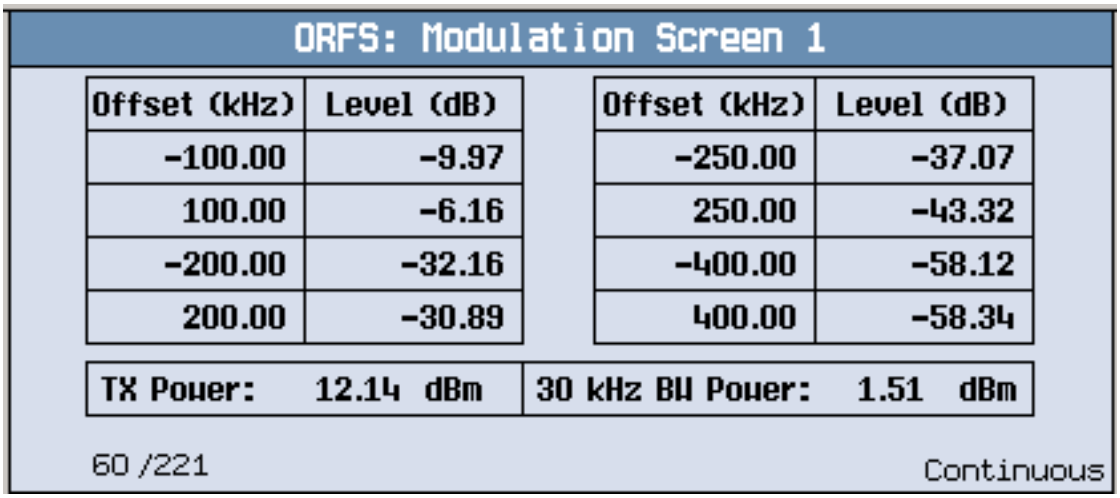
If you require details on how to navigate through the phase and frequency error graph menus, see "Phase and Frequency Error Graph Menus" on page 935.

## Phase and Frequency Error Graph Menus



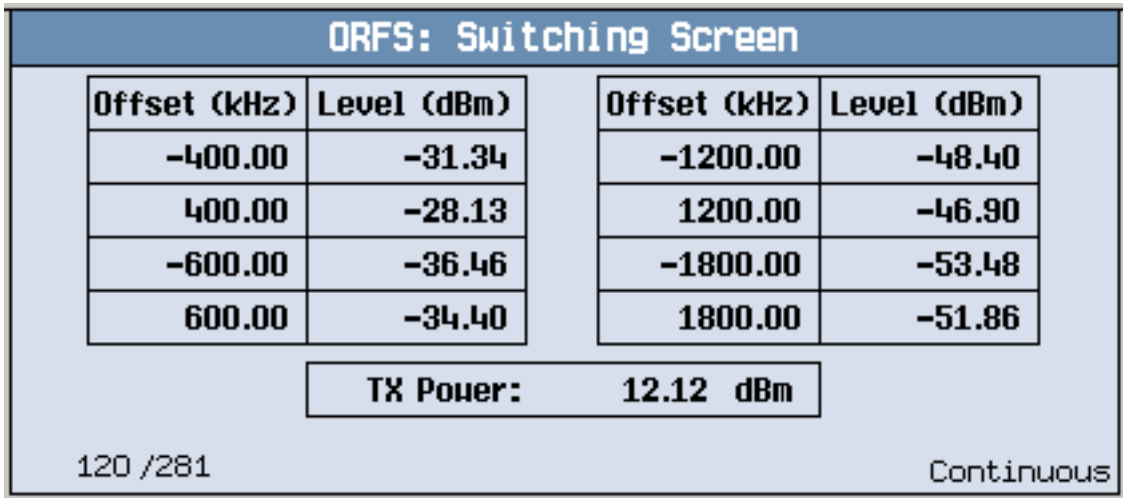
## Measuring Output RF Spectrum

1. Connect the mobile.
2. Turn the mobile on and wait for Attached in the Active Cell: field.
   Note: For mobiles that don't perform a GPRS attach automatically, set the mobile to data mode.
3. Press the Start Data Connection (**F3**) key and watch for the Active Cell: field changing to Transferring.
4. Press the **Measurement selection** key.
5. Select the Output RF Spectrum measurement.
6. Press the ORFS Setup (**F1**) key.
7. Press the Measurement Setup (**F1**) key.
8. Set the measurement parameters as needed for your measurement, including:
   Measurement Timeout = 20 s.
9. Press the Modulation Frequencies (**F2**) key and set up your required offset frequencies for ORFS due to modulation.
10. Press the Switching Frequencies (**F3**) key and set up your required offset frequencies for ORFS due to switching.
11. Press the Close Menu (**F6**) key.
12. Press the Return (**F6**) key.
13. Press the Change View (**F2**) key.
14. Press the Modulation Numeric 1 of 3 (**F1**) key.



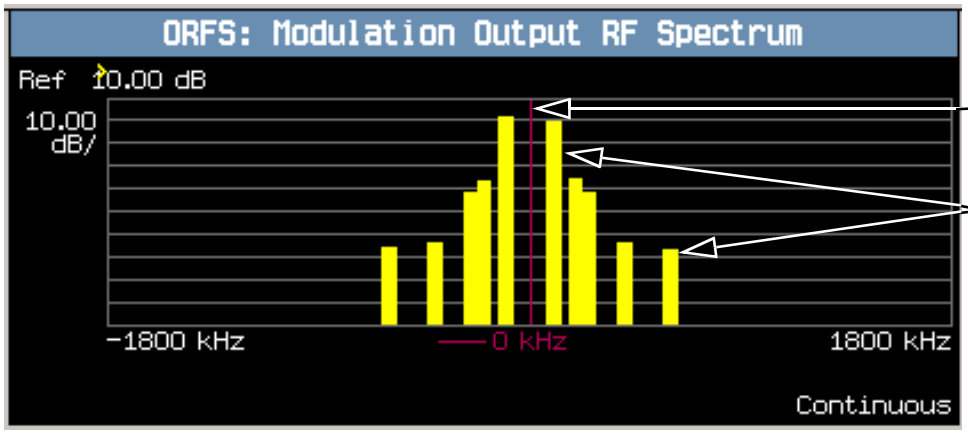

The measurement results for the first eight positions in the ORFS due to modulation table are displayed. You can view the results for the remaining 14 positions by pressing the Modulation Numeric 2 of 3 (**F2**) key or the Modulation Numeric 3 of 3 (**F3**) key. Note that the results are in dB relative to the 30kHz BW Power shown on the screen.

15. Press the Switching Numeric (**F4**) key to display the measurement results for ORFS due to switching.



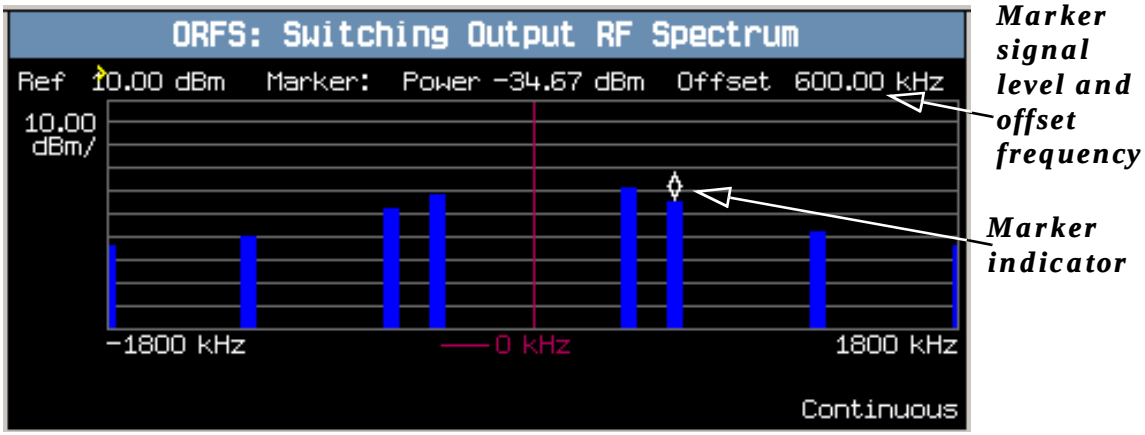

A typical measurement results screen for ORFS due to switching is shown above.

16.Press the Graph (**F5**) key then the Modulation (**F1**) key to access the ORFS due to modulation bar graph.




A typical ORFS due to modulation graph is shown above. On the display, the bar representing each offset is shown in yellow and the center frequency is indicated by a red vertical line.

17.Press the Switching (**F2**) key to access the ORFS due to switching bar graph.

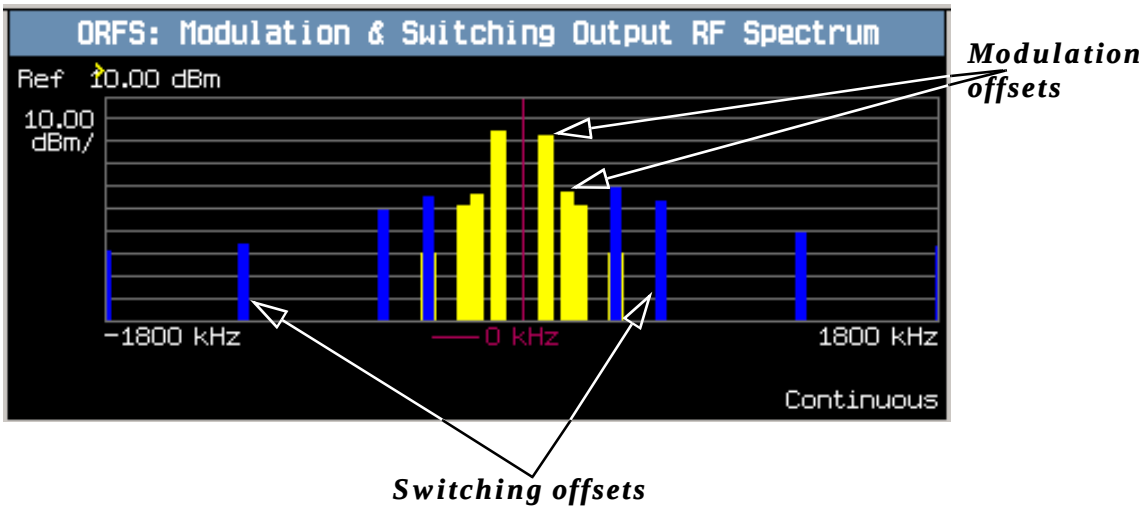



A typical ORFS due to switching graph is shown above. On the display, the bar representing each offset is shown in blue and the center frequency is indicated by a red vertical line.

In this case, the marker is turned on and positioned at the 600 kHz offset. The signal level and frequency of the offset where the marker is positioned, are shown at the top of the display above the graph.

The marker can be turned on by pressing the Graph Control (**F5**) key then the Marker Position (**F2**) key. Set the required marker position using the knob or the numeric entry keys. In addition, the axis values can be changed by pressing the Axis Control (**F1**) key. This allows you to zoom in or out to look at particular sections of the graph in more detail.

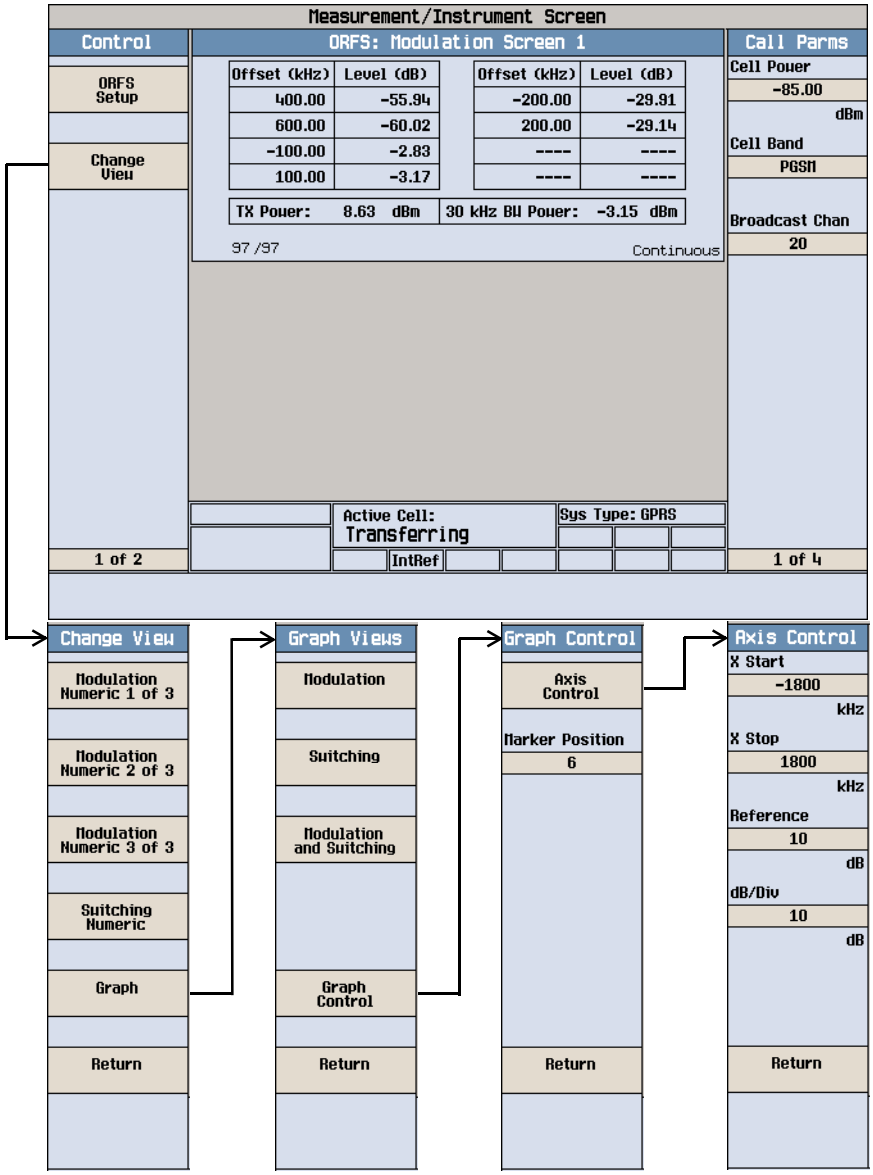
18.Press the Modulation and Switching (**F3**) key to access the combined ORFS bar graph.




A typical combined ORFS due to modulation and switching graph is shown above. On the display, modulation offsets are shown in yellow, switching offsets are shown in blue, and the center frequency is indicated by a red vertical line.

If you require details on how to navigate through the Output RF Spectrum graph menus, see "Output RF Spectrum Graph Menus" on page 940.

## Output RF Spectrum Graph Menus



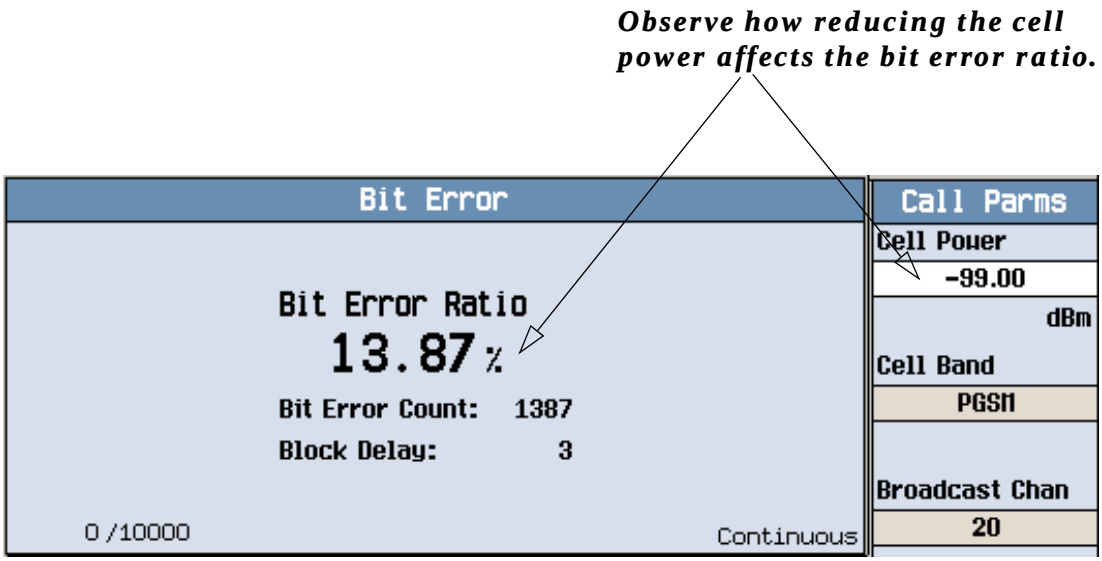
## Measuring Bit Error

**NOTE** To make bit error measurements your mobile must be fitted with a Test SIM card and have ETSI Type B connection capability.

1. Press the **CALL SETUP** key.
2. Press the **More** key (bottom right) to obtain the Call Parms (3 of 4) screen.
3. Press the `Multislot Config` (**F7**) key and select `1 down, 1 up`.
4. Press the `Data Conn Type` (**F4**) key and select `ETSI Type B`.
5. Connect the mobile.
6. Turn the mobile on and wait for `Attached` in the `Active Cell:` field.

**NOTE** For mobiles that don't perform GPRS attach automatically, set the mobile to data mode.

7. Press the `Start Data Connection` (**F3**) key and watch for the `Active Cell:` field changing to `Transferring`.
8. Press the **Measurement selection** key.
9. Select the `Bit Error` measurement.
10. Press the `Bit Error Setup` (**F1**) key.
11. Set the measurement parameters as needed for your measurement situation, including:
    `Measurement Timeout = 13.0 s`

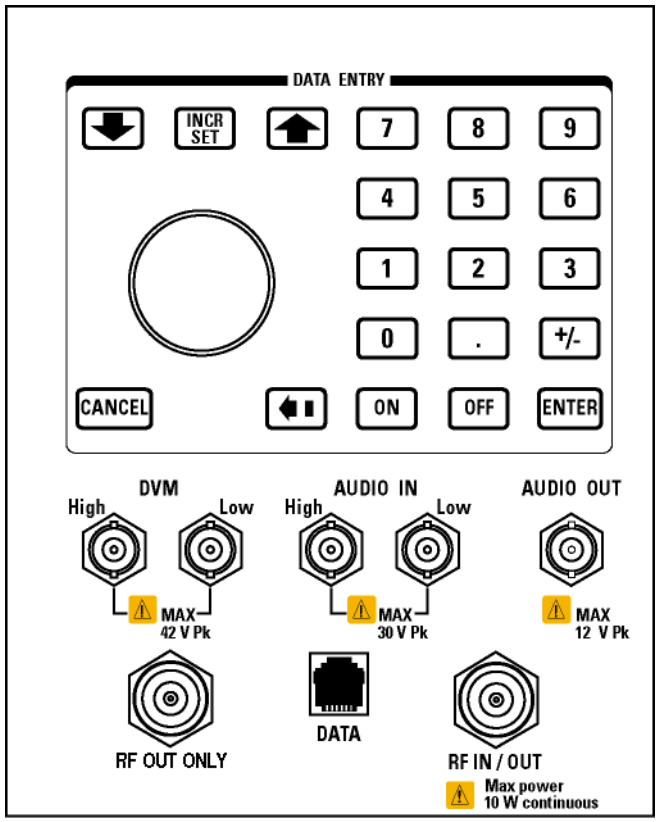



A typical bit error ratio measurement result is shown above.

To see the effect of cell power on the bit error ratio, press the `Cell Power` (**F7**) key on the Call Parms (1 of 3) screen and slowly reduce the power while observing the Bit Error display.

# 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

**NOTE** This port is usable only with the E1962B and E1963A test applications.

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

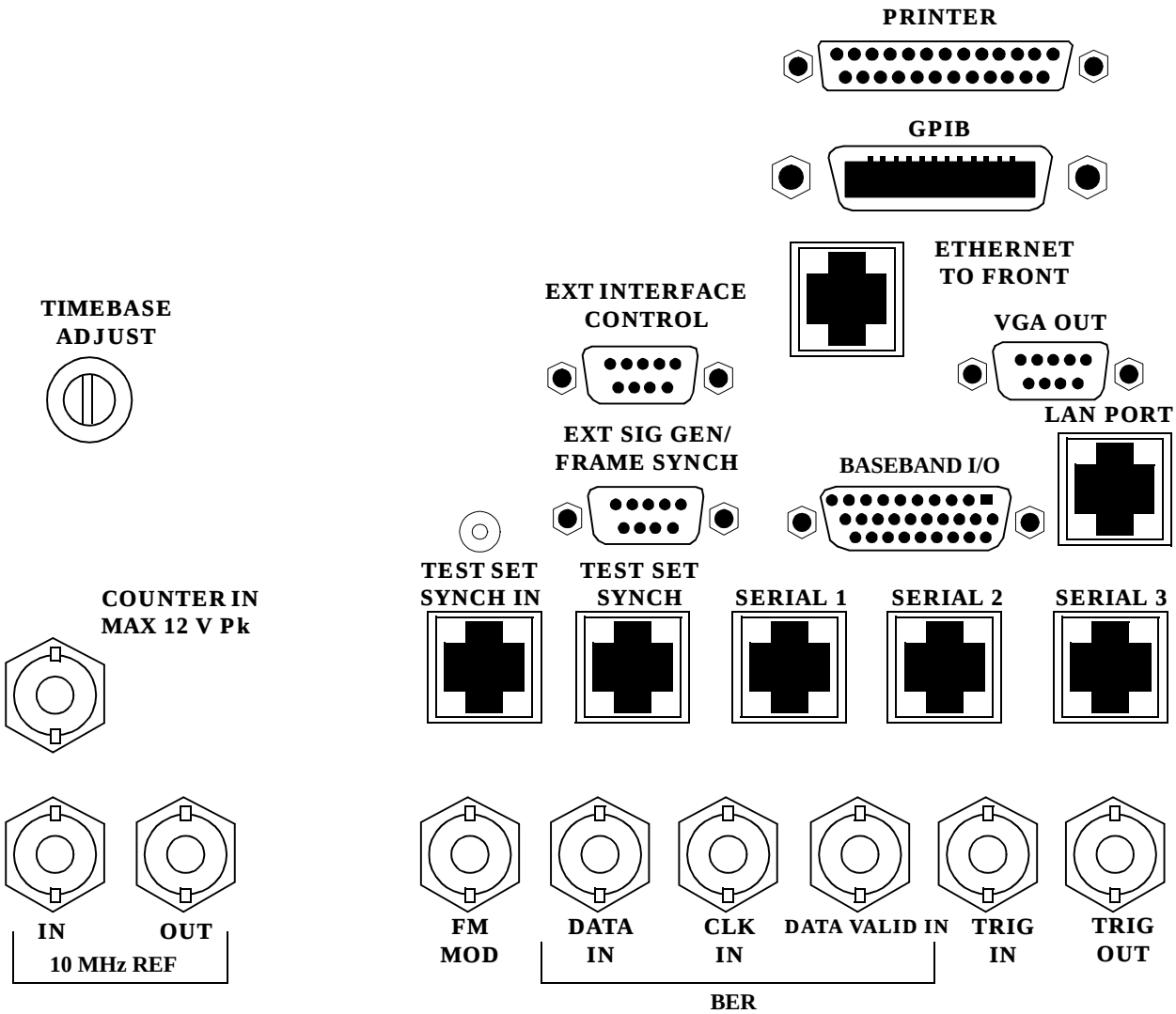
"Analog Audio Measurement Description" on page 36

"AFGenerator" on page 330

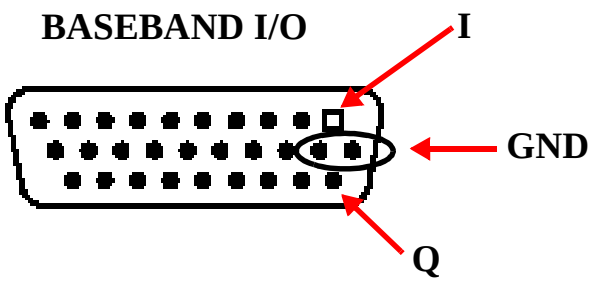
"Configuring the Test Set's LAN" on page 1032

# Rear Panel Connectors

## Description



## BASEBAND I/O




Four pins are functional on this connector:

- I channel
- Q channel
- Ground
- Ground

## CLK IN

Not functional for this release.

## COUNTER IN

Not functional for this release.

## DATA IN

Not functional for this release.

## DATA VALID IN

Not functional for this release.

## ETHERNET TO FRONT PANEL

This RJ-45 connector is used with a separate LAN jumper cable to connect the front panel DATA connector to the rear panel LAN PORT.

The the DATA connector on the front panel is connected internally to the ETHERNET TO FRONT PANEL connector on the rear panel. In order to use the front panel DATA connector the user must connect the rear panel LAN PORT, to the rear panel ETHERNET TO FRONT PANEL connector with the LAN jumper cable.

The LAN jumper cable, part number E5515-61160, is supplied with the test set.

## EXT INTERFACE CONTROL

Not functional for this release.

## EXT SIG GEN/FRAME SYNCH

Not functional for this release.

## FM MOD IN

This BNC connector let's you use an external signal to frequency modulate the test set's RF generator. It has a fixed sensitivity of 20 KHz/volt, and a frequency range of 100Hz to 20 KHz.

## GPIB

The GPIB connector allows test set control with compatible devices.

## LAN PORT

This RJ-45 connector provides connection for down loading firmware upgrades, or new test applications into the test set. No other types of communication are possible with the LAN port.

## PRINTER

Not functional for this release.

## SERIAL 1

Not functional for this release.

## SERIAL 2

Not functional for this release.

## SERIAL 3

Not functional for this release.

## TEST SET SYNCH IN

Not functional for this release.

## TEST SET SYNCH OUT

Not functional for this release.

## TIMEBASE ADJUST

This is the timebase adjust cover, removing this screw allows access for timebase adjustment.

## TRIG IN

Not functional for this release.

## TRIG OUT

This BNC connector allows for synchronization of the test set to other equipment and is configured by setting Frame Trigger Parameters.

## VGA OUT

This DB-15 connector allows the user to simultaneously route the test set's display to another monitor.

### 10 MHZ REF IN

This BNC connector accepts an external 10 MHz timebase signal. The nominal input impedance is 50 ohm. This version of test set can only accept a 10 MHz timebase signal.

## 10 MHZ REF OUT

This BNC connector provides a 10 MHz timebase signal to external test equipment. The accuracy of this signal is determined by the timebase used. The nominal output impedance is 50 ohm with a typical level of 0.5 V rms.

## Related Topics

"Setting Frame Trigger Parameters" on page 288

"Timebase Description/Configuration" on page 1031

"SYSTem:ROSCillator" on page 867

"Configuring the Test Set's GPIB Address" on page HIDDEN

"Configuring the Test Set's LAN" on page 1032

# 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.

## Related Topics

"Configuring the Test Set's GPIB Address" on page HIDDEN

# Printing and Saving Screen Images

## 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.

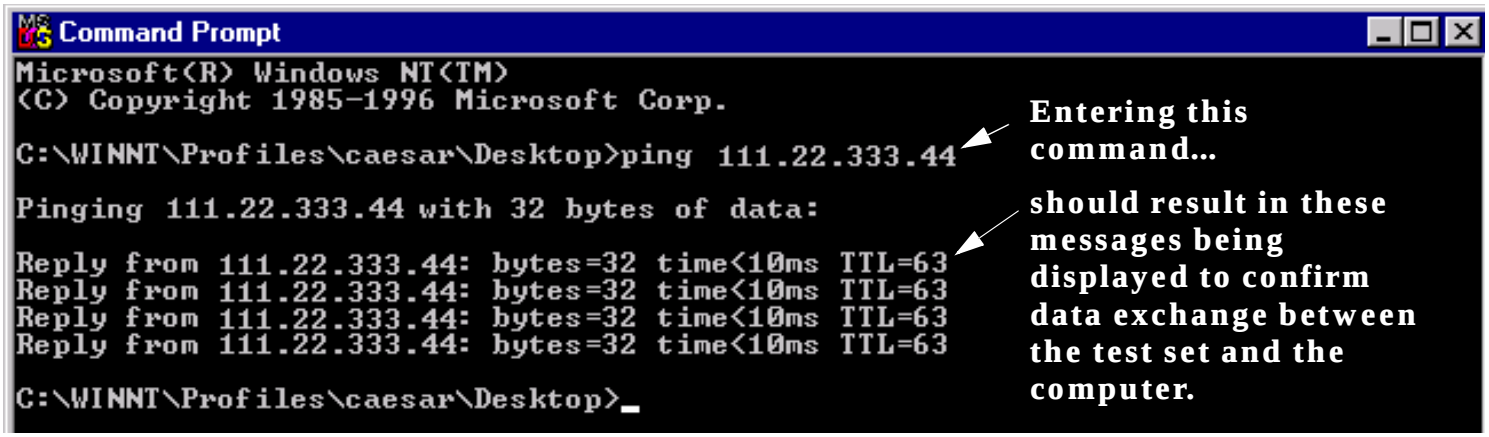
The image can now be retrieved from your directory and used as needed.

### 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.




3. If the message "`Request Timed Out`" is displayed instead of a reply from the test set, try entering the command again. If the request times out again, your LAN connections are incorrect and/or your LAN settings for the two devices do not match.

### Troubleshooting LAN Connections

If your web browser did not display the test set's screen, or you could not "ping" your test set from your browser, refer to the following information to find the cause and fix the problem.

**Try Altering Connections** •If you are using the test set's front panel DATA port, make sure the jumper between the rear-panel LAN PORT and ETHERNET TO FRONT PANEL port is in place; or try connecting directly to the rear-panel LAN PORT.

- Try using a different type of LAN cable. If you were using a crossover cable, try using a standard LAN cable; if using a standard LAN cable, try using a crossover cable. If this doesn't fix the problem, be sure to replace the cable with the type recommended in "Test Set to Computer Connections" above.

**Reconfigure the Computer and Test Set LAN Settings** If the test set's image is still not displayed on your web browser, and the ping command still indicates that the test set is not communicating with the computer, you need to verify that the LAN settings for the computer and the test set are compatible. The following sections provide general guidelines in getting the LAN settings configured for both instruments to communicate with each other.

Perform the configuration in the following order:

1. Configure the computer's LAN settings.
2. Restart Windows on the computer to start using the new LAN configuration.
3. Configure the test set's LAN settings to work with the computer's settings. (It is important that the computer be configured and re-started before configuring the test set's LAN settings.)
4. Turn the test set off and back on to make sure it finds the computer's newly-configured LAN card on power up.

### LAN Setting Guidelines

- It is highly recommended that the Subnet Mask be set to 255.255.248.0 for the test set and the computer when using a direct computer-to-test set connection.
- The first three groups of numbers for the LAN IP Address of the test set and the computer must match. Example; if the test set's LAN IP Address is set to 130.29.189.33, the computer's LAN IP address must begin with 130.29.189.

  The number in the fourth group of digits in the computer's and test set's LAN IP Addresses must NOT match. Example; if the test set is set to LAN IP Address 130.29.189.33, set the computer's LAN IP Address to 130.29.183.34 (or 130.29.183.77, 130.29.183.42...- just so the last number is not also set to 33). The last entry in the IP Address must not be >254 or 0.

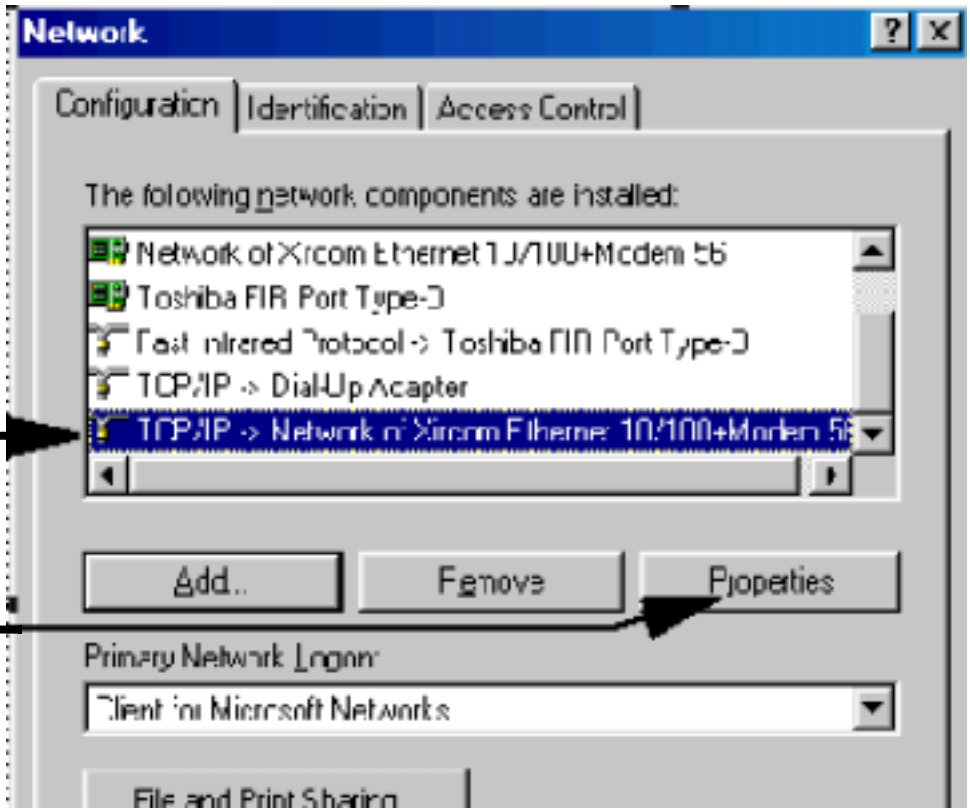
**Changing the LAN Setting on Your Computer** Network configuration procedures vary between operating systems. You may have to refer to your computer's help system, or your LAN adapter card's documentation, for assistance.

Perform the following steps to alter the network settings for most PCs using a Microsoft Windows operating system.

### Access the Network Settings

1. Double-click on the `My Computer` icon on the Windows desk top.
2. Double-click on the `Control Panel` icon.
3. Double-click on the `Network` icon.
4. Select the `TCP/IP->` [your Ethernet network adapter] entry from the list of components. Note: Do not select `TCP/IP Dial-Up Adapter` settings if present.
5. Select `Properties` to access the TCP/IP settings screen.

**Figure 4. Accessing Your Computer's LAN Settings**



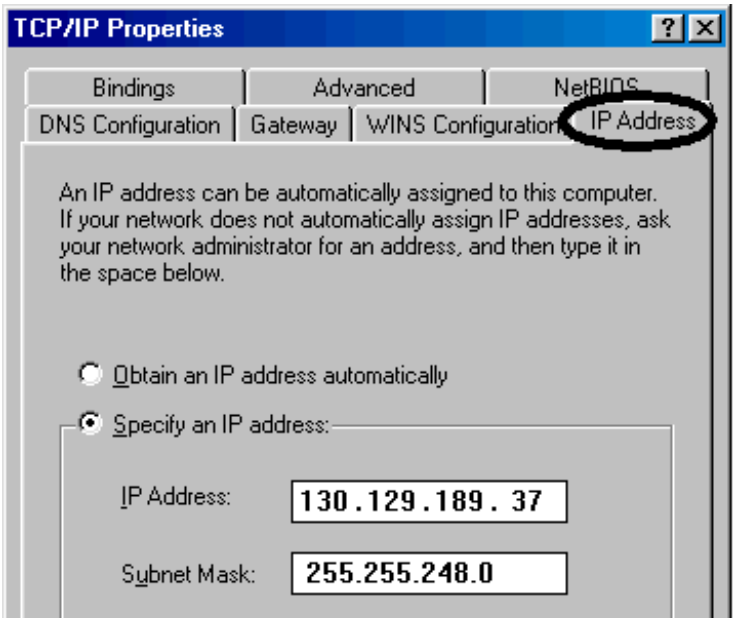

Select the entry for your Ethernet network adapter, then...

select Properties to list the TCP/IP settings for your adapter.

### Set the IP Address and Subnet Mask

1. Select the `IP Address` tab on the TCP/IP Properties screen.
2. Select `Specify an IP Address`.
3. Enter the IP Address for the computer. Remember, the last entry in the IP Address must not be >254 or 0.
4. Enter the Subnet Mask (255.255.248.0).

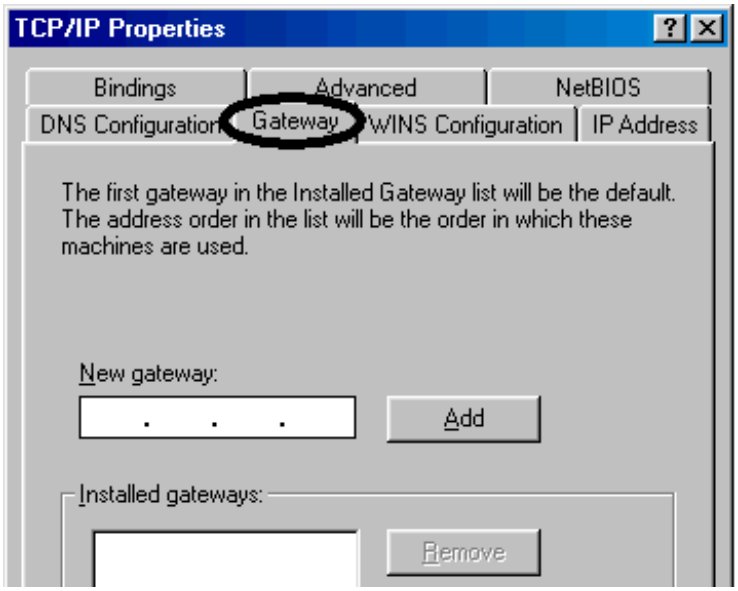
**Figure 5. Specifying the Computer's IP Address and Subnet Mask**




### 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.

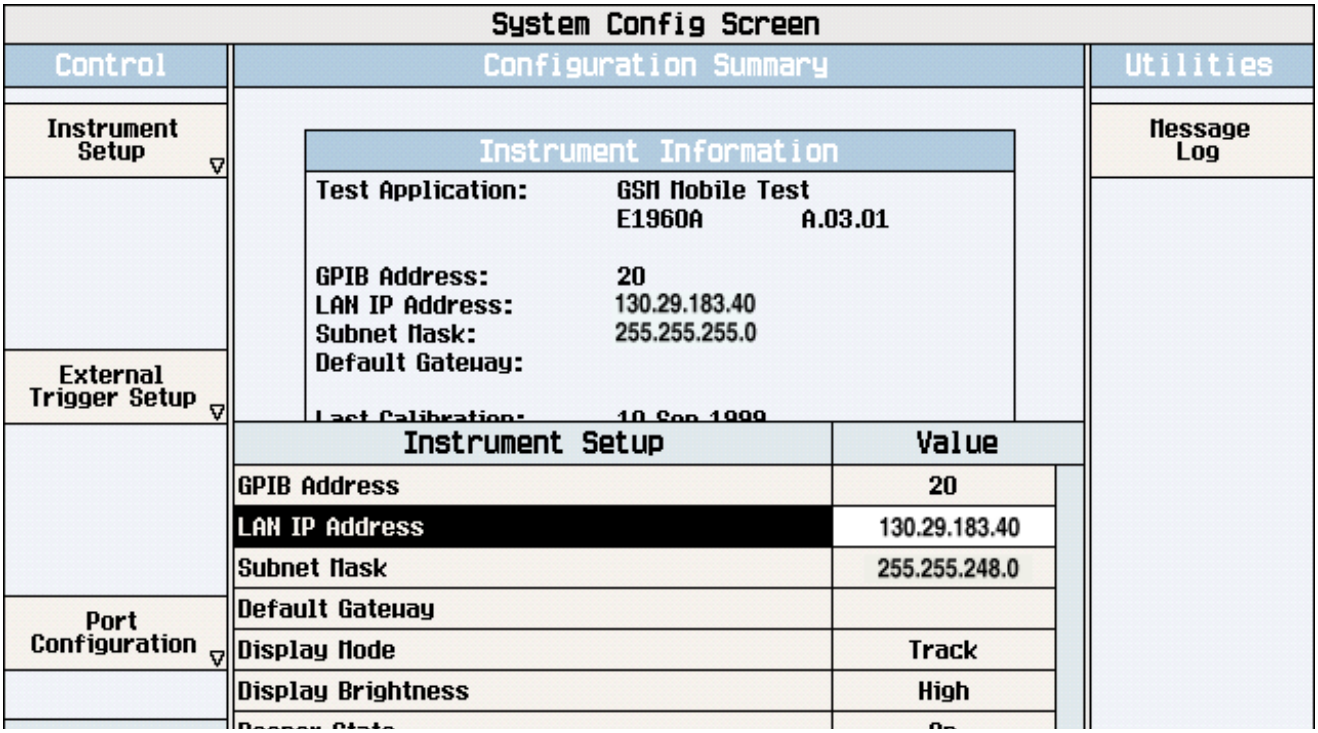
**Figure 6. Accessing the Gateway Setting**



### 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 import 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.




2. Press the **F1** (`Instrument Setup`) key.

---

**NOTE** Changing the LAN IP Address may alter the Subnet Mask setting. Therefore, change the LAN IP Address first, then change the Subnet Mask. Also, The last entry in the IP Address must not be >254 or 0.

---

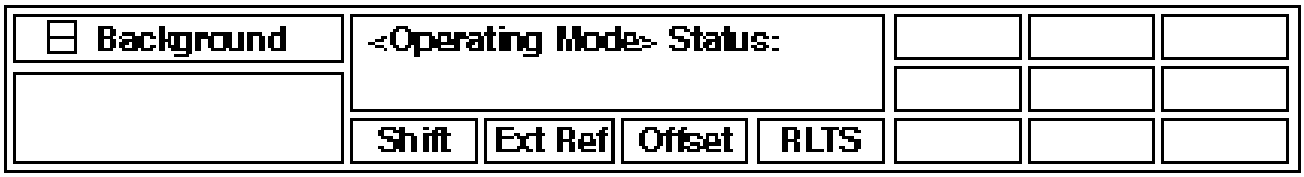
3. Turn the knob to highlight the setting you want to change.
4. Press the knob to select the setting.
5. Enter the new value using the keypad, and press the knob to complete the setting.
6. Turn the test set off and back on to start using the new settings.

# Instrument Status Area

## Description

The Instrument status area is found on the bottom center of the test set's display.

**Figure 7. 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.

### R L T S

This annunciator indicates the state of four different conditions of the test set:

- Remote annunciator. 'R' turns on when the test set is operated remotely.

- Listen annunciator. ‘L’ turns on when the test set is listening to a command.
- Talk annunciator. ‘T’ turns on when the test set is providing information over GPIB.
- SRQ annunciator. ‘S’ turns on when an SRQ is active.

# 6 Troubleshooting

# Analog Audio Troubleshooting

## Possible Setup Issues

During remote operation of the analog audio measurements, 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?" on page 605 is used.

If any other measurements are active, turn them off or set their trigger source to Immediate.

The Detector Type selected (Peak or RMS) also sets how analog 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 $V_{peak}$, regardless of the Detector Type selected, and cannot exceed 20 $V_{peak}$ (14.1 $V_{rms}$).

For accurate measurements, always set all the analog audio measurement setup parameters to their proper settings for the measurement being made. The SINAD and Distortion measurements typically use different settings than the analog audio level measurement. See "Analog Audio Measurement Description" on page 36 and "Analog Audio Measurement Block Diagram" on page 38.

For very low level audio signals, use the 100 Hz BW BPF filter to reduce the effects of noise (see "Audio Level Measurement Description" on page 40).

For accurate analog 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 40).

## Interpreting Integrity Indicator Values

See "Integrity Indicator" on page 283.

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.

# Bit Error Troubleshooting

## Possible Setup Issues

### GSM

During remote operation of the bit error measurement you should configure the trigger arm to single, see "SETup:BERRor:CONTinuous" on page 651.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

If you have a BER measurement active and your mobile drops the call it may be that you have the "SETup:BERRor:SLControl[:STATe]" on page 653 command set to OFF. This is likely to occur with mobiles that do not respond to downlink signalling when loopback is closed. To solve this problem set the command to ON.

### GPRS

The error correction inherent in channel coding scheme CS-1, if used during BER testing, will mask low to medium bit error rates, and result in very much reduced measurement result granularity. CS-4 is therefore the recommended coding scheme for BER measurements. You use the command "CALL:PDTCH:CSCHeme" on page 458 to set the channel coding scheme.

During remote operation of the bit error measurement you should configure the trigger arm to single, see "SETup:GBERror:CONTinuous" on page 675.

The BER measurement only provides results when the test set's operating mode is:

- GPRS BCH+PDTCH test mode, or
- Active Cell, and the Data Connection Type is set to ETSI Type B. For details on setting the Data Connection Type see "CALL:FUNCtion:DATA:TYPE" on page 408. For details on setting the cell operating mode, see "CALL:OPERating:MODE" on page 442.

## Interpreting Integrity Indicator values

See "Integrity Indicator" on page 283.

# Decoded Audio Troubleshooting

## Possible Setup Issues

This measurement is *not* applicable to GPRS. To run this measurement ensure the test set is configured for GSM measurements.

During remote operation of the analog audio measurement you should configure the trigger arm to single, see "SETup:DAUDio:CONTinuous" on page 656.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

The audio signal expected by the DAUDio measurement is, pulsed at a 10 Hz rate and has a 50% duty cycle. The device under test should have echo cancellation disabled.

The signal measured is whatever is coming back in the speech frames, this includes any electrical or acoustical coupling from the downlink signal, earpiece or any noise coupled from the microphone of the MS.

## Interpreting Integrity Indicator values

See "Integrity Indicator" on page 283.

If PCM Full Scale Warning (14) is returned the measurement is accurate, however you may want to reduce the signal level applied to the test set to achieve an integrity indicator of zero.

If the DAUDio measurement is active when the channel mode is set to EFRSpeech (see "CALL:TCHannel:CMODe" on page 514), Questionable Result Due To Channel Mode (16) is returned. This is because the DAUDio measurement is not supported in this channel mode.

# Dynamic Power Troubleshooting

## Possible Setup Issues

The Dynamic Power measurement closes all other currently active measurements when it is initiated. When this happens, the test set beeps and a measurement specific closure warning is reported via GPIB for each measurement that has been closed (see "+700 to +799 Test Application Measurement Device-Specific Error" on page 1002).

## Interpreting Integrity Indicator Values

See "Integrity Indicator" on page 283.

# Fast Bit Error Troubleshooting

## Possible Setup Issues

This measurement is *not* applicable to GPRS. To run this measurement ensure the test set is configured for GSM measurements.

During remote operation of the Fast BER measurement you should configure the trigger arm to single, see "SETup:FBERror" on page 668.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

Set signalling loopback control to on; if signalling loopback control is off, set loopback to Type C, see "CALL:TCHannel:LOOPback" on page 515.

The test set may never correlate the uplink and downlink, see "SETup:FBERror:LDControl:AUTO" on page 671 so that the measurement appears to hang. The mobile station may not have closed its loop after the loopback type was set. You must allow sufficient time for the mobile station to close its loop and set time out mechanisms see "SETup:FBERror:TIMeout[:STIMe]" on page 673.

## Interpreting Integrity Indicator values

See "Integrity Indicator" on page 283.

Questionable Result for PGSM (15) Fast BER measurement appears to work but it is only possible on a Phase 2 GSM system.

# ORFS Troubleshooting

## Possible Setup Issues

During remote operation of the Output RF Spectrum measurement you should configure the trigger arm to single, see “SETup:ORFSpectrum” on page 696.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

ORFS due to modulation measurements: Averaging for each measurement, including the zero offset measurement, is performed over 40 or more bits on the front and back of the burst, from bit 15 to 60 and bit 87 to 132. ETSI standards only require measuring the back bits 87 to 132. By making measurements on the front and back of the burst, two measurements per burst are achieved.

When fetching (frequency offsets) for ORFS due to modulation or switching remotely, the values for the offsets are entered after the “ ? ”, see “FETCh:ORFSpectrum:MODulation:FREQuency[:OFFSet]?” on page 558 or “FETCh:ORFSpectrum:SWITChing:FREQuency[:OFFSet][:MAXimum]?” on page 560 for GPIB commands.

## Interpreting Integrity Indicator values

See “Integrity Indicator” on page 283.

If over range (5) is returned the input signal is likely to clip during the useful part of the burst or the ORFS TX Power measurement has detected an over range.

If signal too noisy (10) is returned, the actual power at certain offsets is > 8 dB off from the expected level.

If under range (6) is returned; the measured 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 for the RF Range setting. RF Range is automatically set based on the input power setting. Input power is a combination of amplitude offset and expected power settings. See “Mobile Station Receiver Example” on page 91.

Unsupported Configuration (22) is returned if you attempt to perform a GPRS ORFS measurement on two uplinks. The ORFS measurements can only be performed on a single uplink.

# Phase and Frequency Error Troubleshooting

## Possible Setup Issues

During remote operation of the Phase and Frequency Error measurement you should configure the trigger arm to single, see “SETup:PFERror:CONTinuous[:SELected]” on page 728.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

The Manual Frequency must be offset by +/- 67.7083 kHz in order to measure non-bursted or non-GMSK modulated signals.

If the Trigger Source is set to RF Rise and the signal measured is not burst modulated the measurement will wait until aborted or timed out.

If the input signal is more than 10 dB below the Expected Power, see “Expected Power” on page 237 or if the input signal is below -30 dBm there is not enough power to generate an RF Rise trigger so the measurement will hang.

## Interpreting Integrity Indicator values

See “Integrity Indicator” on page 283.

If the signal has both over range (5) and under range (6) conditions only the over range (5) is indicated.

Syn Not Found (11) will be returned if the measurement Burst Synchronization is set to Midamble synchronized and Expected Burst pattern is not set to TSC0 through TSC7, or RACH. see “CALL:BURSt” on page 381.

# Power versus Time Troubleshooting

This section is applicable to both GSM and GPRS.

## Possible Setup Issues

During remote operation of the Power versus Time measurement you should configure the trigger arm to single, see "SETup:PVTime:CONTinuous[:SELected]" on page 747.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

If the Trigger Source is set to RF Rise and the signal measured is not burst modulated the measurement will wait until aborted or timed out.

If the input signal does not rise above the threshold set at 20 to 30 dB below the Expected Power, see "Expected Power" on page 237 there is not enough power to generate an RF Rise trigger so the measurement may hang.

## Time Offset Range Restrictions for GPRS Mobiles

When you want to perform a Power versus Time measurement on a GPRS mobile which supports a two uplink multislot configuration, there are restricted ranges for the power offset times to ensure that a valid result is returned. This restriction is a function of the expected power for each burst and the guard period as shown in the table below. Note that multislot configurations where the first burst is greater in level than the second burst are not supported for the GPRS PvT measurement.

**Table 8. Restricted Ranges for GMSK Multislot Power Offset Times**

| | **Expected Power of Burst 1 is less than or equal to Burst 2** | |
|---|---|---|
| **Guard Period** | **Burst 1** | **Burst 2** |
| 9 bits | -50 us to 542.8 us | -33.2 us to 593 us |
| 10 bits | -50 us to 542.8 us | -36.9 us to 593 us |

## Interpreting Integrity Indicator values

See "Integrity Indicator" on page 283.

If over range (5) is returned; the PvT input power has exceeded the test set's internal sampler maximum value during some part of the sampling or the input power has exceeded the calibrated range of the test set's power detector for the RF Range setting. RF Range is automatically set based on the input power setting. Input power is a combination of amplitude offset and expected power settings. See "Mobile Station Receiver Example" on page 91.

If the signal has both over range and under range conditions only the over range (5) will be indicated.

If under range (6) is returned; the PvT 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 for the RF Range setting. RF Range is automatically set based on the input power setting. Input power is a combination of amplitude offset and expected power settings. See "Mobile Station Receiver Example" on page 91.

### GSM Only

Sync Not Found (11) will be returned if the measurement Burst Synchronization is set to Midamble synchronized and the Expected Burst pattern is not set to TSC0 through TSC7, or RACH. Note that the Expected Burst parameter is only used when the test set's operating mode is set to Test Mode or when the Cell Activated state is set to Off. See " CALL:BURSt:TYPE[:SELected]" on page 381.

### GPRS Only

Sync Not Found (11) is returned if a valid midamble cannot be found when measuring two adjacent uplink bursts. The measurement still completes on a best effort basis using RF Amplitude synchronization. See "Burst Synchronization of Measurements" on page 280.

Parameter Error (21) is returned if you set a value outside the restricted range of offset times when testing a GPRS mobile station with a two uplink multislot configuration. For more details, see "Time Offset Range Restrictions for GPRS Mobiles" on page 965.

Potential Receiver Saturation (20) is returned if you attempt to measure a multislot configuration where the first burst's level is greater than the second burst's level.

# Transmit Power Troubleshooting

Last updated: November 14, 2001

## Possible Setup Issues

During remote operation of the Transmit Power measurement you should configure the trigger arm to single, see "SETup:TXPower" on page 767.

If the trigger arm is not set to single, the measurement may not return a result. When trigger arm is continuous the measurement 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 278.

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.

## Interpreting Integrity Indicator values

See "Integrity Indicator" on page 283.

If over range (5) is returned; the input power has exceeded the test set's internal sampler maximum value during some part of the sampling or the input power has exceeded the calibrated range of the test set's power detector for the RF Range setting. RF Range is automatically set based on the input power setting. Input power is a combination of amplitude offset and expected power settings. See "Mobile Station Receiver Example" on page 91.

If the signal has both over range and under range conditions only the over range (5) will be indicated.

If under range (6) is returned; the 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 for the RF Range setting. RF Range is automatically set based on the input power setting. Input power is a combination of amplitude offset and expected power settings. See "Mobile Station Receiver Example" on page 91.

# I/Q Tuning Troubleshooting

## Possible Setup Issues

This measurement is *not* applicable to GPRS. To run this measurement ensure the test set is configured for GSM measurements.

On most occasions the test set will be able to select the correct reference frequency when "SETup:IQTuning:REFerence[:MANual][:FREQuency][:SELected]" is set to AUTO. However, if the I/Q Modulator is very badly calibrated, it is possible that the test set selects the wrong offset. This could be confirmed by using the "SETup:IQTuning:REFerence[:MANual][:FREQuency][:SELected]" query.

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. You must input the carrier frequency into the test set. Invalid measurements may be also be caused by modulation data other than all 1s or all 0s, for example, it may be that a midamble is being transmitted.

## Interpreting Integrity Indicator Values

See "Integrity Indicator" on page 283.

# RACH Troubleshooting

Last updated: November 14, 2001

## Possible Setup Issues

During manual or remote operation of a RACH measurement ensure that the multi-measurement count is set to Off. The measurement would not complete if multi-measurement count was set to On.

If required refer to the appropriate command:

- "SETup:PVTime:COUNt:STATe[:SELected]" on page 752
- "SETup:TXPower:COUNt:STATe[:SELected]" on page 773
- "SETup:PFERror:COUNt:STATe[:SELected]" on page 732

## Interpreting Integrity Indicator values

See "Integrity Indicator" on page 283.

# Error Messages

### Error Message Descriptions

"Fixed Timer Messages" on page 974

"Manual User Error Messages" on page 977

"-400 to -499 Query Errors" on page 979

"-300 to -399 SCPI Specified Device-Specific Errors" on page 980

"-200 to -299 Execution Errors" on page 982

"-100 to -199 Command Errors" on page 985

"+100 to +199 Core Device-Specific Error" on page 989

"+200 to +299 Call Processing Device-Specific Error" on page 992

"+300 to +399 Link Control Device-Specific Error" on page 996

"+400 to +499 Core Hardware Device-Specific Error" on page 997

"+500 to +599 Test Application Hardware Device-Specific Error" on page 1000

"+600 to +699 Instrument Device-Specific Error" on page 1001

"+700 to +799 Test Application Measurement Device-Specific Error" on page 1002

"+800 to +899 Core Measurement Device-Specific Error" on page 1003

# 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.

## GSM Mobile Test Maskable Messages

- GSM measurement warning; TX Power measurement has been closed.
- GSM measurement warning; Power vs Time measurement has been closed.
- GSM measurement warning; Phase Frequency Error measurement has been closed.

- GSM measurement warning; Output RF Spectrum measurement has been closed.
- GSM measurement warning; Fast Bit Error measurement has been closed.
- GSM measurement warning; Decoded Audio measurement has been closed.
- GSM measurement warning; IQ Tuning measurement has been closed.

## GSM Mobile Test Maskable Messages

- GPRS measurement warning; TX Power measurement has been closed.
- GPRS measurement warning; Power vs Time measurement has been closed.
- GPRS measurement warning; Phase Frequency Error measurement has been closed.
- GPRS measurement warning; Output RF Spectrum measurement has been closed.
- GPRS measurement warning; Bit Error measurement has been closed.

## Related Topics

“SYSTem:COMMunicate:GPIB:DEBug[:STATe]” on page 848

“Test Set Beeper” on page 1030

“SYSTem:ERRor?” on page 858

“DISPlay:WINDow:ERRor:CLEar”

“DISPlay:MESSage:MASKable:STATe” on page 519

“Integrity Indicator” on page 283

“FETCh? Subsystem” on page 520

# 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 970

# 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 |

| 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 HANDOVER COMMAND message until receiving HANDOVER COMPLETE or HANDOVER 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 |

| 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. |

### GSM and GPRS Mobile Test Manual User Messages

These messages are maskable so that they can be blocked from appearing on the display. See “Error Messages”

on page 970.

**Table 9.**

| Message | Description |
|---|---|
| GSM measurement warning; TX power measurement has been closed<br>GPRS measurement warning; TX power measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; Power vs time measurement has been closed<br>GPRS measurement warning; Power vs time measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; Phase frequency error measurement has been closed<br>GPRS measurement warning; Phase frequency error measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; Output RF spectrum measurement has been closed<br>GPRS measurement warning; Output RF spectrum measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; Fast bit error measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; Bit error measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; Decoded audio measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| GSM measurement warning; IQ tuning measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |
| Protocol warning; Setting change has terminated the link with the DUT | Indicates that a user setting has caused the link with the device under test (DUT) to be dropped. (For example, this may occur if you change the ETSI Test Mode Type parameter while the data connection status is Transferring.) |

# -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. |

| 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 834

# -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. |

| 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 4882, 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 count 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 that 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. |

| 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, and 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 834

# +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> | <message1> will appear as:<br>If the DSP generated the assert:<br>;P:DSP T:<task ID> E:<error code> C:<error classif.> F1:<flag 1> F2:<flag 2><br>If the Protocol processor generated the assert:<br>;P:Protocol T:<task ID> L:<line number> F:<file name><br>If the Host processor generated the assert:<br>;P:Host T:<task ID> L:<line number> F:<file name> |
| +102 Exception; Cycle power. Exception message<message2> | <message2> will appear as: T:<task ID> or V:<vector number> or PC:<program counter> or DA:<data adrs reg value>.<br>Vector number, program counter and data address register values are hexadecimal format. |
| +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. |

| Error Message | Description |
|---|---|
| +113 Internal error; <VI NAME> forced inactive | Indicates that a VI is inactivated when not executed.<br><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.<br><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.<br><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). |

| Error Message | Description |
|---|---|
| +132 Configuration error; Selected Test Application Format is not available. | Indicates that the fast switching operation will not activate a particular radio format. Check the revision number of the test application associated with the radio format, does the revision correspond with what the fast switching test application needs? |
| +133 Configuration error; Selected Test Application Format is not licensed, (License = N). | The radio format selected is not licensed. Select another revision or obtain a licensed revision of the test application test application that is licensed (License = L). |
| +134 Configuration error; Unable to switch to selected Test Application Format | The Test Application Format name used is correct but for some reason the test set can not switch to that format. |
| +142 Configuration error; Functionality not available | An attempt has been made to access lab application functions from a test application. |
| +150 Calibration operation; Recalibrating due to present temperature | Indicates that the test set is recalibrating due to hardware inaccuracies based on temperature changes. Any measurements that are running will be temporarily aborted and then restarted after the recalibration is complete. |

# +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.

Errors with a description beginning with “GSM call disconnected” mean that the call is dropped when the error occurs. Errors beginning with “GSM protocol failure” mean that the call is not necessarily dropped, these are informational messages.

| Error Message | Description |
|---|---|
| +201 GSM call disconnected; Radio link failure (Timer T100 expiry) | “Fixed Timer Messages” on page 974 |
| +202 GSM call disconnected; Immediate assignment failure (Timer T3101 expiry) | “Fixed Timer Messages” on page 974 |
| +203 GSM call disconnected; Handover failure (Timer T3103 expiry) | “Fixed Timer Messages” on page 974 |
| +204 GSM call disconnected; Channel assignment failure (Timer T3107 expiry) | “Fixed Timer Messages” on page 974 |
| +205 GSM call disconnected; No response to page (Timer T3113 expiry) | “Fixed Timer Messages” on page 974 |
| +206 GSM call disconnected; No answer (Timer T301 expiry) | “Fixed Timer Messages” on page 974 |
| +207 GSM call disconnected; No response to setup (Timer T303 expiry) | “Fixed Timer Messages” on page 974 |
| +210 GSM call disconnected; No response to release 2 times (Timer T308 expiry) | “Fixed Timer Messages” on page 974 |
| +211 GSM call disconnected; No alert from mobile (Timer T310 expiry) | “Fixed Timer Messages” on page 974 |
| +212 GSM call disconnected; No response to connect (Timer T313 expiry) | “Fixed Timer Messages” on page 974 |
| +213 GSM call disconnected; Data link failure (Timer T200 expiry) | “Fixed Timer Messages” on page 974 |
| +214 GSM call disconnected; Physical information repetition failed (Timer T3105 expiry) | “Fixed Timer Messages” on page 974 |
| +217 GSM call disconnected; TMSI (Temporary Mobile Subscriber Identity) reallocation failed (Timer T3250 expiry) | “Fixed Timer Messages” on page 974 |
| +218 GSM call disconnected; Authentication failed (Timer T3260 expiry) | “Fixed Timer Messages” on page 974 |

| Error Message | Description |
|---|---|
| +219 GSM Call disconnected; Mobile not capable of supporting the selected Channel Mode | Indicates that the mobile station cannot support the requested channel mode. |
| +220 GSM call processing failure; (Call processing not available | Indicates the BS Emulator VI cannot be instantiated. |
| +230 GSM operation rejected; Call processing disabled | Indicates an attempt to perform a BS Emulator action when the BS emulator VI is inactive. |
| +231 GSM/GPRS operation rejected; Attempting to set MCC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the MCC. |
| +232 GSM/GPRS operation rejected; Attempting to set LAC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the LAC. |
| +233 GSM/GPRS operation rejected; Attempting to set BCC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the BCC. |
| +234 GSM/GPRS operation rejected; Attempting to set NCC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the NCC. |
| +235 GSM/GPRS operation rejected; Attempting to set MNC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the MNC. |
| +236 GSM operation rejected; Only one call can be supported at a time | Indicates an attempt at a second call being activated. |
| +237 GSM operation rejected; Requested TCH Band is invalid in current state | Indicates that there is not an active link between the MS and the test set. |
| +238 GPRS operation rejected; Attempting to set RAC while generating a BCH | Indicates that the Cell Activated State is still On. The Cell Activated State must be turned Off before setting the RAC. |
| +239 GPRS operation rejected; Attempting to start ping while data connection type is not IP data | Indicates the CALL:DATA:PING:STARt command was received when the data connection type was not IP Data. |
| +240 GPRS operation rejected; DUT PDP context request rejected due to invalid DUT IP address | Indicates DUT IP address is invalid. May be address setting, subnet mask, or incorrect LAN IP address. |
| +241 GPRS operation rejected; DUT PDP context request rejected due to data connection type not being IP data | Indicates PDP context request occurred when the data connection type was not IP Data. |
| +242 GPRS operation rejected; DUT and instrument are in incompatible states | Indicates that the instrument and the DUT were not able to meet the other's requests. |
| +243 GPRS operation rejected; Activate PDP context request procedure failed (Timer T3385 expired 5 times) | Context request timed out. |

| Error Message | Description |
|---|---|
| +244 GPRS operation rejected; Modify PDP context request procedure failed (Timer T3386 expired 5 times) | Change request for PDP context timed out. |
| +245 GPRS operation rejected; Deactivate PDP context request procedure failed (Timer T3395 expired 5 times) | Deactivation request timed out. |
| +246 GPRS operation rejected; Request PDP context activation rejected by DUT | Request to send PDP activation request rejected by DUT. |
| +250 GSM protocol failure; No response to disconnect (Timer T305 expiry) | "Fixed Timer Messages" on page 974 |
| +251 GSM protocol failure; No response to release (Timer T308 expiry) | "Fixed Timer Messages" on page 974 |
| +252 GSM protocol failure; Channel release failed (Timer T3109 expiry) | "Fixed Timer Messages" on page 974 |
| +253 GSM protocol failure; (Timer T3270 expiry) | "Fixed Timer Messages" on page 974 |
| +254 GSM protocol failure; Unknown identity type received from mobile | Indicates that an identity type other than 1, 2, 3 or 4 was received from the MS. |
| +255 GSM protocol failure; Unexpected identity type received from mobile | Indicates that the MS has responded with an unexpected identity type. Example MS returned IMSI when IMEI was queried.<br>See "CALL:MS:REPorted:IMEI?" on page 425. |
| +256 GSM protocol failure; Channel assignment exceeded specified number of frames | Indicates that the max frames allowed for assignment parameter should be increased. |
| +257 GSM call disconnected; Invalid TMSI received from MS | Indicates that some of the bits received were not set to their normal or expected value for a TMSI (Temporary Mobile Subscriber Identity). |
| +258 GSM protocol failure; Out-of-range for timing advance | Indicates that there is a likely issue with the mobile's protocol board which is causing its timing advance to be out of the expected range. |
| +259 GPRS protocol failure; Received ACK/NACK for a block that has not been sent to the MS | Indicates that there is a likely issue with the mobile's protocol board as it is responding to messages that haven't been sent. |
| +260 GSM RR Cause; <cause identifier> | The <cause identifier> is a 4 digit hexadecimal number |
| +261 GSM MM Cause; <cause identifier> | The <cause identifier> is a 4 digit hexadecimal number |
| +262 GSM CC Cause; <cause identifier> | The <cause identifier> is a 4 digit hexadecimal number |
| +270 GSM protocol failure; Cell Change procedure failed | Indicates that the BCH ARFCN or Cell Band was changed while the mobile station was attached (thus initiating a cell change. The mobile station had not completed the cell change procedure after 5 seconds. |

| Error Message | Description |
|---|---|
| +271 GPRS data connection terminated; Data connection failed to start | Indicates that the GPRS test application was unable to start the data connection with the DUT (Device Under Test). |
| +272 GPRS data connection terminated; Detach failure (Timer T3322 expired 5 times) | Indicates that the Detach procedure failed after five attempts. The Data Connection Status will be set to Idle. |
| +273 GPRS data connection terminated; Attach failure (Timer T3350 expired 5 times) | Indicates that the Attach procedure failed after five attempts. The Data Connection Status will be set to Idle. |
| +274 GPRS data connection terminated; Routing Area Update failure (Timer T3350 expired 5 times) | Indicates that the Routing Area Update procedure failed after five attempts. The Data Connection Status will not be changed. |
| +275 GPRS data connection terminated; MS unexpectedly ended TBF | Indicates that the mobile station unexpectedly ended the TBF (temporary block flow). |
| +276 GPRS data connection terminated; Test set timed out waiting for data from the MS | Indicates that no data was received from the mobile station in the allowed time. |
| +277 GPRS data connection terminated; MS timed out ACK/NACK exchanges and released the TBF | Indicates that the mobile station timed out ACK (Acknowledged) or NACK (Not Acknowledged) exchanges and released the TBF (temporary block flow). |
| +278 GPRS data connection terminated; MS did not respond to uplink immediate assignment | Indicates that the mobile station did not respond to the uplink immediate assignment. |
| +279 GPRS data connection terminated; MS did not respond to downlink immediate assignment | Indicates that the mobile station did not respond to the downlink immediate assignment. |
| +280 GPRS data connection terminated; Test set timed out waiting for data from the MS | Indicates that the mobile station did not respond to the test set within the allowed time. |
| +281 GPRS data connection terminated; MS did not respond to packet timeslot reconfigure | Indicates that the mobile station did not respond to a packet timeslot reconfiguration request from the test set. |
| +286 GPRS data connection terminated; MS did not respond to packet downlink assignment | Indicates that the mobile station did not respond to a packet downlink assignment. |
| +287 GPRS data connection terminated; MS did not respond to packet uplink | Indicates that the mobile station did not respond to a packet uplink assignment. |
| +290 GPRS protocol warning; No IMSI received from MS (using default IMSI) | This warning message occurs with some GPRS mobiles and not with others. It is an advisory message only and does not indicate failure of the test set or the mobile. |

# +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 834 for information on this register.

| Error Message |
| --- |
| +303 GSM data link failure; Unsolicited DM response, multiple frame established state |
| +309 GSM data link failure; N(R) sequence error |

# +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 | |

| Error Message | Description |
|---|---|
| +414 Hardware failure; Fixed external reference output is not responding | |
| +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 | |

| 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 834

# +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 10. Test Application Hardware Device Specific Errors**

| Error Message | Description |
|---|---|
| +520 DUT IP address must be on same subnet as instrument | IP addresses of the DUT and the test set are on different subnets. This may be caused by incorrect IP addresses or the subnet mask may be incorrect. |
| +521 DUT IP address cannot be the same as instrument LAN address | The DUT and the instrument have the same IP address. |
| +522 Operation rejected due to invalid IP address | Indicates that and attempt was made to start a ping session before a valid IP address is entered for the device to be pinged. |

## Related Topics

"Standard Event Status Register" on page 834

# +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. |

### Related Topics

"Standard Event Status Register" on page 834

# +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 (such as BERR, or TX power). 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 "Standard Event Status Register" on page 834 for information on this register.

| Error Message | Description |
|---|---|
| +701 GSM measurement failure; TX power hardware is not responding<br>+701 GPRS measurement failure; TX power hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +702 GSM measurement failure; Power vs time hardware is not responding<br>+702 GPRS measurement failure; Power vs time hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +703 GSM measurement failure; Phase frequency error hardware is not responding<br>+703 GPRS measurement failure; Phase frequency error hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +704 GSM measurement failure; Output RF spectrum hardware is not responding<br>+704 GPRS measurement failure; Output RF spectrum hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +705 GSM measurement failure; Fast bit error hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +706 GSM measurement failure; Bit error hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +707 GSM measurement failure; Decoded audio hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +708 GSM measurement failure; IQ tuning hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +709 GSM measurement failure; Dynamic power hardware is not responding | This indicates a problem with your test set's hardware. Please call your local Agilent Service Center. |
| +729 GSM measurement warning; Dynamic Power measurement has been closed | Indicates that a measurement has been inactivated because of a resource conflict. |

# +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. |

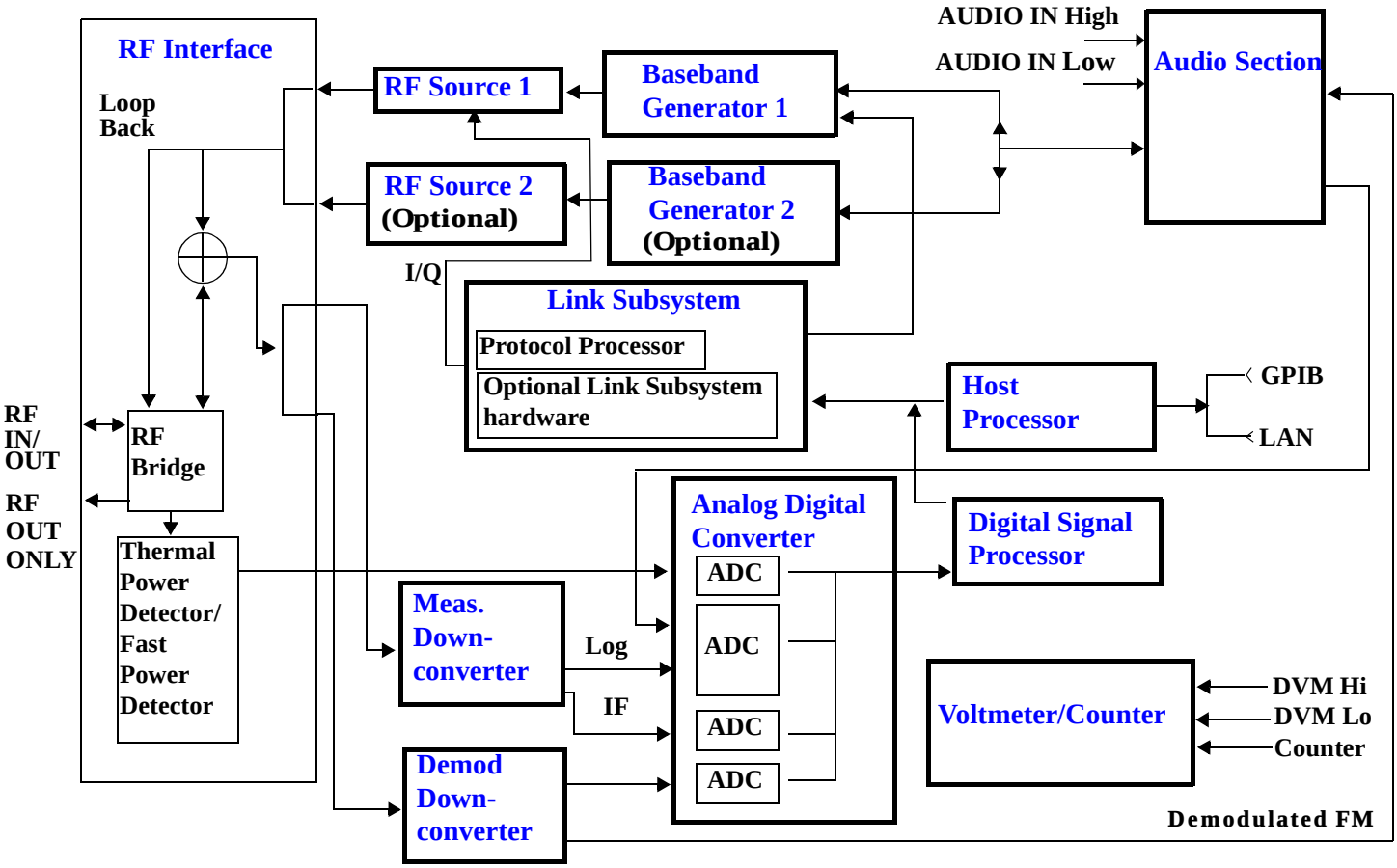
### Related Topics

"Standard Event Status Register" on page 834

# 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 269.

## Description




### RF Interface Module

Input and output signals are routed through the RF Interface module. The RF Interface module consists of:

- A directional bridge for sampling incoming power.
- Hybrid power splitters which create 4 bidirectional ports, (two receiver ports and two source ports). The directional bridge couples power to the Power Detector.

- RF amplifiers.
- Video gain circuits
- Fast and thermal power detectors

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)

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 form the Digital Signal Processing and Protocol Processor modules to the appropriate output device (display, GPIB, LAN, serial, etc.)

### Voltmeter/Counter

**Voltmeter** The voltmeter is used to measure internal voltages for instrument self-diagnostics.

**Frequency Counter** The Frequency Counter is used to measure external frequencies from the front panel Audio IN, High or Low BNC connectors, and to measure internal signals for diagnostics. The external input can receive a signal between 20 Hz and 50 MHz, with a level from 25 mV to 8 V rms.

### Audio Section

**Audio Analysis Path** Externally applied audio signals can be analyzed through the test set's DSP module for such characteristics as AC level, SINAD, or distortion.

The audio signal to be analyzed is input to the test set using the front panel Audio IN High/Low connectors. The signal is then routed to the Analog To Digital Converter module's measurement sampler for analysis by the DSP module.

The Audio In connector accepts signals from 20 Hz to 15 KHz, at input levels from 10 mV to 20 V peak.

**Audio 1 Path** The Audio 1 path provides analog baseband signals used for frequency modulation of the test set's RF sources. Up to four separate audio sources may be summed together in any combination to provide the composite Audio 1 output. These include the external FM input, internal direct digital synthesis (DDS,) regenerated SAT, and audio echo input.

The external FM input accepts an externally supplied audio signal with a peak voltage between 0.25 and 2 V peak.

The internal DDS generates low distortion audio signals from DC to 20 KHz with 0.1 Hz resolution. One to four signals may be generated and internally summed, with independent level control of each waveform.

The SAT regeneration circuit outputs a signal which is phase-locked to a received SAT signal. This is useful for testing situations where the test set needs to emulate a mobile station.

The audio echo input is used for retransmitting the received audio after a selectable time delay, to check both radio transmit and receive paths simultaneously.

For most applications, only one or two of these Audio 1 path sources are enabled at any given time.

**Audio 2 Path** The Audio 2 path provides a secondary means for sending analog baseband signals to the FM modulator. Audio 2 contains only one source, a DDS similar to that used for Audio 1.

Typically, the Audio 2 path DDS is used for cases where multiple signals must be summed together with the lowest possible distortion. Another potential use of Audio 2 would be to obtain higher output levels than Audio 1 is capable of (up to twice as much), assuming the two outputs are set to the same frequency and phase, and then summed together at the Baseband Generator module.

Audio 2 is rarely used in practice because the DDS used for Audio 2 is the same DDS that is used for the front panel audio output.

**Audio Out Path** Any one of four inputs may be coupled to the front panel audio output connector. These include a 4 channel DDS (shared with Audio 2), receiver discriminator audio from the Demodulation Downconverter module, audio echo from the Analog To Digital Converter module, and audio vocoder.

The front panel output is capable of providing signal levels up to 9 V peak into > 600 ohm loads, and up to 0.8 V peak into an 8 ohm load (e.g. speaker). The output level is calibrated for all modes except discriminator audio,
The discriminator audio has an uncalibrated volume control provided due to the high tolerances involved.

Typically the DDS mode is used to feed the MIC input of a radio, or it may simply be used as a general purpose low distortion function generator.

Audio echo can be selected to route the received audio to the front panel audio output connector.

### RF Sources

The test set has up to two identical RF sources. The RF sources are used to provide analog or digitally modulated RF carriers for use in parametric testing of mobile stations encompassing a variety of cellular radio formats. In general, the sources have a frequency range of 292 MHz to 2.7 GHz and an amplitude range of -10 dBm to -127 dBm.

The RF sources consist of a Synthesized Signal Generator module followed by a Vector Output module and an RF Attenuator module. Baseband modulation information is supplied to the RF sources from a Baseband Generator module preceded by an Audio Section module.

### Baseband Generators

The purpose of the Baseband Generator module is to provide, for the modulation type currently in effect, properly formatted baseband signals to the modulation circuits on the RF Source modules.

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

"*IDN?" on page 873

"CALibration:DATE" on page 336

"SYSTem:CURRent:TA" on page 856

"SYSTem:COMMunicate" on page 847

# Hardware Configuration Report

## Description

You can generate a list of the test set's hardware configuration over the LAN or GPIB.

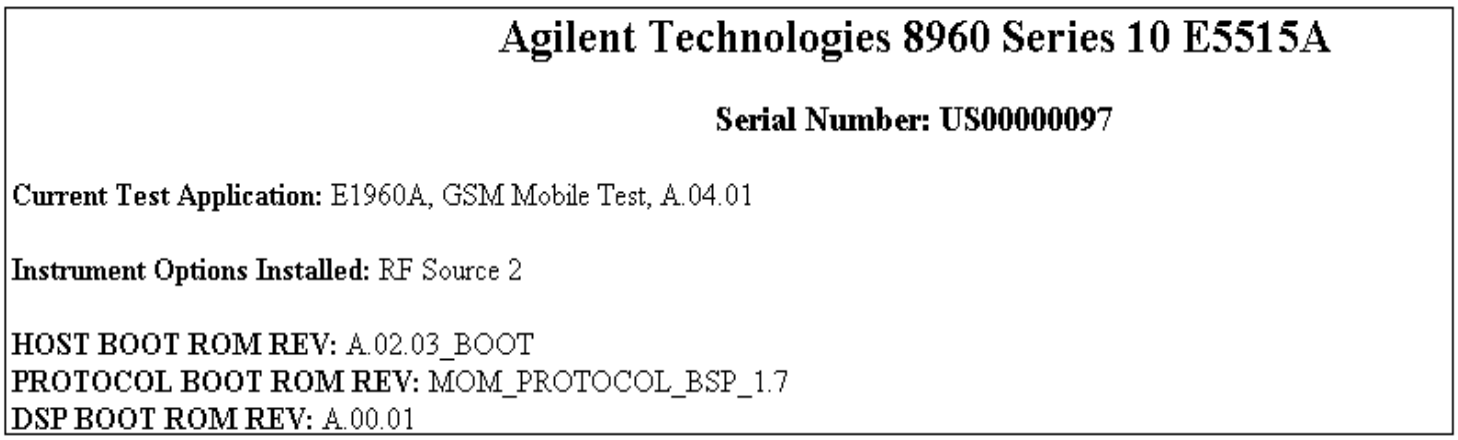
The LAN query is the easiest and most direct way to query the test set's hardware configuration. This method uses your web browser to display a formatted report.

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:




### 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" on page 846

"SYSTem:CURRent:TA" on page 856

"SYSTem:APPLication" on page 838

"Obtaining Identification Information *IDN?" on page 1010

"Rear Panel Connectors" on page 944

# GSM Revision Information

This document describes features and functionality that are part of the E1960A GSM 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.


- "A.08 Release July 2001" on page 1013
- "A.07 Release May 2001" on page 1014
- "A.06 Release February 2001" on page 1015
- "A.05 Release May 2000" on page 1016
- "A.04 Release - March 2000" on page 1016
- "A.03 Release - December 1999" on page 1017
- "A.02 Release - July 1999" on page 1018
- "A.01 Release - March 1999" on page 1020
- "A.00 Initial Release - January 1999" on page 1021


## A.08 Release July 2001

### Call Processing

This release provides you with the GSM850 frequency band.

### Measurements

- The Phase and Frequency Error measurement has been enhanced to include a confidence level feature. Using confidence levels for your measurements can reduce your test time. Confidence levels simply end the measurement early, that is, before all the multi-measurements you specified are taken. It ends the measurement early *only* if it determines statistically that the rest of the measurements should pass. You can set the confidence level and the measurement limits. For more information on this feature refer to "Confidence Levels" on page 1035.

### Other

- This release gives you the first revision of GSM which can be used for the E1985A GSM_AMPS/136_GPRS fast switching test application. The previous GSM release (A.07) only allowed you to switch quickly between GSM and AMPS/136, whereas this GSM revision also allows you to also switch quickly between GPRS.
- Internal graphical measurements for: Power versus Time, Output RF Spectrum, Phase and Frequency Error and I/Q Tuning.

  For more details on these graphical measurements refer to one of the following step-by-step measurement procedures:

  — "Measuring Power versus Time" on page 891

— “Measuring Output RF Spectrum” on page 901

— “Measuring Phase and Frequency Error” on page 896

— “Measuring IQ Tuning” on page 905

- 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 and Saving Screen Images” on page 949 for a complete explanation of this procedure.

## A.07 Release May 2001

### Call Processing

No new features in this release.

### Measurements

No new measurements in this release.

### Other

This release gives you the first revision of GSM which can be used for the E1985A GSM_AMPS/136 fast switching test application. To allow the GSM test application to operate in the fast switching environment with AMPS/136 two existing GSM commands had to be changed. These commands were:

- `SETUP:IQTUNING:REFERENCE:FREQUENCY`
- `CALL:MS:REPORTED:REVISION?`

If you previously used either of these commands you must change them to the new commands to allow your

code to run.

**Table 11. Command Changes in the A.07 Release**

| Previous Commands | New Commands |
|---|---|
| SETUP:IQTUNING:REFERENCE:FREQUENCY | "SETup:IQTuning:REFerence[:MANual][:FREQuency]:CHARacter:GSM" on page 687. This command allows you to use the same settings as with the previous command, that is NEG67KHZ, ZEROKHZ, POS67KHZ, and AUTO. You can use this command for the GSM I/Q Tuning measurement whether or not the GSM test application is the currently active format. |
| | Alternatively you can use the following commands which are consistent with the format of the commands and settings in AMPS/136:<br><br>"SETup:IQTuning:REFerence[:MANual][:FREQuency]:GSM" on page 687. This command allows you to use the settings -67000, 0, and + 67000. You can use this command for the GSM I/Q Tuning measurement whether or not the GSM test application is the currently active format.<br><br>"SETup:IQTuning:REFerence[:MANual][:FREQuency][:SELected]" on page 686. This command allows you to use the settings -67000, 0, and + 67000. You can only use this command for the GSM I/Q Tuning measurement if GSM is the currently active format.<br><br>"SETup:IQTuning:REFerence:AUTO" on page 686. |
| CALL:MS:REPORTED:REVISION? | "CALL:MS:REPorted:REVision:CHARacter:GSM?" on page 429. This command returns the same values as with the previous command, that is, UNKNown, PHASe1, and PHASe2. You can use this command for the mobile's revision whether or not the GSM test application is the currently active format. |
| | Alternatively you can use the following commands which are consistent with the format of the command and setting in AMPS/136:<br><br>"CALL:MS:REPorted:REVision[:DIGital]:GSM?" on page 430. This command returns the values; +1.00000000E+000 for phase 1, +2.00000000E+000 for phase 2, and NAN for unknown. You can use this command for the mobile's revision whether or not the GSM test application is the currently active format.<br><br>"CALL:MS:REPorted:REVision[:DIGital][:SELected]?" on page 429. This command returns the values; +1.00000000E+000 for phase 1, +2.00000000E+000 for phase 2, and NAN for unknown. You can only use this command for the GSM revision if GSM is the currently active format. |

## A.06 Release February 2001

### Call Processing

No new features in this release.

### Measurements

- Analog Audio measurement
  In the previous revisions of this test application it was possible to make Analog Audio Level measurements. In this release we have increased the number of Analog Audio measurements to include Audio Frequency and Distortion. Although not typically a GSM mobile measurement we have also included SINAD measurements. For more information refer to "Analog Audio Measurement Description" on page 36.

### Other

- RF Source Analyzer Level Compensation
  Amplitude offset is provided over a range of frequencies, in order to compensate for loss or gain of the external network between the test set and the DUT (device under test). For more information refer to "Amplitude Offset" on page 90.
- Dynamic Power measurement enhanced
  The number of bursts over which you can make this measurements has increased from 100 to 999. For more information on this measurement refer to "Dynamic Power Measurement Description" on page 53.
- Selectable AC or DC coupling between the Audio Generator and the front panel AUDIO OUT port.

## A.05 Release May 2000

### Call Processing

No new features in this release.

### Measurements

No new measurements in this release.

### Other

- Test Application Security
  A licensed version of each test application is required in order for the test application to operate. If you switch test applications to an unlicensed test application, the test set will reboot to the SYSTEM CONFIG screen. You will be unable to switch to any other screen, or make any measurements.

## A.04 Release - March 2000

### Call Processing

No new features in this release.

### Measurements

No new measurements in this release.

### Other

- Test Application selection for multi-format operation
  Menus have been added to the System Configuration screen which allow you to select between different Test Applications that are installed in the test set. This feature can also be accessed remotely within the

SYSTem subsystem using the command “SYSTem:APPLication:SELect[:NAME] ‘<test application name>’” on page 843.

**NOTE** It is not recommended that you switch to a GSM Test Application that has a revision earlier than A.04. Earlier revisions did not have the capability to select Test Applications.

There may be up to a three second delay between the time the Test Application is selected and it being implemented in the test set.

- Options installed display is now active
  The Options Installed display on the System Configuration screen has been activated to allow for the optional second source. Although the second source has been optional since the A.03 release, the Options Installed display has remained blank until this current release.
- Usability enhanced through gray fields
  Non-enabled menu items are now denoted as gray text, versus enabled menu items that are a standard black text. Currently there are no GSM Test Application menu items that use this feature.
- Measurement time-out resolution increased
  The measurement time-out resolution has been increased from 1 second to 0.1 seconds. The minimum time-out has also been reduced from 1 second to 0.1 seconds.
- Warning messages can be masked from the display
  A new command is available in the DISPlay subsystem which allows you to set whether or not the test set displays and beeps warning messages. For further information on this command refer to “DISPlay:MESSage:MASKable:STATe” on page 519. This feature is also available over the manual interface (the Maskable Messages Display State field is available in the Instrument Setup menu in the System Configuration screen).

## A.03 Release - December 1999

### Call Processing

- EFS
  The Enhanced Full-rate Speech (EFS) feature provides the ability to set up a call in EFS mode.
- SACCH Tx Level Signalling
  The mobile can now be commanded to use a different Tx level by signalling using the SACCH header alone. In previous releases a FACCH assignment as well as the updated SACCH header was used.

### Measurements

- I/Q Tuning
  A new measurement that can be used to determine the quality of an I/Q modulator by measuring the power of spurious signals at harmonics of 67.7 kHz.
- Simultaneous BER results
  An enhancement to the BER measurement now allows all types of BER measurement results to be returned at the same time if required.
- Dynamic Power
  A new feature that performs a series of rapid power measurements on a mobile station. This is only

available via the test set's remote user interface.

### Other

- Remote clear of error messages on screen
  A new command can be sent over the GPIB to clear error messages from the screen to enhance use of the test set in a remote situation. Previously, error messages on the screen could only be cleared through manual intervention, by pressing a key on the front panel. For further information on this command refer to "DISPlay:WINDow:ERRor:CLEar" on page 519.
- Status field indication of external or internal reference
  A status field has been implemented on the screen to indicate whether the test set has locked to an external or an internal reference.
- Beeper ON/OFF setting is non-volatile
  The ON/OFF setting of the beeper is now maintained through power-off. Previously, a power cycle would reset the beeper to its default state of OFF.
- Enhanced status subsystem for multi-format capability
  The status subsystem has been enhanced with radio system nodes where necessary for future multi-format capability. This will cause some status subsystem commands to be in error condition, unless they are replaced with the modified commands. The commands are:
  - STATus:QUEStionable:ERRors is now STATus:QUEStionable:ERRors:GSM
  - STATus:QUEStionable:CALL is now STATus:QUEStionable:CALL:GSM
  - STATus:OPERation:CALL is now STATus:OPERation:CALL:GSM
  - STATus:OPERation:NMRReady is now STATus:OPERation:NMRReady:GSM
- Instrument configuration information available remotely
  Information on the instrument hardware can be obtained through a remote command over the GPIB, and through a remote command via the LAN and a web browser. For further information on the commands refer to "Hardware Configuration Report" on page 1011.
- Enhanced instrument information on the Configuration Screen
  The Instrument Information display on the Configuration Screen, now includes Subnet Mask and Gateway Default information in a new, improved information display.
- *IDN? returns "Agilent Technologies" in the manufacturer's field where previously it returned "Hewlett-Packard".
- RF Generator frequency range is now matched to the RF Receiver frequency range
  Previously the RF Generator had a low end limit of 45 MHz, while the RF Receiver has always had a low end limit of 292.5 MHz. The RF Generator is now limited to 292.5 MHz to enhance testability and supportability of the test set.

## A.02 Release - July 1999

### Call Processing

- Paging Mode selectable between "Reorganisation" or "Normal"

### Measurements

- Automatic closed loop settings as part of Normal BER and Fast BER measurements
- 3 kHz speech selection for Downlink Speech Source

### Other

- LAN subnet mask and LAN Default Gateway settable
- Status Subsystem for GPIB queries of instrument status
- Display Brightness
- Display Automatic Backlight Dimming

# A.01 Release - March 1999

## Call Processing

No new features in this release.

## Measurements

- Normal BER
- Pulsed Audio Source (For uplink speech measurement)

## Other

Measurement Integrity on Manual User Interface

## A.00 Initial Release - January 1999

### Call Processing

- GSM 900 (Includes PGSM/EGSM), DCS1800, PCS1900
- MS and BS Originated Calls
- TCH, Timeslot, Timing Advance, MS Tx Level Assignments
- Dual-Band Handover
- Downlink Speech Source
- Test Mode - CW, BCH Only, BCH + TCH

### Measurements

- Tx Power
- Output RF Spectrum
- Power versus Time
- Phase / Frequency Error
- Burst Timing
- Analog Audio
- Uplink Speech Measurement (requires pulsed audio source)
- Burst by Burst BER (Fast BER)

### Other

- Audio Source
- User settable amplitude offset

# GPRS Revision Information

This document describes features and functionality that are part of the E1964A GPRS Mobile Test Application releases. This document contains the enhancements that have been added over time.

Select the appropriate link below to view the required release.


- "A.02 Release July 2001" on page 1023
- "A.01 Release February 2001" on page 1026


## A.02 Release July 2001

### Call Processing

- This release provides you with GPRS operation in the GSM850 frequency band.
- Additional data connection commands
  Three new commands have been added that may enable the test set to establish a data connection with mobiles which cannot connect using the test application default settings. These commands are:

  — Data Connection Frame Number Type (see "CALL:FUNCtion:DATA:FRAMe:STARt" on page 407)
  This command relates to the GPRS Attach procedure allowing you to change the TBF (Temporary Block Flow) frame starting position type.

  — Data Connection LLC Frame Check Sequence (see "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405)

  — BLER Block Polling Interval (see "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406)

  "CALL:FUNCtion:DATA:FRAMe:STARt" on page 407 is applicable to all data connection types. "CALL:FUNCtion:DATA:BLER:LLC:FCSequence" on page 405 and "CALL:FUNCtion:DATA:BLER:POLLing:INTerval" on page 406 are only applicable when you want to establish a BLER mode data connection.
- Additional PDTCH protocol control commands
  Two new commands are now provided in case your mobile does not fully support the Packet Timeslot Reconfigure (PTR) message.
  The PTR message is a superset message which is used to change most of the connection related parameters (for example, MS TX Level, timeslot configuration, and power control). This message is described in 3GPP TS 04.60 section 11.2.31. The Packet Power Timing Advance (PPTA) message can be used as an alternative to the PTR message, but only for changes to the MS TX Level or timing advance. This message is described in 3GPP TS 04.60 section 11.2.13.

  The two new commands are:

  — Packet Timeslot Reconfigure State (see "CALL:PDTCH:PMESsage:PTReconfig" on page 462)

  — Packet Power Timing Advance State (see "CALL:PDTCH:PMESsage:PPTadvance" on page 461)

**NOTE** The recommended method for modifying PDTCH parameters during an active data connection is to use the "CALL:HANDover | HANDoff[:IMMediate]" on page 411 to apply deferred settings. If

you currently use this method, note that you will need to amend your code to specifically set "CALL:PDTCH:PMESsage:PTReconfig" on page 462 to On.

- RLC/MAC Header State
  This command allows you to define whether or not a valid RLC/MAC (Radio Link Control/Medium Access Control) header is present on the downlink PDTCH bursts when using the BCH+PDTCH Test Mode. The RLC/MAC Header contains a PR field which is used to indicate a power reduction level to the mobile. When the RLC/MAC Header State command is set to Off, the PR field of the RLC/MAC Header is filled with random data. For further information on this command see "CALL:PBPTest:RLCMac[:HEADer]:STATe" on page 453.

- First Downlink Burst to Loop
  This command allows you to select which downlink burst of the multislot configuration you want to be looped back in the first uplink burst. Subsequent downlink bursts are looped back onto subsequent uplink bursts. This command is important for the Bit Error Rate (BER) measurement and BLock Error Rate (BLER) reports. For more details on this command, see "CALL:PDTCH:MSLot[:FIRSt]:DOWNlink:LOOPback[:BURSt]" on page 461.
- Network Initiated Detach
  This new command allows you to perform a GPRS Detach procedure from the test set rather than from the mobile. For details on this command refer to "CALL:FUNCtion:DATA:DETach" on page 406.
- Manual setting of the BA table entry
  Previously, you could only set the BA table entry using the command "CALL[:CELL]:BA:TABLe[:SELected][:SELected]" on page 343. You can now set this entry using the test set's front panel. To do this, press the **CALL SETUP** key, press `Cell Info` (**F6**), press `BA Table` (**F3**) then press the knob and make a selection.
- Extended Range for Downlink Power Reduction Levels
  The downlink PDTCH power reduction level range has been extended. You can now specify a range from 0 to 25 dB (previously 0 to 12 dB). For details on this command refer to "CALL:PDTCH:PREDuction:LEVel[1|2]" on page 464.

### Measurements

No new measurements in this release.

### Other

- Internal graphical measurements for; Power versus Time, Output RF Spectrum and Phase and Frequency Error.
  For more details on these graphical measurements refer to one of the following step-by-step measurement procedures:
  - "Measuring Power versus Time" on page 926
  - "Measuring Phase and Frequency Error" on page 932
  - "Measuring Output RF Spectrum" on page 936
- This release gives you the first revision of GPRS which can be used for the E1985A GSM_AMPS/136 fast switching test application. This release when used with the E1985A GSM_AMPS/136_GPRS fast switching test application allows you to switch quickly between GSM, AMPS/136, and GPRS formats.

To allow the GPRS test application to operate in the fast switching environment with GSM and AMPS/136 a number of the existing GPRS commands had to be changed. The previous commands and their new replacements are shown in the table below. If you previously used any of these commands you must change them to the new commands to allow your code to run. Otherwise, you will receive an error message. Note, this error message only appears if you are using the individual E1964A GPRS Mobile Test Application. If you are using the E1985A GSM_AMPS/136_GPRS Fast Switching Test Application, you will not receive an error message as these commands are still valid for setting the inactive GSM format.

**Table 12. Command Changes in the A.02 Release**

| Previous Commands | New Commands |
|---|---|
| CALL[:CELL]:POWer[:SAMPlitude]:GSM | "CALL[:CELL]:POWer[:SAMPlitude]:GPRS" on page 473 |
| CALL[:CELL]:POWer:AMPLitude:GSM | "CALL[:CELL]:POWer:AMPLitude:GPRS" on page 475 |
| CALL[:CELL]:POWer:STATe:GSM | "CALL[:CELL]:POWer:STATe:GPRS" on page 476 |
| RFANalyzer:MANual:POWer:GSM[:SELected]<br>:BURSt[1\|2] | "RFANalyzer:MANual:POWer:GPRS[:SELected]:BURSt[1\|2]" on page 635 |
| STATus:OPERation:NMRReady:GSM:CONDition<br>STATus:OPERation:NMRReady:GSM:ENABle<br>STATus:OPERation:NMRReady:GSM:NTRansition<br>STATus:OPERation:NMRReady:GSM:PTRansition<br>STATus:OPERation:NMRReady:GSM[:EVENt] | STATus:OPERation:NMRReady:GPRS:CONDition<br>STATus:OPERation:NMRReady:GPRS:ENABle<br>STATus:OPERation:NMRReady:GPRS:NTRansition<br>STATus:OPERation:NMRReady:GPRS:PTRansition<br>STATus:OPERation:NMRReady:GPRS[:EVENt]<br>If you require more details on this status register, see "STATus:OPERation:NMRReady:GPRS Condition Register Bit Assignment" on page 804. |
| STATus:QUEStionable:CALL:GSM:DATA:CONDition<br>STATus:QUEStionable:CALL:GSM:DATA:ENABle<br>STATus:QUEStionable:CALL:GSM:DATA:NTRansition<br>STATus:QUEStionable:CALL:GSM:DATA:PTRansition<br>STATus:QUEStionable:CALL:GSM:DATA[:EVENt] | STATus:QUEStionable:CALL:GPRS:CONDition<br>STATus:QUEStionable:CALL:GPRS:ENABle<br>STATus:QUEStionable:CALL:GPRS:NTRansition<br>STATus:QUEStionable:CALL:GPRS:PTRansition<br>STATus:QUEStionable:CALL:GPRS[:EVENt]<br>If you require more details on this status register, see "STATus:QUEStionable:CALL:GPRS Condition Register Bit Assignment" on page 820. |
| STATus:QUEStionable:ERRors:GSM:CONDition<br>STATus:QUEStionable:ERRors:GSM:ENABle<br>STATus:QUEStionable:ERRors:GSM:NTRansition<br>STATus:QUEStionable:ERRors:GSM:PTRansition<br>STATus:QUEStionable:ERRors:GSM[:EVENt] | STATus:QUEStionable:ERRors:GPRS:CONDition<br>STATus:QUEStionable:ERRors:GPRS:ENABle<br>STATus:QUEStionable:ERRors:GPRS:NTRansition<br>STATus:QUEStionable:ERRors:GPRS:PTRansition<br>STATus:QUEStionable:ERRors:GPRS[:EVENt]<br>If you require more details on this status register, see "STATus:QUEStionable:ERRors:GPRS Condition Register Bit Assignment" on page 828. |

- 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 and Saving Screen Images” on page 949 for a complete explanation of this procedure.

## A.01 Release February 2001

### Call Processing

- ETSI Test mode A and B
  In the initial GPRS release the only type of data connection available was the Agilent proprietary BLER method. This enhancement gives you two additional options for data connection, namely the ETSI defined Type A and Type B. For more information refer to the command “CALL:FUNCtion:DATA:TYPE” on page 408.
- Additional Timeslot Configurations
  A new command is available that allows you to select from a list of multiple timeslot configurations. These configurations are:

  — one downlink and one uplink

  — two downlinks and one uplink

  — two downlinks and two uplinks

  — three downlinks and one uplink

  — three downlinks and two uplinks

  — four downlinks and one uplink

  For more information refer to the command “CALL:PDTCH:MSLot:CONFiguration” on page 460.
- Coding Scheme Options for Data
  A new command is available that allows you to set the PDTCH coding scheme in ETSI test mode to either CS1, CS2, CS3 or CS4. For more information on this command refer to “CALL:PDTCH:CSCHeme” on page 458.
- Deferred Settings
  A new feature allows you to set-up all your PDTCH parameters but defers their implementation until you send one handover command. This has the advantage of increasing the speed of the PDTCH change as the signalling happens only once, at the handover command, and not at the change of each individual PDTCH parameter. For more information refer to the command “CALL:HANDover | HANDoff[:IMMediate]” on page 411.
- Operating Modes
  An additional two operating modes are available, namely, GPRS Test Mode BCH and GPRS Test Mode BCH + PDTCH. For more information refer to the command “CALL:OPERating” on page 441.

### Measurements

- Output RF Spectrum due to modulation (using ETSI Test mode A or B)
  For more information on this measurement refer to “Output RF Spectrum Measurement Description” on page 60.
- Power versus Time multi-uplink mask
  For more information on this measurement refer to “GPRS Power versus Time Measurement” on page 71.

- Multislot BER (using ETSI Test mode B only)
  For more information on this measurement refer to “GPRS Bit Error Measurement” on page 45.
- Multislot tolerant Transmit Power
  For more information on this measurement refer to “Transmit Power Measurement Description” on page 83.
- Multislot tolerant Phase and Frequency Error
  For more information on this measurement refer to “Phase and Frequency Error Measurement Description” on page 63.

### Other

- Manual User Interface
  The initial GPRS release only had remote user access. This release provides you with access to the measurements and configuration via the test set’s front panel. For more information on using the test set manually refer to your GPRS Quick Guide which was delivered with your test set.

Note, due to the lack of commercially available GPRS mobile stations some of the features added to this release have not been fully verified.

# 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 518

# 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 519

# 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 845

"Error Messages" on page 970

# 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 867

"Rear Panel Connectors" on page 944

# Configuring the Test Set's LAN

## Description

### LAN IP Address

The LAN address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223, and B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN address can be set/queried using the SYSTem subsystem.

The LAN address is a non-volatile parameter. The LAN address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

**NOTE** If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

For convenience the DATA port on the front panel may be configured as a LAN port. When a RJ45 jumper cable, (part number E5515-61160) is connected from the LAN PORT on the rear panel, to the ETHERNET TO FRONT PANEL port also on the rear panel, the user has LAN access from the front panel of the test set. Without the RJ45 jumper cable, the test set connection to a LAN is the rear-panel, LAN PORT connector.

### LAN Default Gateway

The LAN router, (default gateway), is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223 , and B, C, and D are between 0 and 255, no embedded spaces are allowed. If the default gateway is set to a format not allowed with the LAN address or the subnet mask that have been selected, the default gateway will be set to a null string, indicated by a blank field on the test set display. The address may be manually set/viewed in the system configuration screen. The LAN default gateway can be set/queried using the SYSTem subsystem.

The LAN default gateway is the address of a router that routes messages between networks and or subnets. If this value is not specified, LAN communications will be limited to the network and subnet specified by the LAN IP address and the subnet mask. Your network administrator will know if a default gateway is needed and if so, the address of the router. If the default gateway address is not needed by your network, it may be disabled by entering any of the following values: "0" (zero), "" (null string), "0.0.0.0"

The LAN default gateway is a non-volatile parameter. The LAN default gateway is not affected by any reset operation and can only be changed by direct access to the parameter itself.

### LAN Subnet Mask

The LAN subnet mask address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A , B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN subnet mask address can be set/queried using the SYSTem subsystem.

The subnet mask number combined with the IP address identifies which network and subnet your computer is on. Contact your system administrator for the correct subnet mask for your network.

The subnet mask determines the boundaries between the subnet ID and the host ID.

The LAN subnet mask is a non-volatile parameter. The LAN subnet mask is not affected by any reset operation and can only be changed by direct access to the parameter itself.

**NOTE** If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

The subnet mask number is obtained from your network administrator.

## Related Topics

"SYSTem:COMMunicate:LAN[:SELF]:ADDRess" on page 848

"SYSTem:COMMunicate:LAN[:SELF]:DGATeway" on page 849

"SYSTem:COMMunicate:LAN[:SELF]:SMASk" on page 849

## 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 847

# Confidence Levels

This feature is *not* applicable to GPRS.

## What are Confidence Levels?

Using confidence levels for your measurements can reduce your test time. Confidence levels simply end the measurement early, that is, before all the multi-measurements you specified are taken. It ends the measurement early *only* if it determines statistically that the rest of the measurements should pass. You specify the level of certainty that you are satisfied with, for example, you may decide that you are satisfied in passing a measurement on your mobile if the test set is 95% confident that the rest of the measurements will pass.

Note, the test set only reduces your test time if it determines that the measurement *will* pass. If it determines that a future measurement may fail, or if a measurement does actually fail, the test set continues as normal executing your test plan.

It is not possible to determine the amount of time by which confidence levels reduce your test time as this is determined by a number of factors, some of which cannot be controlled. The following list details some of the factors:

- The confidence level that you select. This can be set between 80% to 99.99%. Obviously, the lower the level you select, the greater the potential for a reduction in test time.
- The stability of the mobile station's results. That is, if the individual results are variable (that is, differ significantly but are still within the limits), then the measurement will take longer. However, if the results returned are very similar and well within the limits then the measurement will end sooner.
- The test limits that you select. For example, the tighter your test limits the longer the measurement will take.

To ensure that the prediction of the measurement result is accurate there is a minimum number of measurements made by the test set. This number is independent of the confidence level you set. However, this number is dependent on the multi-measurement count and is shown below.

**Table 13. Minimum Number of Measurements**

| Multi-Measurement Count | Minimum Number of Measurements |
|---|---|
| 1-4 | Same as multi-measurement count |
| 5-999 | 4 |

## How do you set Confidence Levels?

You can set confidence levels for a measurement using its relevant SETup subsystem. Currently the only measurement in GSM with the confidence level feature is Phase and Frequency Error.

Confidence levels are only relevant when the measurement's multi-measurement count is on. Therefore if you turn on the confidence level feature for a measurement the test set automatically enables that measurement's multi-measurement count feature.

The following procedure and example show the steps needed when you are using confidence intervals via the

GPIB.

1. Set-up the mobile station and the test set for your required measurement.
2. Use the SETup subsystem to turn the measurement's multi-measurement count on and specify the count number.
3. Use the SETup subsystem to turn on the measurement's confidence state and set its confidence level.
4. If required, use the SETup subsystem to set the measurements pass/fail limits. The test set uses the defaults pass/fail values if you do not specify any.
5. Start the measurement using the INITiate subsystem.
6. Use the FETCh? command to obtain the measurement results.

### Programming Example

The following example uses the GSM Phase and Frequency Error measurement to demonstrate the use of confidence levels.

```
10  OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Configures a PFER measurement to
20                                            !single trigger mode.
30  OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO"!Configure trigger source
40                                                !to auto.
50  OUTPUT 714;"SETUP:PFERROR:SYNC MIDAMBLE" !Configures a PFER measurement so
60                                           !that burst synchronization, which
70                                           !will synchronize the timing of the
80                                           !measurement algorithm relative to
90                                           !the data sample, will be set
100                                          !to midamble.
110 OUTPUT 714; "SETUP:PFERROR:COUNT 20" !Sets the multi-measurement count state on,
                                         !and the number of measurements to 20.
120 OUTPUT 714; "SETUP:PFERROR:CONFIDENCE 90" !Sets the confidence level feature on,
                                              !and the level to 90%.
130 OUTPUT 714;"INITIATE:PFERROR" !Starts the PFER measurement.
140 OUTPUT 714;"FETCH:PFERROR:FAIL?"
150 ENTER 714;Integrity, Rms_ph_err_fail, Peak_ph_err_fail, Freq_err_fail, Number_of_meas
160 END
```

## Using Confidence Levels with the Phase and Frequency Error Measurement

Currently the only measurement in GSM with the confidence level feature is Phase and Frequency Error. The Phase and Frequency Error measurement actually consists of three measurements: RMS Phase Error, Peak Phase Error and Frequency Error. The test set will not end a Phase and Frequency Error measurement early until it determines statistically that all three individual measurements should pass, with a level of confidence that is at least as high as the confidence level you set.

For example, if you set the confidence level to 95%, the test set only ends the measurement when it is:

- at least 95% confident that the RMS Phase Error will pass, and
- at least 95% confident that the Peak Phase Error will pass, and
- at least 95% confident that the Frequency Error will pass.

The level of confidence with which the complete Phase and Frequency Error measurement passes early is

equal to the product of the confidence levels with which each of the three individual measurements passed early. This means that for this example, the test set will only end the measurement early if there is at least an 85.74% (95% x 95% x 95%) level of confidence that the measurements that have still to be taken will pass.

# 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.
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 1042

“SYSTem:APPLication” on page 838

“SYSTem:CURRent:TA” on page 856

“Test Application Name” on page 1044

# Test Application Revisions and Licenses

## Description

Different revisions of the test applications in your test set provide different capabilities. The selected test application revision is loaded after the next test application switch or power cycle of the test set. Once you select a revision the revision does not change unless you select another revision.

You can query the selected revision, all available revisions, and the total count of available revisions for a selected test application. These queries are helpful when selecting revisions but are not usually necessary when switching test applications.

**NOTE** The Agilent E1960A GSM mobile test application revisions prior to A.04.00 do not support test application switching. If you select a revision prior to A.04.00 you will not have a path to switch back to later revisions.

If you accidentally switch to a non-supported revision, use the firmware upgrade process to load firmware with the correct revision.

### Test Application Revision Queries and Commands

These are commands to query revision information or select a revision.

- To query a **selected** test application revision (running or not) use this GPIB command:

  ```
  OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? 'AMPS/136 MOBILE TEST'"
  ```

- To query the revision of the test application **currently running** use this GPIB command:

  ```
  OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"
  ```

- To query **all** of the revisions available for a test application use this GPIB command:

  ```
  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'AMPS/136 MOBILE TEST'"
  ```

- To **select** a revision of a test application use this GPIB command:

  ```
  OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM mobile test','A.04.01'"
  ```

- To query the number of revisions for a specified test application:

  ```
  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? 'GSM MOBILE TEST'"
  ```

## Test Application License Status Query

The test application license status can be queried for a particular test application and revision using the following GPIB query:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.01'"
```

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 1040

"SYSTem:APPLication" on page 838

# 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 838

"Test Application Switching" on page 1040

# 8 Protocol Logging

# Protocol Logging

The Lab Application enables the test set to log GPRS protocol messages. The log results are displayed in a web page format, served from the test set over a network. You control which messages are logged by choosing observation points.

Log results can only be viewed in the test set's web page. Once the log has been captured and is displayed, you can view both a detail version and a summary version of the log. It is also possible to set a header to personalize each log.

Logging is available in the test set for all data types, including BLER, IP Data, and ETSI Test Modes A and B. It is possible to start logging at any time, so you can capture the protocol messages that are exchanged during the attach process.

## Controlling Logging from Different Locations

Logging can be controlled from three points: the front panel, a GPIB program, and the test set's web page. It is also possible to have multiple web browser windows pointing to the same test set, and to use the front panel of the test set all at the same time. All of these points can control the test set.

The test set responds to all commands in the order received. Also, the log is available only as long as it has not been cleared. The log is cleared whenever a new Start command is given. Therefore, if there is a log displayed for a test set, it can be cleared by anyone who selects Start Logging from any of the possible control points.

## How to Log Protocol


- "Protocol Logging Requirements" on page 1047
- "Protocol Logging Procedure" on page 1048
- "Establish Data Connection" on page 1052
- "What Can Be Logged" on page 1054


## Understanding the Log


- "Understanding the Log" on page 1055
- "Explanation of Log Detail" on page 1056
- "Saving and Printing the Log" on page 1058
- "Logged Message and GPRS Standard Cross-reference" on page 1059

# Protocol Logging Requirements

## PC Requirements

- PC operating system: Microsoft® Windows NT®, Version 4.0 with Service Pack 5 or higher, or Windows 98®. (other operating systems may work, but they are not supported).
- Web browser: Microsoft Internet Explorer, Version 5.0 (Other browsers may work, but require the following features: support for nested frames, support for JavaScript™ version 1.2 or higher, support for tables)

## Configuration Requirements

Before you log protocol, the test set must be connected to the logging PC. This is conveniently done by connecting both the test set and the PC to a network. Frequently your PC is already on your network, so you'll just need to connect the test set to the network. To do this, you'll need some network information. This information is generally obtained by working with your IT department. The following information is required:

- an IP address valid for the subnet that you will connect the test set to
- the valid subnet mask for that subnet
- the default gateway for that network

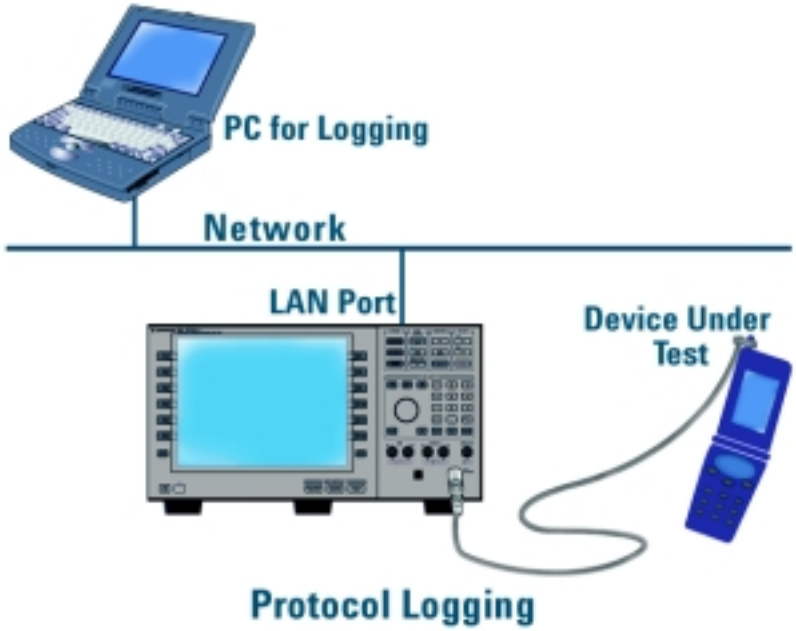
## Related Topics

"Protocol Logging Procedure"

# Protocol Logging Procedure

Since the protocol log must be viewed with a PC using an internet browser, it is recommended that you connect your test set to a network that communicates with a PC you already use.

## A. Hardware Connections




### Connect PC to LAN

Please consult with your IT department if you need assistance connecting your PC to the LAN. It is generally convenient to use a PC that is already connected to the LAN.

### Connect Test Set to LAN

1. Connect the LAN port on the back of the test set to your LAN.

**Direct Connection** An alternate connection may be made using the Direct Connection method of connecting to the test set.

For a Direct Connection, make the following connections:

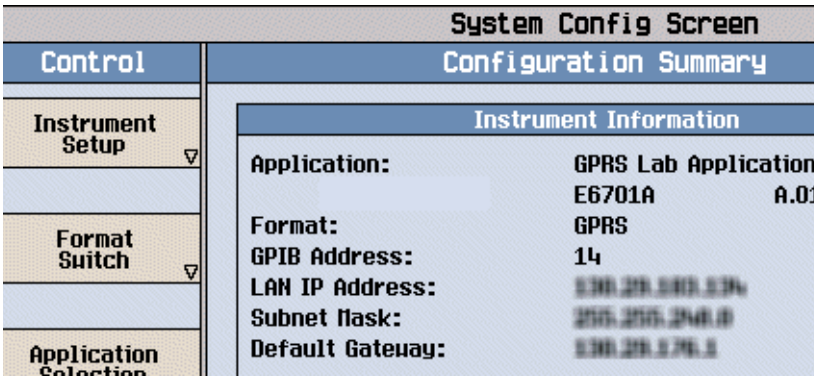
1. Connect the Logging PC directly to the LAN port of the test set using a crossover cable.
2. When setting up the test set and PCs (see "B. PC, Test Set and DUT Setup" on page 1049), set the IP addresses of the PCs and test set to any valid IP addresses, as long as they are on the appropriate subnets.

### Connect DUT to the Test Set

1. Connect the DUT to the test set. While there are several ways to connect the DUT to the test set, the connection diagram shows a connection to the DUT's antenna. There may be other test points on your specific DUT that are more convenient for a connection.

## B. PC, Test Set and DUT Setup

### Set Up Test Set



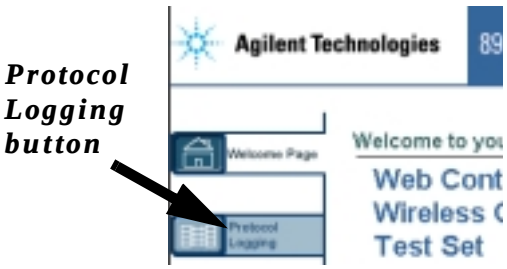

1. Press the **Sys Config** key to display the System Config screen.
2. Use the `Instrument Setup` softkey (**F1**) to display the Instrument Setup menu.
3. Enter the IP address for the test set.
4. Use the same menu to set the Subnet Mask.
5. Use the same menu to set the Default Gateway.

### Set Up DUT

1. You may need to set the IP address or other network parameters in the DUT. Set these as needed.
2. If the device uses a dial-up connection, you may need to set up Dial-Up Networking in the device. Do this as needed.

### Start Web Browser

1. Open a web browser on the Logging PC and enter the following URL:
   http://<IP_address> where <IP address> is the address of the test set. If there's a network name for the test set on your network, that can also be used (for example, http://TS440 where TS440 is the network name of the test set).
   The test set's Welcome page should be displayed.
2. Select Protocol Logging on the navigation bar on the left side of the Welcome page. The Protocol Logging page should be displayed.




**NOTE** Enter only the IP address or an assigned network name. Do not append extra characters to the address. The web display may act unpredictably.

### Optional: Set Up Logging

1. Select Logging Setup on the logging web page.

2. Choose observation points to be logged. At least one point must be selected.
3. Choose Buffer Operation. Linear stops the log when full, Cyclic writes over the oldest data.
4. Add a User Comment. This is a good place to add a header identifying the DUT or other specific issues. It can be up to 74 characters long, but may only contain alphanumeric characters. No special characters or html tags are allowed.
5. Press the OK button to save settings, or Cancel to return to the Protocol Logging page.

## C. Begin Logging

1. Select Start Logging to begin logging. The Summary and Detail views indicate Logging in Progress, but no data will be displayed until the log is stopped.
2. If you have not yet made a data connection with the DUT, you can do so now (see "Establish Data Connection" on page 1052.) Use the full facilities of the test set to control the data connection or make measurements.
3. When finished, press Stop Logging to stop logging. The log will now be displayed on the Protocol Logging Web page.

**NOTE** The test set responds to all commands in the order received. Logging can be controlled from three points: the front panel, a GPIB program, and the test set's web page. It is also possible to have multiple browser windows controlling the same test set. Therefore, if you and a colleague are both looking at the logging page for the same test set, either of you can control logging.

# Establish Data Connection

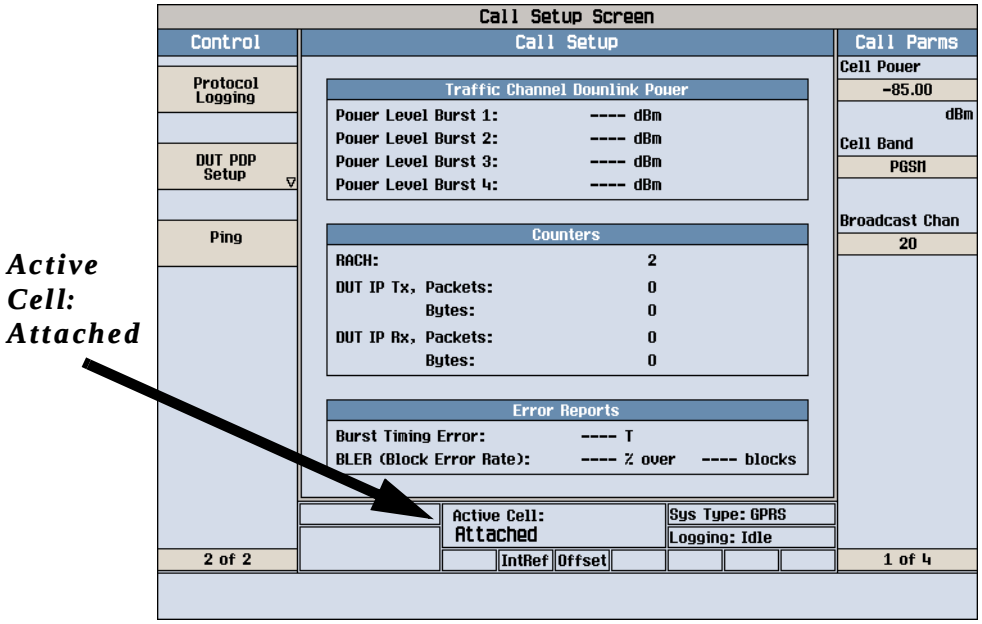
You can start logging at any time, but use the following procedures if you want to establish a data connection between the DUT and the test set.

You must choose either ETSI Type A, ETSI Type B, BLER, or IP Data as a data type.ETSI Type A transmits no PDTCH bursts on the downlink. ETSI Type B presents one or more PDTCH bursts on the downlink, which can be used to loopback data through the uplink. BLER is an Agilent proprietary data type used to obtain Block Error Rate (BLER) measurement reports from the DUT. The IP Data type enables the transmission of Internet Protocol (IP) datagrams. For more information on the data modes, see the explanation in the GPIB command CALL:FUNCtion:DATA:TYPE.

## Connect Using IP Data Mode

1. Press the **Call Setup** key to go to the Call Setup screen on the test set.
2. Select `Data Conn Type` and set the field to `IP Data`.
3. Press the left **More** key to go to the second screen of the Control menu.
4. Select `DUT PDP Setup` to open the DUT PDP Setup menu on the test set.
5. Set the DUT's IP address in the DUT PDP Setup menu on the test set.

   Note: The entered IP address must be on the same subnet as the test set.



## Connect Using ETSI Type 1, ETSI Type 2, and BLER Data Modes

1. Press the **Call Setup** key to go to the `Call Setup` screen.
2. Turn the power to the DUT on.
3. Wait for `Attached` to appear in the `Active Cell:` field on the test set's front panel display.

---

**NOTE** For DUTs that don't perform GPRS attach automatically, set the DUT to data mode.

---

### Using ETSI or BLER Data Modes

If you want to use a `Data Conn Type` of `ETSI Type A`, `ETSI Type B`, or `BLER`, choose the desired mode and press the `Start Data Connection` (**F3**) key and watch for the `Active Cell:` field changing to `Transferring`. IP Data Mode does not have a Start Data key.

---

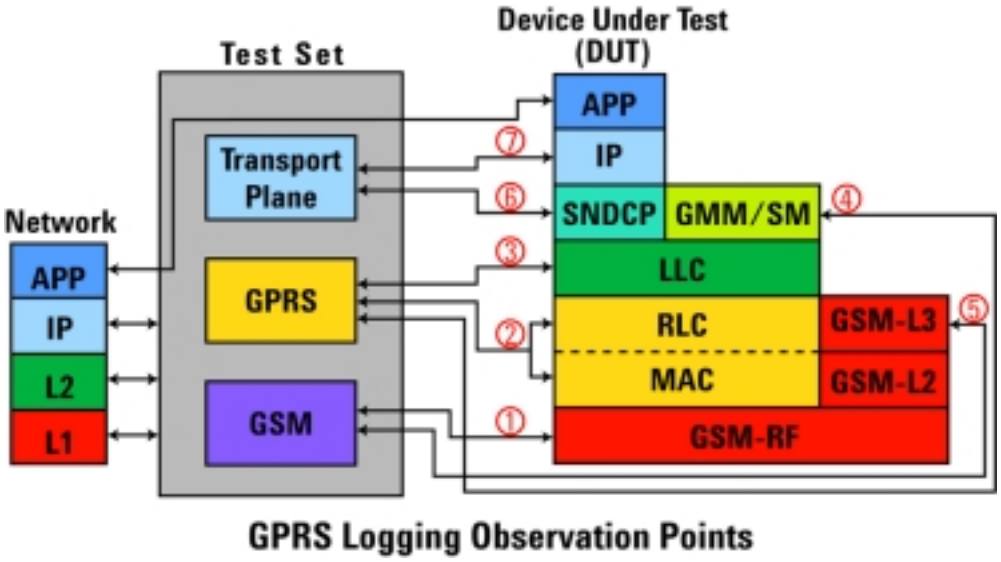
**NOTE** If you have problems establishing a data connection using the BLER Data Connection Type, you may want to change the setting of the Data Connection LLC Frame Check Sequence or the BLER Block Polling Interval.

---

# What Can Be Logged

The test set acts as a Base Station Emulator (BSE) to provide the appropriate network communications to the DUT. To a certain extent, the test set represents the following GPRS network components: Base Station Subsystem (BSS), Serving GPRS Support Node (SGSN), and Gateway GPRS Support Node (GGSN).

The Logging Setup page lists the available observation points. These points correspond to points in the GPRS/GSM/Transport Plane hybrid protocol stack shown in the figure below and are described in the table.




GPRS Logging Observation Points

**Table 14.**

| Observation Point | Message | Description |
|---|---|---|
| 1 | L1_Interface | Raw information between DUT and test set |
| 2 | RLC/MAC | Access and control messages |
| 3 | LLC | Unnumbered and supervisory messages |
| 4 | GMM/SM | Attach, detach, security and PDP context messages |
| 5 | GSM_L3 | Common control channel messages |
| 6 | SNDCP | Network level messages |
| 7 | IP | IP datagram data and control fields |

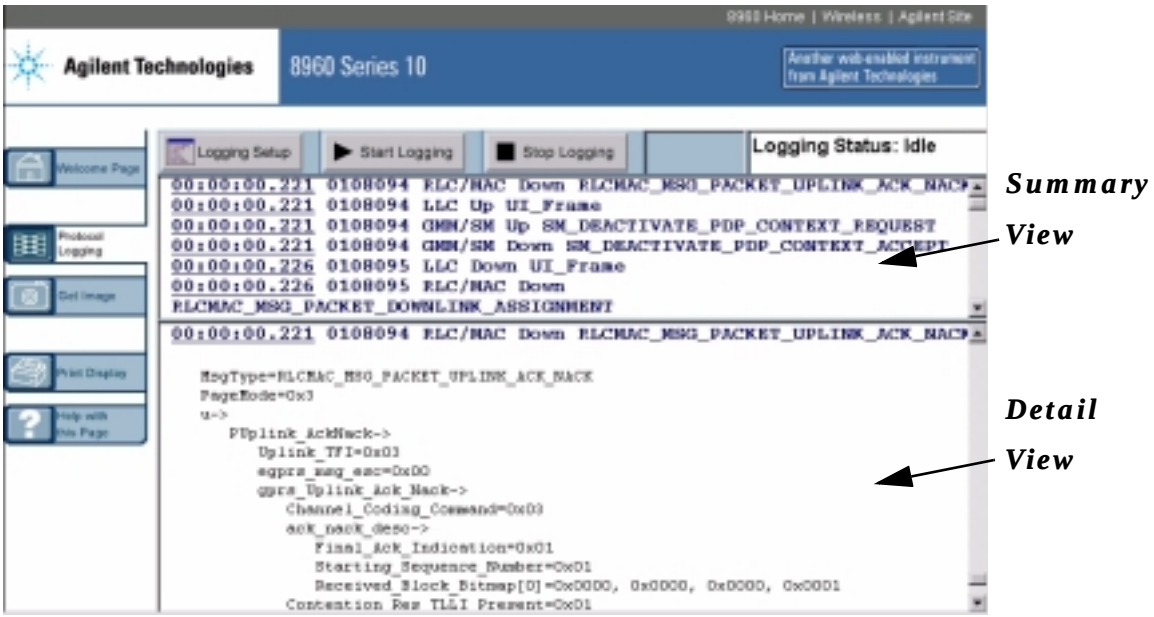
## Related Topics

“Explanation of Log Detail” on page 1056

“Protocol Logging Procedure” on page 1048

# Understanding the Log

The Log has two views – a Summary View and a Detail View. The Summary View lists only the first line of each separate log item, while the Detail View shows the all of the logged information. The log timestamp (the first number) in each log line in the Summary View is hyperlinked to a corresponding line in the Detail View. Also, the first line of each message in the Detail View is linked to the corresponding Summary View line.




## Related Topics

"Explanation of Log Detail"

"Protocol Logging Procedure" on page 1048

# Explanation of Log Detail

Let's take a look now at a sample message from the detail view, shown in the figure below.

```
00:00:00.221 0108094 RLC/MAC Down RLCMAC_MSG_PACKET_UPLINK_ACK_NACK
   MsgType=RLCMAC_MSG_PACKET_UPLINK_ACK_NACK
   PageMode=0x3
   u->
      PUplink_AckNack->
         Uplink_TFI=0x03
         egprs_msg_esc=0x00
         gprs_Uplink_Ack_Nack->
            Channel_Coding_Command=0x03
            ack_nack_desc->
               Final_Ack_Indication=0x01
               Starting_Sequence_Number=0x01
               Received_Block_Bitmap[0]=0x0000, 0x0000, 0x0000, 0x0001
            Contention_Res_TLLI_Present=0x01
            TLLI->
               TLLI=0xDABADA55
            Packet_Timing_Advance_Enabled=0x0
            Power_Control_Parameters_Enabled=0x0
            Extension_Bits_Enabled=0x0
            Fixed_Allocation_Enabled=0x0
```

The first line of this detail is the same as the corresponding summary line and is explained in the table below.

**Table 15. Summary Line Explanation**

| Summary Line Field | Explanation |
|---|---|
| **00:00:00:221** | Time within the log. (Hours:Minutes:Seconds:milliseconds)<br>Displayed as HH:MM:SS:mmm |
| **0108094** | System Time.<br>Useful to compare with Frame Number from a DUT log. |
| **RLC/MAC** | The protocol entity from which this detail was logged. |
| **Down** | Direction.<br>Up is uplink, from DUT to test set. Down is downlink. |
| **RLCMAC_MSG_PACKET_UPLINK _ACK_NACK** | Message string.<br>Gives information about the detail logged here. Generally corresponds to an equivalent name in the standard, but since not all messages logged have exact equivalents in the standard, there is some variance. |

Each of the lines following the header are the actual logged information. There are two formats for this information:

1. *field=value* This is the field name followed by an equal sign, then the value in hexadecimal.
2. *name->list of fields* This is a larger grouping of fields, followed by each field name on individual lines.

This particular message is a Packet Uplink Ack/Nack message for the RLC/MAC layer. The following information was logged with respect to this message:

- Page Mode
- Uplink TFI
- Channel Coding Command
- Ack/Nack Description and its parameters
- Final Ack Indication
- Starting Sequence Number
- Received Block Bitmap
- Contention Resolution TLLI
- Packet Timing Advance
- Power Control Parameters
- Extension Bits
- Fixed Allocation Parameters

## Related Topics

“Logged Message and GPRS Standard Cross-reference” on page 1059

“Protocol Logging Procedure” on page 1048

# Saving and Printing the Log

It is important to save the logs, because they are not stored anywhere on the test set. Whenever Start Logging is selected (via front panel, web or GPIB program), the log is reset and all old data is lost.

You can save the log by using the Internet Explorer command File...Save As... selection. If you choose this, multiple html files are saved into a directory. The Detail log file has a default name of logdtl.html and the Summary log has a default name of logsum.html. The two files are still hyperlinked between messages.

With some versions of Internet Explorer, you can right-click in the frame, choose Open Frame In New Window and then select File/Save As… from the menu. If your version does not have this feature, you may wish to download Internet Explorer Web Accessories from the Microsoft web page http://www.microsoft.com/windows/ie/ and search for Web Accessories for the version you are running.

Alternatively, you can select all the text in the frame, and cut and paste the text to your desired text editor. A very large log, for example one that has filled the buffer completely, can take a long time to copy and paste.

To print a frame on a web page, right click in the frame and choose Print.

# Logged Message and GPRS Standard Cross-reference

Due to design considerations and the wireless standards definitions, it was necessary to create some differences between the logged names and the names in the standards. These tables describe these changes. Also noted are messages which are not supported.

**Table 16. Standards Used for Message Naming**

| Technology | Standard Number | Layer |
|---|---|---|
| GPRS | 04.60 v. 7.3.1 | RLC/MAC |
| GSM | 04.08 v. 7.6.1 | GMM/SM |
| GSM | 04.64 v. 7.3.0 | LLC |
| GSM | 04.65 v. 7.3.0 | SNDCP |

**Table 17. Logged Message Name and Standard Cross-Reference**

| Logged Name Displayed | Standard Name | Layer | Comment |
|---|---|---|---|
| - | Packet Cell Change Failure | RLC/MAC | Not Supported |
| PControl_Ack_Frame | Packet Control Acknowledgement | RLC/MAC | - |
| PDownlink_Ack_Nack | Packet Downlink Ack/Nack | RLC/MAC | - |
| PUplink_Dummy_Control_Block | Packet Uplink Dummy Control Block | RLC/MAC | - |
| - | Packet Measure-ment Report | RLC/MAC | Not supported |
| PResource_Request_Frame | Packet Resource Request | RLC/MAC | - |
| PMobile_TBF_Status | Packet Mobile TBF Status | RLC/MAC | - |
| PPSI_Status | Packet PSI Status | RLC/MAC | - |
| PAccess_Reject | Packet Access Reject | RLC/MAC | - |

**Table 17. Logged Message Name and Standard Cross-Reference (Continued)**

| Logged Name Displayed | Standard Name | Layer | Comment |
|---|---|---|---|
| PUplink_Assignment | Packet Uplink Assignment | RLC/MAC | Frequency parameters are set not to support frequency hopping |
| PDownlink_Assignment | Packet Downlink Assignment | RLC/MAC | TLLI_Selected has no name in the standard |
| PTBF_Release | Packet TBF Release | RLC/MAC | - |
| PUplink_AckNack | Packet Uplink Ack/Nack | RLC/MAC | - |
| PSysInfo_1 | Packet System Information Type 1 | RLC/MAC | - |
| PSysInfo_2 | Packet System Information Type 2 | RLC/MAC | - |
| PSysInfo_3 | Packet System Information Type 3 | RLC/MAC | - |
| PSysInfo_3Bis | Packet System Information Type 3bis | RLC/MAC | - |
| PSysInfo_13 | Packet System Information Type 13 | RLC/MAC | - |
| PCell_Change_Order | Packet Cell Change Order | RLC/MAC | - |
| PTimeSlot_Reconfigure | Packet Timeslot Reconfigure | RLC/MAC | - |
| PDownlink_Dummy_Control_Block | Packet Downlink Dummy Control Block | RLC/MAC | - |
| PPower_Control_Block | Packet Power Control/Timing Advance | RLC/MAC | - |

**Table 17. Logged Message Name and Standard Cross-Reference (Continued)**

| Logged Name Displayed | Standard Name | Layer | Comment |
|---|---|---|---|
| PPoll_Request | Packet Polling Request | RLC/MAC | - |
| AttachRequest | Attach Request | GMM | - |
| AttachAccept | Attach Accept | GMM | - |
| AttachComplete | Attach Complete | GMM | Only MsgType is displayed. MsgType is GMM_ATTACH_ COMPLETE |
| DetachRequest | Detach Request | GMM | - |
| DetachAccept | Detach Accept | GMM | - |
| RAURequest | Routing Area Update Request | GMM | - |
| RAUAccept | Routing Area Update Accept | GMM | - |
| Information | GMM Information | GMM | - |
| Activate_PDP_Context_Request | Activate PDP Context Request | SM | - |
| Activate_PDP_Context_Accept | Activate PDP Context Accept | SM | - |
| Request_PDP_Context_Activation | Request PDP Context Activation | SM | - |
| U_Frame | Unnumbered Frames(U) | LLC | - |
| UI_Frame | Unconfirmed Information Frames(UI) | LLC | - |
| IS_Frame | Information Transfer Frames(I) | LLC | - |

**Table 17. Logged Message Name and Standard Cross-Reference (Continued)**

| Logged Name Displayed | Standard Name | Layer | Comment |
|---|---|---|---|
| S_Frame | Supervisory Frames(S) | LLC | - |
| SN_DATA | SN-DATA | SNDCP | - |
| SN_UNIT_DATA | SN-UNITDATA | SNDCP | - |

## Related Topics

"Explanation of Log Detail" on page 1056

"Understanding the Log" on page 1055

"Protocol Logging Procedure" on page 1048

# Protocol Logging and Data Channel Troubleshooting

## Protocol Logging

- Buffer fills very fast: If it seems that the buffer fills very fast (within a few seconds), you may want to select fewer observation points. IP data is one observation point that can transfer a lot of data very fast.
- Observation points or other settings changing: The setup for logging can be changed via the front panel, a GPIB program, or by any browser window open to the test set's logging page. The test set will perform all commands in the order received. If there are multiple browser windows open, or someone is using the front panel, it is possible for others to be changing the setup without your knowledge.

## Data Channel

- If your data channel application does not seem to be working, try pinging the device. The test set has a ping feature, and so do most computer operating systems. See "Ping" on page 1067 for more information.
- Ping log has an unknown IP address: If you log a Ping that originated from the test set, the Ping Downlink Source Address and the Uplink Destination Address have a fixed value of 0x821DB5CB. This is because the test set uses an internal address to originate IP data from the test set to the DUT. See "Protocol Logging During Ping" on page 1069 for more information.
- Ping does not work although DUT is attached: The device must be PDP activated. This may require that you initiate a data transfer from the DUT. Also, Ping and Data Channel are only available in IP Data mode.
- Can't find where to set the DUT address: Switch the `Data Conn Type` to `IP Data` mode first.
- BER measurements wrong when using the data channel: The BER measurement is not supported with the IP Data type, which is required for Data Channel use.
- What is the APN (Access Point Name) that I need to include with the dial string when using dial-up? No APN is needed.

## Related Topics

"Explanation of Log Detail" on page 1056

"Understanding the Log" on page 1055

"Protocol Logging Procedure" on page 1048

"Data Channel" on page 1066

# 9 Data Channel

# Data Channel

The Data Channel function allows you to use the test set as a router while you exchange IP datagrams between your DUT and the server. This feature is available only through the front panel and through the remote user interface (programming).

There are several applications of the Data Channel:

- “Ping” on page 1067
- “WAP Test with the Data Channel” on page 1075(link your WAP device to a wml server)
- “Modem Functional Test with the Data Channel” on page 1078(e.g. to test a GPRS wireless modem, connect a PC with an html browser to the modem, and route the data through the test set to an html server)
- “FTP Throughput Test with the Data Channel” on page 1081(use FTP to transfer data to and from an FTP source)
- “Base Station Emulation with the Data Channel” on page 1085(use the test set as a router to transfer datagrams from your application to a wireless device)

## Related Topics

“Protocol Logging and Data Channel Troubleshooting” on page 1063

# Ping

## Ping Description

Ping is a tool to help check system interconnects. The test set has a Ping feature that allows you to ping either the DUT or another address. It sends a 64 byte IP datagram (technically an ICMP message: Internet Control Message Protocol) from the test set to the ping target, and expects a response, recording the response information on the test set's display. Of those 64 bytes, 56 bytes are of data and 8 bytes are of header information. This feature is controlled through the front panel or through GPIB control.

Ping is the simplest implementation of the Data Channel feature. If you are trying to debug a system that is not responding to a full network setup (for example a WAP setup), try pinging the DUT from a computer attached to the network. Experiment with very large packets, very long timeouts and continuous pings. (These ping options are not available with the ping from the test set.) You can actually create a large, continuous data transfer with just ping.

### Ping Notes

- When pinging the DUT, the DUT must have at least requested a PDP Context.
- Ping is only available in IP Data mode.
- When the Ping originates from the test set and the target is the DUT, the Downlink Source address is always 0x821DB5CB (130.29.181.203), and Uplink Destination Address is the same value.

### To Ping the DUT From the Test Set

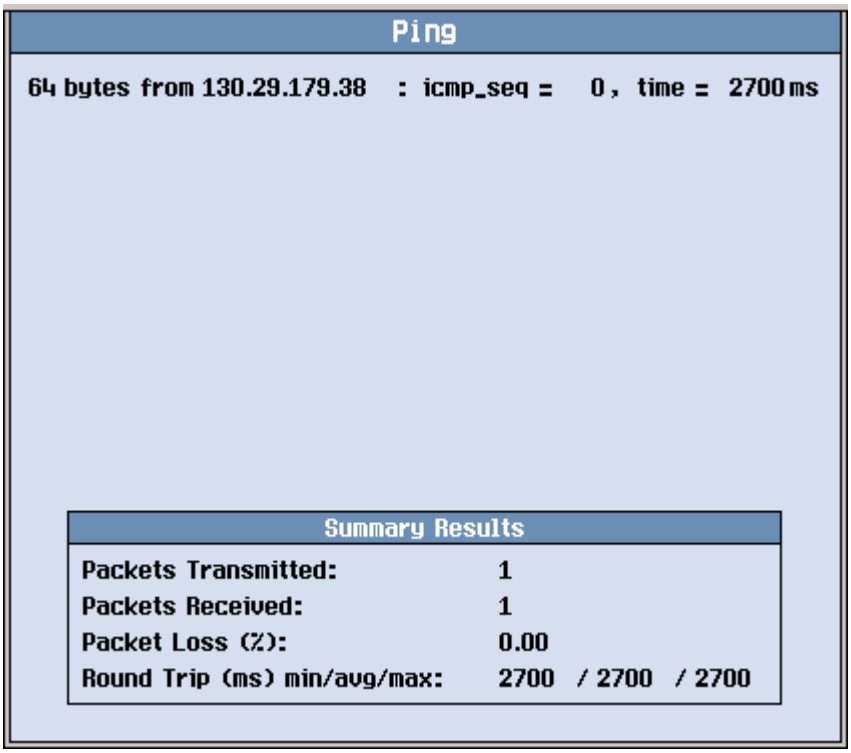
1. Press the **Call Setup** key.
2. Select *Data Conn Type* and set it to IP Data.
3. Press the **More** key to display the second page of the Control Menu.
4. Select DUT PDP Setup.
5. Set the DUT IP address.
6. Close the DUT PDP Setup menu.
7. Select Ping.
8. Select Start Ping.

### To Ping an Alternate Address From the Ping screen:

1. Select Ping Setup.
2. Set the Alternate Ping Address to your desired target IP address.
3. Set Device to Ping to Alternate.
4. Select Start Ping.

## How to Read the Ping Results

If the connection is good, then the device will return a packet to the test set and the packet transfer information is displayed on the test set's screen (see Ping Data Display). In this example, the Ping has been setup to ping only once. Note that it took 2700 msec to complete the ping.



# Protocol Logging During Ping

When ping data passes between the test set and the DUT, it can be logged. The log results during ping depend on the method used. Here are several methods and descriptions of the log results.

1. Ping the DUT from the test set.
2. Ping an alternate IP address from the test set.
3. In addition to the test set's ping feature, you can ping any IP address (including the DUT) from any network device with a ping feature.

## Method 1: Ping the DUT From the Test Set

To ping the DUT from the test set, use the following procedure:

1. Press the **Call Setup** key.
2. Select Data Conn Type and set it to IP Data.
3. Press the **More** key to display the second page of the Control Menu.
4. Select DUT PDP Setup.
5. Set the DUT IP address.
6. Close the DUT PDP Setup menu.
7. Select Ping.
8. Select Start Ping.

A Ping data transfer may be successful as long as the DUT is either in an Active PDP Connection, or if the DUT has at least accepted a request (from the test set) to send a PDP Context Request. Some devices in early stages have been rejecting requests from the test set to do this, so it may be necessary to establish the PDP Context Activation before a successful Ping occurs.

If you use the test set's protocol logging to capture a log of this ping, you will note that the IP_Down IP_Datagram Source_Address for the datagram that contains the ping data is a fixed number (0x821DB5CB). This is an internal address the test set uses to originate IP traffic from the test set to the DUT.

## Method 2: Ping an Alternate IP Address From the Test Set

To ping an alternate address from the test set, use the following procedure:

1. Press the **Call Setup** key.
2. Select Data Conn Type and set it to IP Data.
3. Press the **More** key to display the second page of the Control Menu.
4. Select Ping.
5. Select Ping Setup.
6. Set the Alternate Ping Address to your desired target.
7. Set Device to Ping to Alternate.
8. Select Start Ping.

No active PDP context is required for this ping.

If your Alternate Ping Address is anything but the DUT address, the test set's protocol logging will not log this ping, because the test set's logging only logs protocol between the test set and the DUT. If you have a network logging device on your LAN, it will show that the source IP address is the test set's LAN IP address. If your Alternate Ping Address is the DUT address, then the data can be logged by the test set, and the IP_Down IP_Datagram Source_Address for the datagram that contains the ping data is the same fixed number as in Method 1.

## Method 3: Using Ping From Other Devices

Any device on the network that has a ping feature can ping any other device, including the DUT. For example, if you have a PC on the LAN that the test set is connected to, you can use ping from that PC to ping the DUT.

Example procedure of pinging the DUT from another device (e.g. a Windows PC):

1. Open a DOS window on the PC.
2. Type ping followed by the IP address of the DUT.
3. The ping should respond as normal.

You can use protocol logging in the test set to log the ping to the DUT. In this case, the IP_Down IP_Datagram Source_Address for the datagram that contains the ping data is not a fixed number, it is the IP address of your PC.

## Ping Log

The following log is from a ping to the DUT, in this case a GPRS mobile phone.

Note the following information can be determined from the log:

- "IP_Down" indicates that this is a downlink message and is therefore passing from the test set to the DUT.
- Protocol is ICMP (Internet Control Message Protocol).
- Type is ECHO_MESSAGE, which is the instruction to the DUT to generate an ECHO_REPLY message.
- The timestamp for the first message is 0.0 seconds. The first IP_Up message has a timestamp, and the time difference between the two is approximately the same 2700 msec (this log shows 2699 msec, to be exact).
- The IP address of the DUT is the Destination_Address on the IP_Down IP_Datagram and is the Source_Address on the IP_Up IP_Datagram. The alternate address is an address within the test set that originated the Ping data packet.
- The Type, Code, Checksum, Identifier and Sequence Number are all listed.

**Message Details**

Log Started: FRI NOV 25 14:19:08 2011
User Comment: Ping IP Data
Observation Points: IP

**00:00:00.000 0686613 IP Down IP_Datagram**

```
Version=0x04
IHL=0x05
Type_of_Service=0x00
Total_Length=0x0054
Identification=0x2432
Flags->
   Reserved=0x00
   DF=MAY_FRAGMENT
   MF=LAST_FRAGMENT
Fragment_Offset=0x0000
Time_to_Live=0x40
Protocol=ICMP
Header_Checksum=0xE94A
Source_Address=0x821DB5CB
Destination_Address=0x821DB326
Higher_Level_Protocol->
   ICMP->
      Type=ECHO_MESSAGE
      Message->
         Echo->
            Code=0x00
            Checksum=0xE7F9
            Identifier=0x1F18
            Sequence_Number=0x0000
            Data[0]=0x00, 0x02, 0xFB, 0xDC, 0x04, 0x05, 0x06, 0x07
            Data[8]=0x08, 0x09, 0x0A, 0x0B, 0x0C, 0x0D, 0x0E, 0x0F
            Data[16]=0x10, 0x11, 0x12, 0x13, 0x14, 0x15, 0x16, 0x17
            Data[24]=0x18, 0x19, 0x1A, 0x1B, 0x1C, 0x1D, 0x1E, 0x1F
            Data[32]=0x20, 0x21, 0x22, 0x23, 0x24, 0x25, 0x26, 0x27
            Data[40]=0x28, 0x29, 0x2A, 0x2B, 0x2C, 0x2D, 0x2E, 0x2F
            Data[48]=0x30, 0x31, 0x32, 0x33, 0x34, 0x35, 0x36, 0x37
```

```
00:00:02.699 0687198 IP Up IP_Datagram
   Version=0x04
   IHL=0x05
   Type_of_Service=0x00
   Total_Length=0x0054
   Identification=0x144D
   Flags->
      Reserved=0x00
      DF=DONT_FRAGMENT
      MF=LAST_FRAGMENT
   Fragment_Offset=0x0000
   Time_to_Live=0x40
   Protocol=ICMP
   Header_Checksum=0xB92F
   Source_Address=0x821DB326
   Destination_Address=0x821DB5CB
   Higher_Level_Protocol->
      ICMP->
         Type=ECHO_REPLY_MESSAGE
         Message->
           Echo->
             Code=0x00
             Checksum=0xEFF9
             Identifier=0x1F18
             Sequence_Number=0x0000
             Data[0]=0x00, 0x02, 0xFB, 0xDC, 0x04, 0x05, 0x06, 0x07
             Data[8]=0x08, 0x09, 0x0A, 0x0B, 0x0C, 0x0D, 0x0E, 0x0F
             Data[16]=0x10, 0x11, 0x12, 0x13, 0x14, 0x15, 0x16, 0x17
             Data[24]=0x18, 0x19, 0x1A, 0x1B, 0x1C, 0x1D, 0x1E, 0x1F
             Data[32]=0x20, 0x21, 0x22, 0x23, 0x24, 0x25, 0x26, 0x27
             Data[40]=0x28, 0x29, 0x2A, 0x2B, 0x2C, 0x2D, 0x2E, 0x2F
             Data[48]=0x30, 0x31, 0x32, 0x33, 0x34, 0x35, 0x36, 0x37
```

Log Stopped: FRI NOV 25 14:19:27 2011
Reason: User Stop Request
User Comment: Ping IP Data
Observation Points: IP

## Related Topics

“Ping” on page 1067

“Data Channel” on page 1066

“Protocol Logging and Data Channel Troubleshooting” on page 1063

# WAP Test with the Data Channel

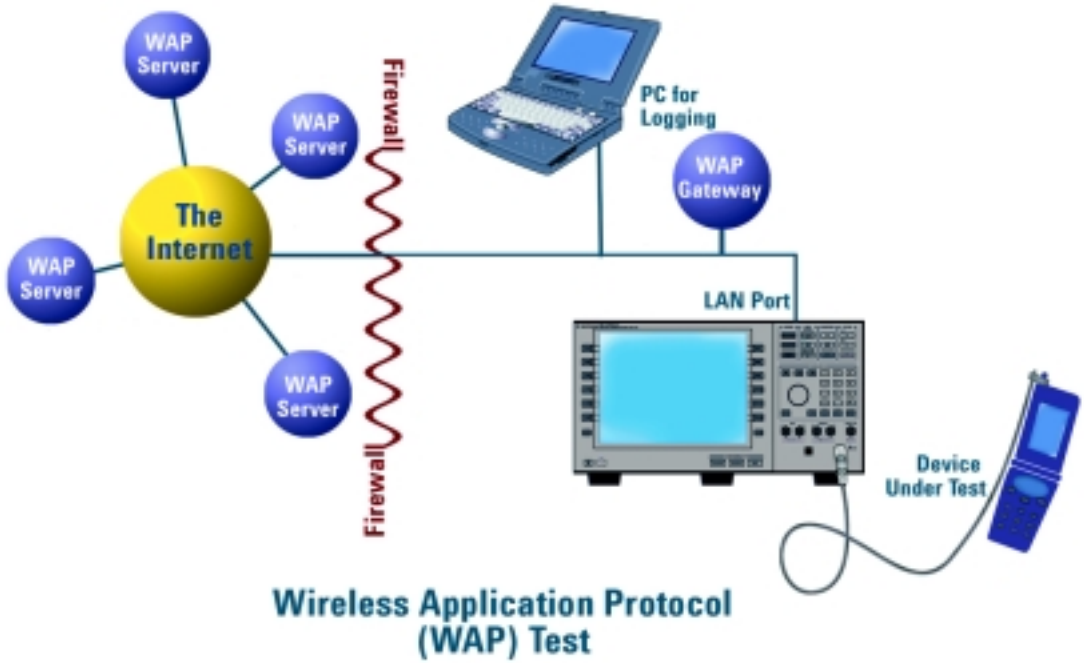
The Data Channel facilitates the functional test of a Wireless Application Protocol (WAP) device such as a WAP-enabled GPRS phone.

Logging data during this process provides protocol data at useful points in the stack, which may help in debugging the Device Under Test (DUT).

Before you use the Data channel for WAP, you must have the following information:

- an IP address valid for the subnet that you will connect the test set to
- the valid subnet mask for that subnet
- the default gateway for that network (not the same as the WAP gateway)
- a valid IP address for the DUT
- the default WAP gateway address (this may be required by the DUT)

## A. Hardware Connections




### Connect PC to LAN

Please consult with your IT department if you need assistance connecting your PC to the LAN. Refer to "Protocol Logging" on page 1046 for more information about setting up protocol logging.

### Connect Test Set to LAN

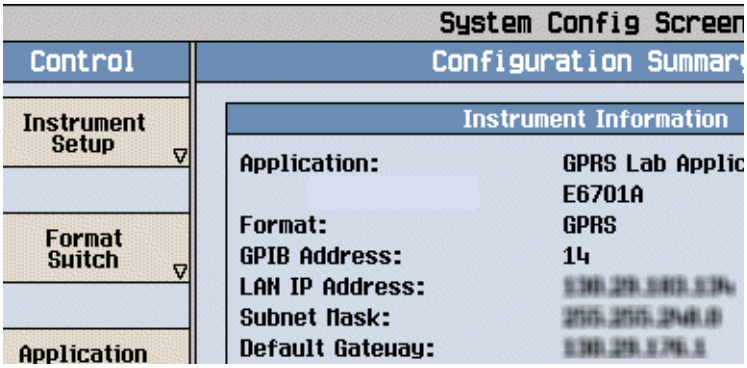
1. Connect the LAN port on the back of the test set to your LAN.

### Connect DUT to the Test Set

1. Connect the DUT to the test set. There may be several ways to connect to the RF link of the DUT. The connection diagram shows a connection to the DUT's antenna.

## B. Test Set and DUT Setup

### Set Up Test Set




1. Press the **Sys Config** key to display the System Config screen.
2. Use the `Instrument Setup` softkey (**F1**) to display the Instrument Setup menu.
3. Enter the IP address for the test set.
4. Use the same menu to set the Subnet Mask.
5. Use the same menu to set the Default Gateway.
6. Press the **Call Setup** key to go to the Call Setup screen on the test set.
7. Select `Data Conn Type` and set the field to `IP Data`.
8. Press the left **More** key to go to the second screen of the Control menu.
9. Select `DUT PDP Setup` to open the DUT PDP Setup menu on the test set.
10. Set the DUT's IP address in the DUT PDP Setup menu on the test set.

    Note: The entered IP address must be on the same subnet as the test set.

### Set Up DUT

1. You may need to set some network parameters in the WAP device (the DUT). Some typical parameters include a home page, Primary Port, or Data Bearer. Set these as needed.
2. You may also need to set a default WAP gateway (may be called Primary IP Address). Do this if necessary. Some network setups may require that the WAP gateway be on the same side of the firewall as the DUT and test set.

## C. Data Connection

The objective of the WAP evaluation is to successfully transfer WAP datagrams. The DUT must complete a successful PDP Context activation before datagrams can be transferred. With the test set this involves two steps:

**First, the DUT must perform a GPRS attach.**

1. Connect the DUT to the RF IN/OUT port of the test set.
2. Turn the DUT on and wait for Attached to appear in the Active Cell: field on the test set's front panel display.

**NOTE** For DUTs that don't perform a GPRS attach automatically, you may have to set the DUT to data mode.

**Second, the DUT must request a PDP Context Activation.**

1. Use the DUT to initiate data transfers. The DUT will request an activation, the DUT's IP address will be assigned by the test set, and the PDP Context will be active.

   Additional Information:

   If the Network initiates a data transfer before the DUT has requested a PDP context, the 8960 will send a Request_PDP_Context_Activation message. No data will be sent to the DUT until a PDP Context has been activated.
2. This can be observed by looking for "PDP Active" in the Active Cell Status: field.

**NOTE** You can also perform some measurements while using the Data Channel:

- BLER measurements are supported.
- TX measurements are supported.
- BER measurements are not supported.
- Logging is possible during Data Channel operation.

## How do You Know When You Have Succeeded?

You have made a successful data connection if you can:

- Look at the WAP device and verify that the pages you were trying to transfer have actually transferred.
- See data transfer in both directions by observing the Counters field in the Call Setup screen.

## Related Topics

"Protocol Logging and Data Channel Troubleshooting" on page 1063

"Data Channel" on page 1066

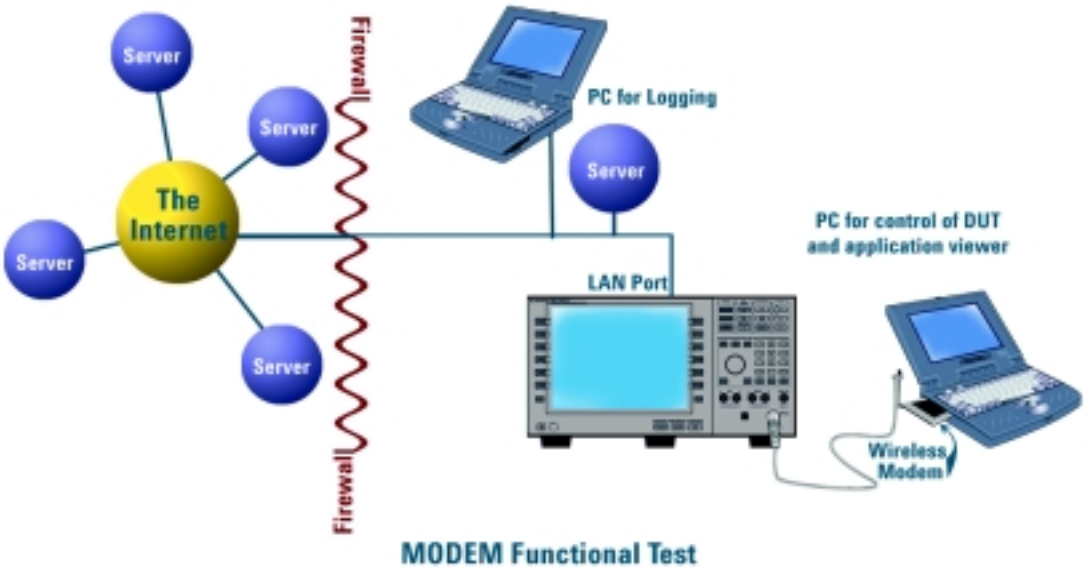
# Modem Functional Test with the Data Channel

The Data Channel enables testing of wireless modems or GPRS devices with built-in modems, typically using dial-up connections. If the modem is not built-in, it is usually controlled from another device such as a PC.

Before you use the Data channel for modem testing, you must have the following information:

- an IP address valid for the subnet that you will connect the test set to
- the valid subnet mask for that subnet
- the default gateway for that network
- a valid IP address for the modem or its controlling PC (even though the modem is the Device Under Test (DUT), typically a PC will be assigned the IP address)

## A. Hardware Connections




### Connect Logging PC to LAN

Please consult with your IT department if you need assistance connecting your PC to the LAN. Refer to "Protocol Logging" on page 1046 for more information about setting up protocol logging.

### Connect Test Set to LAN

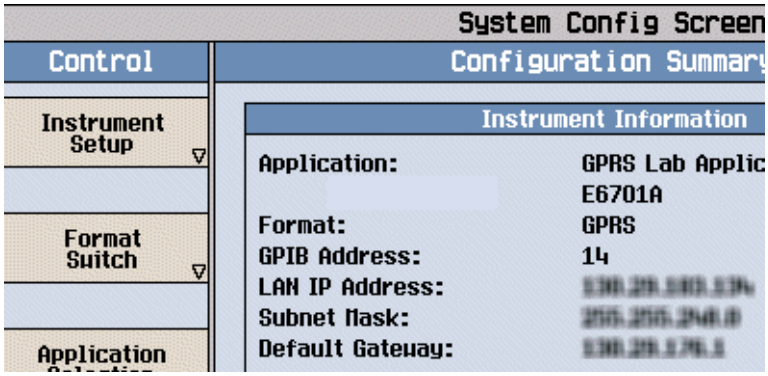
1. Connect the LAN port on the back of the test set to your LAN.

### Connect DUT (Modem and Control PC) to the Test Set

1. Connect the modem to the PC as appropriate for your application.
2. Connect the DUT to the test set.

## B. Test Set and DUT Setup

### Set Up Test Set




1. Press the **Sys Config** key to display the System Config screen.
2. Use the `Instrument Setup` softkey (**F1**) to display the Instrument Setup menu.
3. Enter the IP address for the test set.
4. Use the same menu to set the Subnet Mask.
5. Use the same menu to set the Default Gateway.
6. Press the **Call Setup** key to go to the Call Setup screen on the test set.
7. Select `Data Conn Type` and set the field to `IP Data`.
8. Press the left **More** key to go to the second screen of the Control menu.
9. Select `DUT PDP Setup` to open the DUT PDP Setup menu on the test set.
10. Set the DUT's IP address (or the address of the controlling PC) in the DUT PDP Setup menu on the test set.

    Note: The entered IP address must be on the same subnet as the test set.

### Set Up DUT

1. You may need to set the IP address or other network parameters in the controlling PC or the GPRS device. Set these as needed.
2. If using a dial-up connection, you may need to set up Dial-Up Networking in your PC. Do this as needed.

## C. Modem Functional Test

In order to test the functioning of the DUT, it must first complete a successful PDP Context activation. With the test set this involves two steps:

### First, the DUT must perform a GPRS attach.

1. Connect the DUT to the RF IN/OUT port of the test set.
2. Turn the DUT on and wait for Attached to appear in the Active Cell: field on the test set's front panel display. Some modems may need to attempt data transfer before it attaches to the test set. Sometimes the modem will attach if the number *99# is dialed.

**NOTE** For DUTs that don't perform a GPRS attach automatically, you may have to set the DUT to data mode.

**Second, the DUT must request a PDP Context Activation.**

1. Use the DUT to initiate data transfers. The DUT will request an activation, an IP address will be assigned by the test set, and the PDP Context will be active.
2. This can be observed by looking for "PDP Active" in the Active Cell Status: field.

**NOTE** You can also perform some measurements while using the Data Channel:

- BLER measurements are supported.
- TX measurements are supported.
- BER measurements are not supported.
- Logging is possible during Data Channel operation.

**How do You Know When You Have Succeeded?**

You have made a successful data connection if you can:

- Browse the Internet over the DUT.
- See data transfer in both directions by observing the Counters field in the Call Setup screen of the test set.
- Look at the DUT and its PC and verify that the data you were trying to transfer has actually transferred.

## Related Topics

"Protocol Logging and Data Channel Troubleshooting" on page 1063

"Data Channel" on page 1066

# FTP Throughput Test with the Data Channel

The Data Channel facilitates file transfer (FTP) via the device. Typically this is done with a dial-up connection to an external PC using a GPRS PCMCIA modem or an external GPRS modem.

With appropriate evaluation tools on the Control PC, you can measure the throughput of the modem (DUT). Many commercial FTP programs provide detailed information on transfer speed (example: WS_FTP PRO from Ipswitch, Inc.).

To empirically measure the throughput, the performance of the network must be known. For this reason, it is not recommended to perform this evaluation while connected to the Internet. A "Direct Connection" or Intranet connection should be used instead.

## A. Hardware Connections

FTP Throughput Evaluation

### Connect PC to LAN

Please consult with your IT department if you need assistance connecting your PC to the LAN. Refer to "Protocol Logging" on page 1046 for more information about setting up protocol logging.

### Connect Test Set to LAN

1. Connect the LAN port on the back of the test set to your LAN.

**Direct Connection** An alternate connection may be made using the Direct Connection method of connecting to the test set. This may be preferred, since it won't be necessary to characterize the Intranet for the throughput evaluation.

Make the following connections:

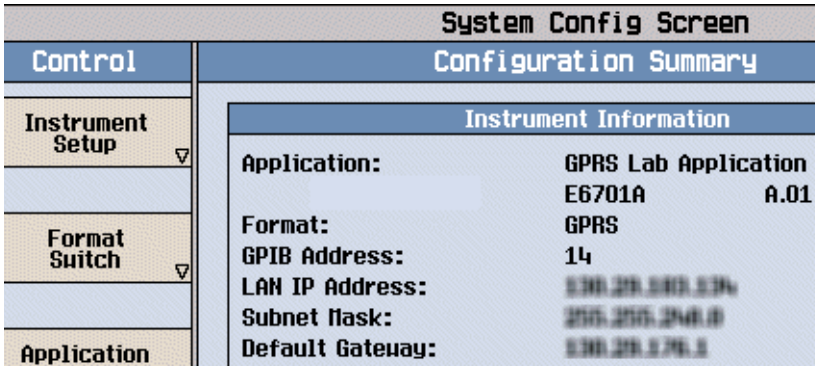
1. Connect the Logging PC directly to the LAN port of the test set using a crossover cable.
2. When setting up the test set and PCs (see "B. Test Set and DUT Setup" on page 1082), set the IP addresses of the PCs and test set to any valid IP addresses, as long as they are on the appropriate subnets.

### Connect DUT to the Test Set

1. Connect the modem to the PC as appropriate for your application.
2. Connect the DUT to the test set.

## B. Test Set and DUT Setup

### Set Up Test Set




1. Press the **Sys Config** key to display the System Config screen.
2. Use the `Instrument Setup` softkey (**F1**) to display the Instrument Setup menu.
3. Enter the IP address for the test set.
4. Use the same menu to set the Subnet Mask.
5. Use the same menu to set the Default Gateway.
6. Press the **Call Setup** key to go to the Call Setup screen on the test set.
7. Select `Data Conn Type` and set the field to `IP Data`.
8. Press the left **More** key to go to the second screen of the Control menu.
9. Select `DUT PDP Setup` to open the DUT PDP Setup menu on the test set.
10. Set the DUT's IP address (or the address of the controlling PC) in the DUT PDP Setup menu on the test set.

    Note: The entered IP address must be on the same subnet as the test set.

### Set Up DUT

1. You may need to set the IP address or other network parameters in the controlling PC or the GPRS device. Set these as needed.
2. If using a dial-up connection, you may need to set up Dial-Up Networking in your PC. Do this as needed.

## C. Data Connection

In order to test the throughput of the DUT during active data transfer, the DUT and test set must first complete a successful PDP Context activation. With the test set this involves two steps:

### First, the DUT must perform a GPRS attach.

1. Connect the DUT to the RF IN/OUT port of the test set.
2. Turn the DUT on and wait for Attached to appear in the Active Cell: field on the test set's front panel display. Some modems may need to attempt data transfer before it attaches to the test set. Sometimes the modem will attach if the number *99# is dialed.

**NOTE** For DUTs that don't perform a GPRS attach automatically, you may have to set the DUT to data mode.

### Second, the DUT must request a PDP Context Activation.

1. Use the DUT or the server to initiate transfers. The DUT will request an activation, an IP address will be assigned by the test set, and the PDP Context will be active.
2. This can be observed by looking for "PDP Active" in the Active Cell Status: field.

**NOTE** You can also perform some measurements while using the Data Channel:

- BLER measurements are supported.
- TX measurements are supported.
- BER measurements are not supported.
- Logging is possible during Data Channel operation, but it may affect throughput times.

### How do You Know When You Have Succeeded?

You have made a successful data connection if you can:

- You see the data that was transferred on your DUT.
- Measure the throughput.
- See data transfer in both directions by observing the Counters field in the Call Setup screen of the test set.

## Related Topics

“Protocol Logging and Data Channel Troubleshooting” on page 1063

“Data Channel” on page 1066

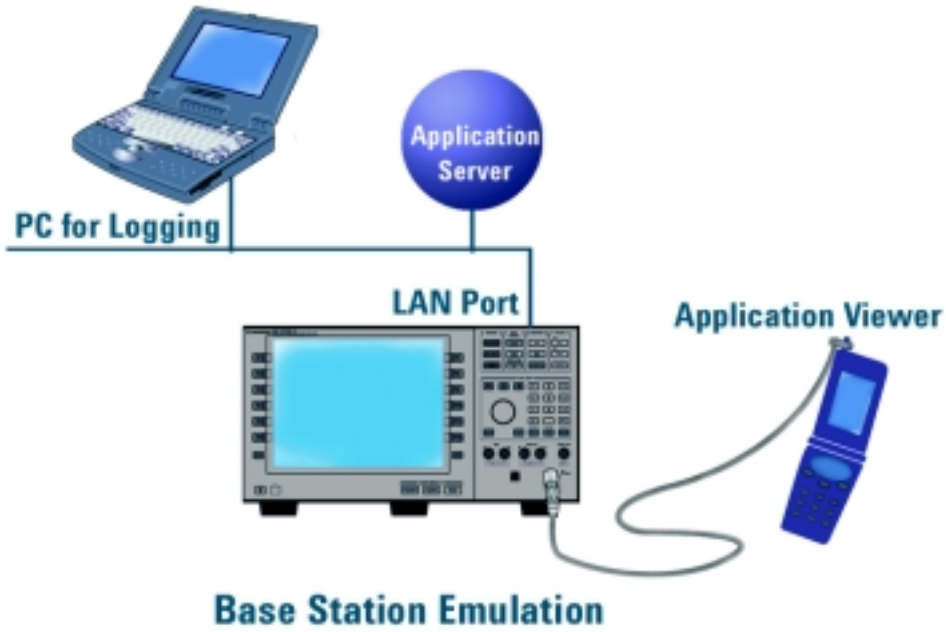
# Base Station Emulation with the Data Channel

You can use the Data Channel and the test set to emulate a base station. This is particularly useful when you want to have a base station available, for example when demonstrating a wireless application, or when functionally testing wireless devices on a workbench. You may also want to vary key parameters of the cell, such as transmit power, and observe how the DUT performs.

Before you use the Data Channel for Base Station Emulation, you must have the following information:

- an IP address valid for the subnet that you will connect the test set to
- the valid subnet mask for that subnet
- the default gateway for that network
- a valid IP address for the DUT

## A. Hardware Connections




### Connect PC to LAN

Please consult with your IT department if you need assistance connecting your PC to the LAN. Refer to "Protocol Logging" on page 1046 for more information about setting up protocol logging.

### Connect Test Set to LAN

1. Connect the LAN port on the back of the test set to your LAN.

**Direct Connection** An alternate connection may be made using the Direct Connection method of connecting to the test set. This may be preferred, since it won't be necessary to characterize the Intranet for the throughput evaluation.

Make the following connections:

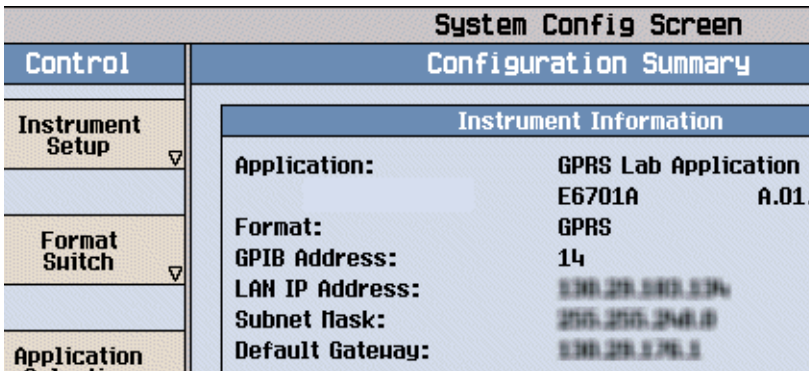
1. Connect the Logging PC directly to the LAN port of the test set using a crossover cable.
2. When setting up the test set and PCs (see "B. Test Set and DUT Setup" on page 1086), set the IP addresses of the PCs and test set to any valid IP addresses, as long as they are on the appropriate subnets.

### Connect DUT to the Test Set

1. Connect the DUT to the test set.

## B. Test Set and DUT Setup

### Set Up Test Set




1. Press the **Sys Config** key to display the System Config screen.
2. Use the `Instrument Setup` softkey (**F1**) to display the Instrument Setup menu.
3. Enter the IP address for the test set.
4. Use the same menu to set the Subnet Mask.
5. Use the same menu to set the Default Gateway.
6. Press the **Call Setup** key to go to the Call Setup screen on the test set.
7. Select `Data Conn Type` and set the field to `IP Data`.
8. Press the left **More** key to go to the second screen of the Control menu.
9. Select `DUT PDP Setup` to open the DUT PDP Setup menu on the test set.
10. Set the DUT's IP address (or the address of the controlling PC) in the DUT PDP Setup menu on the test set.

    Note: The entered IP address must be on the same subnet as the test set.

### Set Up DUT

1. You may need to set the IP address or other network parameters in the DUT. Set these as needed.
2. If the device uses a dial-up connection, you may need to set up Dial-Up Networking in the device. Do this as needed.

Base station emulation is ready. You can adjust the cell settings on the test set as desired. Most Cell Parameters require the BCH to be OFF (i.e. Operating mode = Cell Off) before adjusting the settings. Cell Power is an example of a setting that does not require BCH to be OFF. Changing Cell Power, however, or making ARFCN changes would force the DUT to re-camp.

To use Base Station Emulation to transfer data, you must make a data connection with the DUT. See "C. Data Connection" on page 1087.

## C. Data Connection

The DUT must complete a successful PDP Context activation before datagrams can be transferred. With the test set this involves two steps:

### First, the DUT must perform a GPRS attach.

1. Connect the DUT to the RF IN/OUT port of the test set.
2. Turn the DUT on and wait for Attached to appear in the Active Cell: field on the test set's front panel display.

**NOTE** For DUTs that don't perform a GPRS attach automatically, you may have to set the DUT to data mode.

### Second, the DUT must request a PDP Context Activation.

1. Use the DUT or the server to initiate transfers. The DUT will request an activation, an IP address will be assigned by the test set, and the PDP Context will be active.
2. This can be observed by looking for "PDP Active" in the Active Cell Status: field.

**NOTE** You can also perform some measurements while using the Data Channel:

- BLER measurements are supported.
- TX measurements are supported.
- BER measurements are not supported.
- Logging is possible during Data Channel operation.

### How do You Know When You Have Succeeded?

You have made a successful data connection if you can:

- Look at the DUT and verify that the data you were trying to transfer has actually transferred.
- See data transfer in both directions by viewing the number of packets transferred in the Counters window of the Call Setup screen on the test set.

## Related Topics

"Protocol Logging and Data Channel Troubleshooting" on page 1063

"Data Channel" on page 1066

# Parameter and Other Enhancements

Several cell parameters can be controlled in the test set with the Lab Application. You can also control the "Timing Advance and Uplink State Flag (USF)" on page 1091.

## Cell Parameters

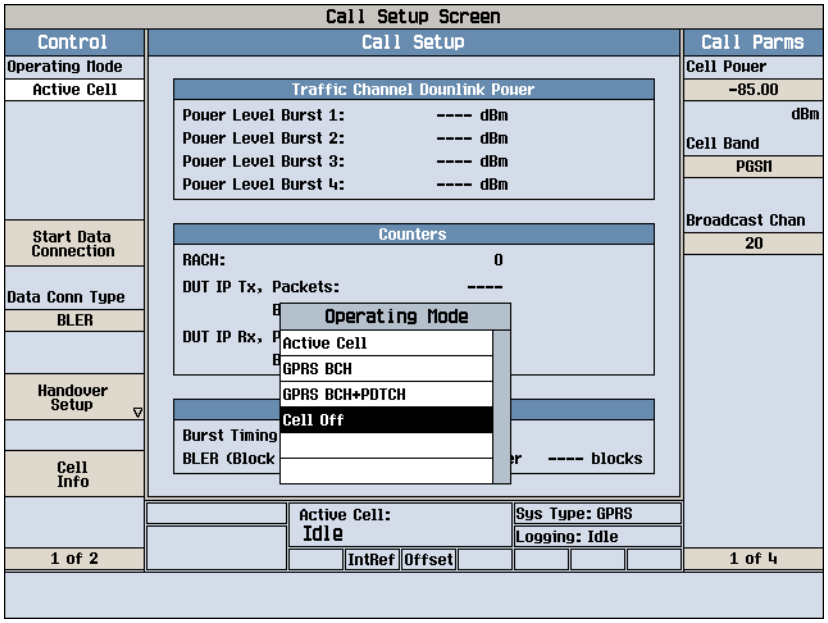
Several parameters can be controlled in the test set. Cell parameters can only be changed when the test set is not transmitting a BCH, so you will need to switch to Cell Off operating mode, or the changes will not take effect.

**Table 18.**

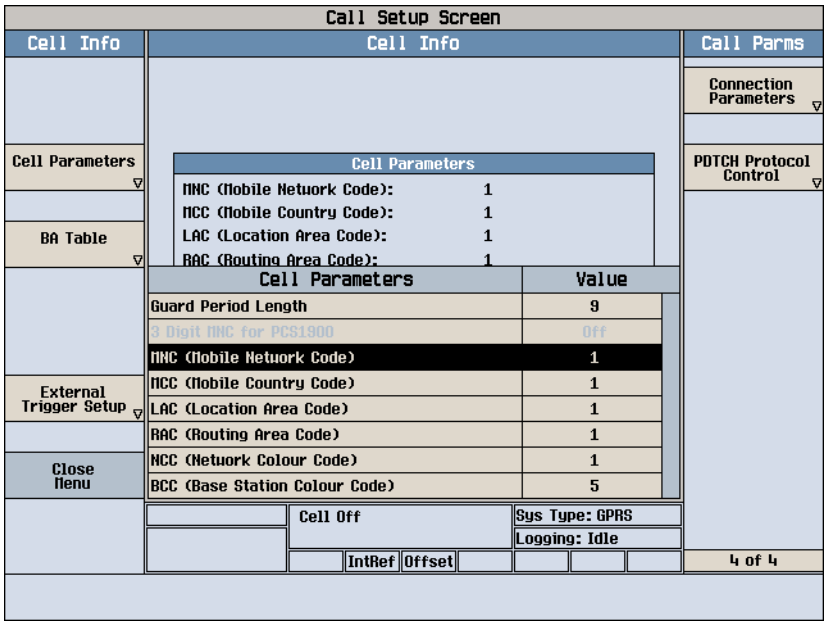
| Parameter Name | Channel | Description | Range | Default Value |
|---|---|---|---|---|
| MCC | BCCH | Mobile Country Code | 0-999 | 1 |
| MNC (except 1900 MHz band) | BCCH | Mobile Network Code | 0-99 | 1 |
| MNC (1900 MHz band) | BCCH | Mobile Network Code | 0-999 | 1 |
| LAC | BCCH | Location Area Code | $0\text{-}2^{16}$ | 1 |
| NCC | SCH | Network Color Code | 0-7 | 1 |
| BCC | SCH | Base Station Color Code | 0-7 | 5 |
| RAC | BCCH | Routing Area Code | 0-255 | 1 |

## How to Set Cell Parameters

1. In the `Call Setup` screen select `Operating Mode` (**F1**).




2. Set `Operating Mode` to `Cell Off`.
3. Select `Cell Info` (**F6**).
4. Select `Cell Parameters` (**F2**). Change the values as desired.

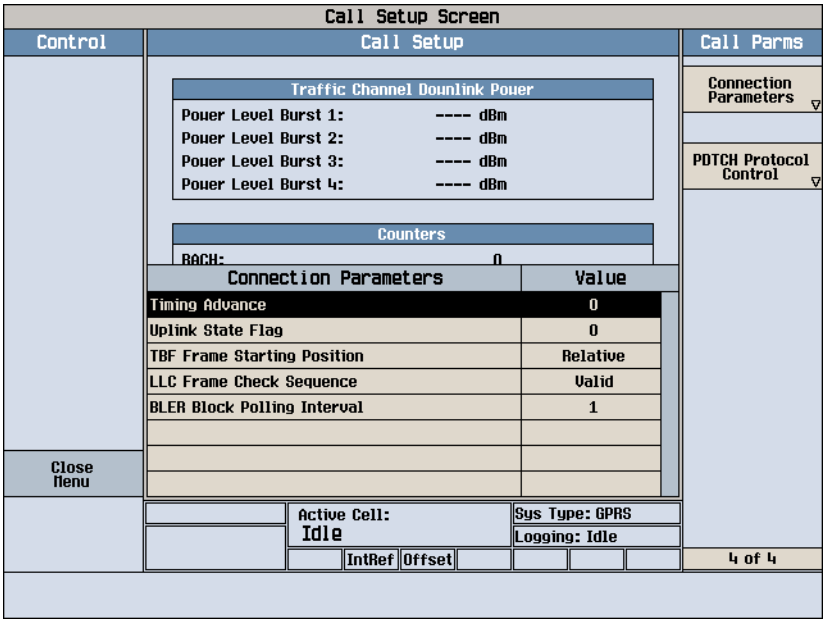



5. Set `Operating Mode` back to `Cell On`.

# Timing Advance and Uplink State Flag (USF)

Timing Advance and USF are fields in the Call Parms menu, fourth screen.

1. Press the **Call Setup** key.
2. Press the **More** key to advance the Call Parms menu.
3. In the fourth screen, select Connection Parameters.
4. Set Timing Advance or USF as desired.




## Timing Advance

Timing Advance values can now be sent to the DUT. This feature allows you to simulate propagation delays by telling the DUT how much it should offset its transmissions. The actual value is dependent on the selected band. This is done using Immediate Assignments, Packet Uplink & Downlinks Assignments, Packet Power Control/Timing Advance and Packet Timeslot Reconfigure messages. However, Control/Timing Advance and Packet Timeslot Reconfigure messages are only used in the handover scenarios.

**Table 19.**

| Timing Advance Values | Range | Default |
|---|---|---|
| All values are undefined, except for 11111, which indicates there is no timing advance defined. | 0-63 | 0 |

## Uplink State Flag

The USF, or Uplink State Flag, allows the multiplexing of several wireless appliances onto a single uplink PDCH. The USF value is sent to the DUT in an immediate assignment message.

It can be used to determine that the DUT will transmit on the appropriate uplink block with several different USF numbers:

1. Establish a GPRS data link and start transferring data.
2. Change the USF value sent to the DUT via an assignment message.
3. Send the new USF value via an assignment message.
4. Verify that the DUT transmits on the block corresponding to the new USF.

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