

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

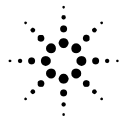
# **Reference Manual**

GSM Test Application Revision A.05  
GPRS Test Application Revision A.00

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**<http://www.agilent.com/find/8960support/>**

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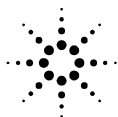
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U.S.A.



**Agilent Technologies**

# Legal Information

## Manufacturer's Declaration

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

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

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

## Herstellerbescheinigung

- Schalldruckpegel  $L_p < 70$  dB(A).
- Diese Information steht im Zusammenhang mit den Anforderungen der Maschinenlärminformationsverordnung vom 18 Januar 1991.
- Am Arbeitsplatz.
- Normaler Betrieb.
- Nach ISO 7779:1988/EN 27779:1991 (Typprüfung).

## Safety Considerations

### GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

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.

### SAFETY EARTH GROUND

A uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

### SAFETY SYMBOLS



Indicates instrument damage can occur if indicated operating limits are exceeded.



Indicates hazardous voltages.



Indicates earth (ground) terminal

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#### WARNING

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

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#### CAUTION

A CAUTION note denotes a hazard. It calls attention to an operation procedure, practice, 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 an CAUTION note until the indicated conditions are fully understood and met.

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**WARNING**

**This product is a Safety Class I instrument (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.**

**Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.**

**If this instrument is to be energized via an autotransformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.**

**If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.**

**No operator serviceable parts in this product. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**

**Servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**

**The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources while it is being opened.**

**The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.**

**For Continued protection against fire hazard, replace the line fuse(s) only with 250 V fuse(s) or the same current rating and type (for example, normal blow or time delay). Do not use repaired fuses or short circuited fuseholders.**

**Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.**

**This product is designed for use in Installation Category II and Pollution Degree 2 per *IEC 1010* and *IEC 664* respectively. FOR INDOOR USE ONLY.**

**This product has autoranging line voltage input, be sure the supply voltage is within the specified range.**

**To prevent electrical shock, disconnect instrument from mains (line) before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

**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.**

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## **Product Markings**

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

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

## **CERTIFICATION**

*Agilent Technologies, Inc. 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*

## **WARRANTY**

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Agilent Technologies, Inc. will at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent. Buyer shall prepay shipping charges to Agilent and Agilent shall pay shipping charges, duties, and taxes for products returned to Agilent from another country.

Agilent warrants that its software and firmware designated by Agilent for use with an instrument will execute its programming instructions when properly installed on that instrument. Agilent does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

## **LIMITATION OF WARRANTY**

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. AGILENT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

## **EXCLUSIVE REMEDIES**

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. AGILENT SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASE ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

## **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.*

# 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.

## EMC:

Conforms with the following product specifications:

### Standard:

CISPR11:1990 / EN55011:1991  
IEC 801-2:1991 / EN 50082-1:1992  
IEC 801-3:1984 / EN 50082-1:1992  
IEC 801-4:1988 / EN 50082-1:1992

### Limit:

Group 1 Class A  
4kV CD, 8kV AD  
3V/m, 27-500 MHz  
0.5kV signal lines, 1kV power lines

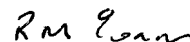
## Safety:

The product conforms to the following safety standards:

IEC 61010-1(1990) +A1(1992) +A2(1995) / EN 61010-1:1993  
Canada / CSA-C22.2 No. 1010.1-93

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC, and the EMC Directive 89/336/EEC, and carries the CE mark accordingly.

**South Queensferry, Scotland. 04 May 2000**



R.M. Evans / Quality Manager

**Spokane, Washington, USA. 04 May 2000**



W.V. Roland / Reliability & Regulatory  
Engineering Manager

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

**Table 1. Regional Sales and Service Offices**

<p>United States of America: Agilent Technologies Test and Measurement Call Center P.O. Box 4026 Englewood, CO 80155-4026</p> <p>(tel) 1 800 452 4844</p>	<p>Canada: Agilent Technologies Canada Inc. 5159 Spectrum Way Mississauga, Ontario L4W 5G1</p> <p>(tel) 1 877 894 4414</p>	<p>Europe: Agilent Technologies European Marketing Organization P.O. Box 999 1180 AZ Amstelveen The Netherlands</p> <p>(tel) (3120) 547 9999</p>
<p>Japan: Agilent Technologies Japan Ltd. Measurement Assistance Center 9-1 Takakura-Cho, Hachioji-Shi, Tokyo 192-8510, Japan</p> <p>(tel) (81) 456-56-7832 (fax) (81) 426-56-7840</p>	<p>Latin America: Agilent Technologies Latin America Region Headquarters 5200 Blue Lagoon Drive, Suite #950 Miami, Florida 33126 U.S. A.</p> <p>(tel) (305) 267 4245 (fax) (305) 267 4286</p>	<p>Australia/New Zealand: Agilent Technologies Australia Pty Ltd 347 Burwood Hightway Forest Hill, Wictoria 3131</p> <p>(tel) 1 800 629 485 (Australia) (fax) (61 3) 9272 0749 (tel) 0 800 738 378 (New Zealand) (fax) (64 4) 802 6881</p>
<p>Asia Pacific: Agilent Technologies 19/F, Cityplaza One, 111 Kings Road, Taikoo shing, Hong Kong, SAR</p> <p>(tel) (852) 2599 7899 (fax) (852) 2506 9233</p>		



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# 1 GSM Call Processing

---

## 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 370](#).
2. If necessary, set the IMSI state. See [“CALL:PAGing:IMSI” on page 342](#).

#### Example 1.

```
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\[:STATe\]” on page 343](#).

#### Example 2.

```
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 37](#).
5. Page the mobile station by sending the call originate command to the test set.

#### Example 3.

```
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 37](#).

---

## 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 370](#).
2. Configure the necessary call processing connect/disconnect synchronization conditions. See [“Call Processing State Synchronization” on page 37](#).
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 37](#).

---

## Operating Considerations

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

---

## 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 1. Overlapped Commands**

Command	Purpose Of Command	Example
:DONE?	Returns a 0 if the associated command's pending operation flag is true, or a 1 if it is false.	<pre> 10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 REPEAT 50 OUTPUT 714;"CALL:TCH:DONE?" 60 ENTER 714;Process_done 70 UNTIL Process_done 80 OUTPUT 714;INIT:TXP;PFER" 90 END </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :DONE? command is used to find out if the handover is finished</p>
:SEQuential	Forces an overlapped command to execute in a sequential manner. No subsequent commands will be executed until the pending operation flag for this operation is false.	<pre> OUTPUT 714;"CALL:TCH:SEQ 65" </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and to not execute any more commands until the pending operation flag associated with the CALL:TCH command is false.</p>
:WAIT	Forces the test set to wait until the associated command's pending operation flag is false before executing any more commands.	<pre> 10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 OUTPUT 714;"CALL:TCH:WAIT" 50 OUTPUT 714;"INIT:TXP;PFER" 60 END </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :WAIT command is sent to prevent the test set from executing the INITiate command until the handover is finished.</p>

**Table 1. Overlapped Commands**

Command	Purpose Of Command	Example
:OPComplete?	Places a 1 in the test set's output queue when the associated command's pending operation flag goes false. Controlling program hangs on this query until the 1 is retrieved.	<pre> 10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 OUTPUT 714;"CALL:TCH:OPC?" 50 ENTER 714;Op_complete 60 OUTPUT 714;"INIT:TXP;PFER" 70 END                     </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :OPC? command is sent to hang program execution until a 1 is put in the test set's output queue, satisfying the ENTER statement and allowing program execution to continue with the INITiate command.</p>

**Operating Considerations**

When using the call processing subsystem overlapped command synchronization commands, check the conditions that set the operation's pending operation flag (POF) false to avoid unexpected results.

## Call Processing Subsystem Overlapped Commands

Call Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
CALL:ORIGinate See <a href="#">“CALL:ORIGinate” on page 341.</a>	Performs a base station call origination.	The call processing state leaves the Idle state (when the operating mode is active cell), or  The test set has noted this parameter change (when the operating mode is test mode).
CALL:END See <a href="#">“CALL:END” on page 318.</a>	Performs a base station call termination.	The call processing state reaches the Idle state (when the operating mode is active cell), or  The test set has noted this parameter change (when the operating mode is test mode).
CALL[:CELL[1]]:BCHannel[:ARFCn][:SElected] See <a href="#">“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 306.</a>	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> See <a href="#">“CALL:BCHannel” on page 306.</a>	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] See <a href="#">“CALL:TCHannel[:ARFCn][:SElected]” on page 371.</a>	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:  The channel assignment has been successfully completed (when a call is established), or  The test set has noted this parameter change (no call established), or  The test set has noted this parameter change (not currently selected band), or  An error message was generated.
CALL:TCHannel[:ARFCn]:<traffic band> See <a href="#">“CALL:TCHannel” on page 370.</a>	Sets the TCH ARFCN for a traffic band not currently selected.	
CALL:TCHannel:TSLot See <a href="#">“CALL:TCHannel:TSLot” on page 376.</a>	Sets the TCH timeslot.	
CALL:MS:TADVance See <a href="#">“CALL:MS:TADVance” on page 335.</a>	Sets the mobile station timing advance.	
CALL:MS:TXLevel[:SElected] See <a href="#">“CALL:MS:TXLevel[:SElected]” on page 336.</a>	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] See <a href="#">“CALL:CONNected:ARM[:IMMediate]” on page 311.</a>	Arms the call control status change detector.	

## Related Topics

\*\*\*\*\*

[“Call Processing State Synchronization” on page 37](#)

[“Measurement Event Synchronization” on page 153](#)

[“Test System Synchronization Overview” on page 42](#)

\*\*\*\*\*

## Call Processing State Synchronization

### Description

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

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 method provides the advantage of indicating that a call state change has occurred. The change detector works in conjunction with the Connected /Idle Query. Arming the CALL:CONNECTED query provides a way for the test set to know when the call state change process is done.

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

- the call processing state has progressed to either connected or idle  
or..
- the attempt to connect or disconnect a call 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 timeout timer

The following command arms the call state change detector, but does not cause any call processing function to start:

```
OUTPUT 714;"CALL:CONNECTED:ARM[:IMMEDIATE]" !Used for mobile station originated calls.
```

These commands automatically arm the call state change detector, and start the base station originated call processing functions:

```
OUTPUT 714;"CALL:ORIGINATE" !Used for base station originated call connect.
```

```
OUTPUT 714;"CALL:END" !Used for base station originated call disconnect (idle).
```

## 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.

### Example 5. Using the Change Detector - Mobile Station Originated Call

The following example illustrates the use of the call state change detector and connected/idle query for a mobile station originated call. This program prompts the operator to make a call from the mobile station being tested. When the CALL:CONNECTED:ARM command is sent, it causes the reply from the CALL:CONNECTED:STATE? query to be held-off temporarily until the connected or idle state is reached. The timeout is provided for cases where an expected call state change does not happen, for instance if the user does not make the call when prompted by the program.

```

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

```

## 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 534](#) for status bit definitions and GPIB command syntax. See [“Call State STATUS:OPERation:CALL:GSM Program Example” on page 40](#).

## Call State STATUS:OPERation:CALL:GSM Program Example

### Example 6. 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 summary
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 32](#)

[“CALL:STATus\[:STATe\]?” on page 366](#)

[“CALL:CONNected:ARM\[:IMMediate\]” on page 311](#)

[“CALL:CONNected:TIMEout” on page 312](#)

[“Instrument Status Area” on page 642](#)

\*\*\*\*\*

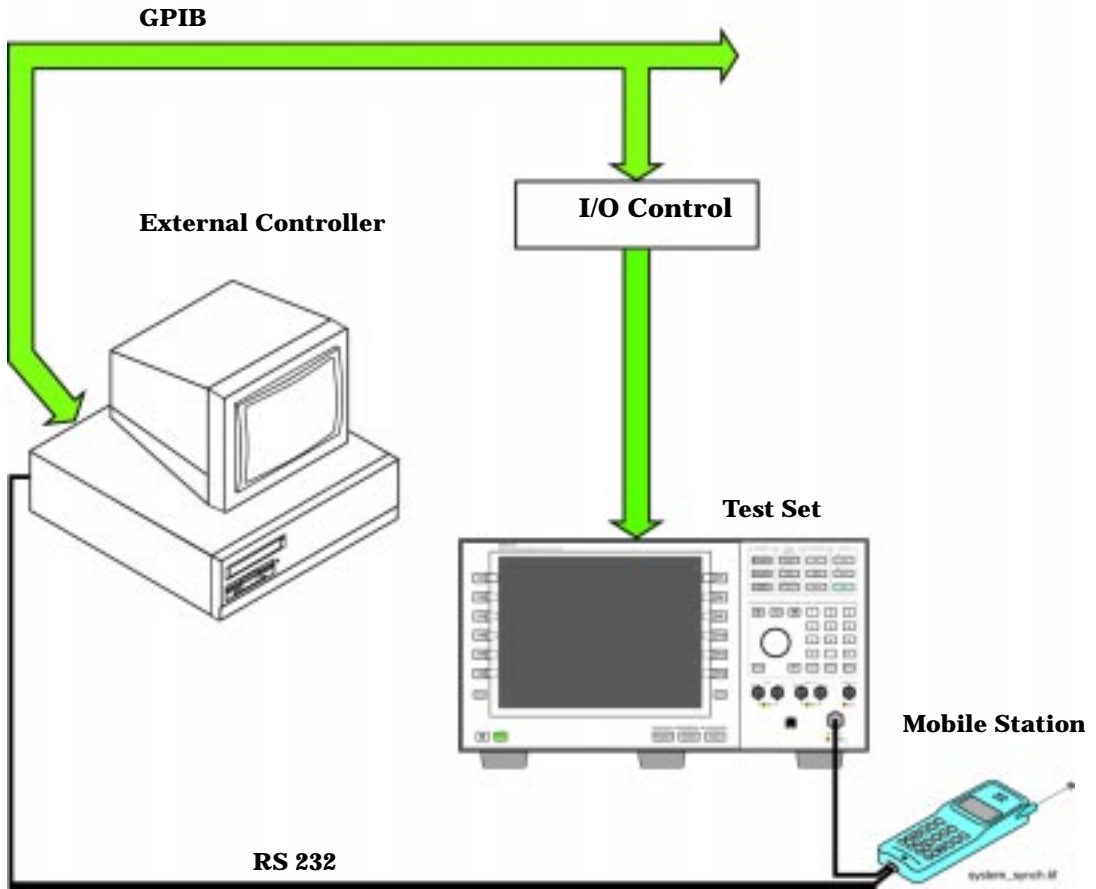
## Test System Synchronization Overview

### 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 1. 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\[:STATe\]?” on page 366](#)

This command queries the test set's current call processing state. This command supports synchronization method five. (See [“Call Processing State Query” on page 37](#)).

- [“CALL:CONNected\[:STATe\]?” on page 310](#)

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 37](#)). 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 33.](#))

- **: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 33.](#))
- **: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 33.](#))
- **“INITiate:DONE?” on page 439**  
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 153.](#))
- **STATUS:<register>**  
Status bits in the [“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 534](#) 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 540](#) 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 524.](#)

- [“SYSTem:SYNChronized” on page 591](#)  
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 529](#)). This command supports synchronization method four and six.
- [“\\*OPC” on page 592](#), [“\\*OPC?” on page 592](#), and [“\\*WAI” on page 593](#) (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 37](#)

[“Measurement Event Synchronization” on page 153](#)

[“Call Processing Event Synchronization” on page 32](#)

[“SYSTem:SYNChronized” on page 591](#)

\*\*\*\*\*

## **2 GPRS Data Connection**





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## Establishing a Data Connection with the Mobile Station

For step-by-step instructions on how to make a data connection, see [“Step 5: Establish a Data Connection with the Mobile Station”](#) on page 253.

### Related Topics

\*\*\*\*\*

[“CALL:PDTCH|PDTChannel”](#) on page 345

[“CALL:FUNCTION:DATA:START”](#) on page 321

[“Data Connection Processing State Synchronization”](#) on page 53

\*\*\*\*\*

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## 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.

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**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 2. Overlapped Commands

Command	Purpose Of Command	Example
:DONE?	Returns a 0 if the associated command's pending operation flag is true, or a 1 if it is false.	<pre> 10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 REPEAT 50 OUTPUT 714;"CALL:TCH:DONE?" 60 ENTER 714;Process_done 70 UNTIL Process_done 80 OUTPUT 714;INIT:TXP;PFER" 90 END </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :DONE? command is used to find out if the handover is finished</p>
:SEQuential	Forces an overlapped command to execute in a sequential manner. No subsequent commands will be executed until the pending operation flag for this operation is false.	<pre> OUTPUT 714;"CALL:TCH:SEQ 65" </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and to not execute any more commands until the pending operation flag associated with the CALL:TCH command is false.</p>
:WAIT	Forces the test set to wait until the associated command's pending operation flag is false before executing any more commands.	<pre> 10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 OUTPUT 714;"CALL:TCH:WAIT" 50 OUTPUT 714;"INIT:TXP;PFER" 60 END </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :WAIT command is sent to prevent the test set from executing the INITiate command until the handover is finished.</p>

**Table 2. Overlapped Commands**

Command	Purpose Of Command	Example
:OPComplete?	Places a 1 in the test set's output queue when the associated command's pending operation flag goes false. Controlling program hangs on this query until the 1 is retrieved.	<pre> 10 OUTPUT 714;"CALL:TCH 65" 20 OUTPUT 714;"SETUP:TXP:CONT OFF" 30 OUTPUT 714;"SETUP:PFER:CONT OFF" 40 OUTPUT 714;"CALL:TCH:OPC?" 50 ENTER 714;Op_complete 60 OUTPUT 714;"INIT:TXP;PFER" 70 END                     </pre> <p>The example shown is from the E1960A GSM test application. Commands the test set to perform a traffic channel handover and execute two setup commands. After the two setup commands have finished, the :OPC? command is sent to hang program execution until a 1 is put in the test set's output queue, satisfying the ENTER statement and allowing program execution to continue with the INITiate command.</p>

**Operating Considerations**

When using the call processing subsystem overlapped command synchronization commands, check the conditions that set the operation's pending operation flag (POF) false to avoid unexpected results.

**Data Connection Processing Subsystem Overlapped Commands**

Data Connection Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
CALL:FUNCTION:DATA:START See <a href="#">"CALL:FUNCTION:DATA:START" on page 321</a> .	Attempts to initiate a data connection.	The connection status is any non-transitory state other than Attached (that is Idle, or Transferring).

**Related Topics**

\*\*\*\*\*

["Data Connection Processing State Synchronization" on page 53](#)

["Measurement Event Synchronization" on page 153](#)

["Test System Synchronization Overview" on page 56](#)

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# 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 321](#)). 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 or Attached, 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 321](#)). 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 an ETSI test mode TBF (temporary block flow) has been established.

## Data Connection Processing State Synchronization

The following command returns the current state of a data connection:

```
OUTPUT 714;"CALL:STATus:STATe:DATA?"  
ENTER 714;Inst_state$
```

### Related Topics

\*\*\*\*\*

["Test System Synchronization Overview" on page 56](#)

["Data Connection Processing Event Synchronization" on page 50](#)

["CALL:STATus\[:STATe\]:DATA?" on page 366](#)

\*\*\*\*\*



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## Test System Synchronization Overview

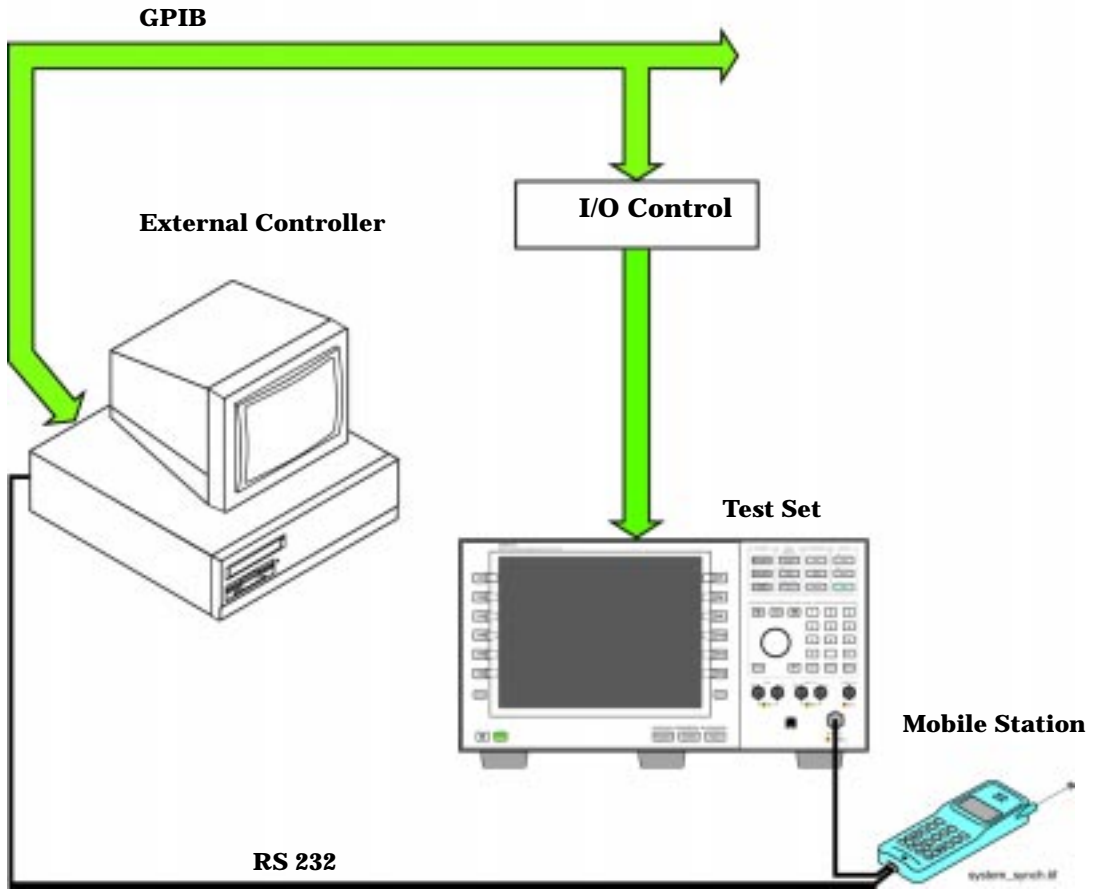
### Description

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\[:STATe\]:DATA?” on page 366](#)

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 53](#).

- :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 51](#).

- :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 51](#).

- :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 51](#).

- [“INITiate:DONE?” on page 439](#)

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 153](#).

- [“SYSTem:SYNChronized” on page 591](#)

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 529](#)). This command supports synchronization method four and six.

- [“\\*OPC” on page 592](#), [“\\*OPC?” on page 592](#), and [“\\*WAI” on page 593](#) (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 53](#)

[“Measurement Event Synchronization” on page 153](#)

[“Data Connection Processing Event Synchronization” on page 50](#)

[“SYSTem:SYNChronized” on page 591](#)

\*\*\*\*\*



## **3 Measurements**

## Analog Audio Measurement Description

This measurement is *not* applicable to GPRS.

### How is an analog audio measurement made?

Analog audio measurement response is measured from the mobile station's audio output, which also may be an acoustic coupler or electrical connection from the mobile station connected to the test set's AUDIO IN connector.

The expected voltage is the absolute peak audio input signal voltage at the front panel BNC. The expected voltage sets the analog audio clipping level and must be set. The expected voltage is peak voltage and the results are returned as rms, so a 1-volt rms input signal would need a  $1.414 V_{\text{peak}}$  expected voltage value.

The trigger source for analog audio is always set to Immediate.

The test set has a tunable bandpass filter with a 100 Hz bandwidth that can be used to tune out ambient noise for making 217 Hz buzz or 8 kHz whine tests. The filter's range is from 200 Hz to 8.0 kHz.

The analog audio measurement returns the following measurement results:

- Audio Measurement Integrity Indicator
- Audio Measurement Result ( $0 V_{\text{rms}}$  to  $+20 V_{\text{rms}}$ )
- Audio Multi-measurement Maximum ( $0 V_{\text{rms}}$  to  $+20 V_{\text{rms}}$ ) when multi-measurement count is on.
- Audio Multi-measurement Minimum ( $0 V_{\text{rms}}$  to  $+20 V_{\text{rms}}$ ) when multi-measurement count is on.
- Audio Multi-measurement Standard Deviation ( $0 V$  to  $+14.14214 V$ ) when multi-measurement count is on.

None of the analog audio measurement results are affected by amplitude offset.

When making an audio measurement on a single port you should terminate the other audio port with either a 50 ohm load or a short. This improves the accuracy of the measurement by reducing sensitivity to stray signals at the unused port.

If noise is making your audio measurement difficult, use the 100 Hz bandwidth tunable band pass filter. This narrow band filter reduces the noise significantly. Refer to [“SETup:AAUDio:FILTer\[:SFRequency\]” on page 466](#).

### Trigger Source

Analog audio measurements are triggered immediately after being armed. Arming is not necessary if the trigger state is set to continuous.

### Related Topics

\*\*\*\*\*

[“Programming an Analog Audio Measurement” on page 63](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

## Programming an Analog Audio Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make the analog audio (AAUDIO) measurement via GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connector. See [“Analog Audio Measurement Description” on page 62](#).

1. Configure analog audio measurement parameters using the SETUp subsystem.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to find out if analog audio measurement results are available.
4. Use the FETCh? command to obtain analog audio measurement results.

### Programming Example

```

10 OUTPUT 714;"SETUP:AAUDIO:CONTINUOUS OFF" !Configures the analog audio
20                                     !measurement to single trigger mode.
30 OUTPUT 714;"SETUP:AAUDIO:EXPECTED:VOLTAGE:PEAK 3" !Set the clipping level for
40                                     !audio input.
50 OUTPUT 714;"SETUP:AAUDIO:FILTER:SFREQUENCY 8KHZ" !Specifies the tunable
60                                     !bandpass filter frequency to
70                                     !be 8 kHz and turns the filter
80                                     !state ON.
90 OUTPUT 714;"INITIATE:AAUDIO"!Start the analog audio measurement.
100 REPEAT
110 OUTPUT 714;"INITIATE:DONE?"!Check to see if analog audio measurement is done.
120 ENTER 714;Meas_complete$
130 UNTIL Meas_complete$="AAUD"
140 OUTPUT 714;"FETCH:AAUDIO?"! Fetch analog audio measurement results.
150 ENTER 714;Integrity, Analog_audio
160 END

```

### Returned Values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 146](#) (0 means a successful measurement with no errors).
- Analog\_audio returns the analog audio level in volts rms.

## Related Topics

\*\*\*\*\*

[“Analog Audio Measurement Description” on page 62](#)

[“INITiate” on page 438](#)

[“SETup:AAUDio” on page 463](#)

[“FETCh:AAUDio” on page 381](#)

[“Comprehensive Program Example” on page 223](#)

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## AAUDio 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:AAUDio:CONTinuous” on page 464](#).

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 170](#).

The analog audio measurement results are rms values, the Expected Peak Audio Amplitude is a peak value.

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).

If over range (5) is returned then the input level is greater than 3dB above the Expected Peak Audio Amplitude value or the maximum input level of 20 volts peak.

If under range (6) is returned then the input level is greater than 20dB below the Expected Peak Audio Amplitude value maximum value.

If the signal has both over range and under range conditions only the over range (5) will be indicated.

## Bit Error Measurement Description

This measurement is *not* applicable to GPRS.

### 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 90](#).

---

<b>NOTE</b>	<p>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.</p> <p>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.</p>
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### 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 471](#)). If you query a residual result when a non-residual measurement is initiated, the test set returns 9.91 E+37 (NAN). Measurement type must be set before initiating a BER measurement. See [“Measurements type” on page 67](#)

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 470](#) 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 473](#)).

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**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 158](#)

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

### Measurements type

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 388 or “[FETCh:BERRor:RATio\[:BITS\]?](#)” on page 391. Alternatively the “[FETCh:BERRor\[:ALL\]?](#)” on page 387 or “[FETCh:BERRor:FULL?](#)” on page 390 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

\*\*\*\*\*

[“Programming a Bit Error Measurement” on page 69](#)

[“Test Adherence to Standards” on page 131](#)

[“Fast Bit Error Measurement Description” on page 90](#)

[“Programming a Fast Bit Error Measurement” on page 93](#)

[“CALL:TCHannel:LOOPback” on page 375](#)

[“BERR Troubleshooting” on page 72](#)

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## Programming a Bit Error Measurement

This measurement is *not* applicable to GPRS.

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 30](#).

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 INITiate:DONE? command to find out if the BER measurement results are available.
7. Use the FETCh? command to obtain BER measurement results.
8. 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 REPEAT
200     OUTPUT 714;"INITIATE:DONE?"
210     ENTER 714;Meas_comp$
220     PRINT Meas_comp$
230 UNTIL Meas_comp$="BERR"
240 OUTPUT 714;"FETCH:BERROR?" ! BERR results.
250 ENTER 714;Integrity,Bits_tested,Bit_err_ratio,Bit_err_count
260 OUTPUT 714;"FETCH:BERROR:COUNT:CRC?" ! Query CRC Count results.
270 ENTER 714;Crc_count
280 OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -85 DBM" ! Sets the cell power level
290                                     ! to a good level.
300 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 Indicator returns the [“Integrity Indicator” on page 146](#) (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 66](#)

[“SETup:BERRor” on page 469](#)

[“INITiate” on page 438](#)

[“FETCh:BERRor” on page 385](#)

[“Comprehensive Program Example” on page 223](#)

[“BERR Troubleshooting” on page 72](#)

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## BERR 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 bit error measurement you should configure the trigger arm to single, see [“SETup:BERRor:CONTinuous” on page 472](#).

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 170](#).

If you have a BER measurement active and your mobile drops the call it may be that you have the [“SETup:BERRor:SLControl” on page 474](#) 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.

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).



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## BLER Reports 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 packets to the total number of packets 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 (see [“CALL:FUNCTION:DATA:TYPE”](#) on page 321).

### When are BLER Report Measurements Made?

You obtain BLER results using the GPIB query [“CALL:STATUS:PDTCH | PDTChannel:BLERror?”](#) on page 367. This query returns the percentage of blocks tested that were in error and the total number of blocks used to generate the BLER result. The BLER results are reset using [“SYSTEM:MEASUREMENT:RESet”](#) on page 587.

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 53.

### 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 5: Establish a Data Connection with the Mobile Station”](#) on page 253.

1. Use the `CALL:STATUS:PDTCH:BLERror?` query to obtain the first BLER results.
2. End the data connection and then re-configure the downlink PDTCH power levels using the `CALL:subsystem`.
3. Reset the BLER results and then re-start the data connection.
4. 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    !
40    ! Read the initial BLER result
50    OUTPUT 714;"CALL:STAT:PDTCH:BLER?"
60    ENTER 714;Bler_initial,Blocks_initial
70    !
80    ! Print results at initial downlink PDTCH power level
90    ! of -90 dBm(-60 dBm BCH level - 30 dB fixed P0 level)
100   PRINT "BLER Result at downlink PDTCH power of -90 dBm = ";Bler_initial
110   PRINT "Blocks tested at -90 dBm = ";Blocks_initial
120   !
130   !
140   ! End the data connection before changing the downlink PDTCH power level
150   OUTPUT 714;"CALL:FUNC:DATA:STOP"
160   ! Check the connection status to make sure the state is Attached
170   WAIT 4
180   OUTPUT 714;"CALL:STAT:DATA?"
190   ENTER 714;Conn_stat$
200   IF Conn_stat$<>"ATT" THEN
210       PRINT "Data Connection was not stopped"
220       STOP
230   END IF
240   !
250   ! Set up and select the downlink PDTCH power reduction levels for bursts 1 and 2
260   OUTPUT 714;"CALL:PDTCH:PRED:LEV1 10db"
270   OUTPUT 714;"CALL:PDTCH:PRED:BURS1 PRL1"
280   OUTPUT 714;"CALL:PDTCH:PRED:BURS2 PRL1"
290   OUTPUT 714;"SYST:MEAS:RES" ! Reset the BLER results
300   ! Now re-establish the data connection
310   OUTPUT 714;"CALL:FUNC:DATA:STAR:SEQ"
320   ! Check the connection status to make sure the state is Transferring
330   WAIT 4
340   OUTPUT 714;"CALL:STAT:DATA?"
350   ENTER 714;Conn_stat$
360   IF Conn_state$<>"TRAN" THEN
370       PRINT "Data connection failed.  Terminated program."
380       STOP
390   END IF
400   !
410   ! Now obtain the second set of BLER results at lower downlink PDTCH power level
420   OUTPUT 714;"CALL:STAT:PDTCH:BLER?"
430   ENTER 714;Bler_second,Blocks_second
440   !
450   ! Print results at lower downlink PDTCH power level of -100 dBm
460   PRINT "BLER Result at downlink PDTCH power of -100 dBm = ";Bler_second
470   PRINT "Blocks tested at -100 dBm = ";Blocks_second
480   END
```

**Returned Values**

The measurement reports returned by this program are:

- `Bler_initial` returns the BLER result, in percent (%) when the downlink PDTCH power levels are at their default value of -90 dBm.
- `Blocks_initial` returns the number of blocks tested to calculate the first BLER result.
- `Bler_second` returns the second BLER result, in percent (%). This result has been obtained when the downlink PDTCH power levels have been reduced by 10 dB to -100 dBm.
- `Blocks_second` returns the number of blocks tested to calculate the second BLER result.

**Related Topics**

\*\*\*\*\*

[“Testing a GPRS Mobile Station” on page 635](#)

[“CALL:STATus:PDTCH | PDTChannel:BLERror?” on page 367](#)

[“Programming the Agilent Technologies 8960 Series 10 for GPRS Mobile Testing in Active Cell Operating Mode” on page 235](#)

\*\*\*\*\*

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## 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 290](#) 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 291](#).

---

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 78](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

## 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 30](#).

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 INITiate:DONE? command to find out if decoded audio measurement results are available.
5. 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 REPEAT
110   OUTPUT 714;"INITIATE:DONE?"                     ! Check to see if measurement done.
120   ENTER 714;Meas_complete$
130   UNTIL Meas_complete$="DAUD"
140   OUTPUT 714;"FETCH:DAUDIO?"                     ! Fetch the decoded audio results.
150   ENTER 714;Ingerity,Decoded_audio
160   END

```

### Returned Values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 146](#) (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 76](#)

[“SETup:DAUDio” on page 484](#)

[“INITiate” on page 438](#)

[“FETCh:DAUDio” on page 393](#)

[“Comprehensive Program Example” on page 223](#)

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## Decoded Audio (DAUDio) 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 485](#).

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 170](#).

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 accoustical 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 146](#).

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 374](#)), Questionable Result Due To Channel Mode (16) is returned. This is because the DAUDio measurement is not supported in this channel mode.



---

## 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” on page 490](#)). 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

\*\*\*\*\*

[“SETup:DPOWer” on page 489](#)

[“FETCh:DPOWer” on page 397](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

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## 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 713](#)).

### Interpreting Integrity Indicator Values

See [“Integrity Indicator” on page 146](#).

## I/Q Tuning Measurement Description

This measurement is *not* applicable to GPRS.

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

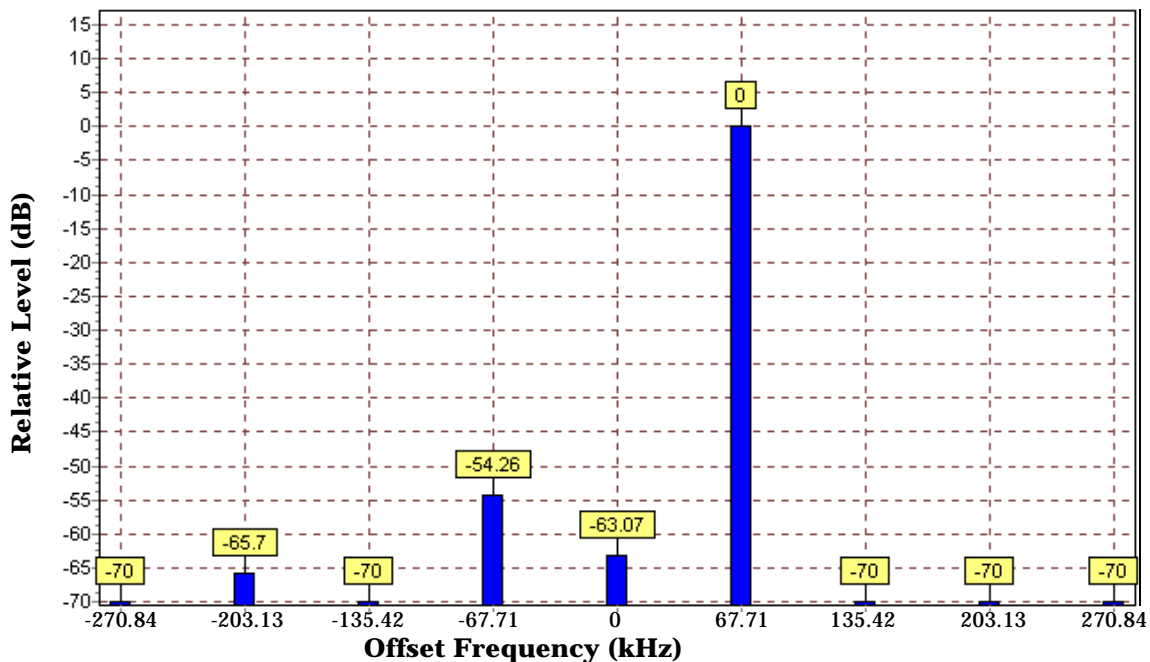
The I/Q Tuning measurement is used in the production process (normally at mobile pre-test) where the I/Q modulator of the mobile is being calibrated. The measurement is normally performed with the mobile station in test mode and transmitting a GMSK modulated sequence of all 0s or all 1s. The mobile can be transmitting either a burst 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 3. 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 86](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

## 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 INITiate:DONE? command to determine if I/Q Tuning measurement results are available.
6. 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  REPEAT

```

```

290     OUTPUT 714;"INITIATE:DONE?"!Check to see if I/Q Tuning
300     !measurement complete.
310     ENTER 714;Meas_complete$
320     UNTIL Meas_complete$="IQT"
330     OUTPUT 714;"FETCH:IQTUNING:ALL?"!Fetches the measurement integrity
340     !value and the relative power levels at the offset frequencies.
350     ENTER 714;Integrity,N270,N203,N135,N67,Carrier,P67,P135,P203,P270,Sr
360     PRINT "I/Q Tuning Measurement Results"
370     PRINT "Integrity = ";Integrity
380     PRINT "Spur Power = ";Sr
390     PRINT "Offset (kHz)          Level (dB)"
400     PRINT "-----"
410     PRINT "-270.334          ";N270
420     PRINT "-203.125          ";N203
430     PRINT "-135.417          ";N135
440     PRINT "-67.708          ";N67
450     PRINT "0.000          ";Carrier
460     PRINT "+67.708          ";P67
470     PRINT "+135.417          ";P135
480     PRINT "+203.125          ";P203
490     PRINT "+270.334          ";P270
500     END

```

## Returned Values

The measurements returned by this program are:

- Integrity returns the measurement **"Integrity Indicator"** on page 146 (0 means a successful measurement with no errors).
- The signal level of the following offsets are measured relative to the signal level at the reference offset (either  $F_c + 67.7083$  kHz for all 0s or  $F_c - 67.7083$  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 84](#)

[“SETup:IQTuning” on page 493](#)

[“INITiate” on page 438](#)

[“FETCh:IQTuning” on page 403](#)

\*\*\*\*\*



## 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[:FREQuency]” 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[:FREQuency]” 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 146.

## 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 66](#).

---

<b>NOTE</b>	<p>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.</p> <p>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.</p>
-------------	---

---

### 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 370](#)

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” on page 480](#). If you set signal loopback control to off, the loopback type is controlled using [“CALL:TCHannel:LOOPback” on page 375](#). If you are using the test set manually, the loopback type is controlled using **Mobile Loopback (F12) on Call Params 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 477](#) 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 479](#) or [“SETup:FBERror:MANual:DELAy” on page 480](#)

---

**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 76](#)

FBER measurement trigger source is always set to immediate. The FBER measurement does not offer multi-measurement results. see [“Statistical Measurement Results” on page 158](#)

## 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 401](#) or [“FETCh:FBERror:RATio?” on page 402](#). 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 93](#)

[“Test Adherence to Standards” on page 131](#)

[“Bit Error Measurement Description” on page 66](#)

[“Programming a Bit Error Measurement” on page 69](#)

[“CALL:TCHannel:LOOPback” on page 375](#)

\*\*\*\*\*

## 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 30](#).

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 INITiate:DONE? command to find out if the FBER measurement results are available.
6. Use the FETCh? command to obtain FBER measurement results.
7. 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 REPEAT
210   OUTPUT 714;"INITIATE:DONE?"
220   ENTER 714:Meas_comp$
230   PRINT Meas_comp$
240 UNTIL Meas_comp$="FBER"
250 OUTPUT 714;"FETCh:FBERROR?"
260 ENTER 714:Integrity,Bits_tested,Fas_bit_ratio,Fas_bit_err_cnt
270 OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -85 DBM" ! Sets the cell power level
280 ! to a good level.

```

290 END

## Returned values

The measurements returned by this program are:

- Integrity returns the measurement “[Integrity Indicator](#)” on page 146 (0 means a successful measurement with no errors).
- Bits\_tested returns the number of bits tested.
- Bit\_error\_ratio returns 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 90](#)

[“SETup:FBError” on page 476](#)

[“INITiate” on page 438](#)

[“FETCh:FBError” on page 399](#)

[“Comprehensive Program Example” on page 223](#)

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## FBER 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 476](#).

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 170](#).

Set signalling loopback control to on; if signalling loopback control is off, set loopback to Type C, see [“CALL:TCHannel:LOOPback” on page 375](#).

The test set may never correlate the uplink and downlink, see [“SETup:FBERror:LDControl:AUTO” on page 479](#) 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 481](#).

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).

Questionable Result for PGSM (15) Fast BER measurement appears to work but it is only possible on a Phase 2 GSM system.

---

# Output RF Spectrum Measurement Description

## 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, ETSI GSM 11.10, section 13.4. For GPRS mobiles which support a single uplink timeslot, the ORFS due to switching measurement conforms to ETSI GSM 11.10, section 13.16.3.

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 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.

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 127](#), 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 all offsets, the ORFS due to modulation measurement uses the 30 kHz resolution bandwidth filter. ETSI specifies a 100 kHz resolution bandwidth filter for the 1800 kHz offset.

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 158](#) 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, thereby providing average power results across the number of frequency offsets selected. 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.

## Making an ORFS measurement on GPRS mobiles while 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 be different from what would be expected.

## 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 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 3. 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 burst with mobile station in test mode	RF Rise
Non-bursted signal including GMSK data with mobile station in test mode	RF Rise

## Related Topics

\*\*\*\*\*

[“Programming an Output RF Spectrum Measurement” on page 99](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

## Programming an Output RF Spectrum Measurement

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 30](#).

1. Configure the ORFS measurement parameters using the SETUp subsystem.
2. Start the ORFS measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to find out if ORFS measurement results are available.
4. 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 REPEAT
220 OUTPUT 714;"INITIATE:DONE?" !Check to see if ORFS measurement is done.
230 ENTER 714;Meas_complete$
240 UNTIL Meas_complete$="ORFS" !"ORFS" must be all upper case.
250 OUTPUT 714;"FETCH:ORFSPECTRUM:ALL?" !Fetch ORFS results.
260 ENTER 714;Integrity,Tx_pwr,Max_swit_200,Max_swit_400,Bw_pwr,Avg_mod_200
270 END

```

## Returned values

The measurements returned by this program are:

- `Integrity` returns the measurement “[Integrity Indicator](#)” on page 146 (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 96](#)

[“SETup:ORFSpectrum” on page 499](#)

[“INITiate” on page 438](#)

[“FETCh:ORFSpectrum” on page 407](#)

[“Comprehensive Program Example” on page 223](#)

\*\*\*\*\*

## 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 499](#).

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 170](#).

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 410](#) or [“FETCh:ORFSpectrum:SWITChing:FREQUency\[:OFFSet\]\[:MAXimum\]?” on page 412](#) for GPIB commands.

The ORFS Transmit Power, 30 kHz BW Power, Max switching offset level and Average switching offset level results are shifted in proportion to the value of Amplitude Offset that you set. The following table shows the measurements that are affected and how amplitude offset affects them. For more information about amplitude offset commands, see [“Measurement Related Configuration” on page 670](#).

**Table 4. Measurements affected by amplitude offset**

Amplitude Offset Command	Power (dBm)		Switching Offset Level (dBm)		Cell Power Setting (dBm)
	ORFS Transmit	30 kHz BW	Max	Average (up to 8)	
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -3" !Offset for 3 dB of loss in the network.	6.74	-1.42	-35.60	-36.07	-82
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN 3" !Offset for 3 dB of gain in the network.	6.75	-1.66	-35.71	-36.09	-88
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN 0" !Zero dB of offset.	6.67	-1.18	-35.64	-36.09	-85

## Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).

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 [“Receiver Example” on page 674](#).

---

## 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, the Phase & Frequency Error measurement conforms to ETSI GSM 11.10, section 13.16.1.

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.
- Normal GSM TCH burst with mobile station in test mode.
- Access (RACH) burst with mobile station in test mode.
- 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  $\pm 12$  Hz + timebase reference.
- rms phase error measurement accuracy of less than  $\pm 1$  degree.
- Peak phase error measurement accuracy of less than  $\pm 4$  degrees.

under these conditions:

- Level is between  $-15$  dBm and  $+43$  dBm.
- Level within  $\pm 3$  dB of the expected input level.
- Frequency is within  $\pm 100$  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 5. 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	Protocol or RF Rise
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
Non-bursted non-GMSK signals with a manual frequency offset of $\pm 67.7083$ kHz	RF Rise



### Burst Synchronization

The PFER measurement provides you with a choice for the time reference (burst synchronization). see [“Burst Synchronization of Measurements” on page 136](#)

**Table 6.**

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 106](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

## Programming a Phase and Frequency Error Measurement

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 30](#).

1. Configure PFER measurement parameters using the SETUp subsystem.
2. Start the PFER measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to find out if PFER measurement results are available.
4. 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-measurment
40                                     !of 100.
50 OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO"!Configure trigger source
60                                     !to auto.
70 OUTPUT 714;"SETUP:PFERROR:BSYNC: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 REPEAT
150 OUTPUT 714;"INITIATE:DONE?" !Query to see if PFER measurement is done
160 ENTER 714;Meas_complete$
170 UNTIL Meas_complete$="PFER"
180 OUTPUT 714;"FETCH:PFERROR:ALL?"
190 ENTER 714;Integrity, Max_phase_err, Max_peak_error, Worst_freq_err
200 END

```

### Returned values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 146](#) (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 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 103](#)

[“SETup:PFERror” on page 508](#)

[“INITiate” on page 438](#)

[“FETCh:PFERror” on page 414](#)

[“Comprehensive Program Example” on page 223](#)

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## PFER 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” on page 509](#).

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 170](#).

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 618](#) 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 146](#).

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 309](#).

---

## Power versus Time Measurement Description

### 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/GPRS PvT Measurement” on page 112](#).

During a PvT measurement, the test set makes a narrowband point-by-point measurement of the instantaneous power received during the signal burst. 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. (Note that the Summary screen is *not* available for GPRS.) The PvT Transmit Power measurement is synchronized to the burst midamble as recommended in 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 127](#)).

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

This measurement conforms to ETSI GSM 11.10, section 13.3. For GPRS mobiles which support a single uplink timeslot, the transmitter output power result conforms to ETSI GSM 11.10, section 13.16.2. These are 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 426](#).

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\[:OFFSet\]” on page 516](#). Note that these points are not the same as those used in the point-by-point comparison which determines the pass/fail result.

- Results for a **single** PvT measurement include:
  1. PvT pass/fail result (0 = Pass, 1 & NaN = Fail)
  2. PvT measurement integrity indicator
  3. Transmit carrier power with midamble synchronization (average power during the burst)
  4. Upper limit power margin worst case (how close to or where the signal exceeded upper power limit)
  5. Lower limit power margin worst case (how close or where the signal exceeded lower power limit)
  6. Upper limit timing margin worst case (the time offset where the signal came close to or exceeded upper timing limit)

7. Lower limit timing margin worst case (the time offset where the signal came close to or exceeded lower timing limit)
- Results for **multi-measurement** PvT measurements include:
    1. Average of transmit carrier power measurements (average of averages)
    2. Maximum transmit carrier power measured across each burst
    3. Minimum 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, include:
    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 146](#).
  - 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. (Note that the progress report is *not* available for GPRS.) 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 or GPRS PDTCH 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  $\pm 3$  dB of expected input level.
3. Input signal frequency is within  $\pm 10$  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.

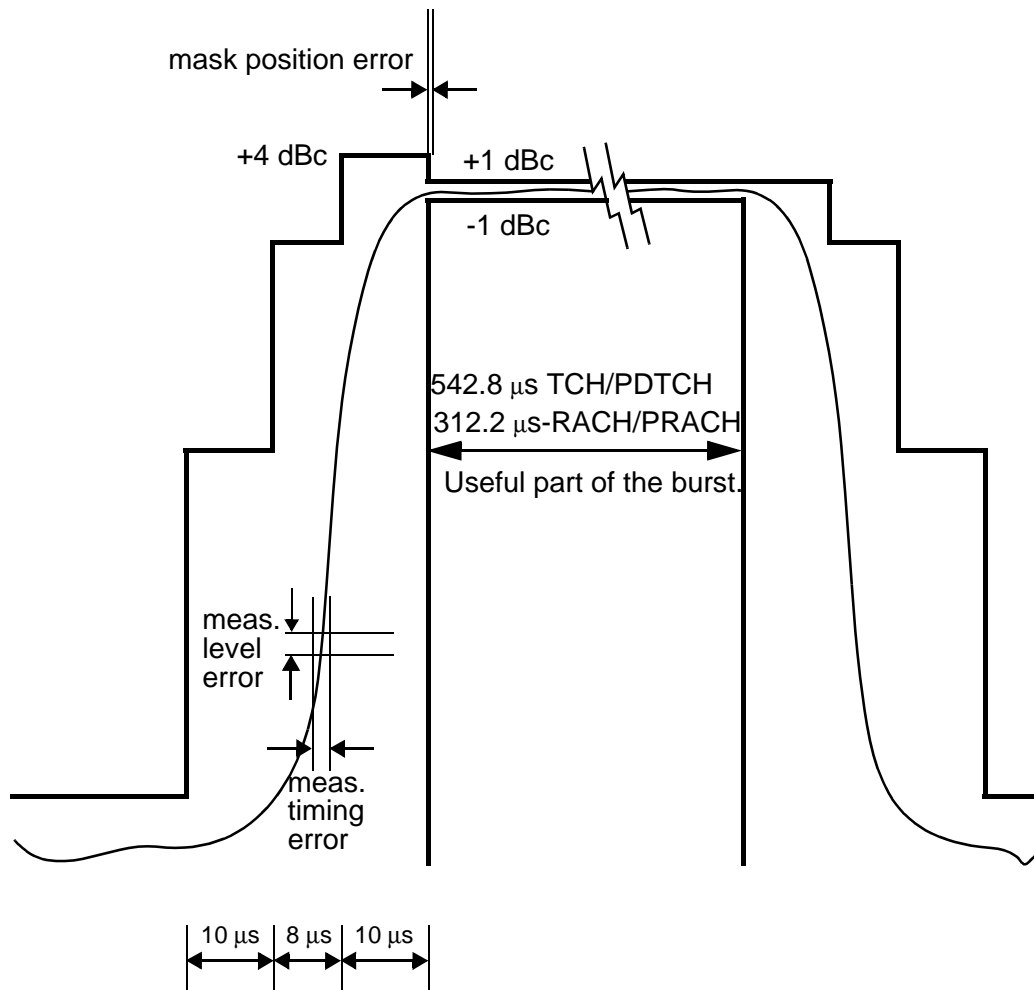
In situations where no protocol trigger is available, the test set will choose RF rise triggering for the PvT measurement. An example of this situation might be when the test set is in test mode operating mode.

**Table 7. 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	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 169](#).

**Figure 4. Typical GSM/GPRS PvT Measurement**





## Burst Synchronization

The PvT measurement provides you with a choice for the time reference setting (burst synchronization). See [“Burst Synchronization of Measurements” on page 136](#).

**Table 8.**

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 114](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*

## Programming a Power versus Time Measurement

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 30](#).

1. Configure PvT measurement parameters using the SETUp subsystem.
2. Start the PvT measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to find out if the PvT measurement results are available.
4. 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:BSYNC 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 REPEAT
170 OUTPUT 714;"INITIATE:DONE?" !Check to see if PvT measurement is done.
180 ENTER 714;Meas_complete$
190 UNTIL Meas_complete$="PVT"
200 OUTPUT 714;"FETCH:PVTIME:ALL?" !PvT results for time measurements.
210 ENTER 714;Integrity,Pvt_mask, Pvt_power, Max_offset
220 END

```

### Returned values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 146](#) (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\_offset returns the maximum offset level in dB, relative to the PvT carrier power.

## Related Topics

\*\*\*\*\*  
[“Power versus Time Measurement Description” on page 109](#)  
[“SETup:PVTime” on page 513](#)  
[“INITiate” on page 438](#)  
[“FETCh:PVTime” on page 421](#)  
[“Comprehensive Program Example” on page 223](#)  
\*\*\*\*\*

## PVT Troubleshooting

### Possible Setup Issues

During remote operation of the Power vs. Time measurement you should configure the trigger arm to single, see [“SETup:PVTime:CONTinuous” on page 514](#).

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 170](#).

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 618](#) there is not enough power to generate an RF Rise trigger so the measurement may hang.

The PVT Transmit Power measurement results are shifted in proportion to the value of Amplitude Offset that you set. The following table shows the measurements that are affected and how amplitude offset affects them. For more information about amplitude offset commands, see [“Measurement Related Configuration” on page 670](#).

**Table 9. Measurements affected by amplitude offset**

Amplitude Offset Command	PVT Transmit Power (dB)			Cell Power Setting (dBm)
	Minimum	Maximum	Average	
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -3" !Offset for 3 dB of loss in the network.	7.123	7.152	7.136	-82
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN 3" !Offset for 3 dB of gain in the network.	7.129	7.16	7.14	-88
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN 0" !Zero dB of offset.	7.112	7.147	7.124	-85

## Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).

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 [“Receiver Example” on page 674](#).

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 [“Receiver Example” on page 674](#).

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 309](#)

---

## 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  $\mu$ s. 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 120](#)

[“RACH Troubleshooting” on page 123](#)

\*\*\*\*\*

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## 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.

---

<b>NOTE</b>	Only one measurement at a time can be made on the RACH even if two measurements are initiated.
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---



## 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 118](#)

[“RACH Troubleshooting” on page 123](#)

\*\*\*\*\*

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## RACH Troubleshooting

### 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” on page 515](#)
- [“SETup:TXPower:COUNT:STATe” on page 521](#)
- [“SETup:PFERror:COUNT:STATe” on page 510](#)

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).

## 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.

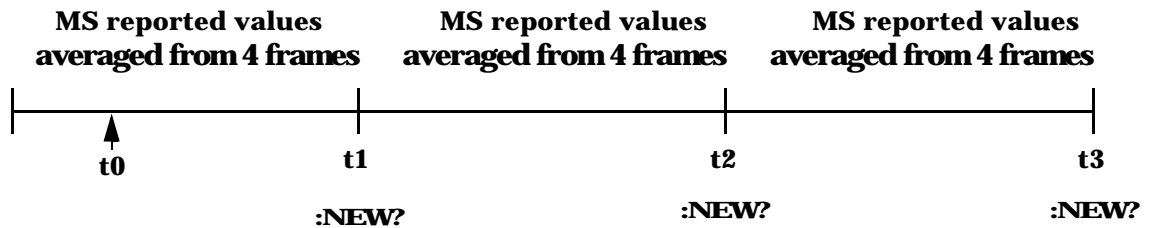
### :NEW? and [:LAST?] Queries

:NEW? queries hang until a new SACCH message is received by the test set. 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 5. 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 613](#)

[“CALL:MS:REPorted:TXLevel\[:LAST\]?” on page 335](#)

[“CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?” on page 335](#)

[“CALL:MS:REPorted:TADVance\[:LAST\]?” on page 334](#)

[“CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?” on page 334](#)

[“CALL:MS:REPorted:RXLevel\[:LAST\]?” on page 332](#)

[“CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?” on page 333](#)

[“CALL:MS:REPorted:RXQuality\[:LAST\]?” on page 333](#)

[“CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?” on page 333](#)

[“CALL:MS:REPorted:NEIGHbour\[1\]?” on page 331](#)

\*\*\*\*\*

---

## Transmit Power Measurement Description

### 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.

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 ETSI GSM 11.10. (See [“Burst Synchronization of Measurements” on page 136](#)). The power versus time measurement provides a carrier power measurement that is synchronized to the burst’s midamble, and conforms to ETSI GSM 11.10, section 13.3 and ETSI GSM 11.10, section 13.16.2. (See [“Power versus Time Measurement Description” on page 109](#) 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 the user. 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 to the user 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.
- Normal GSM TCH burst with mobile station in test mode.
- Access (RACH) burst with mobile station in test mode.
- 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  $\pm 0.6$ dB when.

- Level is between  $-20$ dBm and  $+3$  dBm.
- Level within  $\pm 3$  dB of the expected input level.
- Frequency is within  $\pm 100$ 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 10. on page 128

**Table 10. Recommended Trigger Source Settings**

Input Signal Type	Recommend 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	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

## Related Topics

\*\*\*\*\*

[“Programming a Transmit Power Measurement” on page 129](#)

[“Test Adherence to Standards” on page 131](#)

\*\*\*\*\*



## Programming a Transmit Power Measurement

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 30](#).

1. Configure the TXP measurement parameters using the SETup subsystem.
2. Start the TXP measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to find out if TXP measurement results are available.
4. 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 REPEAT
90 OUTPUT 714;"INITIATE:DONE?" !Check to see if TXP measurement is done.
100 ENTER 714;Meas_complete$
110 UNTIL Meas_complete$="TXP" !"TXP" must be all upper case.
120 OUTPUT 714;"FETCH:TXPOWER:ALL?" !Fetch TXP results.
130 ENTER 714;Integrity, Avg_tx_power
140 END

```

### Returned Values

The measurements returned by this program are:

- Integrity returns the measurement [“Integrity Indicator” on page 146](#) (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 127](#)

[“SETup:TXPower” on page 519](#)

[“INITiate” on page 438](#)

[“FETCh:TXPower” on page 433](#)

[“Comprehensive Program Example” on page 223](#)

\*\*\*\*\*

# Transmit Power Troubleshooting

Last updated: September 15, 2000

## Possible Setup Issues

During remote operation of the Transmit Power measurement you should configure the trigger arm to single, see [“SETup:TXPower” on page 519](#).

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 170](#).

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.

The Transmit Power Average, Transmit Power Maximum, Transmit Power Minimum results are shifted in proportion to the value of Amplitude Offset that a user may set. The following table shows the measurements that are affected and how amplitude offset affects them. For more information about amplitude offset commands, see [“Measurement Related Configuration” on page 670](#).

**Table 11. Measurements affected by amplitude offset**

Amplitude Offset Command	Transmit Power (dBm)			Cell Power Setting (dBm)
	Average	Maximum	Minimum	
OUTPUT 714;“SYSTEM:CORRECTION:SGAIN -3” !Offset for 3 dB of loss in the network.	6.86	6.86	6.85	-88
OUTPUT 714;“SYSTEM:CORRECTION:SGAIN 3” !Offset for 3 dB of gain in the network.	6.86	6.86	6.86	-82
OUTPUT 714;“SYSTEM:CORRECTION:SGAIN 0” !Zero dB of offset.	6.86	6.87	6.85	-85

## Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 146](#).

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 [“Receiver Example” on page 674](#).

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 [“Receiver Example” on page 674](#).

## Test Adherence to Standards

The 8960 Series 10 is compliant with ETSI GSM 11.10 Phase 2 Technical specifications - release 97.

### Frequency Error and Phase Error - ETSI GSM 11.10 sections 13.1 and 13.16.1

The method of test implemented by the test set's Phase & Frequency Error measurement conforms to the measurement method defined in ETSI GSM 11.10, section 13.1. For GPRS mobiles which support a single uplink timeslot, the Phase & Frequency Error measurement conforms to ETSI GSM 11.10, section 13.16.1.

#### Related Topics

\*\*\*\*\*

["Phase and Frequency Error Measurement Description" on page 103](#)

["Programming a Phase and Frequency Error Measurement" on page 106](#)

\*\*\*\*\*

### Transmitter Output Power and Burst Timing Error - ETSI GSM 11.10 sections 13.3 and 13.16.2

To make a transmitter output power measurement that conforms to 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 on the Call Setup screen and by issuing a query to the CALL subsystem ("[CALL:STATus:TCHannel:TERRor?](#)" on page 368). The Burst Timing Error result is *not* available for GPRS.

For GPRS mobiles which support a single uplink timeslot, the transmitter output power result conforms to ETSI GSM 11.10, section 13.16.2.

#### 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).

## Related Topics

\*\*\*\*\*

[“Transmit Power Measurement Description” on page 127](#)

[“Programming a Transmit Power Measurement” on page 129](#)

[“Power versus Time Measurement Description” on page 109](#)

[“Programming a Power versus Time Measurement” on page 114](#)

\*\*\*\*\*

## Output RF Spectrum - 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 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 (when the Multi-Measurement Count - Modulation parameter is set to Off).

### 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 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 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.

### Making an ORFS measurement on GPRS mobiles while 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 be different from what would be expected.

## Related Topics

\*\*\*\*\*

[“Output RF Spectrum Measurement Description” on page 96](#)

[“Programming an Output RF Spectrum Measurement” on page 99](#)

\*\*\*\*\*

## Reference Sensitivity - 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 ETSI GSM 11.10, section 14.2.

The Bit Error measurement is *not* applicable to 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

\*\*\*\*\*

["Bit Error Measurement Description" on page 66](#)

["Programming a Bit Error Measurement" on page 69](#)

["Fast Bit Error Measurement Description" on page 90](#)

["Programming a Fast Bit Error Measurement" on page 93](#)

\*\*\*\*\*

## 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 84](#)

["Programming an I/Q Tuning Measurement" on page 86](#)

\*\*\*\*\*

## 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 81](#)

\*\*\*\*\*



# 4 General Programming

---

# 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 103](#) and [“Power versus Time Measurement Description” on page 109.](#)) 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** This note is *not* applicable to GPRS.

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 623.](#)

---

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 146](#) for descriptions of integrity indicators.

#### Programming Example:

```
OUTPUT 714;"SETUP:PVTIME:BSYNC MIDAMBLE"!selects midamble synchronization for PVT
measurements
```

#### Related Topics

\*\*\*\*\*

[“Integrity Indicator” on page 146](#)

[“INITiate” on page 438](#)

[“SETup Subsystem” on page 462](#)

\*\*\*\*\*

## 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 30](#).

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 146](#) (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 632](#)

[“CALL:TCHannel:CMODE” on page 374](#)

\*\*\*\*\*

## 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
- DCS/PCS to EGSM/PGSM

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 30](#) or [“Step 5: Establish a Data Connection with the Mobile Station” on page 253](#).

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 597](#). 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:

- [“Performing a Dual-Band Handover” on page 215](#)
- [“CALL:TCHannel” on page 370](#)

For GPRS:

- [“Process for Reconfiguring a Data Connection” on page 267](#)

\*\*\*\*\*

## 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
```

Since the programmer knows that the control program should expect multiple responses to the above command string he or she might construct the following data entry statement:

```
ENTER 714;Imsi$,Pcl,Rev$,Sban$,Onum$,Mcc,Mnc,Lac
```

In the Basic programming environment the above ENTER statement will fail with an 'Insufficient data for ENTER' error. Some programming languages, Basic for example, cannot use the semicolon character as a data item terminator for string variables. In this example Basic will attempt to enter data into Imsi\$ until it sees a LF (line feed) data item terminator. The test set does not send the LF until all the data has been sent. Consequently when Basic sees the LF it terminates entry of data into Imsi\$ and starts to look for data to enter into Pcl. Since the test set is no longer sending any data the error message 'Insufficient data for ENTER' is generated.

One possible workaround is to enter all the data into a single string variable, replace all semicolons with line feeds and then enter the data from the string into the individual data items. For example:

## Dealing With Semicolon Separated Response Data Lists

```
DIM Response$(500)
!
!
OUTPUT 714;"CALL:MS:REP:IMSI?;PCL?;REV?;SBAN?;ONUM?;MCC?;MNC?;LAC?"
ENTER 714;Response$
Semicolon=POS(Response$,";")
WHILE Semicolon
Response$(Semicolon,Semicolon)=CHR$(10)
Semicolon=POS(Response$,";")
END WHILE
ENTER Response$;Imsi$,Pcl,Rev$,Sban$,Onum$,Mcc,Mnc,La
```

## Semicolon Separated Response Data Lists Containing Only Numeric Data Types

Semicolon separated response data lists containing only numeric data types do not present the types of problem associated with semicolon separated response data lists containing mixed data types. The number building routines in most languages will use any non-numeric character (that is, anything other than +/- 0123456789 E.) as the data item terminator. Consequently when the number building routines encounter the semicolon the data item is terminated. The following example illustrates this:

```
OUTPUT 714;"FETCH:TXP:INT?;POW:MIN?;MAX?"
ENTER 714;Integrity,Min_power,Max_power
```

---

## 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's block diagram includes three parallel signal paths. One path, the demodulation downconverter, is primarily used for base station emulation. This frees the measurement downconverter and power detector from performing functions necessary to maintain an active RF link. 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 link maintenance, one transmitter, and one receiver measurement 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.

**Table 12. GSM Concurrency Considerations**

	BER	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	I/Q Tuning	Output RF Spectrum	Phase & Frequency Error	Power vs. Time	Transmit Power	Uplink Path Demodulation
BER																
Dynamic Power	D															
TCH assignment/handover	C	C														
Transmit Power Level change	C	C														
Mobile SACCH info	D															
Audio Level Meas		D														
Audio Source		D														
Downlink Speech Source	A	D														
Decoded Audio	A	D	C													
Fast Bit Error	A	D	C	C				A	A							
I/Q Tuning		D	C			B										
Output RF Spectrum		D	C			B					B					
Phase & Frequency Error		D	C			B					B	B				
Power vs. Time		D	C			B					B	B	B			
Transmit Power		D	C	C								B		B		



**Table 13. GPRS Concurrency Considerations**

	PDTCH Reconfigure	Transmit Power Level change	Output RF Spectrum	Phase & Frequency Error	Power vs. Time	Transmit Power
Uplink Path Demodulation						
Transmit Power	C	C	B		B	
Power vs. Time	C	C	B	B		
Phase & Frequency Error	C	C	B			
Output RF Spectrum	C	C				
Transmit Power Level change						

**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.

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 153](#)

[“Block Diagram” on page 602](#)

\*\*\*\*\*

## 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.

The values returned by the measurement integrity indicator range from 0 to 16. Not all of the 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** Measurement synchronization must be set to midamble in order for GSM measurements to return integrity indicator (8, 9, 11).

---

**Table 14.**

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 14.**

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.

## 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 685](#)

\*\*\*\*\*

# Measurement Timeouts

## Description

The primary use of measurement timeouts is to regain control of the test set’s GPIB in cases where the bus could potentially “hang.”

The time normally required for a measurement to complete may vary greatly depending on the individual measurement, its settings, its multiple measurement count value, and so forth. Because of this, you may need to set the timeout longer than the default for measurements where a large number of multiple measurements are requested or where measurement triggers may be infrequent.

Be careful when setting a timeout that is shorter than the default. It is possible to specify a timeout that is so short the measurement does not even have a chance to begin. Measurement timeouts should always be at least several seconds long.

Timeout units default to S (seconds). The seconds suffix is an optional part of the command. If you want MS (milliseconds), US (microseconds) or NS (nanoseconds), you must specify these units in the suffix.

## Timeout Default Values

**Table 15. List of Timeouts and Default Values**

Measurement Function	Default Timeout Time	Default Timeout State	Integrity Indicator Value
Transmit Power	10 seconds	OFF	2
Power versus Time	10 seconds	OFF	2
Phase and Frequency Error	10 seconds	OFF	2
Output RF Spectrum	10 seconds	OFF	2
Fast Bit Error Rate *	10 seconds	OFF	2
Bit Error Rate *	10 seconds	OFF	2
Analog Audio *	10 seconds	OFF	2
Decoded Audio * also know as Uplink Speech Level	10 seconds	OFF	2
IQ Tuning *	10 seconds	OFF	2
Dynamic Power *	10 seconds	OFF	2

---

**NOTE**      The measurements in the table marked with an \* apply to GSM *only*.

---

## Programming Example

The following program forces 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 146](#)

["SETup Subsystem" on page 462](#)

\*\*\*\*\*

---

## 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, 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, 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 will return 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 .

# 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 158](#)

\*\*\*\*\*



# 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 439](#) 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 441](#). 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 441](#). 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 30](#) and [“Triggering Process Description” on page 169](#).

```

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**

This command is *not* applicable to GPRS.

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 540](#) 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 165](#).
- 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 524](#) or [“Status Subsystem Overview” on page 159](#).
- STATUS:OPERation bit (512 for NMRReady).
- Service Request Enabling (\*SRE 128 for NMRReady).

The [“STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 540](#) 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
- Bit Error
- I/Q Tuning
- Dynamic Power

**Example 7. Generating a Service Request (SRQ) Interrupt - Bit Error Rate NMRR**

This example is *not* applicable to GPRS.

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:CONTinuous:OFF” command during measurement setups are ways to set the trigger to single for all measurements.

## Related Topics

\*\*\*\*\*

[“INITiate Command Functions” on page 436](#)

[“What Happens When a Measurement is INITiated?” on page 436](#)

[“Concurrent Measurements” on page 143](#)

\*\*\*\*\*

## 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 152](#)

\*\*\*\*\*

# Status Subsystem Overview

## Description

### Overview of STATus Reporting Structure

#### STATUS QUESTIONABLE ERRORS

Extension Bit	0
COMMon Summary	1
GSM Summary	2
AMPS Summary	3
DIGital136 Summary	4
TA136 Summary	5

#### STATUS QUESTIONABLE CALL

Extension Bit	0
COMMon Summary	1
GSM Summary	2
AMPS Summary	3
DIGital136 Summary	4
TA136 Summary	5

#### STATUS QUESTIONABLE HARDWARE

Extension Bit	0
Power-up Self test Fail	4

#### STATUS OPERATION NMRREADY

Extension Bit	0
COMMon Summary	1
GSM Summary	2
AMPS Summary	3
DIGital136 Summary	4
TA136 Summary	5

#### STATUS OPERATION CALL

Extension Bit	0
COMMon Summary	1
GSM Summary	2
AMPS Summary	3
DIGital136 Summary	4
TA136 Summary	5

#### STATUS QUESTIONABLE

1
10
11

#### STANDARD EVENT STATUS REGISTER

Operation Complete	0
Query Error	2
Device Dependent Error	3
Execution Error	4
Command Error	5
Power On	7

#### STATUS OPERATION

9
10
12

Processing SYST:SYNC command

#### ERROR/EVENT QUEUE

⋮
data
data
data

#### STATUS BYTE REGISTER

2
3
4 — MAV
5
6 — RQS
7

## Status Reporting Structure For The GSM Test Application

### STATUS QUESTIONABLE CALL GSM

Extension Bit	0
Data Link Failure	1
Radio Link Failure	2
Immediate Assignment Failure	3
Channel Assignment Failure	4
Handover Failure	5
No Response to Page	6
Channel Assignment > Frames	7
Identification	8
Channel Mode Not Supported	9

Bit 2  
STATUS  
QUESTIONABLE

### STATUS QUESTIONABLE ERRORS GSM

Extension Bit	0
+100 Messages	1
+200 Messages	2
+300 Messages	3
+400 Messages	4
+500 Messages	5
+600 Messages	6
+700 Messages	7
+800 Messages	8
+900 Messages	9

Bit 2  
STATUS  
QUESTIONABLE  
ERRORS

### STATUS OPERATION NMRREADY GSM

Extension Bit	0
TX Power	1
Power vs. Time	2
Phase/Freq Error	3
Output RF Spectrum	4
Analog Audio	5
Decoded Audio	6
Fast Bit Error Rate	7
Bit Error	8
I/Q Tuning	9
Dynamic Power	10

Bit 2  
STATUS  
OPERATION  
NMRREADY

### STATUS OPERATION CALL GSM

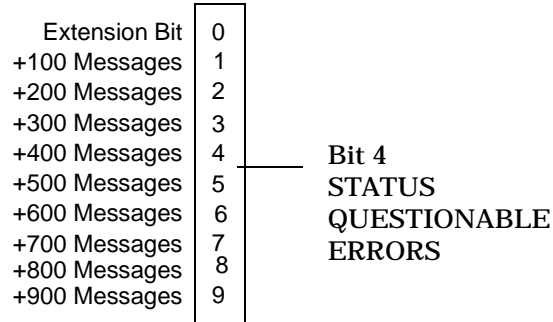
Extension Bit	0
Idle	1
Connected	2
Alerting	3
BCH Changing	4
TCH Changing	5
Control Status Changing	6
BS Originating	7
BS Disconnecting	8

Bit 2  
STATUS  
OPERATION  
CALL

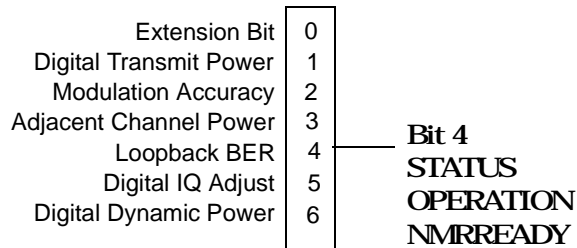


## Status Reporting Structure For The DIGital136 Registers

### STATUS QUESTIONABLE ERRORS DIGITAL136

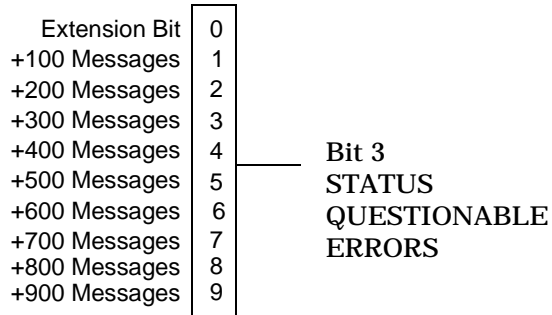


### STATUS OPERATION NMRREADY DIGITAL136

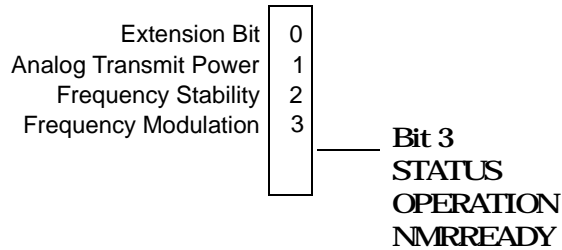


## Status Reporting Structure For The AMPS Registers

### STATUS QUESTIONABLE ERRORS

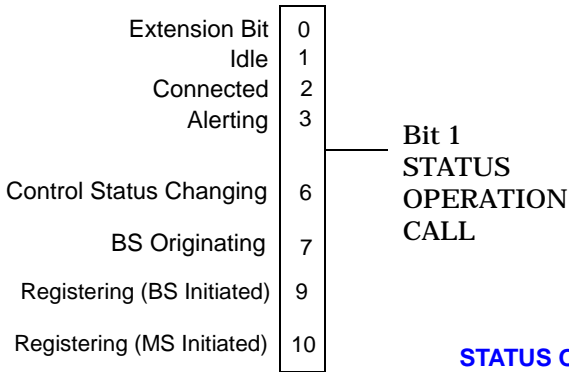


### STATUS OPERATION NMRREADY AMPS

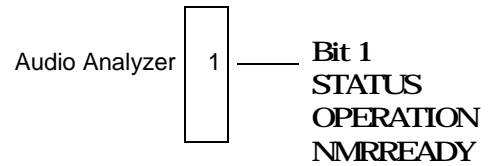


## Status Reporting Structures For The COMMON Registers

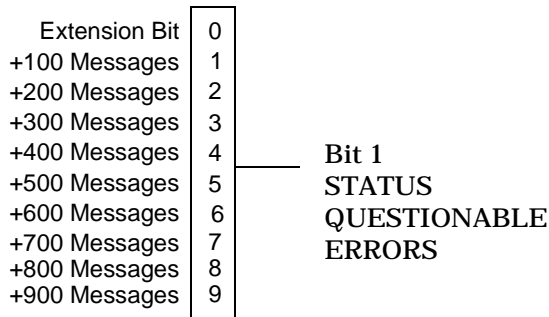
### STATUS OPERATION CALL COMMON



### STATUS OPERATION NMRREADY COMMON

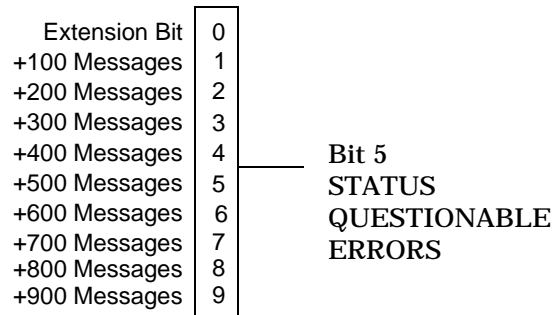


### STATUS QUESTIONABLE ERRORS COMMON



## Status Reporting Structures For The TA136 Registers

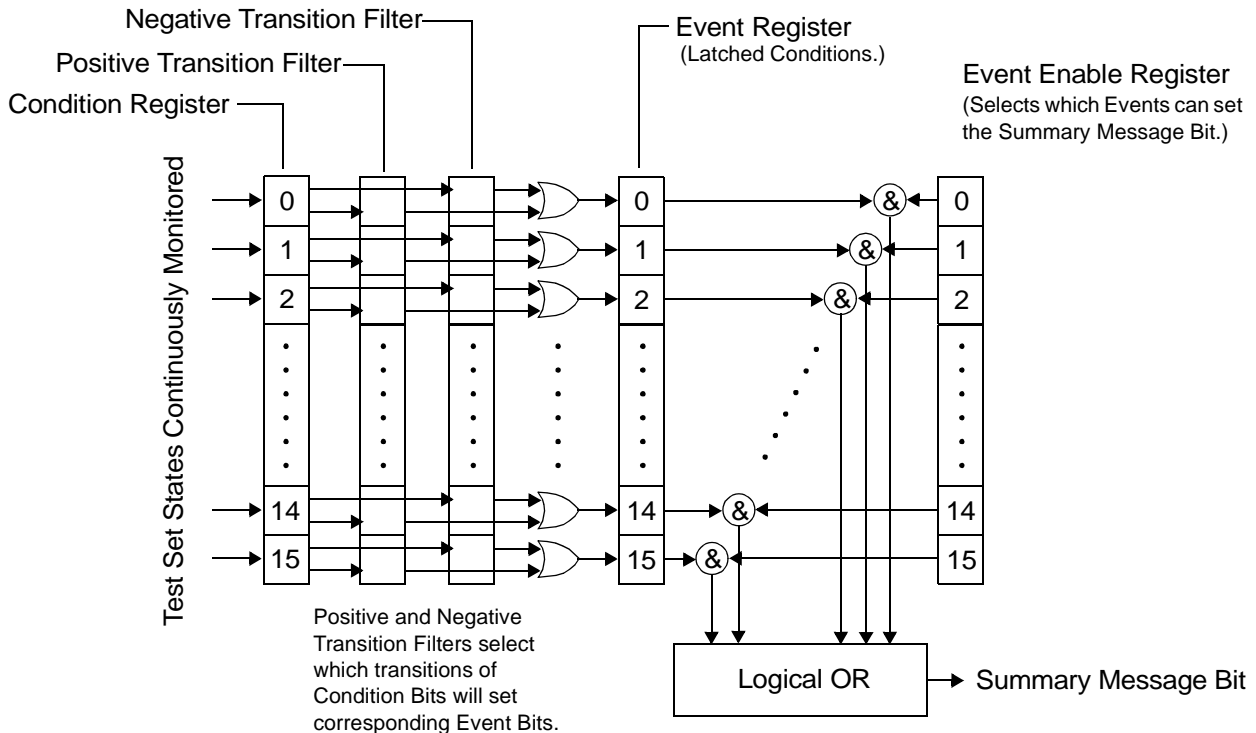
### STATUS QUESTIONABLE ERRORS TA136



## 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.

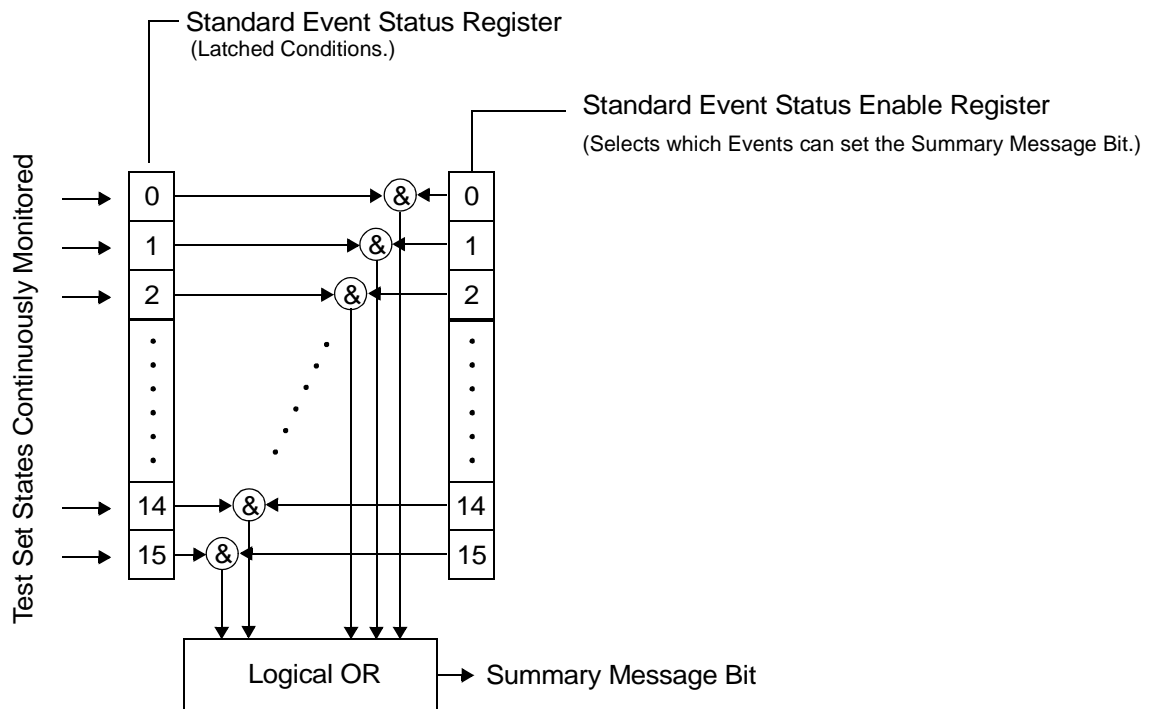
**Event Enable Register** The Event Enable Register defines which bits in the Event Register will be used to generate the Summary Message. Each bit in the Enable Register has a corresponding bit in the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and 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.

**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.

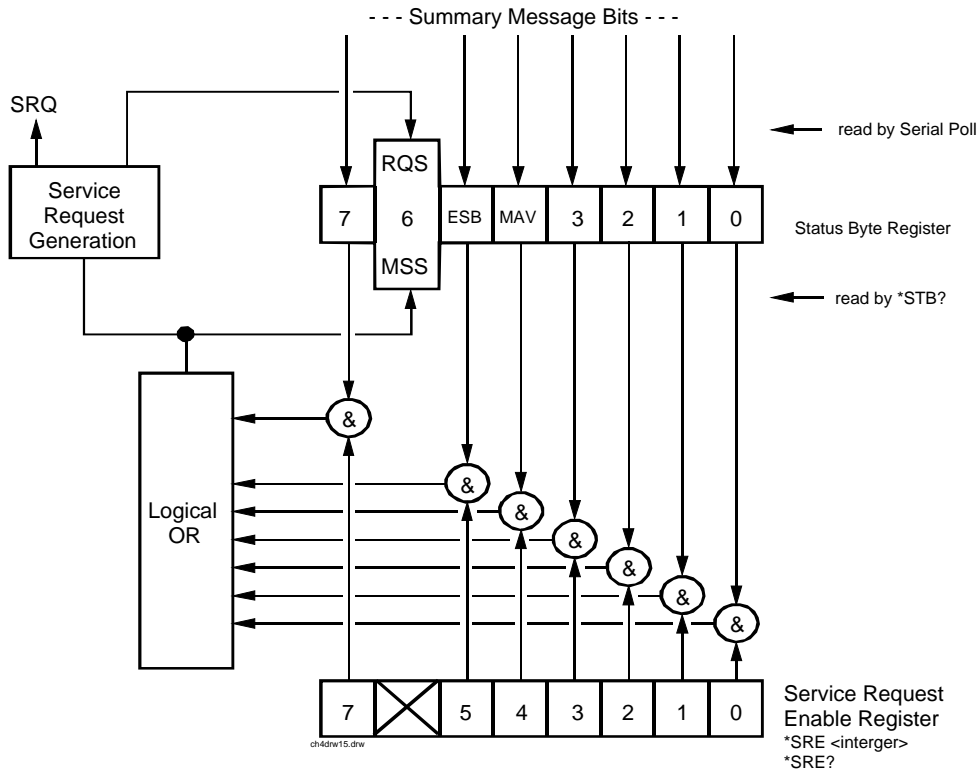
The Summary Message is TRUE, logic 1, if the register contains some information and an enabled event in the Event Register is set TRUE.

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.

### Standard Event Status Register Model



### Service Request Enabling Register Model



### Related Topics

\*\*\*\*\*

[“STATUS Subsystem Description” on page 524](#)

[“Standard Event Status Register” on page 560](#)

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# Triggering of Measurements

## GSM and GPRS Operating Considerations

When the operating mode = active cell mode, Auto triggering sets the trigger source to Protocol. When the operating mode = test mode, auto triggering sets the trigger source to RF Rise.

Test mode operating mode is *not* available for GPRS.

## 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.

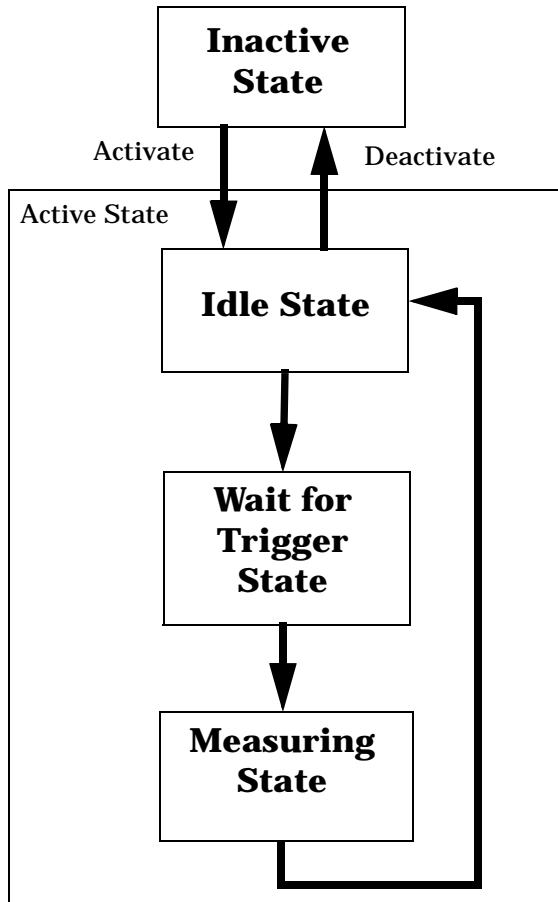
### Triggering Process Description

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 inactivated by pressing the Measurement Selection key, scrolling to measurement in the Measurement Selection menu, and then pressing F4 (Close Measurement).

**Figure 6. The Test Set's Measurement States**



## Measurement States

The following examples describe states of the test set under various conditions. Refer to Figure 6. on page 170.

### Example 8. 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 9. 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 10. 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. After results are available, the state transitions to idle (awaiting another INITiate).

**Example 11. 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. When the measurement is deactivated (INITiate:<MEAS>:OFF. or Close Measurement), it becomes inactive.

**Trigger Arm (Single or Continuous) Description**

Trigger arm determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).

---

**NOTE** When operating the test set remotely, trigger arm must be set to single, this causes the measurement cycle to transition to the idle state but remain active.

---

Pressing the Start Single key on the front panel will cause all currently active measurements with trigger arm set to single to arm and make the measurement.

Pressing Shift, Start Single (Stop) causes all measurements with trigger arm set to single to abort the measurement.

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

**Table 16. 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 analyzes (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 making a measurement. Trigger qualifier is available for 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 146](#)

[“SETup:ORFSpectrum:TRIGger:SOURce” on page 507](#)

[“SETup:PFERror:TRIGger:SOURce” on page 512](#)

[“SETup:PVTime:TRIGger:SOURce” on page 518](#)

[“SETup:IQTuning:TRIGger:SOURce” on page 498](#)

[“SETup:TXPower:TRIGger:SOURce” on page 522](#)

\*\*\*\*\*

## **5 GSM Programming Guide**



# **Programming the Agilent Technologies 8960 Series 10 for GSM Mobile Testing in Active Cell Operating Mode**

## Introduction

### Conventions Used in This Programming Guide

Throughout this Programming 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.

### Purpose of This Programming Guide

The test set represents state-of-the-art technology in one-box-testers and contains many powerful test capabilities which are accessible through easy-to-use GPIB programming commands. The purpose of this Programming Guide is to teach you how to write a basic control program, using the test set’s GPIB command set. This program will perform fundamental manufacturing tests on a GSM mobile station with the test set operating in active cell mode.

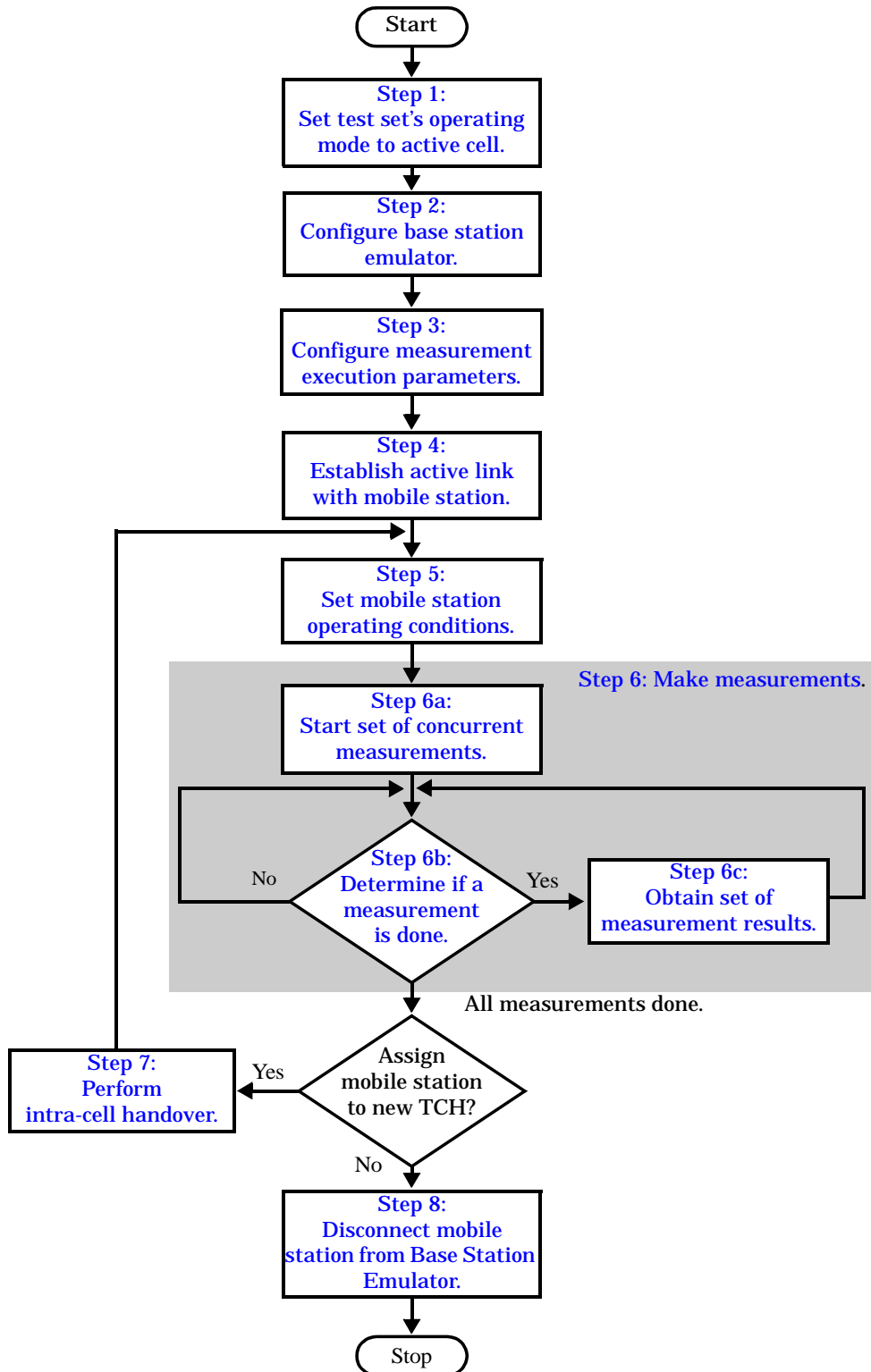
### How This Programming Guide Is Organized

The Programming Guide is organized around a typical set of tasks a control program would normally perform when testing a GSM mobile station in a manufacturing environment. The set of tasks is shown in [“Figure 1. Typical Flow of Tasks Performed by Control Program”](#) on page 177.

Typically in a manufacturing environment, steps 1, 2, and 3 are done once each time a production run is started, steps 4 and 8 are done once for each mobile station tested during the production run, and steps 5, 6, and 7 are done iteratively for each mobile station tested during the production run. The number of iterations for steps 5, 6, and 7 is dependent upon how many mobile station operating conditions are being tested (that is, number of channels, number of power levels, and so fourth).



Figure 1. Typical Flow of Tasks Performed by Control Program



## How to Use This Programming Guide

This Programming Guide is divided into 9 sections. Sections 1 through 8 (step 1 through 8) should be read in sequence. Each section, in order, discusses one of the tasks to be performed by the control program, showing how to accomplish that task using the test set's GPIB command set. As you progress through each section your understanding of how the test set's GPIB interface operates will increase as you see the control program evolve.

The last section of the Programming Guide presents a [“Comprehensive Program Example” on page 223](#) which uses all of the topics discussed in sections 1 through 8 together in one program to give the programmer a sense of how to tie everything together.

## About the Programming Examples Presented in This Programming Guide

### Programming Language:

Programming examples presented in this Programming Guide are written in the Rocky Mountain BASIC programming language, also known as RMB.

### Syntax Used in Programming Examples:

1. 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.

#### Example 1. Command Syntax:

```
CALL:STATus:TCHannel:TSLot?
```

#### Example 2. Shortened Form:

```
CALL:STAT:TCH:TSL?
```

2. Programming examples do not include default nodes. Default nodes in the command syntax are defined by enclosing the node inside the [ ] brackets.

#### Example 3. Command Syntax:

```
CALL[:CELL[1]]:ACTivated[:STATe]<ON|1|OFF|0>
```

#### Example 4. Command Syntax without Default Nodes:

```
CALL:ACT <ON|1|OFF|0>
```

3. Programming examples make extensive use of compound commands using the ; and the ;; separators. Refer to the test set's reference information for information on the definition and use of these command separators.

---

## Step 1: Set the Test Set's Operating Mode to Active Cell

### Background

The test set contains a GSM base station emulator. The base station emulator's primary purpose is to provide the GSM call processing necessary for parametric measurements on the RF and audio signals of a GSM mobile station.

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. The base station emulator has two operating modes; active cell mode and test mode.

Active cell mode is used when emulating a normal GSM cell. Test mode is used when it is not possible, or not desired, to communicate with the mobile station via over-the-air signaling, but downlink stimulus and uplink measurements are still needed.

This Programming Guide focuses on programming the test set's base station emulator in active cell operating mode.

### Overview of Active Cell Operating Mode

Active cell is the default operating mode of the test set's base station emulator and is used when emulating a normal GSM cell (that is, active signaling between the mobile station and the base station emulator).

### Active Cell Features

The basic features provided by the base station emulator when the operating mode is set to active cell are:

- Generation of a BCH (broadcast channel) without TCH (traffic channel).
- Support for location updating.
- Call setup, both mobile station and base station emulator originated.
- Changing TCH parameters during a call using over-the-air signaling.
- Base station emulator initiated and mobile station initiated call disconnection.
- All measurements supported in the test application are available.
- The base station emulator automatically controls the test set's demodulation receiver.

Step 1: Set the Test Set's Operating Mode to Active Cell

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

The test set's operating mode is set using the CALL:OPERating:MODE command.

### Example 1. Command Syntax:

```
CALL:OPERating:MODE <CELL|TEST>
```

### Example 2. Programming Example:

```
!*****  
! Step 1: Set Test Set Operating Mode To Active Cell  
!*****  
!  
OUTPUT Test_set;"CALL:OPER:MODE CELL
```

---

## Step 2: Configure the Base Station Emulator

### Background

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 mobile station can camp to this signal, just as it would camp to a cell on a real network. The base station emulator can then page the mobile station on the BCH and listen to the response of the mobile station on the uplink (mobile station to base station direction), using the test set's demodulating receiver. Calls can then be set up with the establishment of a traffic channel (TCH) in both the downlink and uplink directions. Measurements can be made, using the base station emulator's measuring receiver, under essentially identical conditions to that which the mobile station would experience on a real network.

The base station emulator can emulate a cell in any one of the following GSM frequency bands:

- PGSM - Primary (band) GSM, also known as GSM900
- EGSM - Extension (band) GSM (includes PGSM)
- DCS - Also known as DCS1800
- PCS - Also known as PCS1900, DCS1900

---

**NOTE**            The term GSM is used to refer to any combination of, or all of, the supported bands. It is not used as a shortened term for PGSM.

---

The task of configuring the base station emulator consists of configuring the BCH and the TCH. There are numerous parameters that can be configured for both the BCH and the TCH. It may not be necessary to configure all the parameters all the time. The test set's default settings should allow a properly functioning mobile station to successfully camp on the cell under most circumstances.

In a manufacturing environment it may be desirable to explicitly configure the BCH and TCH parameters to ensure that the settings have not been corrupted by someone setting a parameter's value through the test set's front panel.

## Configuring the Broadcast Channel Parameters

The broadcast channel parameters are configured using the CALL processing subsystem commands shown in the following table.

### Broadcast Channel Settable Parameters

Parameter	Command Syntax	Footnote
Broadcast Band	CALL[:CELL[1]]:BAND <PGSM   EGSM   DCS   PCS>	1
Cell Power	CALL[:CELL[1]]:POWer:AMPlitude <numeric value>[<suffix>]	
Cell Power State	CALL[:CELL[1]]:POWer:STATe <ON   1   OFF   0>	
Cell Power and State	CALL[:CELL[1]]:POWer[:SAMPlitude]<numeric value>[<suffix>]	2
Cell BCH Number	CALL[:CELL[1]]:BCHannel[:ARFCn]:SELEcted]<numeric value> OR CALL[:CELL[1]]:BCHannel[:ARFCn]:<PGSM   EGSM   DCS   PCS> <numeric value>	3
Mobile Country Code	CALL[:CELL[1]]:MCCode <numeric value>	4
PCS Mobile Country Code	CALL[:CELL[1]]:PMNCCode:VALue <numeric value>	4
Use PCS MNC	CALL[:CELL[1]]:PMNCCode:STATe <ON   1   OFF   0>	4
PCS Mobile Country Code and Use PCS NMC State	CALL[:CELL[1]]:PMNCCode[:SVALue] <numeric value>	4, 5
Mobile Network Code	CALL[:CELL[1]]:MNCCode <numeric value>	4
Location Area Code	CALL[:CELL[1]]:LACode <numeric value>	4
Network Color Code	CALL[:CELL[1]]:NCCode <numeric value>	4
Base Station Color Code	CALL[:CELL[1]]:BCCode <numeric value>	4
Paging IMSI	CALL:PAGing:IMSI <string>	
Repeat Paging State	CALL:PAGing:REPeat[:STATe] <ON   1   OFF   0>	
Paging Mode	CALL:PAGing:MODE <NORMal   REORg>	7
Paging Multiframes	CALL:PAGing:MFRames <numeric value>	
Auto IMEI Request	CALL:IMEI:AUTO <ON   1   OFF   0>	
BA Table Entries	CALL[:CELL[1]]:BA:TABLE[:SELEcted][<numeric value>{,<numeric value>}] OR CALL[:CELL[1]]:BA:TABLE:<PGSM   EGSM   DCS   PCS> [<numeric value>{,<numeric value>}]	6

**Table Footnotes**

- 1 The broadcast band setting becomes the selected (:SElected) band (see note 3).
- 2 Sets amplitude to <numeric value> and state to ON in one command.
- 3 Sets the BCH channel for the broadcast band selected with the broadcast band command (see note 1).
- 4 Can only be set when Cell Activated State = OFF. See ["Things That Can Go Wrong" on page 185](#).
- 5 Sets PCS mobile country code to <numeric value> and state to ON in one command.
- 6 Sets the BA table entries for the broadcast band selected with the broadcast band command (see note 1).
- 7 Setting Paging Mode to Normal causes the mobile station to use discontinuous reception (that is, DRX = ON).

**Example 1. Programming Example:**

The following program example illustrates proper use of the base station emulator BCH configuration commands. Not all parameters are accessed. Note the use of the cell activated state command to set the network configuration parameters.

```
!*****
! Step 2: Configure Base Station Emulator
!*****
!
OUTPUT Test_set;"CALL:CELL:BAND PGSM"
OUTPUT Test_set;"CALL:PAG:MODE REOR" ! Sets discontinuous reception to OFF
OUTPUT Test_set;"CALL:ACT OFF"
OUTPUT Test_set;"CALL:CELL:MCC 1;LAC 1;MNC 1;NCC 1;BCC 5"
OUTPUT Test_set;"CALL:ACT ON"
OUTPUT Test_set;"CALL:BCH 20"
OUTPUT Test_set;"CALL:POW:SAMP -85"
```

## Configuring the Traffic Channel Parameters

The traffic channel parameters are configured using the CALL processing subsystem commands shown in the following table.

### Traffic Channel Settable Parameters

Parameter	Command Syntax
TCH Band ("1")	CALL:TCHannel:BAND <PGSM   EGSM   DCS   PCS>
Channel Number ("2")	CALL:TCHannel[:ARFCn][:SElected] <numeric value> OR CALL:TCHannel[:ARFCn]:<PGSM   EGSM   DCS   PCS> <numeric value>
Loopback Mode	CALL:TCHannel:LOOPback <OFF   A   B   C>
Timeslot	CALL:TCHannel:TSLot <numeric value>
Downlink Speech Source	CALL:TCHannel:DOWNlink:SPEech <NONE   ECHO   PRBS15   SIN300   SIN1000   SIN3000>

### Table Footnotes

- 1 The TCH band setting becomes the selected band (see Note 2).
- 2 Sets the TCH channel for the TCH band selected with the TCH Band command (see Note 1).

### Example 2. Programming Example:

The following program example illustrates proper use of the base station emulator TCH configuration commands. Not all parameters are accessed.

```
OUTPUT Test_set;"CALL:TCH 45"  
OUTPUT Test_set;"CALL:TCH:TSL 4"
```



## Things That Can Go Wrong

### Trying to Set the MCC, MNC, LAC, NCC, or BCC While the Cell Activated State = ON

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
```

**Background** The network configuration parameters are encoded into the messaging broadcast on the BCH. Changing the network parameter values while the BCH is active would require the BCH to be stopped, and have the new values encoded, and then the BCH would have to be re-started. This would cause calls to be dropped or disrupt a mobile station camped to the cell. Consequently the network configuration parameters cannot be changed while the cell is active.

**Control of the Cell Activated State** The active/inactive state of the cell is controlled using the cell activated state command. This command is only used when the operating mode is set to active cell mode.

#### Example 3. Command Syntax:

```
CALL[:CELL[1]]:ACTivated[:STATe]<ON|1|OFF|0>
```

#### Example 4. Programming Example:

```
OUTPUT Test_set; "CALL:ACT ON"
```

## Effects of Activating and Deactivating the Cell

**Effects of Deactivating the Cell** Among others (refer to the test set's reference information for a complete listing of actions), setting the cell activated state to OFF causes the following actions to take place:

- The control program is no longer prevented from setting the following parameters: MCC, MNC, PCS MNC, Use PCS MNC, BCC, NCC and LAC.
- All signaling operations, uplink demodulation and downlink (BCH & TCH) generation are stopped.
- Any measurements that rely on uplink demodulation are aborted. No special error messages are generated.

**Effects of Activating the Cell** Among others (refer to the test set's reference information for a complete listing of actions), setting the cell activated state to ON causes the following actions to take place:

- The control program is prevented from setting the following parameters: MCC, MNC, PCS MNC, Use PCS MNC, BCC, NCC and LAC.
- If the cell activated state was previously OFF, the TDMA frame number of the BS emulator starts from zero, and a BCH is generated.
- If a TCH was present prior to setting cell activated state to OFF, the TCH is not reinstated.

## Step 3: Configure the Measurement Execution Parameters

### Background

Measurement execution parameters control the conditions under which a measurement operates. The general set of measurement execution parameters and their generic categories are as follows:

- Measurement Averaging (used by most measurements)
  - Multi-Measurement Count State
  - Multi-Measurement Count State
- Measurement Triggering (used by most measurements)
  - Trigger Arm
  - Trigger Source
  - Trigger Delay
  - Trigger Qualifier
- Measurement Synchronization (used by some measurements)
  - Burst Synchronization
- Measurement Timeouts (used by all measurements)
  - Measurement Timeout
  - Measurement Timeout State
- Measurement Specific (execution parameters specific to an individual measurement)

---

**NOTE** Not all measurements use all the execution parameters shown above. Additionally, some measurements have parameters that are specific to the measurement such as offset frequency lists or filter settings. Each measurement has its own set of parameters which are unique to it and have no affect on the execution of other measurements. Refer to the GPIB syntax listing for a detailed list of execution parameters for individual measurements.

---

## Overview

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:<meas-mnemonic>:<measurement parameter><parameter setting/value>
```

The following table shows the measurements available in the Agilent E1960A GSM mobile test application and their associated <meas-mnemonic> used in the SETup command syntax.

**Measurement Mnemonics Used In The SETup Subsystem**

Measurement	<meas-mnemonic>
Transmit Power	TXPower
Power vs Time	PVTime
Phase & Frequency Error	PFERror
Output RF Spectrum	ORFSpectrum
Bit Error	BERRor
Fast Bit Error	FBERRor
Decoded Audio	DAUDio
Analog Audio	AAUDio
I/Q Tuning	IQTuning
Dynamic Power	DPOWer

## Configuring Measurement Averaging Parameters

### Multi-Measurement Count State Parameter

The Multi-Measurement Count State parameter is used to turn measurement averaging on and off.

#### Example 1. Command Syntax:

```
SETup:<meas-mnemonic>:COUNT:STATE <ON|1|OFF|0>
```

#### Example 2. Programming Example:

```
OUTPUT Test_set;"SET:PVT:COUN:STATE ON"
```

would turn measurement averaging ON for the power versus time measurement.

### Multi-Measurement Count Number Parameter

The Multi-Measurement Count Number parameter sets the number of measurement samples taken during each measurement cycle when the COUNT:STATE parameter is set to ON.

#### Example 3. Command Syntax:

```
SETup:<meas-mnemonic>:COUNT:NUMBER <numeric value>
```

#### Example 4. Programming Example:

```
OUTPUT Test_set;"SET:TXP:COUN:NUMB 10"
```

would set the number of averages to 10 for the transmit power measurement.

### Configuring Multi-Measurement Count State and Count Number Simultaneously

The multi-measurement count state can be set to ON and the multi-measurement count number can be set to some value using a single complex command.

#### Example 5. Command Syntax:

```
SETup:<meas-mnemonic>:COUNT[:SNUMBER] <numeric value>
```

#### Example 6. Programming Example:

```
OUTPUT Test_set;"SET:TXP:COUN:SNUM 10"
```

would set the multi-measurement count state to ON and set the number of averages to 10 for the transmit power measurement. Note that in this example the optional command mnemonic :SNUMBER has been included for purposes of clarity.

## Configuring Measurement Triggering Parameters

### Trigger Source Parameter

The Trigger Source parameter selects the source of the measurement trigger signal.

#### Example 7. Command Syntax:

```
SETup:<meas-mnemonic>:TRIGger:SOURce <AUTO|IMMediate|PROTOcol|RISE>
```

#### Example 8. Programming Example:

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

would set the trigger source to AUTO for the transmit power measurement.

### Trigger Delay Parameter

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.

#### Example 9. Command Syntax:

```
SETup:<meas-mnemonic>:TRIGger:DELay <numeric value>[<suffix>]
```

#### Example 10. Programming Example:

```
OUTPUT Test_set;"SET:TXP:TRIG:DEL 10 US"
```

would set the trigger delay to 10  $\mu$ s for the transmit power measurement.

### Trigger Qualifier Parameter

The Trigger Qualifier parameter enables or disables automatic trigger re-arming following a trigger event which occurred when no valid signal (burst) was present.

#### Example 11. Command Syntax:

```
SETup:<meas-mnemonic>:TRIGger:QUALifier <ON|1|OFF|0>
```

#### Example 12. Programming Example:

```
OUTPUT Test_set;"SET:TXP:TRIG:QUAL ON"
```

would turn the trigger qualifier on for the transmit power measurement.

### Step 3: Configure the Measurement Execution Parameters

#### Trigger Arm Parameter

The Trigger Arm parameter determines whether a measurement will make one measurement then stop (single), or automatically re-arm upon completion of one measurement and repeat the process (continuous).

#### Example 13. Command Syntax:

```
SETup: <meas-mnemonic>:CONTinuous <ON|1|OFF|0>
```

---

**NOTE** The recommend trigger arm setting for all measurements when using the remote user interface is single (CONTinuous OFF).

---

#### Example 14. Programming Example:

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

would set the trigger arming to single for the transmit power measurement.

### Configuring the Burst Synchronization Parameter

#### Burst Synchronization Parameter

The burst synchronization parameter specifies where in the sampled data stream the measurement algorithm starts making its analysis of the captured data. Burst synchronization occurs after the measurement data is captured. The burst synchronization parameter's setting determines how the measurement's time reference is developed from the sampled data.

Not all measurements will have synchronization choices and not all synchronization choices will be available in measurements that use synchronization. Measurement synchronization and measurement triggering are independent settings and may be used in any combination.

#### Example 15. Command Syntax:

```
SETup: <meas-mnemonic>:BSYNc <MIDamble|AMPLitude|NONE>
```

#### Example 16. Programming Example:

```
OUTPUT Test_set; "SET:PVT:BSYN MID"
```

would set the burst synchronization to midamble for the power versus time measurement.

## Configuring Measurement Timeout Parameters

### Measurement Timeout State Parameter

The Measurement Timeout State parameter is used to enable or disable measurement timeout functionality.

#### Example 17. Command Syntax:

```
SETup:<meas-mnemonic>:TIMEout:STATE <ON|1|OFF|0>
```

#### Example 18. Programming Example:

```
OUTPUT Test_set;"SET:PVT:TIM:STAT ON"
```

would enable measurement timeouts for the power versus time measurement.

### Measurement Timeout Time Parameter

The Measurement Timeout Time parameter sets the maximum time that a measurement will execute before failing with a timeout error (when the TIMEout:STATE parameter is set to ON).

#### Example 19. Command Syntax:

```
SETup:<meas-mnemonic>:TIMEout:TIME <numeric value>[<suffix>]
```

#### Example 20. Programming Example:

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

would set the measurement timeout time to 10 seconds for the transmit power measurement.

### Configuring Measurement Timeout State and Timeout Time Simultaneously

The measurement timeout state can be set to ON and the measurement timeout time can be set to some value using a single complex command.

#### Example 21. Command Syntax:

```
SETup:<meas-mnemonic>:TIMEout[:STIME] <numeric value>[<suffix>]
```

#### Example 22. Programming Example:

```
OUTPUT Test_set;"SET:TXP:TIM:STIM 10"
```

would set the measurement timeout state to ON and set the measurement timeout time to 10 seconds for the transmit power measurement. Note that in this example the optional command mnemonic :STIME has been included for purposes of clarity.

## Configuring Measurement Specific Parameters

### Background

Some measurements have parameters that are specific to the measurement. Refer to the GPIB syntax listings for a detailed list of execution parameters for individual measurements. This section gives you some insight into the possible programming techniques that can be used to configure these measurement specific execution parameters.

### Sending Comma-Separated Parameter Configuration Lists to the Test Set

High-level measurements in the test application may require numerous parameters to configure the measurement. For example: the output RF spectrum measurement can require up to 22 frequency offsets for the modulation part of the measurement and up to 8 frequency offsets for the switching part of the measurement. The offsets are sent as comma separated lists. There are a variety of techniques that can be used to send these lists. Some of these techniques are shown below.

1. Include each individual parameter in the command itself. For example:

```
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ .4MHZ,.6MHZ,-.4MHZ,-.6MHZ"
```

2. Store the parameter values in a data structure and send the command with the data structure appended to it. For example:

- Using a string variable:

```
DIM Swit_offs$(255)
Swit_offs$=".4MHZ,.6MHZ,-.4MHZ,-.6MHZ,1.2MHZ,-1.2MHZ"
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs
```

- Using numeric arrays:

```
OPTION BASE 1
REAL Swit_offs(8),Mod_offs(22)
!
DATA 400,-400,600,-600,1200,-1200,1800,-1800
DATA .1,-.1,.2,-.2,.25,-.25,.4,-.4,.6,-.6,.8,-.8
DATA 1,-1,1.2,-1.2,1.4,-1.4,1.6,-1.6,1.8,-1.8
!
READ Swit_offs(*)
READ Mod_offs(*)
!
Swit_img:IMAGE K,7(K,"KHZ",""),K,"KHZ"
Mod_img:IMAGE K,21(K,"MHZ",""),K,"MHZ"
OUTPUT Test_set USING Swit_img;"SET:ORFS:SWIT:FREQ",Swit_offs(*)
OUTPUT Test_set USING Mod_img;"SET:ORFS:MOD:FREQ",Mod_offs(*)
```



**Example 23. Programming Example:**

The following example illustrates configuring the measurement execution parameters for the output RF spectrum, transmit power, and phase and frequency error measurements.

```

!*****
! Step 3: Configure Measurement Execution Parameters
!*****
!
! Configure ORFS Measurement:
!
OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5"      ! Examples of using complex
OUTPUT Test_set;"SET:ORFS:MOD:COUN 10"     ! commands to set multi-meas
                                           ! state and count at same time.
OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO"  ! Set trig source to AUTO.
OUTPUT Test_set;"SET:ORFS:CONT OFF"       ! Set trig mode to single.
OUTPUT Test_set;"SET:ORFS:TIM 60"        ! Set timeout time to 60 sec.
! Put switching and modulation offsets to be tested into string variables.
Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
!
! Configure TX Power Measurement:
!
OUTPUT Test_set;"SET:TXP:COUN 3"
OUTPUT Test_set;"SET:TXP:TRIG:SOUR RISE;QUAL ON"
OUTPUT Test_set;"SET:TXP:CONT OFF"
OUTPUT Test_set;"SET:TXP:TIM 20"
!
! Configure Phase & Frequency Error Measurement:
!
OUTPUT Test_set;"SET:PFER:COUN 8"
OUTPUT Test_set;"SET:PFER:TRIG:SOUR PROT;QUAL ON"
OUTPUT Test_set;"SET:PFER:CONT OFF"
OUTPUT Test_set;"SET:PFER:TIM 30"
OUTPUT Test_set;"SET:PFER:BSYN MID

```

## Step 4: Establish an Active Link with Mobile Station

### Background

#### Call Connect/Disconnect Synchronization

When the control program requires that an active link be established/terminated between the mobile station and the test set, the commands necessary to initiate the call connect/disconnect process are sent to the test set (for a base station emulator originated/terminated call) or to the mobile station (for a mobile station originated/terminated call). In either case, synchronization is defined as the control program being able to empirically determine when the call has been successfully connected/disconnected so that the control program can proceed, or being able to empirically determine that the call has not been successfully connected/disconnected so that the control program can take appropriate action.

The determination is made by monitoring the call state as the call connect/disconnect process progresses.

#### Call States

At any instant in time a call can be in one of the following states:

- Idle
- Setup Request
- Proceeding
- Alerting
- Disconnecting
- Connected

Setup Request, Proceeding, Alerting and Disconnecting are referred to as transitory states because the amount of time which the call can spend in any of these states is limited by GSM protocol (that is, the call transitions through these states, it is not allowed to stay in a transitory state forever).

---

**NOTE**      If repeat paging is on it is possible for the call process to stay in one of the transitory states beyond the time specified by the GSM protocol timers.

---

The control program can directly query the state of a call with the CALL:STATus:STATE? query command, which immediately returns the current call state (that is, Idle, Setup Request, Proceeding, Alerting, Disconnecting, or Connected)

## Determining if a Call Connect/Disconnect Process is Completed

The most common technique used by control programs to determine if a call connect/disconnect process has completed (either successfully or unsuccessfully), is to repeatedly query the call state using the CALL:STATus:STATE? query command inside a program loop. The return value from each query is checked to determine if the connect/disconnect process is proceeding or has reached the desired state.

There are, however, some inherent problems associated with this technique:

- The rapid polling of the instrument increases bus traffic and places increased demand on the instrument's processors to respond to the constant stream of queries.
- The control program must handle failure conditions. For example: if a call origination process is started but the call never leaves the Idle state, the control program must incorporate some technique to prevent the program from staying in the loop forever waiting for a transition out of the Idle state.

The test set implements a set of commands designed specifically for call connect/disconnect synchronization. (see [“Step 8: Disconnect the Mobile Station from the Base Station Emulator” on page 218](#) for call disconnect synchronization). These commands directly address many of the inherent problems discussed above. When properly used these commands eliminate the need for rapid polling of the instrument, and relieve the programmer of many of the tasks associated with error handling.

## Call Connect/Disconnect Synchronization Commands

**Call Connected State Query Command** The call-connected-state query command is used to query the connected state of a call. This command allows the control program to determine if a call is connected (that is, in the Connected state) or disconnected (that is, in the Idle state), with a built-in provision to automatically wait if the call is in one of the transitory states.

The basic operation of this query is:

- If the call is in the Connected state when the query is received by the test set, the query immediately returns a 1.
- If the call is in the Idle state (that is, disconnected) when the query is received by the test set, the query immediately returns a 0.
- If the call is in one of the transitory states (that is, Setup Request, Proceeding, Alerting, or Disconnecting) when the query is received by the test set, the query hangs (that is, does not return an answer) until the call state changes to either Idle or Connected and then behaves as above.

The call-connected-state query command can be used at any time to determine the connected state of a call. The built-in provision to automatically wait if the call is in one of the transitory states eliminates the need for rapid polling when the call-connected-state query command is used to synchronize to a call connect/disconnect process.

---

**NOTE** If repeat paging is on, a call origination process can stay in one of the transitory states until the mobile either answers the page or until the user stops the paging process. This means that if a call-connected-state query command is sent to the test set with repeat paging set to on, the query could hang “forever”.

---

## Step 4: Establish an Active Link with Mobile Station

### Example 1. Command Syntax:

```
CALL:CONNECTed[:STATE]?
```

**Using the Call Connected State Query for Call Connect Synchronization** The call-connected-state query only hangs if the call is in a transitory state, otherwise it immediately returns a 1 (Connected state) or a 0 (Idle state). At the start of a call connect process the call state is Idle. Sending call-connected-state query at the start of a call connect process could immediately return a zero if the query is satisfied before the connection process has started (that is, moved from the Idle state into one of the transitory states). For correct call connect synchronization it is necessary that the query be temporarily held off until after the call connect process has started. A call-state-change-detector is provided which can be used to temporarily hold off the query from returning an answer until the appropriate state change has occurred.

**Call Connected Arm Command** The call-connected-arm command is used to 'arm' the call-state-change-detector.

### Example 2. Command Syntax:

```
CALL:CONNECTed:ARM[:IMMEDIATE]
```

If the call-state-change-detector is armed when a call-connected-state query is received, the reply is held off until the call-state-change-detector is disarmed. The call-state-change-detector is disarmed upon a state change from any of the transitory states to the Idle or Connected state.

The call-state-change-detector is not disarmed by a state change from Idle to any of the transitory states, from Connected to any of the transitory states, nor is it disarmed by any transitions from Idle to Idle, or Connected to Connected. These restrictions ensure that when the call-connected-state query returns an answer:

- the connect process has started since the call state must have moved from Idle to one of the transitory states
- AND
- the connect process has finished since the call state has moved from a transitory state to either the Idle or Connected state.

The arm state of the change detector can be queried with the call-connected-arm-state query command. This query never hangs and immediately returns a 1 if the change detector is armed and a 0 if it is not armed. The command is:

**Example 3. Command Syntax:**

```
CALL:CONNECTed:ARM:STATE?
```

**Using the Call Connected Arm Command for Call Connect Synchronization** The call-state-change-detector arm command is used by 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. By first arming the call-state-change-detector, then querying the call connected state, and then attempting a BS or MS originated call, the call-connected-state query will hang until the connection operation begins and then reaches a final (Idle or Connected) state.

However, if the change detector is armed and a call connection is attempted but the call state never progresses from the Idle state, the call-connected-state query would hang forever. This could easily happen if the mobile is badly broken, the mobile is not connected to the test set, no one pushes the “send” button on the mobile, etc.

A call-state-change-detector time-out timer is provided which is used to prevent the call-connected-state query from hanging forever.

**Call Connected Time-out Command** The call-connected-time-out command is used to set the time-out value for the call-state-change-detector time-out timer.

**Example 4. Command Syntax:**

```
CALL:CONNECTed:TIMEout <numeric value>[<suffix>]
```

**Using the Call State Change Detector Time-out for Call Connect Synchronization** The call-state-change-detector time-out mechanism allows the test set to disarm the call-state-change-detector which releases the call connected state query if it is currently hanging.

The time-out timer is started whenever the call-state-change-detector is armed or gets rearmed when already armed. The duration of the time-out is set using the call-connected-time-out command and should be set to the maximum amount of time the control program should wait between arming and the connect process to begin. 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.

If the timer expires while the call is in the Idle or Connected state, the call-state-change-detector is disarmed, which releases the call connected state query if it is currently hanging.

If the timer expires while the call is in one of the transitory states it is ignored as, once in any transitory state, the GSM-defined protocol timers limit the amount of time that can be spent in any transitory state.

**Call-state-change-detector Auto Arming** As a programming convenience the test set automatically arms the call-state-change-detector, using a fixed time-out value of 60 seconds, whenever a BS originate or BS disconnect is requested.

Because of this, there is never a need for the control program to explicitly arm the call-state-change-detector or set a call-state-change-detector time-out value before BS initiated events. If for sake of coding efficiency, the programmer wishes to use the same code segment for both BS and MS call processing events, the commands to arm the call-state-change-detector and to set the call-state-change-detector time-out time will be accepted but ignored should the control program actually send the commands to the test set for BS call processing events.

**Overview**

Establishing an active link with the mobile station when the test set is in active cell operating mode can be accomplished in one of two ways:

- Base station originated call
- Mobile station originated call

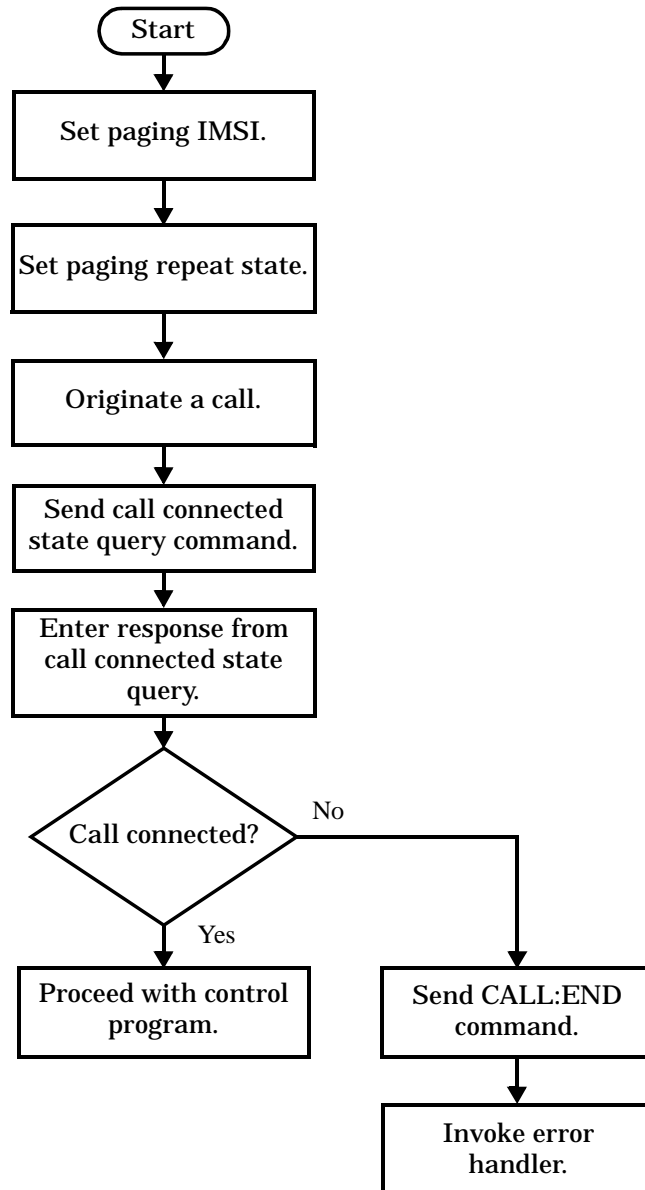
## **Process for Making a Base Station Originated Call**

The recommended process for making a base station originated call is shown in [“Step 4: Figure 1. Process for Making a Base Station Originated Call” on page 199.](#)

The CALL:ORIGinate command is used to initiate a base station originated call.

If the call origination process fails it is necessary to send the CALL:END command to the test set to force immediate termination of all processes associated with the current call origination. This ensures that if another CALL:ORIGinate command is sent to the test set before all processes associated with the failed call origination have been terminated, it will not be ignored. Note that if the test set is currently executing a call origination and it receives another call origination command it will be ignored (that is, you are telling the test set to do something it is already doing and hence it will accept the command but it will be ignored).

## Step 4: Figure 1. Process for Making a Base Station Originated Call



## Step 4: Establish an Active Link with Mobile Station

### Example 5. Programming Example:

```
!*****
! Step 4: Establish Active Link with Mobile Station
!*****
!
OUTPUT Test_set;"CALL:PAG:IMSI `001012345678901`" ! Set paging IMSI
OUTPUT Test_set;"CALL:PAG:REP OFF" ! Set paging repeat state to off
OUTPUT Test_set;"CALL:ORIG" ! Start a base station originated call
OUTPUT Test_set;"CALL:CONN:STAT?" ! Hanging HP-IB query
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"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

### Call Origination Process Commands

**Paging the Mobile Station** Paging the mobile station is accomplished using the CALL:ORIGinate command.

### Example 6. Command Syntax:

```
CALL:ORIGinate
```

### Example 7. Programming Example:

```
OUTPUT Test_set;"CALL:ORIG"
```

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

**Setting the Paging IMSI** The paging IMSI is set using the PAGing:IMSI command.

### Example 8. Command Syntax:

```
CALL:PAGing:IMSI <string>
```

### Example 9. Programming Example:

```
OUTPUT Test_set;"CALL:PAG:IMSI `001012345678901`"
```

would set the paging IMSI to 001012345678901.

**Setting the Paging Repeat State** The paging repeat state is set using the PAGing:REPeat:STATe command.

### Example 10. Command Syntax:

```
CALL:PAGing:REPeat[:STATe] <ON|1|OFF|0>
```

### Example 11. Programming Example:

```
OUTPUT Test_set;"CALL:PAG:REP ON"
```

would turn on paging repeat.



## Process for Making a Mobile Station Originated Call

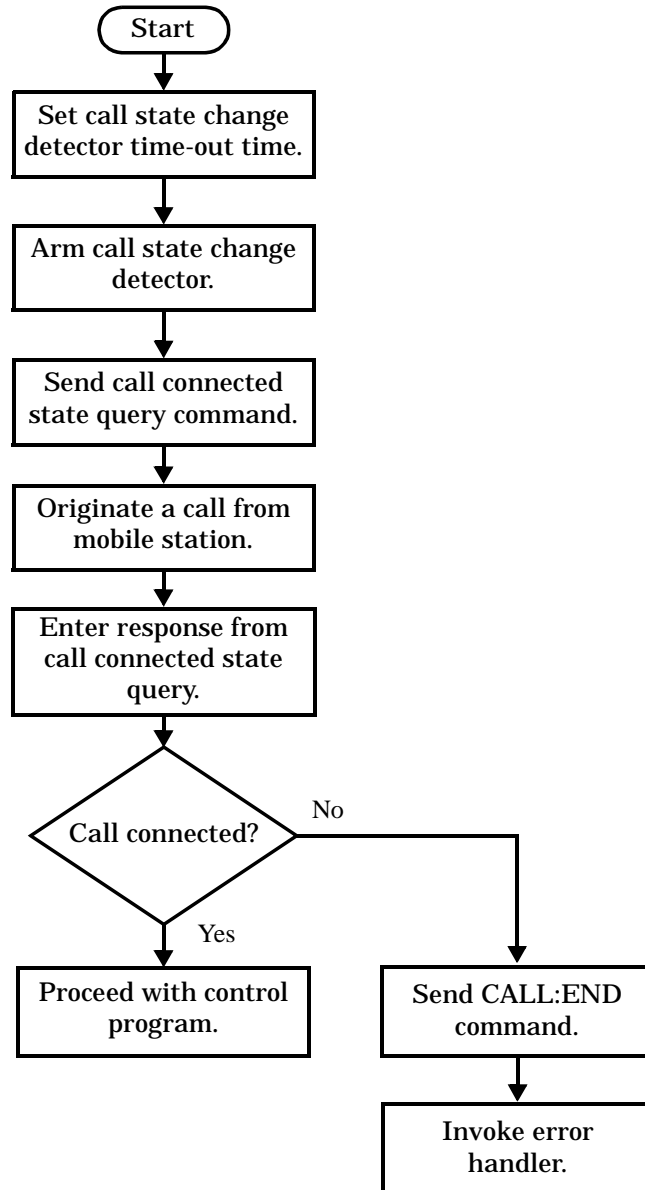
The recommended process for making a mobile station originated call is shown in [“Step 4: Figure 2. Process For Making A Mobile Station Originated Call” on page 202.](#)

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

If the call origination process fails it is necessary to send the CALL:END command to the test set to force immediate termination of all processes associated with the current call origination. This ensures that if the mobile station attempts another originate before all processes associated with the failed call origination have been terminated, it will not be ignored. Note that if the test set is currently executing a call origination and it receives another call origination command it will be ignored (that is, you are telling the test set to do something it is already doing and hence it will accept the command but it will be ignored).

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 time-out time is long enough to allow a human to dial the number.

Step 4: Figure 2. Process For Making A Mobile Station Originated Call



**Example 12. 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
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"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

## Step 5: Set the Mobile Station's Operating Conditions

### Overview

The mobile station's operating conditions are set using the CALL processing subsystem commands shown in the following table.

**Settable Mobile Station Operating Conditions**

Parameter	Command Syntax	Table Footnotes
Timing Advance	CALL:MS:TADVance <numeric value>	
Transmit Level	CALL:MS:TXLevel[:SElected] <numeric value> OR CALL:MS:TXLevel:<PGSM   EGSM   DCS   PCS> <numeric value>	1
Discontinuous Transmission	CALL:MS:DTX[:STATe] <ON   1   OFF   0>	

### Table Footnotes

**1** The TCH band setting becomes the selected band.

### Example 1. Programming Example:

```
!*****
! Step 5: Set Mobile Station Operating Conditions
!*****
!
OUTPUT Test_set;"CALL:MS:DTX OFF"
OUTPUT Test_set;"CALL:MS:TXL 14
```

---

## Step 6: Make Measurements

### Background

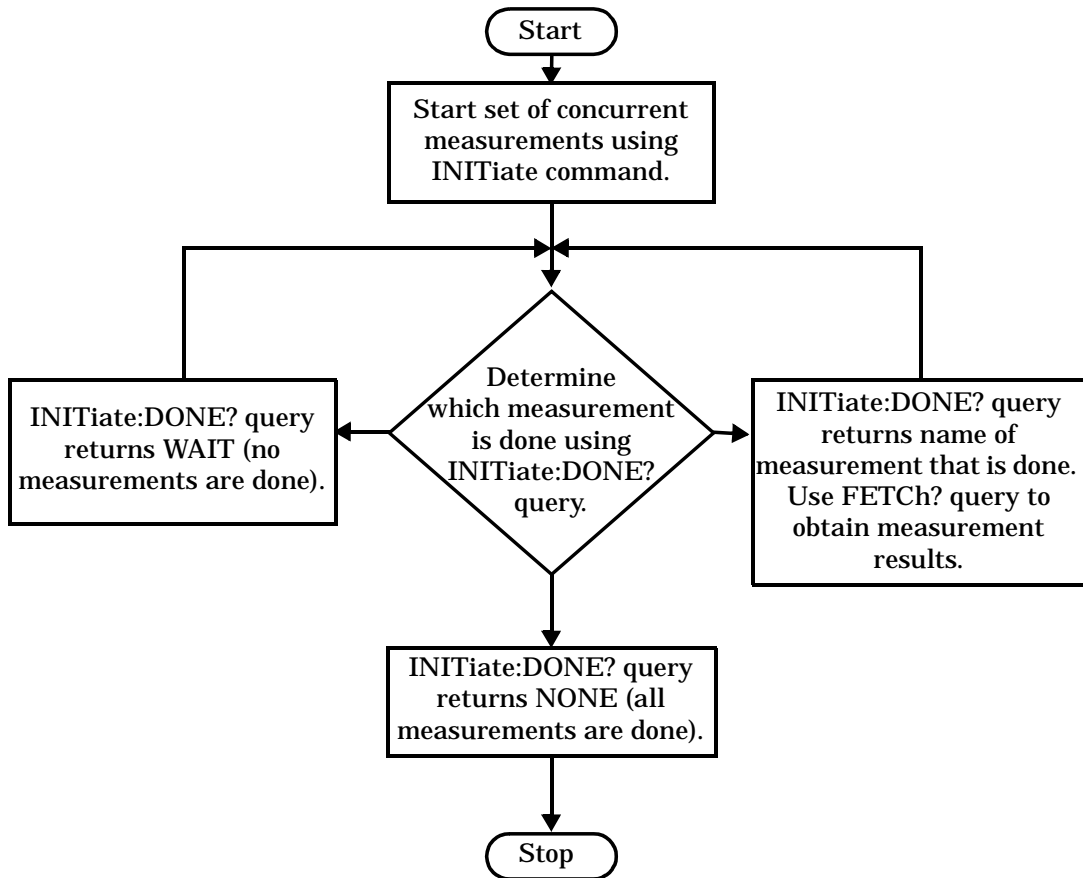
The multiple signal path, DSP based, multiple processor architecture of the test set allows the test set to make concurrent measurements. This means that:

- multiple measurements can execute and finish at the same time (concurrently)
- individual measurement completion is not influenced by other measurement processes
- availability of measurement results is not dependent upon the sequence that the measurements were requested in
- results from measurements that take few processor cycles are available without having to wait for measurements that take many processor cycles

There are no special programming commands or techniques required to implement measurement concurrency.

“[Step 6: Figure 1. Process for Making Measurements](#)” on [page 206](#) shows the recommended process for making concurrent measurements using the test set’s command set.

Step 6: Figure 1. Process for Making Measurements



**Example 1. Programming Example:**

The following program segment illustrates making a transmit power measurement and a phase and frequency error measurement concurrently using the recommended process shown in “[Step 6: Figure 1. Process for Making Measurements](#)” on page 206.

```
!*****
! Step 6: Make Measurements
!*****
!
! Step 6a: Start Set of Concurrent Measurements:
!
OUTPUT Test_set;"INIT:TXP;PFER"
!
! Step 6b: Determine If A Measurement Is Done:
!
LOOP
  OUTPUT Test_set;"INIT:DONE?"
  ENTER Test_set;Meas_done$
!
! Step 6c: Obtain 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
```

## Things That Can Go Wrong

### Measurement Integrity Always Returns a Value of 6

**Background** A measurement integrity value of 6 indicates that some characteristic of the input signal is under range. Typically this will be the amplitude (power) of the DUT signal. This low amplitude will cause the level of the DSP sampler to be below a threshold required by the measurement algorithm to produce results of specified accuracy.

**Possible Cause** One of the most likely causes of a measurement underrange condition is DUT signal loss caused by fixture loss or cable loss.

**Suggested Workaround** Fixture loss or cable loss can be compensated for by using the RF IN/OUT port's amplitude offset parameters. Twenty different offsets can be set up at twenty different frequencies. Refer to the reference documentation for more information.

#### Example 2. Command Syntax:

```
SYSTem:CORRection:GAIN <numeric value>[<suffix>]
```

```
SYSTem:CORRection:STATe <1|ON|0|OFF>
```

Complex form of command (sets gain to <numeric value> and state to ON using single command):

```
SYSTem:CORRection:SGAin <numeric value>[<suffix>]
```

#### Example 3. Programming Example:

```
OUTPUT Test_set; "SYST:CORR:SGA -6"
```

would set the RF IN/OUT port's amplitude offset to -6 dB and set the correction state to ON.



## Step 6a: Start Set Of Concurrent Measurements

### Starting Measurements

The INITiate command is used to start measurements. Each individual measurement in a test application can be started using the INITiate command. For starting measurements, the syntax of the INITiate command is as follows:

#### Example 1. Command Syntax:

```
INITiate:<meas-mnemonic>[:ON]
```

The following table shows the measurements available in the Agilent Technologies E1960A GSM mobile test application and their associated <meas-mnemonic> used in the INITiate command syntax.

**Measurement Mnemonics Used In The INITiate Subsystem**

Measurement	<meas-mnemonic>
Transmit Power	TXPower
Power vs Time	PVTime
Phase & Frequency Error	PFERror
Output RF Spectrum	ORFSpectrum
Bit Error	BERRor
Fast Bit Error	FBERror
Decoded Audio	DAUDio
Analog Audio	AAUDio
I/Q Tuning	IQTuning
Dynamic Power	DPOWER

#### Example 2. Programming Example:

```
OUTPUT Test_set; "INIT:TXP"
```

would start the transmitter power measurement.

### Using Compound Commands to Start Multiple Measurements

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

```
OUTPUT Test_set; "INIT:TXP;PFER"
```

would start the transmit power measurement and the phase and frequency error measurement. These measurements would then run concurrently.

## Step 6b: Determine if a Measurement Is Done

### Background

After a set of concurrent measurements have been started, it is desirable that the control program be able to determine when individual measurement results are available so that the control program can request that measurement's results without having to wait on other measurements which have not yet completed.

### Overview

The INITiate:DONE? query command is used to determine which measurement is finished.

As the name implies, the query returns the name of whichever active measurement is done so that the control program can request that measurement's results.

This command is query only and returns only one response per query. The responses returned and their meaning are shown in the following table.

Once a measurement is reported as being done via the INITiate:DONE? query it is removed from the done list (measurements are only reported as being done once). The design of the INITiate:DONE? query is predicated on the control program immediately fetching a measurement's results once it is reported as being done.

#### Responses Returned from INITiate:DONE? Query

Response	Meaning
TXP	The transmit power measurement is done.
PVT	The power versus time measurement is done.
PFER	The phase and frequency error measurement is done.
ORFS	The output RF spectrum measurement is done.
AAUD	The analog audio measurement is done.
DAUD	The decoded audio measurement is done.
BERR	The bit error measurement is done.
FBER	The fast bit error measurement is done.
DPOW	The dynamic power measurement is done.
IQT	The I/Q Tuning measurement 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.

**Example 1. Command Syntax:**

INITiate:DONE?

**Example 2. Programming Example:**

See [“Programming Example:” on page 207.](#)

## Step 6c: Obtain a Set of Measurement Results

### Background

In order to minimize bus traffic in the manufacturing environment the test set's high-level measurements have been 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 will be five measurement results available as follows:

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

The test set has been designed with the capability to return the measurement results in a variety of formats to suit the needs of the measurement environment. For example, the transmitter power measurement results can be returned as:

- Measurement integrity and average value  
OR
- Average value and minimum value and maximum value and standard deviation value  
OR
- Average value only  
OR
- Minimum value only  
OR
- Maximum value only  
OR
- Standard deviation value only  
OR
- Measurement integrity value only

The formats available for individual measurements can be found in the test set's FETCh? subsystem's GPIB command syntax reference information.

## Overview

The FETCh subsystem is used to query measurement results. The measurement results from each measurement in a test application can be queried using the FETCh subsystem. The general hierarchy of the FETCh command structure is as follows:

```
FETCh:<meas-mnemonic>:<result format>?
```

The following table shows the measurements available in the Agilent Technologies E1960A GSM mobile test application and their associated <meas-mnemonic> used in the FETCh command syntax.

The command syntax used to obtain the various measurement result formats (<result format>) for each measurement can be found in the test set's FETCh? subsystem's GPIB command syntax reference information.

**Measurement Mnemonics Used In The FETCh Subsystem**

Measurement	<meas-mnemonic>
Transmit Power	TXPower
Power vs Time	PVTime
Phase & Frequency Error	PFERror
Output RF Spectrum	ORFSpectrum
Bit Error	BERRor
Fast Bit Error	FBERror
Decoded Audio	DAUDio
Analog Audio	AAUDio
I/Q Tuning	IQTuning
Dynamic Power	DPOWer

### Example 1. Command Syntax:

```
FETCh:<meas-mnemonic>:<result format>?
```

### Example 2. Programming Example:

```
OUTPUT Test_set; "FETCh:TXP:POW:MIN?"
```

would return the minimum value from the set of samples taken during the transmit power measurement (when averaging is turned on and number of samples taken >1).

---

## Step 7: Perform an Intra-Cell Handover

### Background

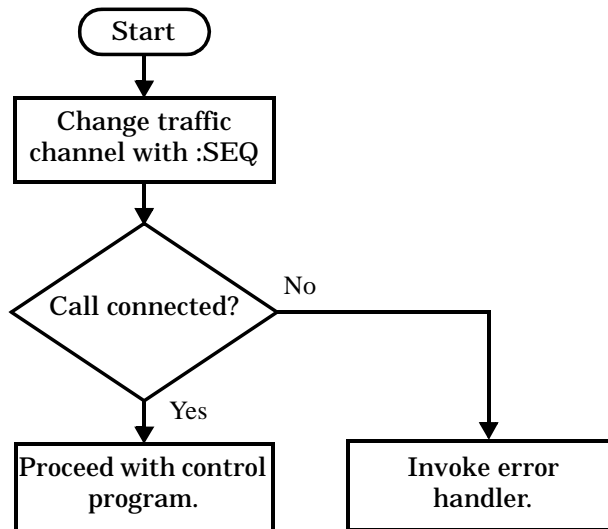
A handover is defined as assigning the mobile station to a new traffic channel. The test set is capable of performing two types of handovers:

- Intra-cell handover: assigning the mobile station to a new traffic channel within the currently active broadcast band.
- Dual-band handover: assigning the mobile station to a traffic channel in a traffic band which is different from the currently active traffic band.

### Performing an Intra-Cell Handover

An intra-cell handover is accomplished using the CALL:TCHannel command in conjunction with the :SEQ synchronization command. The recommended process for performing an intra-cell handover is shown in the following figure.

Step 7: Figure 1. Process for Performing an Intra-Cell Handover



**Example 1. Command Syntax:**

```
CALL:TCHannel[:ARFCn][:SElected]:SEQ <numeric value>
```

OR

```
CALL:TCHannel[:ARFCn]:<PGSM|EGSM|DCS|PCS>:SEQ <numeric value>
```

**Example 2. Programming Example:**

The following example illustrates how to use these commands to perform an intra-cell handover.

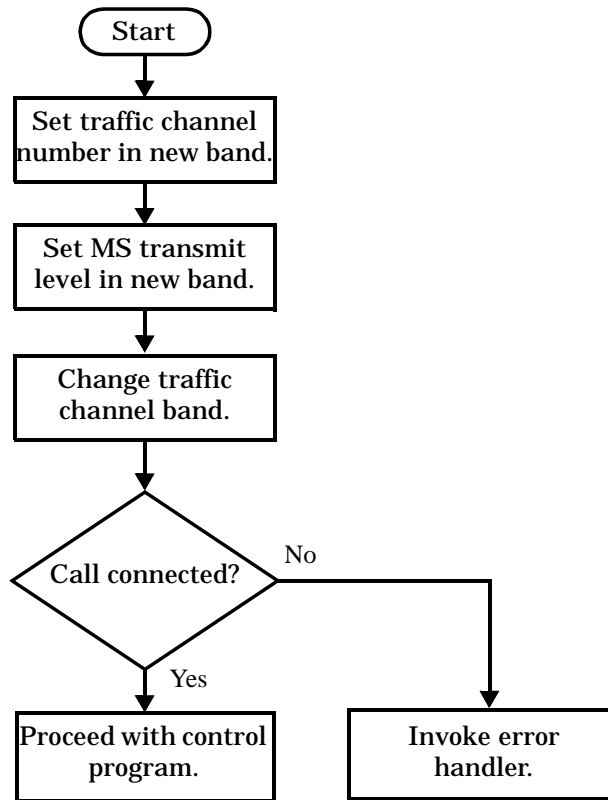
```
! existing conditions: a mobile station is connected to the test
! set, operating mode is set to active cell and a call is in the
! connected state.
! Step 1: Change the traffic channel number
OUTPUT Test_set;"CALL:TCH:SEQ 65"!Starts process of handing over MS
!to new traffic channel 65.
!No other commands will be processed
!until this operation completes
!because the :SEQ has been attached.
! Step #2: Check that the call is still in the connected state. It
! is possible that the MS did not successfully connect on the
! new channel.
OUTPUT Test_set;"CALL:STAT:STAT?"
ENTER Test_set;Call_status$
IF Call_status$ <> "CONN" THEN
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

**Performing a Dual-Band Handover**

A dual-band handover is accomplished using the CALL:TCHannel:BAND command. The recommended process for performing a dual band handover is shown in the following figure.

Step 7: Perform an Intra-Cell Handover

Step 7: Figure 2. Process for Performing a Dual-Band Handover





**Example 3. Programming Example:**

The following example illustrates how to use the CALL:TCHannel:BAND command to perform a dual-band handover.

```

! existing conditions: a mobile station is connected to the test
! set, MS TX Level = 11, Timeslot = 4, Timing Advance = 0,
! operating mode is set to active cell, a call is in the
! connected state, and active broadcast band is EGSM
! Step #1: Configure the traffic channel in the new broadcast band
OUTPUT Test_set;"CALL:TCH:DCS 556"
OUTPUT Test_set;"CALL:MS:TXL:DCS 4"
! Step #2: Change the traffic channel band
OUTPUT Test_set;"CALL:TCH:BAND DCS" !This is a sequential command so no
                                     !other commands will be executed until
                                     !the handover is complete (the
                                     !MS has communicated to the BSE that it
                                     !has successfully transitioned to the
                                     !new channel OR a protocol timer has
                                     !timed out).
! Step #3: Check that the call is still in the connected state. It
           ! is possible that the MS did not successfully connect on the
           ! new channel.
OUTPUT Test_set;"CALL:STAT:STAT?"
ENTER Test_set;Call_state$
IF Call_state$ <> "CONN" THEN
! <put error handler here>
END IF
! Call is connected so proceed with control program

```

## Step 8: Disconnect the Mobile Station from the Base Station Emulator

### Background

See “Step 4: Establish an Active Link with Mobile Station” for a discussion of call connect/disconnect synchronization.

### Using the Call Connected State Query for Call Disconnect Synchronization

The call-connected-state query only hangs if the call is in a transitory state, otherwise it immediately returns a 1 (Connected state) or a 0 (Idle state). At the start of a call disconnect process the call state is Connected. Sending a call-connected-state query at the start of a call disconnect process could immediately return a one if the query is satisfied before the disconnection process has started (that is, moved from the Connected state into one of the transitory states). For correct call disconnect synchronization it is necessary that the query be temporarily held off until after the call disconnect process has started. The call-state-change-detector is provided which can be used to temporarily hold off the query from returning an answer until the appropriate state change has occurred.

### Using the Call Connected Arm Command for Call Disconnect Synchronization

The call-state-change-detector arm command is used by 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. By first arming the call-state-change-detector, then querying the call connected state, and then attempting a base station or mobile station call termination, the call-connected-state query will hang until the disconnection operation begins and then reaches a final (Idle or Connected) state.

However, if the change detector is armed and a call disconnection is attempted but the call state never progresses from the Connected state, the call-connected-state query would hang forever. This could easily happen if the mobile is badly broken, no one pushes the “end” button on the mobile, etc.

The call-state-change-detector time-out timer is provided which is used to prevent the call-connected-state query from hanging forever.

### Using the Call State Change Detector Time-out for Call Disconnect Synchronization

The call-state-change-detector time-out mechanism allows the test set to disarm the call-state-change-detector which releases the call connected state query if it is currently hanging.

The time-out timer is started whenever the call-state-change-detector is armed or gets rearmed when already armed. The duration of the time-out is set using the call-connected-time-out command and should be set to the maximum amount of time the control program should wait between arming and the disconnect process to begin. 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.

If the timer expires while the call is in the Idle or Connected state, the call-state-change-detector is disarmed, which releases the call connected state query if it is currently hanging.

If the timer expires while the call is in one of the transitory states it is ignored as, once in any transitory state, the GSM-defined protocol timers limit the amount of time that can be spent in any transitory state.

## Overview

Terminating an active call with the mobile station when the test set is in active cell operating mode can be accomplished in one of two ways:

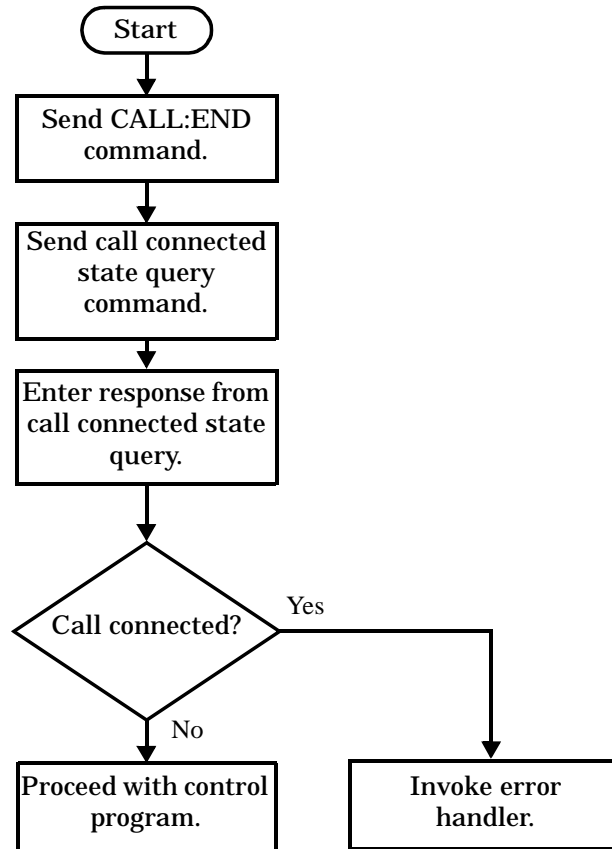
- Terminate the active call from the base station emulator
- Terminate the active call from the mobile station

## Terminating an Active Call from the Base Station Emulator

The recommended process for terminating an active call from the base station emulator is shown in the following figure.

The CALL:END command is used to initiate a base station disconnect.

### Step 8: Figure 1. Process for Terminating an Active Call from the Base Station Emulator



## Step 8: Disconnect the Mobile Station from the Base Station Emulator

### Example 1. Programming Example:

```
!*****  
! Step 8: Disconnect Mobile Station From Base Station Emulator  
!*****  
!  
OUTPUT Test_set;"CALL:END"           ! Initiate a base station disconnect.  
OUTPUT Test_set;"CALL:CONN:STAT?"    ! Initiate call connect state query.  
ENTER Test_set;Call_connected        ! Program will hang here until state  
                                     ! change or timer expires.  
IF Call_connected THEN               ! Check if disconnect successful  
! <put error handler here>  
END IF  
! Call is disconnected so proceed with control program
```

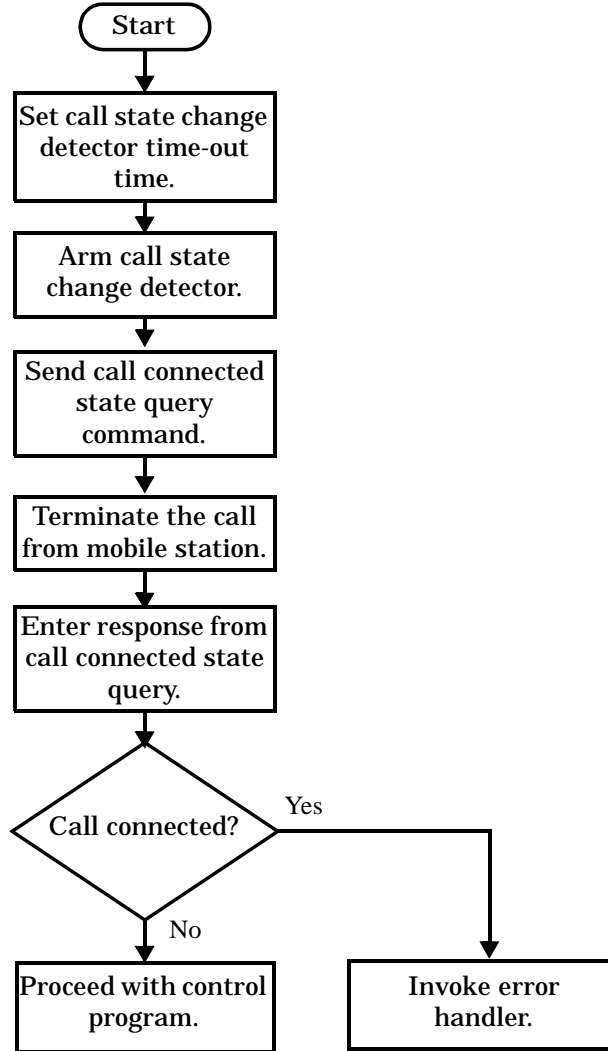
### Terminating an Active Call from the Mobile Station

The process for terminating an active call from the mobile station is shown in the following figure.

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

For mobile station terminated calls 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 time-out time is long enough to allow a human to push the button.

Step 8: Figure 2. Process for Terminating an Active Call from the Mobile Station



## Step 8: Disconnect the Mobile Station from the Base Station Emulator

### Example 2. 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.
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.
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

## Comprehensive Program Example

This section presents two example programs for making measurements using the test set. The first program follows the task flow presented at the beginning of the programming note (see [“Figure 1. Typical Flow of Tasks Performed by Control Program” on page 177](#)) and which is discussed throughout the programming guide. The second program, [“Example Program Without Comments” on page 229](#), is basically the same as the first but comments have been removed and the coding reflects the use of compound commands and complex commands to achieve coding efficiency.

### Example Program With Comments

```

10  ! Prog Name: com_man_ex.txt      Rev: A.0.2      Date Code: 12/18/98
20  !
30  ! Configure the BASIC environment, dimension and initialize variables.
40  ! These actions are unrelated to programming the HP 8960.
50  !
60  OPTION BASE 1
70  COM /Address/ Test_set
80  ! Allocate arrays to hold ORFS switching & modulation frequency offsets.
90  DIM Swit_offs$(255),Mod_offs$(255)
100 ! Allocate arrays to hold measurement results.
110 REAL Txpower(4)
120 Test_set=714 ! Test set's HP-IB address.
130 PRINTER IS CRT
140 CLEAR SCREEN
150 !
160 ! Reset test set to start from a known state. Not always necessary to do full
170 ! preset in a manufacturing environment but desireable in programming example.
180 !
190 OUTPUT Test_set;"*RST"
200 !
210 ! Turn on the HP-IB debugger. This is optional but very helpful for debugging
220 ! HP-IB commands when developing new code.
230 !
240 OUTPUT Test_set;"SYST:COMM:GPIB:DEB:STAT ON"
250 !
260 ! Check error message queue and STOP if any errors present. This ensures that
270 ! the example program starts with no error conditions present in the test set.
280 !
290 CALL Chk_err_msg_que
300 !
310 !*****
320 ! Step 1: Set Test Set's Operating Mode to Active Cell
330 !*****
340 !
350 OUTPUT Test_set;"CALL:OPER:MODE CELL"
360 !
370 !*****
380 ! Step 2: Configure the Base Station Emulator
390 !*****

```

## Comprehensive Program Example

```
400  !
410  ! Set RF IN/OUT port's amplitude offset to compensate for fixture loss of MS.
420  ! After setting offset, cell power settings reflect RF power at the MS antenna
430  ! input.
440  !
450  OUTPUT Test_set;"SYST:CORR:SGA -6"      ! MS has a -6 dB fixture loss.
460  !
470  OUTPUT Test_set;"CALL:CELL:BAND PGSM"  ! Set active broadcast band to PGSM.
480  OUTPUT Test_set;"CALL:ACT OFF"        ! Deactivate cell to set network parms.
490  OUTPUT Test_set;"CALL:CELL:MCC 1;LAC 1;MNC 1;NCC 1;BCC 5" ! Set network parms.
500  OUTPUT Test_set;"CALL:ACT ON"        ! Reactivate the cell.
510  OUTPUT Test_set;"CALL:BCH 20"        ! Set broadcast channel to 20.
520  OUTPUT Test_set;"CALL:POW:SAMP -85"   ! Set cell power to -85 dBm and cell
530  ! power state to ON with complex command.
540  OUTPUT Test_set;"CALL:TCH 45"        ! Set traffic channel to 45.
550  OUTPUT Test_set;"CALL:TCH:TSL 4"     ! Set timeslot to 4.
560  !
570  !*****
580  ! Step 3: Configure the Measurement Execution Parameters
590  !*****
600  !
610  ! Configure ORFS Measurement:
620  !
630  OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5" ! Examples of using complex commands to
640  OUTPUT Test_set;"SET:ORFS:MOD:COUN 10" ! set multi-meas state and count at
650  ! same time.
660  OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO" ! Set trig source to AUTO.
670  OUTPUT Test_set;"SET:ORFS:CONT OFF"    ! Set trig mode to single.
680  OUTPUT Test_set;"SET:ORFS:TIM 60"     ! Set timeout time to 60 seconds.
690  ! Put switching and modulation offsets to be tested into string variables.
700  Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
710  Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
720  OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
730  OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
740  !
750  ! Configure TX Power Measurement:
760  !
770  OUTPUT Test_set;"SET:TXP:COUN 3"
780  OUTPUT Test_set;"SET:TXP:TRIG:SOUR RISE;QUAL ON"
790  OUTPUT Test_set;"SET:TXP:CONT OFF"
800  OUTPUT Test_set;"SET:TXP:TIM 20"
810  !
820  ! Configure Phase & Frequency Error Measurement:
830  !
840  OUTPUT Test_set;"SET:PFER:COUN 8"
850  OUTPUT Test_set;"SET:PFER:TRIG:SOUR PROT;QUAL ON"
860  OUTPUT Test_set;"SET:PFER:CONT OFF"
870  OUTPUT Test_set;"SET:PFER:TIM 30"
880  OUTPUT Test_set;"SET:PFER:BSYN MID"
890  !
900  !*****
910  ! Step 4: Establish an Active Link with the Mobile Station
920  !*****
```



```

930  !
940  OUTPUT Test_set;"CALL:PAG:IMSI '001012345678901'"  ! Set paging IMSI.
950  OUTPUT Test_set;"CALL:PAG:REP OFF"  ! Set paging repeat state to off.
960  !
970  ! This example uses a BSE originated call. The MS must be camped to the BSE
980  ! in order for the BSE to originate a call. The following code will try to
990  ! originate a call 50 times and then STOP the program. This should give
1000 ! adequate time for the MS to camp to the BSE.
1010 !
1020 ! NOTE: This technique will cause the following error to be displayed on the
1030 !       test set's display and be put in the error message queue each time
1040 !       that the call fails to connect. This is normal for this technique.
1050 ! 'GSM call disconnected; No response to page (Timer T3113 expiry)'
1060 !
1070 Tries=1
1080 LOOP
1090   OUTPUT Test_set;"CALL:ORIG"           ! Originate a call.
1100   OUTPUT Test_set;"CALL:CONN:STAT?"    ! CALL:CONNECTed hanging HP-IB query.
1110   ENTER Test_set;Call_connected      ! Program will hang here until origination
1120                                     ! process completes. If successful and
1130                                     ! the call is connected the query will
1140                                     ! return a 1. If unsuccessful and the call
1150                                     ! is not connected the query returns 0.
1160 EXIT IF Call_connected
1170   OUTPUT Test_set;"CALL:END"
1180   IF Tries=50 THEN
1190     BEEP
1200     DISP ""
1210     PRINT "Call did not connect after";Tries;". Program terminated."
1220     STOP
1230   END IF
1240   DISP "Call has not connected after";Tries;"attempts. Trying again."
1250   Tries=Tries+1
1260 END LOOP
1270 DISP ""
1280 !
1290 !*****
1300 ! Step 5: Set the Mobile Station's Operating Conditions
1310 !*****
1320 !
1330 OUTPUT Test_set;"CALL:MS:DTX OFF"      ! Turn DTX off for all MS tests.
1340 !
1350 FOR Traf_chan=120 TO 124 STEP 2        ! Test channels 120, 122 & 124.
1360   OUTPUT Test_set;"CALL:TCH:SEQ ";Traf_chan ! Use :SEQ to force sequential
1370                                       ! execution of the TCH command.
1380   OUTPUT Test_set;"CALL:STAT:STAT?"    ! Verify that the call is still in
1390   ENTER Test_set;Call_status$         ! the connected state after handover.
1400   IF Call_status$<>"CONN" THEN
1410     PRINT "Call handover failed. New channel assignment =";Traf_chan
1420     PRINT "Program terminated."
1430     STOP
1440   END IF
1450 FOR Ms_pwr_lvl=5 TO 15 STEP 5          ! Test power levels 5, 10 & 15.

```

## Comprehensive Program Example

```
1460     OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Ms_pwr_lvl ! Use :SEQ to force
1470                                           ! sequential execution of
1480                                           ! the TXLevel command.
1490 !
1500 !*****
1510 ! Step 6: Make Measurements
1520 !*****
1530 !
1540 ! Step 6a: Start a set of concurrent measurements:
1550 !
1560     OUTPUT Test_set;"INIT:TXP;PFR;ORFS"
1570 !
1580 ! Step 6b: Determine if a measurement is done:
1590 !
1600     LOOP
1610         OUTPUT Test_set;"INIT:DONE?"
1620         ENTER Test_set;Meas_done$
1630 !
1640 ! Step 6c: Obtain measurement results: Each measurement illustrates a
1650 !         different way of reading in results. There is no one right way. The
1660 !         method used is application dependent. Note that the examples do not
1670 !         show all possible ways.
1680 !
1690     SELECT Meas_done$
1700 !
1710     CASE "TXP" ! TX Power measurement done.
1720         OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
1730         ENTER Test_set;Integrity,Txpower(*)
1740         IF (Integrity=0) THEN ! Always check integrity value.
1750             PRINT "TX Power results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
1760             PRINT USING "5X,""Minimum:""",M2D.2D,"" dBm"";Txpower(1)
1770             PRINT USING "5X,""Maximum:""",M2D.2D,"" dBm"";Txpower(2)
1780             PRINT USING "5X,""Average:""",M2D.2D,"" dBm"";Txpower(3)
1790             PRINT USING "5X,""Std Dev:""",M2D.2D,"" dB"";Txpower(4)
1800         ELSE
1810             GOSUB Bad_measurement
1820         END IF
1830 !
1840     CASE "PFR" ! Phase & Frequency Error measurement done.
1850         OUTPUT Test_set;"FETC:PFR:ALL?"
1860         ENTER Test_set;Integrity,Rms_phas_err,Peak_phas_err,Worst_freq_err
1870         IF (Integrity=0) THEN
1880             PRINT "PFError results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
1890             PRINT USING "5X,""RMS Phase Error:""",M2D.2D,"" deg"";Rms_phas_err
1900             PRINT USING "5X,""Peak Phase Error:""",M2D.2D,"" deg"";Peak_phas_err
1910             PRINT USING "5X,""Worst Freq Error:""",M3D.2D,"" Hz"";Worst_freq_err
1920         ELSE
1930             GOSUB Bad_measurement
1940         END IF
1950 !
1960     CASE "ORFS" ! ORFS measurement done.
1970     !
1980     ! This code illustrates a more 'generic' approach to reading measurement
```

```

1990      ! results. By using the capabilities designed into high-level
2000      ! measurements, routines that access measurement results do not have to
2010      ! explicitly know what the measurement execution conditions were. That
2020      ! information can be determined at the time the measurement results are
2030      ! queried.
2040      !
2050      OUTPUT Test_set;"FETC:ORFS:INT?"           ! Check measurement integrity.
2060      ENTER Test_set;Integrity
2070      IF (Integrity=0) THEN
2080          OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?" ! Get number of offsets
2090                                     ! tested.
2100          ENTER Test_set;Points
2110          IF Points THEN ! Only query if one or more offsets tested.
2120              ALLOCATE Orfs_swit_res(Points),Orfs_swit_offs(Points)
2130              OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?" ! Get measurement offsets.
2140              ENTER Test_set;Orfs_swit_offs(*)
2150              OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:SWIT?" ! Get results.
2160              ENTER Test_set;Tx_power,Orfs_swit_res(*)
2170              PRINT "ORFS Swit Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
2180              PRINT USING "19X,""TX Power ="" ,M2D.2D,"" dBm"";Tx_power
2190              PRINT "      Offset(kHz)           Level(dBm)"
2200              PRINT "      -----"           "-----"
2210 Orfs_image:  IMAGE 6X,M4D.2D,12X,M4D.2D
2220              FOR J=1 TO Points
2230                  PRINT USING Orfs_image;(Orfs_swit_offs(J)/1.E+3),Orfs_swit_res(J)
2240              NEXT J
2250              DEALLOCATE Orfs_swit_res(*),Orfs_swit_offs(*)
2260          END IF
2270          OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?" ! Get number of offsets
2280                                     ! tested.
2290          ENTER Test_set;Points
2300          IF Points THEN ! Only query if one or more offsets tested.
2310              ALLOCATE Orfs_mod_res(Points),Orfs_mod_offs(Points)
2320              OUTPUT Test_set;"SET:ORFS:MOD:FREQ?" ! Get measurement offsets.
2330              ENTER Test_set;Orfs_mod_offs(*)
2340              OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:MOD?" ! Get results.
2350              ENTER Test_set;Tx_power,Pwr_30khz,Orfs_mod_res(*)
2360              PRINT "ORFS Mod Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
2370              PRINT USING "18X,""30 KHz BW Power ="" ,M2D.2D,"" dBm"";Pwr_30khz
2380              PRINT "      Offset(kHz)           Level(dB)"
2390              PRINT "      -----"           "-----"
2400              FOR J=1 TO Points
2410                  PRINT USING Orfs_image;(Orfs_mod_offs(J)/1.E+3),Orfs_mod_res(J)
2420              NEXT J
2430              DEALLOCATE Orfs_mod_res(*),Orfs_mod_offs(*)
2440          END IF
2450      ELSE
2460          GOSUB Bad_measurement
2470      END IF
2480  END SELECT
2490  EXIT IF Meas_done$="NONE"
2500  END LOOP ! If 'WAIT' is returned from 'INIT:DONE?' query, it just falls
2510          ! through the loop.

```

## Comprehensive Program Example

```
2520     NEXT Ms_pwr_lvl
2530     !
2540     !*****
2550     ! Step 7: Perform an Intra-cell Handover
2560     !*****
2570     !
2580     NEXT Traf_chan ! The handover is performed at the top of the FOR loop at line
2590                   ! 1300
2600     !
2610     !*****
2620     ! Step 8: Disconnect the Mobile Station From the Base Station Emulator
2630     !*****
2640     !
2650     OUTPUT Test_set;"CALL:END"
2660     OUTPUT Test_set;"CALL:CONN:STAT?"
2670     ENTER Test_set;Call_connected
2680     IF Call_connected THEN
2690         BEEP
2700         PRINT "Unable to complete BS termination. Program terminated."
2710         STOP
2720     END IF
2730     PRINT "Program completed."
2740     STOP
2750     !
2760     Bad_measurement: !
2770     PRINT "Measurement error: "&Meas_done$
2780     PRINT "Measurement Integrity value =" ;Integrity
2790     RETURN
2800     !
2810     END ! End of program
2820     !
2830     SUB Chk_err_msg_que
2840         COM /Address/ Test_set
2850         DIM Error_message$(255)
2860         Error_flag=0
2870         LOOP
2880             OUTPUT Test_set;"SYST:ERR?"
2890             ENTER Test_set;Error_number,Error_message$
2900             EXIT IF Error_number=0
2910             IF Error_number=-350 THEN
2920                 Error_flag=1
2930                 PRINT "Error Message Queue overflow. Error messages have been lost."
2940             ELSE
2950                 Error_flag=1
2960                 PRINT Error_number,Error_message$
2970             END IF
2980         END LOOP
2990         IF NOT Error_flag THEN
3000             PRINT "No errors in Error Message Queue."
3010             SUBEXIT
3020         END IF
3030         STOP
3040     SUBEND
```

## Example Program Without Comments

The following program is basically the same as the example program presented in ["Example Program With Comments" on page 223](#) but comments have been removed and the coding reflects the use of compound commands and complex commands to achieve coding efficiency.

```

10  ! Prog Name: sim_man_ex.txt      Rev: A.0.2      Date Code: 12/18/98
20  OPTION BASE 1
30  COM /Address/ Test_set
40  DIM Swit_offs$(255),Mod_offs$(255)
50  REAL Txpower(4)
60  Test_set=714
70  PRINTER IS CRT
80  CLEAR SCREEN
90  OUTPUT Test_set;"*RST;SYST:COMM:GPIB:DEB:STAT ON"
100 CALL Chk_err_msg_que
110 OUTPUT Test_set;"CALL:OPER:MODE CELL;;SYST:CORR:SGA -6"
120 OUTPUT Test_set;"CALL:CELL:BAND PGSM;BCH 20;POW:SAMP -85;;CALL:TCH:ARFC 45;TSL 4"
130 OUTPUT Test_set;"CALL:CELL:ACT OFF;MCC 1;LAC 1;MNC 1;NCC 1;BCC 5;ACT ON"
140 OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5;;SET:ORFS:MOD:COUN 10"
150 OUTPUT Test_set;"SET:ORFS:CONT OFF;TIM 60;TRIG:SOUR AUTO"
160 Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
170 Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
180 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$&";:SET:ORFS:MOD:FREQ "&Mod_offs$
190 OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20;TRIG:SOUR RISE;QUAL ON"
200 OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;BSYN MID;TRIG:SOUR PROT;QUAL ON"
210 OUTPUT Test_set;"CALL:PAG:REP OFF;IMSI `001012345678901`"
220 Tries=1
230 LOOP
240   OUTPUT Test_set;"CALL:ORIG;CONN:STAT?"
250   ENTER Test_set;Call_connected
260   EXIT IF Call_connected
270   OUTPUT Test_set;"CALL:END"
280   IF Tries=50 THEN
290     BEEP
300     DISP ""
310     PRINT "Call did not connect after";Tries;". Program terminated."
320     STOP
330   END IF
340   DISP "Call has not connected after";Tries;"attempts. Trying again."
350   Tries=Tries+1
360 END LOOP
370 DISP ""
380 OUTPUT Test_set;"CALL:MS:DTX OFF"
390 FOR Traf_chan=120 TO 124 STEP 2
400   OUTPUT Test_set;"CALL:TCH:SEQ ";Traf_chan;";:CALL:STAT:STAT?"
410   ENTER Test_set;Call_status$
420   IF Call_status$<>"CONN" THEN
430     PRINT "Call handover failed. New channel assignment =";Traf_chan
440     PRINT "Program terminated."
450     STOP
460   END IF
470   FOR Ms_pwr_lvl=5 TO 15 STEP 5

```

## Comprehensive Program Example

```
480     OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Ms_pwr_lvl;"::INIT:TXP;PFER;ORFS"
490     LOOP
500         OUTPUT Test_set;"INIT:DONE?"
510         ENTER Test_set;Meas_done$
520         SELECT Meas_done$
530         CASE "TXP"
540             OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
550             ENTER Test_set;Integrity,Txpower(*)
560             IF (Integrity=0) THEN
570                 PRINT "TX Power results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
580                 PRINT USING "5X,""Minimum:""",M2D.2D,"" dBm"";Txpower(1)
590                 PRINT USING "5X,""Maximum:""",M2D.2D,"" dBm"";Txpower(2)
600                 PRINT USING "5X,""Average:""",M2D.2D,"" dBm"";Txpower(3)
610                 PRINT USING "5X,""Std Dev:""",M2D.2D,"" dB"";Txpower(4)
620             ELSE
630                 GOSUB Bad_measurement
640             END IF
650         CASE "PFER"
660             OUTPUT Test_set;"FETC:PFER:ALL?"
670             ENTER Test_set;Integrity,Rms_phas_err,Peak_phas_err,Worst_freq_err
680             IF (Integrity=0) THEN
690                 PRINT "PFERror results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
700                 PRINT USING "5X,""RMS Phase Error:""",M2D.2D,"" deg"";Rms_phas_err
710                 PRINT USING "5X,""Peak Phase Error:""",M2D.2D,"" deg"";Peak_phas_err
720                 PRINT USING "5X,""Worst Freq Error:""",M3D.2D,"" Hz"";Worst_freq_err
730             ELSE
740                 GOSUB Bad_measurement
750             END IF
760         CASE "ORFS"
770             OUTPUT Test_set;"FETC:ORFS:INT?"
780             ENTER Test_set;Integrity
790             IF (Integrity=0) THEN
800                 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?"
810                 ENTER Test_set;Points
820                 IF Points THEN
830                     ALLOCATE Orfs_swit_res(Points),Orfs_swit_offs(Points)
840                     OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?;FETC:ORFS:POW?;FETC:ORFS:SWIT?"
850                     ENTER Test_set;Orfs_swit_offs(*),Tx_power,Orfs_swit_res(*)
860                     PRINT "ORFS Swit Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
870                     PRINT USING "19X,""TX Power ="" ,M2D.2D,"" dBm"";Tx_power
880                     PRINT "      Offset(kHz)          Level(dBm)"
890                     PRINT "      -----          -----"
900 Orfs_image:  IMAGE 6X,M4D.2D,12X,M4D.2D
910                     FOR J=1 TO Points
920                         PRINT USING Orfs_image;(Orfs_swit_offs(J)/1.E+3),Orfs_swit_res(J)
930                     NEXT J
940                     DEALLOCATE Orfs_swit_res(*),Orfs_swit_offs(*)
950                 END IF
960             OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?"
970             ENTER Test_set;Points
980             IF Points THEN
990                 ALLOCATE Orfs_mod_res(Points),Orfs_mod_offs(Points)
1000                OUTPUT Test_set;"SET:ORFS:MOD:FREQ?;FETC:ORFS:POW?;FETC:ORFS:MOD?"
```

```

1010         ENTER Test_set;Orfs_mod_offs(*),Tx_power,Pwr_30khz,Orfs_mod_res(*)
1020         PRINT "ORFS Mod Results: TCH =" ;Traf_chan;"and TXL =" ;Ms_pwr_lvl
1030         PRINT USING "18X,""30 KHz BW Power ="",M2D.2D,"" dBm""";Pwr_30khz
1040         PRINT "         Offset(kHz)         Level(dB)"
1050         PRINT "         -----         -----"
1060         FOR J=1 TO Points
1070             PRINT USING Orfs_image;(Orfs_mod_offs(J)/1.E+3),Orfs_mod_res(J)
1080         NEXT J
1090         DEALLOCATE Orfs_mod_res(*),Orfs_mod_offs(*)
1100     END IF
1110 ELSE
1120     GOSUB Bad_measurement
1130 END IF
1140 END SELECT
1150 EXIT IF Meas_done$="NONE"
1160 END LOOP
1170 NEXT Ms_pwr_lvl
1180 NEXT Traf_chan
1190 OUTPUT Test_set;"CALL:END;CONN:STAT?"
1200 ENTER Test_set;Call_connected
1210 IF Call_connected THEN
1220     BEEP
1230     PRINT "Unable to complete BS termination. Program terminated."
1240     STOP
1250 END IF
1260 PRINT "Program completed."
1270 STOP
1280 !
1290 Bad_measurement: !
1300 PRINT "Measurement error: "&Meas_done$
1310 PRINT "Measurement Integrity value =" ;Integrity
1320 RETURN
1330 !
1340 END
1350 !
1360 SUB Chk_err_msg_que
1370     COM /Address/ Test_set
1380     DIM Error_message$(255)
1390     Error_flag=0
1400     LOOP
1410         OUTPUT Test_set;"SYST:ERR?"
1420         ENTER Test_set;Error_number,Error_message$
1430     EXIT IF Error_number=0
1440     IF Error_number=-350 THEN
1450         Error_flag=1
1460         PRINT "Error Message Queue overflow. Error messages have been lost."
1470     ELSE
1480         Error_flag=1
1490         PRINT Error_number,Error_message$
1500     END IF
1510 END LOOP
1520 IF NOT Error_flag THEN
1530     PRINT "No errors in Error Message Queue."

```

## Comprehensive Program Example

```
1540      SUBEXIT
1550      END IF
1560      STOP
1570 SUBEND
```



## **6 GPRS Programming Guide**



# **Programming the Agilent Technologies 8960 Series 10 for GPRS Mobile Testing in Active Cell Operating Mode**

## Introduction

- [“Conventions used in this Programming Guide”](#)
- [“Purpose of this Programming Guide”](#)
- [“How this Programming Guide is Organized”](#)
- [“How to use this Programming Guide”](#)
- [“About the Programming Examples Presented in This Programming Guide”](#)

### Conventions used in this Programming Guide

Throughout this Programming Guide the term “test set” refers to an Agilent Technologies 8960 Series 10 wireless communications test set with the GPRS mobile test application installed.

### Purpose of this Programming Guide

The test set represents state-of-the-art technology in one-box-testers and contains many powerful test capabilities which are accessible through easy-to-use GPIB programming commands. The purpose of this Programming Guide is to teach you how to write a basic control program, using the test set’s GPIB command set. This program will perform fundamental manufacturing tests on a mobile station with the test set operating in active cell mode.

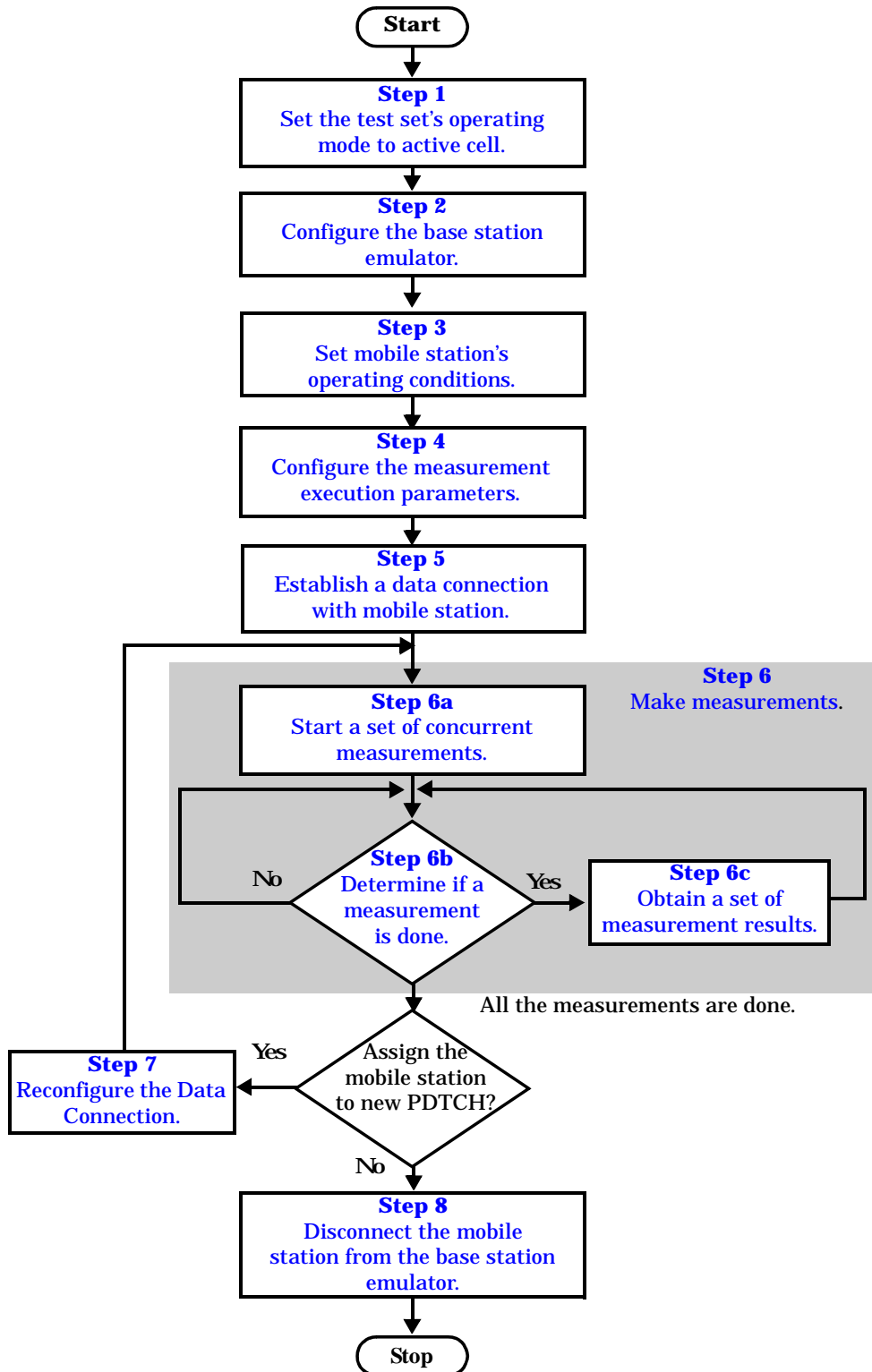
### How this Programming Guide is Organized

The Programming Guide is organized around a typical set of tasks a control program would normally perform when testing a mobile station in a manufacturing environment. The set of tasks is shown in [“Figure 1. Typical Flow of Tasks Performed by a Control Program”](#) on page 237.

Typically in a manufacturing environment:

- steps 1, 2, 3, and 4 are done once each time a production run is started,
- steps 5 and 8 are done once for each mobile station tested during the production run,
- steps 6 and 7 are done iteratively for each mobile station tested during the production run. The number of iterations for these steps is dependent upon how many mobile station operating conditions are being tested (that is, number of channels, number of power levels, and so fourth).

Figure 1. Typical Flow of Tasks Performed by a Control Program



## How to use this Programming Guide

This Programming Guide is divided into 9 sections. Sections 1 through 8 (Step 1 through Step 8) should be read in sequence. Each section, in order, describes one of the tasks to be performed by the control program and shows how to accomplish that task using the test set's GPIB command set. As you progress through each section your understanding of how the test set's GPIB interface operates will increase as you see the control program evolve.

The last section of the Programming Guide presents a [“Comprehensive Programming Example” on page 275](#) which uses all of the topics discussed in sections 1 through 8 together in one program to give you a sense of how to tie everything together.

## About the Programming Examples Presented in This Programming Guide

### Programming Language:

The programming examples presented in this guide are written in the HP BASIC programming language, also known as Rocky Mountain BASIC or RMB.

### Syntax Used in Programming Examples:

- The programming examples use the shortened form of the command syntax to reduce test time by minimizing GPIB bus transactions. The shortened form of a command is defined by use of capital letters in the command syntax. For example, for the command syntax:

```
SETup:TXPower:CONTinuous <ON|1|OFF|2>
```

the shortened form would be:

```
SET:TXP:CONT <ON|1|OFF|2>
```

- 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:PDTCH[:ARFCn][:SElected] <numeric value>
```

appears in the programming examples as:

```
CALL:PDTCH <numeric value>
```

- The programming examples make extensive use of compound commands using the ; and the :: separators. Refer to the test set's reference documentation for details on the definition and use of these command separators.

## Step 1: Set the Test Set's Operating Mode to Active Cell

### Background

The test set contains a base station emulator with the primary purpose of providing the call processing necessary for parametric measurements on the RF signals of a mobile station with GPRS capability.

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.

This Programming Guide focuses on programming the test set's base station emulator in active cell operating mode.

### Overview of Active Cell Operating Mode

Active cell is the only operating mode currently available. It provides active signaling between the mobile station and the base station emulator.

### Active Cell Features

The basic features provided by the base station emulator when the operating mode is set to active cell are:

- Generation of a BCH (broadcast channel).
- Support for Routing Area and Location Area updates.
- Support for the Agilent proprietary BLER data connection.
- The ATTACH procedure is supported.
- The DETACH procedure is supported.
- Packet data transfers on the uplink and downlink are supported.
- All measurements supported in the test application are available.
- The base station emulator automatically controls the test set's receiver.

## Step 1: Set the Test Set's Operating Mode to Active Cell



---

## Step 2: Configure the Base Station Emulator

- [“The Base Station Emulator”](#)
- [“Configuring the Broadcast Channel Parameters”](#)
- [“Configuring the Packet Data Traffic Channel Parameters”](#)
- [“Programming Example”](#)

### The Base Station Emulator

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 mobile station can “camp” to this signal, just as it would camp to a cell on a real network, and performs an attach procedure to register the mobile station with the network. A Packet Data Traffic Channel (PDTCH) can then be established using an Agilent proprietary data connection designed to accommodate block error rate reports from the mobile station. You can also make transmitter measurements using this data connection. Data is transferred in both the downlink and uplink directions. Measurements can be made, using the base station emulator's measurement receiver, under essentially identical conditions to that which the mobile station would experience on a real network.

The base station emulator emulates a cell in any one of the following GSM frequency bands:

- PGSM - Primary (band) GSM, also known as GSM900
- EGSM - Extension (band) GSM (includes PGSM)
- DCS - Also known as DCS1800

---

**NOTE**        The term GSM is used to refer to any combination of, or all of, the supported bands. It is not used as a shortened term for PGSM.

---

To configure the base station emulator, you must configure the BCH and PDTCH as described in the following sections. It may not be necessary to configure all the parameters all the time. The test set's default settings allow a properly functioning mobile station to successfully camp on the cell under most circumstances.

In a manufacturing environment it may be desirable to explicitly configure 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.

## Configuring the Broadcast Channel Parameters

The BCH parameters are configured using the CALL processing subsystem commands shown in the following table.

**Table 1. Broadcast Channel Settable Parameters**

Parameter	Command Syntax	Footnote
Cell Band	CALL[:CELL[1]]:BAND <PGSM   EGSM   DCS>	
Cell Power	CALL[:CELL[1]]:POWer:AMPLitude <numeric value>[<suffix>]	

## Configuring the Packet Data Traffic Channel Parameters

The PDTCH parameters are configured using the CALL processing subsystem commands shown in the following table.

**Table 2. Packet Data Traffic Channel Settable Parameters**

Parameter	Command Syntax	Footnote
Packet Data Traffic Channel Band	CALL:<PDTCH   PDTChannel>:BAND <PGSM   EGSM   DCS>	1
Packet Data Traffic Channel Number (ARFCN)	CALL:<PDTCH   PDTChannel>[:ARFCn][:SELEcted] <numeric value> OR CALL:<PDTCH   PDTChannel>[:ARFCn]:<PGSM   EGSM   DCS> <numeric value>	2
Data Connection Type	CALL:FUNcTION:DATA:TYPE <BLER>	3
Power Reduction Downlink Level	CALL:<PDTCH   PDTChannel>:PREdUction:LEVel<1   2> <numeric value>[<suffix>]	4
Downlink Burst Power Reduction Selection	CALL:<PDTCH   PDTChannel>:PREdUction:BURSt<1   2> <PRL1   PRL2>	5

**Table Footnotes**

1. The PDTCH band setting becomes the selected band (see Note 2).
2. Sets the PDTCH channel for the PDTCH band selected with the PDTCH Band command (see Note 1).
3. The BLER data connection type is Agilent proprietary. It allows block error rate measurements to be made.
4. Assigns power reduction level values to PRL1 and PRL2.
5. Assigns either PRL1 or PRL2 power reduction levels to a downlink burst.

The following program example illustrates the use of the base station emulator BCH and PDTCH configuration commands.

```
OUTPUT Test_set;"CALL:BAND EGSM;POW:AMPL -60"  
OUTPUT Test_set;"CALL:PDTCH 1023"  
OUTPUT Test_set;"CALL:FUNC:DATA:TYPE BLER"  
OUTPUT Test_set;"CALL:PDTCH:PRED:LEV1 2 DB"  
OUTPUT Test_set;"CALL:PDTCH:PRED:LEV2 10 DB"  
OUTPUT Test_set;"CALL:PDTCH:PRED:BURS1 PRL2"  
OUTPUT Test_set;"CALL:PDTCH:PRED:BURS2 PRL1"
```

## Step 2: Configure the Base Station Emulator

## Step 3: Set the Mobile Station's Operating Conditions

### Mobile Station Uplink Burst Transmit Power Level

The mobile station's uplink burst transmit power level is specified by the test set in a command sent to the mobile station. In this way, the test set emulates a base station, which sends transmit level change commands to a mobile. The test set also uses the mobile station's uplink burst TX level parameter to determine the power to expect from the mobile station when making measurements on the mobile station's transmitter.

#### Overview

You can set the mobile station's operating conditions using the CALL processing subsystem commands shown in the following table.

**Table 3. Settable Mobile Station Operating Conditions**

Parameter	Command Syntax	Footnote
Uplink Burst TX Level	CALL:<PDTCH   PDTChannel>:MS:TXLevel[:SElected]:BURSt<n> <numeric value> OR CALL:<PDTCH   PDTChannel>:MS:TXLevel:<PGSM   EGSM   DCS>:BURSt<n> <numeric value>	1,2

#### Table Footnotes

1. The Packet Data Traffic Channel band setting is the selected band.
2. There is only one uplink burst available for this release. Therefore, it is not necessary to specify a value in your code for <n>. It defaults to 1.

#### Programming Example

The following example illustrates how to set the mobile station's operating conditions. The first line sets the mobile station's transmit power level for the currently active band to 14. The second line sets the power level when the DCS band becomes the active band.

```
OUTPUT Test_set ; "CALL:PDTCH:MS:TXL: BURS 14"
OUTPUT Test_set ; "CALL:PDTCH:MS:TXL:DCS: BURS 8"
```

### Step 3: Set the Mobile Station's Operating Conditions

---

## Step 4: Configure the Measurement Execution Parameters

- “Measurement Execution Parameters”
- “Overview of the SETup subsystem”
- “Configuring Measurement Averaging Parameters”
- “Configuring Measurement Triggering Parameters”
- “Configuring the Burst Synchronization Parameter”
- “Configuring Measurement Timeout Parameters”
- “Configuring Measurement Specific Parameters”
- “Programming Example”

### Measurement Execution Parameters

Measurement execution parameters allow you to control the conditions under which a measurement operates. Not all measurements use all the execution parameters shown below. Additionally, some measurements have parameters that are specific to the measurement such as offset frequency lists or filter settings. Each measurement has its own set of parameters which are unique to it and have no affect on the execution of other measurements. Refer to the GPIB syntax listing in the reference documentation for a detailed list of execution parameters for individual measurements. The general set of measurement execution parameters and their generic categories are:

- Measurement Averaging (used by most measurements)
  - Multi-Measurement Count
  - Multi-Measurement Count State
- Measurement Triggering (used by most measurements)
  - Trigger Arm
  - Trigger Source
  - Trigger Delay
  - Trigger Qualifier
- Measurement Synchronization (used by some measurements)
  - Burst Synchronization
- Measurement Timeouts (used by all measurements)
  - Measurement Timeout
  - Measurement Timeout State
- Measurement Specific (execution parameters specific to an individual measurement)

## Overview of the SETup subsystem

The SETup subsystem allows you to configure the 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>
```

For example, the SETup subsystem is used below to set a timeout value for the transmit power measurement:

```
SET:TXP:TIM 5
```

The following table shows the measurements available in the test application and their associated <measurement mnemonic> used in the SETup command syntax.

**Table 4. Measurement Mnemonics used in the SETup Subsystem**

Measurement	<measurement mnemonic>
Transmit Power	TXPower
Power vs Time	PVTime
Phase & Frequency Error	PFERror
Output RF Spectrum	ORFSpectrum

## Configuring Measurement Averaging Parameters

**Table 1. Measurement Averaging Parameters**

Parameter	Command Syntax
Measurement Count Number and State	SETup:<measurement mnemonic>:COUNT[:SNUMber] <numeric value>
Measurement Count State	SETup:<measurement mnemonic>:COUNT:STATe <ON 1 OFF 0>
Measurement Count Number	SETup:<measurement mnemonic>:COUNT:NUMBer <numeric value>

### Configuring Multi-Measurement Count State and Count Number Simultaneously

The multi-measurement count state can be set to ON and the multi-measurement count number can be set to some value using a single command. For example:

```
OUTPUT Test_set;"SET:TXP:COUN 10"
```

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

### Multi-Measurement Count State Parameter

The Multi-Measurement Count State parameter is used to turn measurement averaging on and off.

### Multi-Measurement Count Number Parameter

The Multi-Measurement Count Number parameter sets the number of measurement samples taken during each measurement cycle when the COUNT:STATe parameter is set to ON.



## Configuring Measurement Triggering Parameters

**Table 2. Measurement Triggering Parameters**

Parameter	Command Syntax
Trigger Arm	SETup:<measurement mnemonic>:CONTInuous <ON 1 OFF 0>
Trigger Source	SETup:<measurement mnemonic>:TRIGger:SOURce <AUTO IMMediate PROTOcol RISE>
Trigger Delay	SETup:<measurement mnemonic>:TRIGger:DELay <numeric value>[<suffix>]
Trigger Qualifier	SETup:<measurement mnemonic>:TRIGger:QUALifier <ON 1 OFF 0>

### Trigger Arm Parameter

The Trigger Arm parameter allows you to set whether a measurement either:

- make one measurement then stop (single), or
- automatically re-arm upon completion of one measurement and repeat the process (continuous).

For example,

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

would set the trigger arming to single for the transmit power measurement.

---

**NOTE** If you are using the test set remotely, set the trigger arm to single (CONTInuous OFF) for each measurement or, a single command (SET:CONT:OFF) or the \*RST command can be used to set the trigger arm to single for all measurements.

---

### Trigger Source Parameter

The Trigger Source parameter selects the source of the measurement trigger signal.

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

would set the trigger source to AUTO for the transmit power measurement.

### Trigger Delay Parameter

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 occurs prior to the trigger event.

```
OUTPUT Test_set; "SET:TXP:TRIG:DEL 10 US"
```

would set the trigger delay to 10  $\mu$ s for the transmit power measurement.

## Step 4: Configure the Measurement Execution Parameters

### Trigger Qualifier Parameter

The Trigger Qualifier parameter allows you to enable or disable automatic trigger re-arming following a trigger event which occurred when no valid signal (burst) was present.

```
OUTPUT Test_set; "SET:TXP:TRIG:QUAL ON"
```

would turn the trigger qualifier on for the transmit power measurement.

### Configuring the Burst Synchronization Parameter

#### Burst Synchronization Parameter

The burst synchronization parameter allows you to specify where in the sampled data stream the test set starts analyzing the captured data. Burst synchronization occurs after the measurement data is captured. The burst synchronization parameter's setting determines how the measurement's time reference is developed from the sampled data.

Not all measurements have synchronization choices and not all synchronization choices are available in measurements that use synchronization. Measurement synchronization and measurement triggering are independent from each other and may be used in any combination.

The command syntax for setting the burst synchronization parameter is:

```
SETup:<measurement mnemonic>:BSYNc <MIDamble|AMPLitude|NONE>
```

The burst synchronization is set to midamble for the power versus time measurement in the following example:

```
OUTPUT Test_set; "SET:PVT:BSYN MID"
```

### Configuring Measurement Timeout Parameters

**Table 3. 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>]

#### Configuring Measurement Timeout State and Timeout Time Simultaneously

The measurement timeout state can be set to ON and the measurement timeout time can be set to some value using a single complex command.

```
OUTPUT Test_set; "SET:TXP:TIM:STIM 10"
```

would set the measurement timeout state to ON and set the measurement timeout time to 10 seconds for the transmit power measurement. Note that in this example the optional command mnemonic :STIME has been included for purposes of clarity.

### Measurement Timeout State Parameter

The Measurement Timeout State parameter allows you to enable or disable measurement timeouts.

```
OUTPUT Test_set;"SET:PVT:TIM:STAT ON"
```

would enable measurement timeouts for the power versus time measurement.

### Measurement Timeout Time Parameter

The Measurement Timeout Time parameter allows you to set the maximum time that a measurement executes before failing with a timeout error (when the TIMEout:STATe parameter is set to ON).

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

would set the measurement timeout time to 10 seconds for the transmit power measurement.

## Configuring Measurement Specific Parameters

Some measurements have parameters that are specific to the measurement. Refer to the GPIB syntax listings for a detailed list of execution parameters for individual measurements. Some of the possible programming techniques that you can use to configure measurement specific execution parameters are described below.

### Sending Comma-Separated Parameter Configuration Lists to the Test Set

Numerous parameters may be necessary to configure a measurement. For example, the output RF spectrum measurement can require up to 22 frequency offsets for the modulation part of the measurement and up to 8 frequency offsets for the switching part of the measurement. You send these offsets as comma separated lists. There are a variety of techniques that you can use to send these lists. Some of these techniques are shown below.

1. Include each individual parameter in the command itself. For example:

```
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ .4MHZ,.6MHZ,-.4MHZ,-.6MHZ"
```

2. Store the parameter values in a data structure and send the command with the data structure appended to it. For example:

- Using a string variable:

```
DIM Swit_offs$(255)
Swit_offs$=".4MHZ,.6MHZ,-.4MHZ,-.6MHZ,1.2MHZ,-1.2MHZ"
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
```

## Step 4: Configure the Measurement Execution Parameters

- Using numeric arrays:

```
OPTION BASE 1
REAL Swit_offs(8),Mod_offs(22)
!
DATA 400,-400,600,-600,1200,-1200,1800,-1800
DATA .1,-.1,.2,-.2,.25,-.25,.4,-.4,.6,-.6,.8,-.8
DATA 1,-1,1.2,-1.2,1.4,-1.4,1.6,-1.6,1.8,-1.8
!
READ Swit_offs(*)
READ Mod_offs(*)
!
Swit_img:IMAGE K,7(K,"KHZ,"),K,"KHZ"
Mod_img:IMAGE K,21(K,"MHZ,"),K,"MHZ"
OUTPUT Test_set USING Swit_img;"SET:ORFS:SWIT:FREQ",Swit_offs(*)
OUTPUT Test_set USING Mod_img;"SET:ORFS:MOD:FREQ",Mod_offs(*)
```

### Programming Example

The following example illustrates configuring the measurement execution parameters for the output RF spectrum, transmit power, and phase and frequency error measurements.

```
! Configure ORFS Measurement:
!
OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5"      ! Examples of using complex
OUTPUT Test_set;"SET:ORFS:MOD:COUN 10"     ! commands to set multi-meas
                                           ! state and count at same time.
OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO"  ! Set trig source to AUTO.
OUTPUT Test_set;"SET:ORFS:CONT OFF"        ! Set trig mode to single.
OUTPUT Test_set;"SET:ORFS:TIM 60"         ! Set timeout time to 60 sec.
! Put switching and modulation offsets to be tested into string variables.
Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
!
! Configure TX Power Measurement:
!
OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20"
OUTPUT Test_set;"SET:TXP:TRIG:SOUR RISE;QUAL ON"
!
! Configure Phase & Frequency Error Measurement:
!
OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;BSYN MID"
OUTPUT Test_set;"SET:PFER:TRIG:SOUR PROT;QUAL ON"
```

---

## Step 5: Establish a Data Connection with the Mobile Station

- [“Data Connection Status Synchronization” on page 253](#)
- [“Process for Establishing a Data Connection” on page 254](#)

### Data Connection Status Synchronization

When the control program requires that a data connection be established between the mobile station and the test set, it must also be able to obtain knowledge about the status of the connection. The control program issues the commands necessary to initiate the connection process to the test set. The control program must then be able to determine when the connection has transitioned through various states successfully so that it can proceed. The control program must also be able to determine that the transition has not been successful so appropriate action can be taken.

### Data Connection States

At any instant in time a data connection is in one of the following states:

- Idle
- Attaching\*
- Detaching\*
- Attached
- Starting\*
- Ending\*
- Transferring

The states marked by a \* are referred to as transitory states because the amount of time which the connection spends in any of these states is limited. Therefore, the connection is not allowed to stay in a transitory state forever.

### **CALL:STATus:DATA? Query**

The CALL:STATus:DATA? query immediately returns the state of the data connection at the time the query is received.

**Table 5. Responses Returned from the CALL:STAT:DATA? Query**

<b>Response</b>	<b>Meaning</b>
IDLE	The connection is in the Idle state.
ATTG	The connection is in the Attaching transitory state.
DET	The connection is in the Detaching transitory state.
ATT	The connection is in the Attached state.
STAR	The connection is in the Starting transitory state.
END	The connection is in the Ending transitory state.
TRAN	The connection is in the Transferring state.

### **Using the CALL:STATus[:DATA]? query for Connection State Synchronization**

The most common technique used to determine if a process has completed (either successfully or unsuccessfully), is to repeatedly query the connection state using the CALL:STATus:DATA? query command inside a program loop. The return value from each query is checked to determine if the process is proceeding or has reached the desired state.

There are, however, some inherent problems associated with this technique:

- The rapid polling of the instrument increases bus traffic and places increased demand on the instrument's processors to respond to the constant stream of queries.
- The control program must handle failure conditions. For example: if a call origination process is started but the call never leaves the Idle state, the control program must incorporate some technique to prevent the program from staying in the loop forever waiting for a transition out of the Idle state.

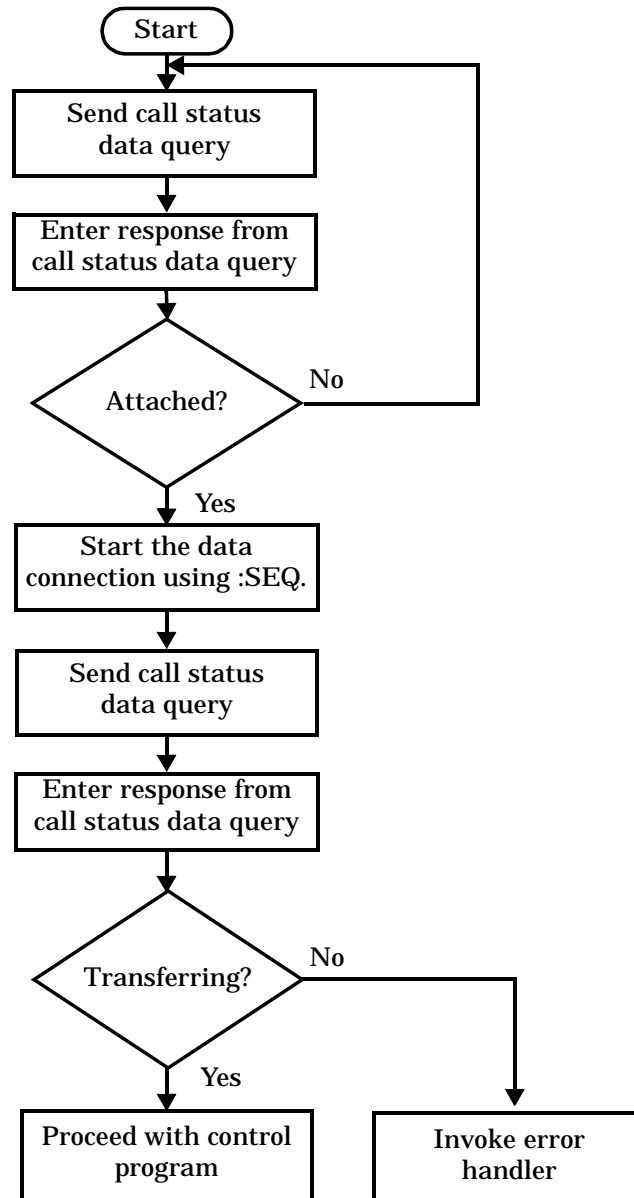
You can avoid rapidly polling the test set by attaching the :SEquential synchronization command to the command used to initiate the data connection. This will force the test set to complete this command before executing any other commands. Therefore, the status of the data connection is stable and only needs to be queried once to determine if the connection succeeded or failed.

### **Process for Establishing a Data Connection**

Use the CALL:FUNCTION:DATA:STARt command in conjunction with the :SEquential synchronization command to establish a data connection.

The recommended process for establishing a data connection is shown in the following figure.

Figure 1. Process for Establishing a Data Connection



## Step 5: Establish a Data Connection with the Mobile Station

### Programming Example

The following programming example illustrates the process for establishing a data connection.

```
REPEAT                                     ! Loop to determine when connection state
                                           ! is Attached
OUTPUT Test_set;"CALL:STAT:DATA?" ! Query state of data connection
ENTER Test_set;Conn_stat$
! <code to prevent infinite looping>
UNTIL Conn_stat$="ATT"
!
OUTPUT Test_set;"CALL:FUNC:DATA:STAR:SEQ" ! Start the data connection
!
OUTPUT Test_set;"CALL:STAT:DATA?"
ENTER Test_set;Conn_stat$
IF Conn_stat$<>"TRAN" THEN
! <put error handler here>
END IF
! Data Connection is established so proceed with control program
```



---

## Step 6: Make Measurements

- [“Measurement Concurrency”](#)
- [“Programming Example”](#)
- [“Things That Can Go Wrong”](#)

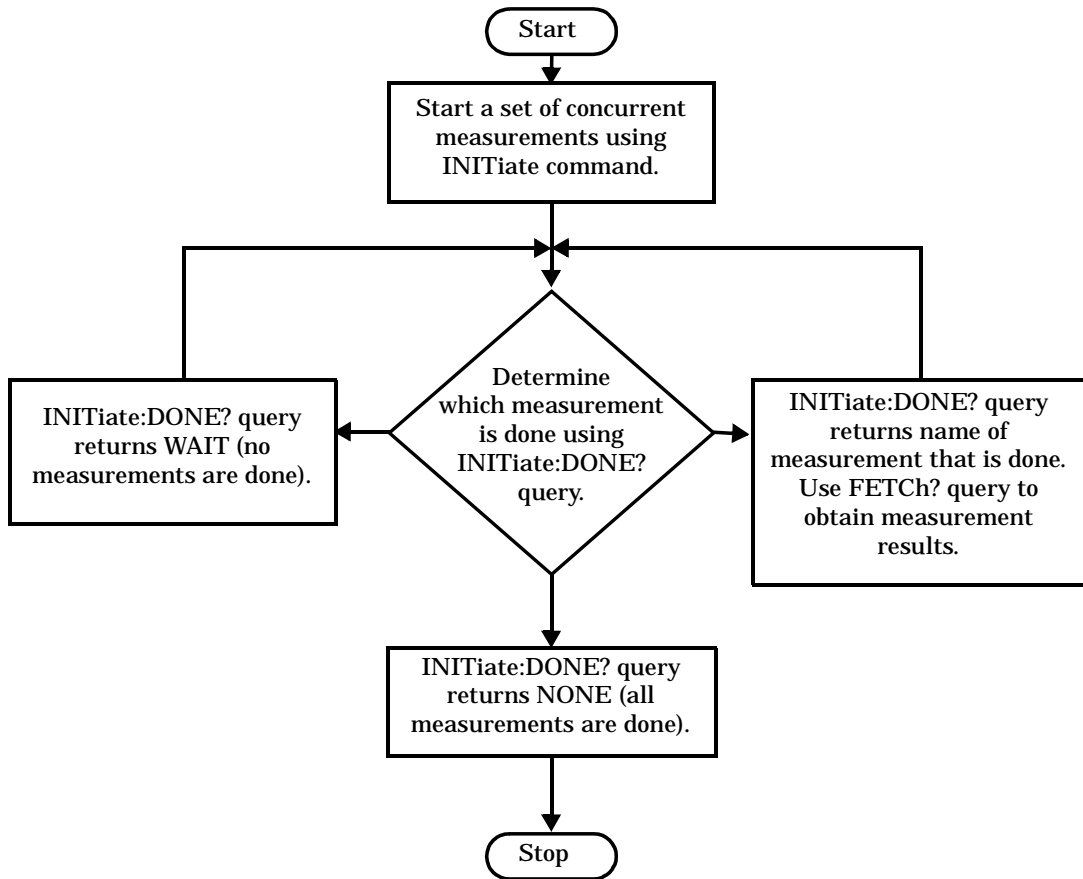
### Measurement Concurrency

The multiple signal path, DSP based, multiple processor architecture of the test set allows the test set to make concurrent measurements. This means that:

- multiple measurements can execute and finish at the same time.
- individual measurement completion is not influenced by other measurement processes.
- availability of measurement results is not dependent upon the sequence that the measurements were requested in.
- results from measurements that take few processor cycles are available without having to wait for measurements that take many processor cycles.

[“Figure 1. Process for Making Measurements” on page 258](#) shows the recommended process for making concurrent measurements using the test set’s command set.

Figure 1. Process for Making Measurements



## Programming Example

The following programming example shows you how to make a transmit power measurement and a phase and frequency error measurement concurrently using the process shown in [“Figure 1. Process for Making Measurements” on page 258](#).

```
! Step 6a: Start Set of Concurrent Measurements:
!
OUTPUT Test_set;"INIT:TXP;PFER"
!
! Step 6b: Determine If A Measurement Is Done:
!
LOOP
  OUTPUT Test_set;"INIT:DONE?"
  ENTER Test_set;Meas_done$
!
! Step 6c: Obtain 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
```

## Things That Can Go Wrong

### Measurement Integrity Always Returns a Value of 6

A measurement integrity value of 6 indicates that some characteristic of the input signal is under range. Typically this is the amplitude (power) of the signal. This low amplitude causes the level of the DSP sampler to be below a threshold required by the test set to produce results with the accuracy specified for the test set.

**Possible Cause** One of the most likely causes of a measurement underrange condition is signal loss caused by either the test fixture or cabling.

**Suggested Workaround** You can compensate for fixture or cable loss by using the RF IN/OUT port's amplitude offset parameters. Twenty different offsets can be set up for twenty different frequencies. To set the frequencies use the command:

```
SYSTem:CORRection:SFRequency (comma separated numeric values)<suffix>
```

Similarly, to then set the offsets for these frequencies, use the following command syntax:

```
SYSTem:CORRection:SGAin (comma separated numeric values)<suffix>
```

Refer to the reference documentation for details about how to use these commands properly.

## Step 6: Make Measurements

## Step 6a: Start Set Of Concurrent Measurements

### Starting 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]
```

The following table shows the measurements available in the test application and their associated <measurement mnemonic> used in the INITiate command syntax.

**Table 6. Measurement Mnemonics Used In The INITiate Subsystem**

Measurement	<measurement mnemonic>
Transmit Power	TXPower
Power vs Time	PVTime
Phase & Frequency Error	PFERror
Output RF Spectrum	ORFSpectrum

### Programming Example

The following command starts the transmitter power measurement.

```
OUTPUT Test_set; "INIT:TXP"
```

### Using Compound Commands to Start Multiple Measurements

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

```
OUTPUT Test_set; "INIT:TXP;PFER"
```

starts the transmit power measurement and the phase and frequency error measurement. These measurements then run concurrently.

## Step 6a: Start Set Of Concurrent Measurements

## Step 6b: Determine if a Measurement Is Done

### Background

After a set of concurrent measurements have been started, you can set up your control program to determine when individual measurement results are available. This enables you to request results for a completed measurement while other measurements are still running.

### Overview

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 meaning are shown in the following table.

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.

**Table 7. Responses Returned from INITiate:DONE? Query**

Response	Meaning
TXP	The transmit power measurement is done.
PVT	The power versus time measurement is done.
PFER	The phase and frequency error measurement is done.
ORFS	The output RF spectrum measurement 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.

For an example of how the INIT:DONE? query is used, see [“Programming Example” on page 259](#).

**Step 6b: Determine if a Measurement Is Done**



---

## Step 6c: Obtain a Set of Measurement Results

### Background

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

- Measurement integrity and average value,  
or
- Average value and minimum value and maximum value and standard deviation value,  
or
- Average value only,  
or
- Minimum value only,  
or
- Maximum value only,  
or
- Standard deviation value only,  
or
- Measurement integrity value only.

The formats available for individual measurements are specifically defined in the reference documentation and can be found in the FETCh? subsystem's GPIB command syntax.

## Overview

After a measurement is initiated, the measurement results can be queried using the FETCh? subsystem. The general structure of the FETCh? command is as follows:

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

The following table shows the measurements available in the test application and their associated <measurement mnemonic> used in the FETCh? command syntax.

The command syntax used to obtain the various measurement result formats (<result format>) for each measurement can be found in the test set's FETCh? subsystem's GPIB command syntax reference information.

**Table 8. Measurement Mnemonics Used In The FETCh? Subsystem**

Measurement	<measurement mnemonic>
Transmit Power	TXPower
Power vs Time	PVTime
Phase & Frequency Error	PFERror
Output RF Spectrum	ORFSpectrum

## Programming Example

The following command returns the minimum value from the set of samples taken during the transmit power measurement (when averaging is turned on and number of samples taken >1).

```
OUTPUT Test_set; "FETCh:TXP:POW:MIN?"
```

---

## Step 7: Reconfigure the Data Connection

### Process for Reconfiguring a Data Connection

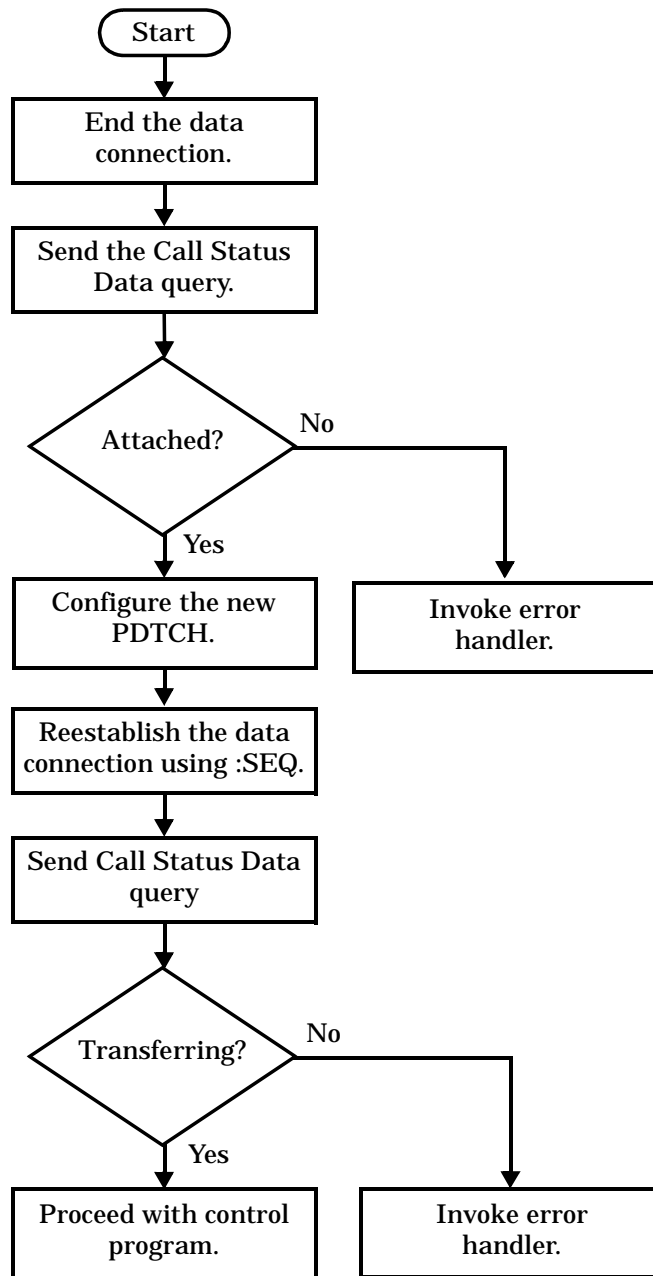
If you want to test the mobile station using different parameters, such as channel number, channel band, or mobile station transmit level, you must reconfigure the data connection.

To reconfigure a data connection you must:

- first end the data connection,
- use the PDTCH commands to setup the new channel, and
- reestablish the data connection using the `CALL:FUNCTION:DATA:START:SEQuential` command.

This process is shown in more detail [“Figure 1. Process for Reconfiguring the Data Connection” on page 268](#) and the [“Programming Example” on page 269](#).

Figure 1. Process for Reconfiguring the Data Connection



## Programming Example

The following example illustrates how to reconfigure the data connection. Notice the packet data traffic channel commands are used to change several parameters.

```

! Existing conditions: a mobile station is connected to the test
! set, operating mode is set to active cell and a data connection
! is in the transferring state.
! Step 1: End the data connection
OUTPUT Test_set;"CALL:FUNC:DATA:STOP"
OUTPUT Test_set;"CALL:STAT:DATA?"
ENTER Test_set;Conn_stat$
IF Conn_stat$<>"ATT" THEN
!<put error handler here>
END IF
! Step 2: Change the packet data traffic channel band, number, and
!         MS TX Level
OUTPUT Test_set;"CALL:PDTCH:BAND DCS"
OUTPUT Test_set;"CALL:PDTCH 556"
OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS 4"
OUTPUT Test_set;"CALL:FUNC:DATA:STAR:SEQ"!Reestablish the data connection
                                     !No other commands will be processed
                                     !until this operation completes
                                     !because the :SEQ has been attached.

! Step #2: Check connection status
OUTPUT Test_set;"CALL:STAT:DATA?"
ENTER Test_set;Conn_stat$
IF Conn_stat$<>"TRAN" THEN
! <put error handler here>
END IF
! Data Connection is established

```

## Step 7: Reconfigure the Data Connection

---

## Step 8: Disconnect the Mobile Station from the Base Station Emulator

- “Data Connection Status Synchronization”
- “End the Data Connection”
- “Initiate the GPRS detach procedure from the Mobile Station”

### Data Connection Status Synchronization

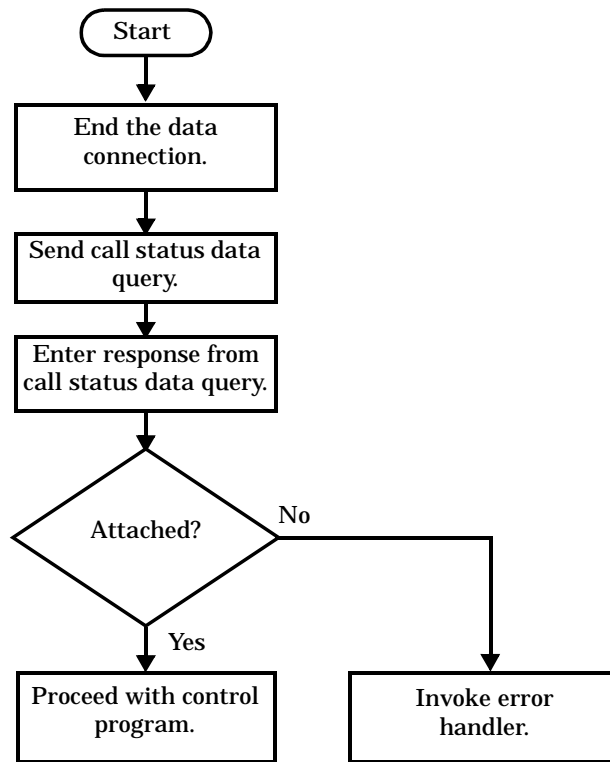
After you have completed the testing of the phone, the last step will be to disconnect the data connection established between the mobile station and the test set. As detailed in “[Step 5: Establish a Data Connection with the Mobile Station](#)” on page 253, the control program must also be able to obtain knowledge about the status of the connection. The control program issues the commands to the test set necessary to begin the disconnect process. It must be able to determine what state the connection is in so that it can proceed or take appropriate action if the disconnect is not progressing correctly.

### End the Data Connection

The recommended process for ending the data connection is shown in the following figure.

Use the `CALL:FUNCTION:DATA:STOP` command.

Figure 1. Process for Stopping ETSI Test Mode



### Programming Example

The programming example below illustrates how to return the data connection status to “Attached” by ending the data connection and how to maintain synchronization with the control program.

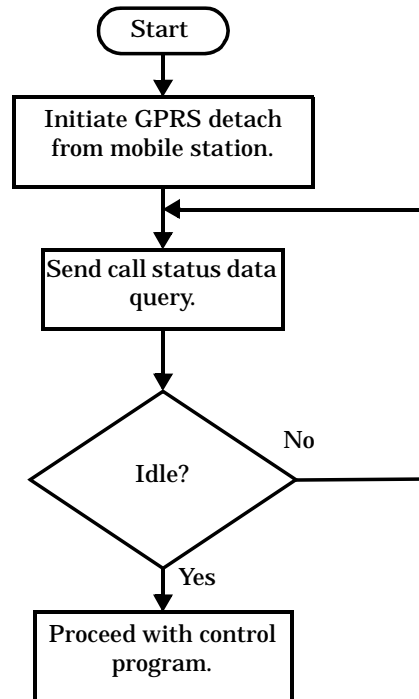
```
OUTPUT Test_set;"CALL:FUNC:DATA:STOP" ! End the data connection.
OUTPUT Test_set;"CALL:STAT:DATA?" ! Send call status data query.
ENTER Test_set;Conn_stat$
IF Conn_stat$<>"ATT" THEN ! Check if exit was successful
! <put error handler here>
END IF
! The data connection has been ended. Proceed with control program.
```

### Initiate the GPRS detach procedure from the Mobile Station

There is no facility in the test set to initiate a call disconnect from the mobile station. This must be done manually or through a test bus built into the mobile station.



Figure 2. Process for Initiating GPRS detach from the Mobile Station



### Programming Example

This example is one way to do data connection synchronization while ending the data connection.

```

! Manually initiate a GPRS Detach or send commands via a bus
DISP "Initiate a GPRS Detach."
REPEAT                                     ! Loop to determine when connection state
                                           ! is Idle
OUTPUT Test_set;"CALL:STAT:DATA?" ! Query state of data connection
ENTER Test_set;Conn_stat$
! <code to prevent infinite looping>
UNTIL Conn_stat$="IDLE"
!
! Data Connection is established so proceed with control program
  
```

## Step 8: Disconnect the Mobile Station from the Base Station Emulator

## Comprehensive Programming Example

This section contains an example program for making measurements using the test set. The program follows the task flow shown in [“Figure 1. Typical Flow of Tasks Performed by a Control Program” on page 237.](#)

### Example Program

```

10      ! Prog Name: Pl_ex.txt      Rev: A.0.1      Date Code: 07 September 2000
20      !
30      ! Configure the BASIC environment, dimension and initialize variables.
40      ! These actions are unrelated to programming the Agilent Technologies 8960.
50      !
60      OPTION BASE 1
70      COM /Address/Test_set
80      ! Allocate arrays to hold ORFS switching & modulation frequency offsets.
90      DIM Swit_offs$(255),Mod_offs$(255)
100     ! Allocate arrays to hold measurement results.
110     REAL Txpower(4)
120     Test_set=714 ! Test set's GPIB address.
130     PRINTER IS CRT
140     CLEAR SCREEN
150     !
160     ! Reset test set to start from a known state. Not always necessary to do full
170     ! preset in a manufacturing environment but desireable in programming example.
180     !
190     OUTPUT Test_set;"*RST"
200     !
210     ! Turn on the GPIB debugger. This is optional but very helpful for debugging
220     ! GPIB commands when developing new code.
230     !
240     OUTPUT Test_set;"SYST:COMM:GPIB:DEB:STAT ON"
250     !
260     ! Check error message queue and STOP if any errors present. This ensures that
270     ! the example program starts with no error conditions present in the test set.
280     !
290     CALL Chk_err_msg_que
300     !
310     !*****
320     ! Step 1: Set Test Set's Operating Mode to Active Cell
330     !*****
340     !
350     ! Active Cell operating mode is the only mode available in this release.
360     ! There is no GPIB command to specify operating mode in this release.
370     !
380     !*****
390     ! Step 2: Configure the Base Station Emulator
400     !*****
410     !
420     OUTPUT Test_set;"CALL:BAND PGSM;POW:AMPL -60"! Set active broadcast band to
430     ! PGSM and cell power to -60 dBm.
440     OUTPUT Test_set;"CALL:PDTCH 45" ! Set packet data traffic channel to 45

```

## Comprehensive Programming Example

```
450 OUTPUT Test_set;"CALL:FUNC:DATA:TYPE BLER" ! Set ETSI Test Mode Type to BLER
460 !
470 ! Assign values to the power reduction levels
480 OUTPUT Test_set;"CALL:PDTCH:PRED:LEV1 12 DB"
490 OUTPUT Test_set;"CALL:PDTCH:PRED:LEV2 3 DB"
500 !
510 ! Assign power levels to the downlink bursts
520 OUTPUT Test_set;"CALL:PDTCH:PRED:BURS1 PRL2"
530 OUTPUT Test_set;"CALL:PDTCH:PRED:BURS2 PRL1"
540 !
550 !*****
560 ! Step 3: Set the Mobile Station's Operating Conditions
570 !*****
580 !
590 ! Assign a power level to the uplink burst
600 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS 14"
610 !
620 !*****
630 ! Step 4: Configure the Measurement Execution Parameters
640 !*****
650 !
660 ! Configure ORFS Measurement:
670 !
680 OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5" ! Examples of using complex commands to
690 OUTPUT Test_set;"SET:ORFS:MOD:COUN 10" ! set multi-meas state and count at
700 ! same time.
710 OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO" ! Set trig source to AUTO.
720 OUTPUT Test_set;"SET:ORFS:CONT OFF" ! Set trig mode to single.
730 OUTPUT Test_set;"SET:ORFS:TIM 20" ! Set timeout time to 20 seconds.
740 ! Put switching and modulation offsets to be tested into string variables.
750 Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
760 Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
770 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
780 OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
790 !
800 ! Configure TX Power Measurement:
810 !
820 OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20"
830 OUTPUT Test_set;"SET:TXP:TRIG:SOUR AUTO;QUAL ON"
840 !
850 ! Configure Phase & Frequency Error Measurement:
860 !
870 OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;BSYN MID"
880 OUTPUT Test_set;"SET:PFER:TRIG:SOUR AUTO;QUAL ON"
890 !
900 !*****
910 ! Step 5: Establish a Data Connection with the Mobile Station
920 !*****
930 !
940 ! This example assumes the MS has initiated a GPRS attach.
950 ! The following code will query the test set for the connection status 50
960 ! times and then stop the program if an attached state is not reached. This
970 ! should give adequate time for the MS to attach.
```

```

980  !
990  Tries=1
1000 LOOP
1010  OUTPUT Test_set;"CALL:STAT:DATA?" ! Query the connection's state
1020  ENTER Test_set;Conn_state$
1030  EXIT IF Conn_state$="ATT"
1040  IF Tries=50 THEN
1050      BEEP
1060      DISP ""
1070      PRINT "GPRS attach did not complete. Program terminated."
1080      STOP
1090  END IF
1100  IF Conn_state$="ATTG" THEN
1110      DISP "GPRS attach has started."
1120  END IF
1130  Tries=Tries+1
1140 END LOOP
1150 DISP ""
1160 FOR Traf_chan=15 TO 115 STEP 50 ! Test channels 15, 65, and 115
1170  OUTPUT Test_set;"CALL:PDTCH ";Traf_chan
1180  FOR Ms_pwr_lvl=5 TO 15 STEP 5 ! Test power levels 5, 10, and 15
1190  OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS1 ";Ms_pwr_lvl
1200  OUTPUT Test_set;"CALL:FUNC:DATA:STAR:SEQ" ! Starts Data Connection
1210  ! No other commands will be processed
1220  ! until this operation completes
1230  ! because the :SEQ has been attached
1240  OUTPUT Test_set;"CALL:STAT:DATA?"
1250  ENTER Test_set;Conn_state$
1260  IF Conn_state$<>"TRAN" THEN
1270      PRINT "Data connection failed. Terminated program."
1280      STOP
1290  END IF
1300  !
1310  !*****
1320  ! Step 6: Make Measurements
1330  !*****
1340  !
1350  ! Step 6a: Start a set of concurrent measurements:
1360  !
1370  OUTPUT Test_set;"INIT:TXP;PFER;ORFS"
1380  !
1390  ! Step 6b: Determine if a measurement is done:
1400  !
1410  LOOP
1420  OUTPUT Test_set;"INIT:DONE?"
1430  ENTER Test_set;Meas_done$
1440  !
1450  ! Step 6c: Obtain measurement results: Each measurement illustrates a
1460  !         different way of reading in results. There is no one right way. The
1470  !         method used is application dependent. Note that the examples do not
1480  !         show all possible ways.
1490  !
1500  SELECT Meas_done$

```

## Comprehensive Programming Example

```
1510 !
1520 CASE "TXP" ! TX Power measurement done.
1530 OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
1540 ENTER Test_set;Integrity,Txpowers(*)
1550 IF (Integrity=0) THEN ! Always check integrity value.
1560 PRINT "TX Power results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
1570 PRINT USING "5X,""Minimum:""",M2D.2D,"" dBm"";Txpower(1)
1580 PRINT USING "5X,""Maximum:""",M2D.2D,"" dBm"";Txpower(2)
1590 PRINT USING "5X,""Average:""",M2D.2D,"" dBm"";Txpower(3)
1600 PRINT USING "5X,""Std Dev:""",M2D.2D,"" dB"";Txpower(4)
1610 ELSE
1620 GOSUB Bad_measurement
1630 END IF
1640 !
1650 CASE "PFER" ! Phase & Frequency Error measurement done.
1660 OUTPUT Test_set;"FETC:PFER:ALL?"
1670 ENTER Test_set;Integrity,Rms_phas_err,Peak_phas_err,Worst_freq_err
1680 IF (Integrity=0) THEN
1690 PRINT "PFERror results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
1700 PRINT USING "5X,""RMS Phase Error:""",M2D.2D,"" deg"";Rms_phas_err
1710 PRINT USING "5X,""Peak Phase Error:""",M2D.2D,"" deg"";Peak_phas_err
1720 PRINT USING "5X,""Worst Freq Error:""",M3D.2D,"" Hz"";Worst_freq_err
1730 ELSE
1740 GOSUB Bad_measurement
1750 END IF
1760 !
1770 CASE "ORFS" ! ORFS measurement done.
1780 !
1790 ! This code illustrates a more 'generic' approach to reading measurement
1800 ! results. By using the capabilities designed into high-level
1810 ! measurements, routines that access measurement results do not have to
1820 ! explicitly know what the measurement execution conditions were. That
1830 ! information can be determined at the time the measurement results are
1840 ! queried.
1850 !
1860 OUTPUT Test_set;"FETC:ORFS:INT?" ! Check measurement integrity.
1870 ENTER Test_set;Integrity
1880 IF (Integrity=0) THEN
1890 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?" ! Get number of offsets
1900 ! tested.
1910 ENTER Test_set;Points
1920 IF Points THEN ! Only query if one or more offsets tested.
1930 ALLOCATE Orfs_swit_res(Points),Orfs_swit_offs(Points)
1940 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?" ! Get measurement offsets.
1950 ENTER Test_set;Orfs_swit_offs(*)
1960 OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:SWIT?" ! Get results.
1970 ENTER Test_set;Tx_power,Orfs_swit_res(*)
1980 PRINT "ORFS Swit Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
1990 PRINT USING "19X,""TX Power ="" ,M2D.2D,"" dBm"";Tx_power
2000 PRINT " Offset (kHz) Level (dBm)"
2010 PRINT " -----"
2020 Orfs_image: IMAGE 6X,M4D.2D,12X,M4D.2D
2030 FOR J=1 TO Points
```

```

2040         PRINT USING Orfs_image;(Orfs_swit_offs(J)/1.E+3),Orfs_swit_res(J)
2050     NEXT J
2060     DEALLOCATE Orfs_swit_res(*),Orfs_swit_offs(*)
2070 END IF
2080 OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?" ! Get number of offsets
2090                                     ! tested.
2100 ENTER Test_set;Points
2110 IF Points THEN ! Only query if one or more offsets tested.
2120     ALLOCATE Orfs_mod_res(Points),Orfs_mod_offs(Points)
2130     OUTPUT Test_set;"SET:ORFS:MOD:FREQ?" ! Get measurement offsets.
2140     ENTER Test_set;Orfs_mod_offs(*)
2150     OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:MOD?" ! Get results.
2160     ENTER Test_set;Tx_power,Pwr_30khz,Orfs_mod_res(*)
2170     PRINT "ORFS Mod Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
2180     PRINT USING "18X,""30 KHz BW Power ="" ,M2D.2D,"" dBm""";Pwr_30khz
2190     PRINT "      Offset(kHz)          Level(dB)"
2200     PRINT "      -----          -----"
2210     FOR J=1 TO Points
2220         PRINT USING Orfs_image;(Orfs_mod_offs(J)/1.E+3),Orfs_mod_res(J)
2230     NEXT J
2240     DEALLOCATE Orfs_mod_res(*),Orfs_mod_offs(*)
2250 END IF
2260 ELSE
2270     GOSUB Bad_measurement
2280 END IF
2290 END SELECT
2300 EXIT IF Meas_done$="NONE"
2310 END LOOP ! If 'WAIT' is returned from 'INIT:DONE?' query, it just falls
2320         ! through the loop.
2330 !
2340 !*****
2350 ! Step 7: Reconfigure the Data Connection
2360 !*****
2370 !
2380 OUTPUT Test_set;"CALL:FUNC:DATA:STOP" ! Ends the Data Connection
2390 OUTPUT Test_set;"CALL:STAT:DATA?" ! Check connection status
2400 ENTER Test_set;Conn_state$
2410 IF Conn_state$<>"ATT" THEN
2420     PRINT "Data Connection was not stopped"
2430     STOP
2440 END IF
2450 !
2460     NEXT Ms_pwr_lvl
2470 NEXT Traf_chan
2480 !
2490 !*****
2500 ! Step 8: Disconnect the Mobile Station From the BSE
2510 !*****
2520 !
2530 ! Data Connction was stopped at the end of the FOR loop above.
2540 !
2550 ! MS must initiate GPRS detach
2560 DISP "Initiate a GPRS Detach"

```

## Comprehensive Programming Example

```
2570 Tries=1
2580 LOOP
2590   OUTPUT Test_set;"CALL:STAT:DATA?"
2600   ENTER Test_set;Conn_state$
2610 EXIT IF Conn_state$="IDLE"
2620   IF Tries=50 THEN
2630     DISP ""
2640     PRINT "GPRS detach did not occur.  Program terminated"
2650     STOP
2660   END IF
2670   IF Conn_state$="DET" THEN
2680     DISP "GPRS detach is in process."
2690   END IF
2700   Tries=Tries+1
2710 END LOOP
2720 PRINT "Program completed."
2730 STOP
2740 !
2750 Bad_measurement: !
2760 PRINT "Measurement error: "&Meas_done$
2770 PRINT "Measurement Integrity value =";Integrity
2780 RETURN
2790 !
2800 END ! End of program
2810 !
2820 SUB Chk_err_msg_que
2830   COM /Address/Test_set
2840   DIM Error_message$(255)
2850   Error_flag=0
2860   LOOP
2870     OUTPUT Test_set;"SYST:ERR?"
2880     ENTER Test_set;Error_number,Error_message$
2890     EXIT IF Error_number=0
2900     IF Error_number=-350 THEN
2910       Error_flag=1
2920       PRINT "Error Message Queue overflow.  Error messages have been lost."
2930     ELSE
2940       Error_flag=1
2950       PRINT Error_number,Error_message$
2960     END IF
2970   END LOOP
2980   IF NOT Error_flag THEN
2990     PRINT "No errors in Error Message Queue."
3000     SUBEXIT
3010   END IF
3020   STOP
3030 SUBEND
```

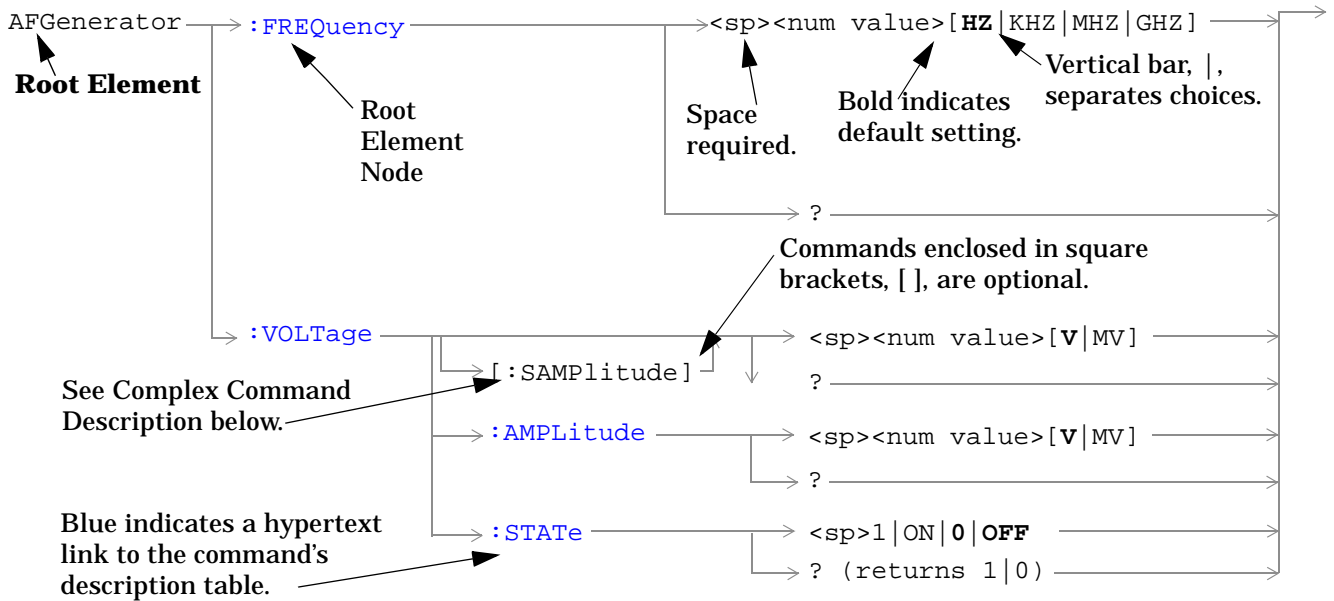


## **7 GPIB Command Syntax**



## Diagram Conventions

### Description



### Diagram Description

Statement elements are connected by lines. Each line can be followed in only one direction, as indicated by the arrow at the end of the line. Any combination of statement elements that can be generated by starting at the **Root Element** and following the line the **direction of the arrow** is syntactically correct. The drawings show the proper use of spaces. Where spaces are required they are indicated by **<sp>**, otherwise no spaces are allowed between statement elements.

**Complex Command Description** A complex command sets the state of the parameter to ON, and is used to set a value for that parameter. These parameters; amplitude, frequency, gain, number, time, and value can be used as a complex command. Refer to the specific command for the parameter that applies.

## 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** If you do not specify units-of-measure in your code the following table indicates the default units-of-measure that will be assumed.

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

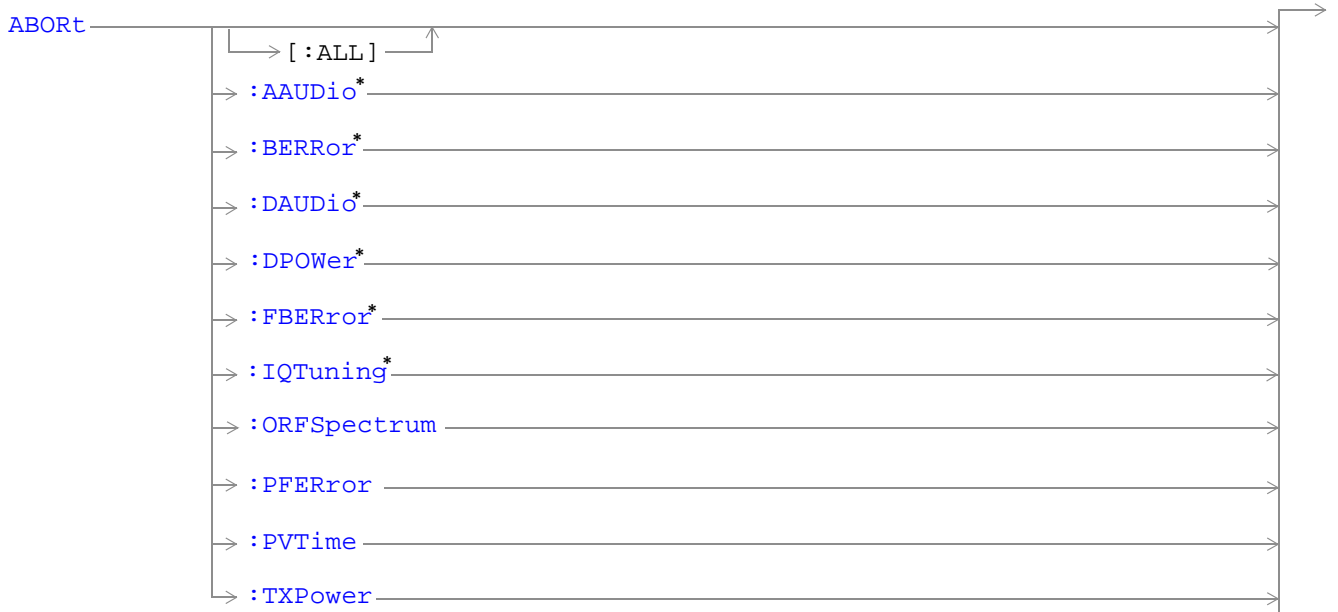
INITiate:<meas> will execute an ABORt:<meas> as part of the INITiate:<meas> command.

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.

“Diagram Conventions” on page 283

## ABORt[:ALL]

Function	GSM	Stops any and all measurements that are active. See “Measurement States” on page 170
	GPRS	<p>If the trigger arm is set to single, see “Trigger Arm (Single or Continuous) Description” on page 171 the measurements will go to the idle state.</p> <p>If the trigger arm is set to continuous the measurements will re-arm and initiate again.</p>

Setting	GSM	Range <ul style="list-style-type: none"> <li>• AAUDio</li> <li>• BERRor</li> <li>• DAUDio</li> <li>• DPOWer</li> <li>• FBERror</li> <li>• IQTuning</li> <li>• ORFSpectrum</li> <li>• PFERror</li> <li>• PVTime</li> <li>• TXPower</li> </ul>
	GPRS	Range <ul style="list-style-type: none"> <li>• ORFSpectrum</li> <li>• PFERror</li> <li>• PVTime</li> <li>• TXPower</li> </ul>
<b>Programming Example</b> OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.		

ABORt

**ABORt:<meas-mnemonic>**

Function	GSM	Stops the selected measurement if it is active. See <a href="#">"Measurement States" on page 170</a>
	GPRS	If the trigger arm is set to single, see <a href="#">"Trigger Arm (Single or Continuous) Description" on page 171</a> the measurements will go to the idle state. If the trigger arm is set to continuous the measurements will re-arm and initiate again.
Setting	GSM	Range <ul style="list-style-type: none"> <li>• AAUDio</li> <li>• BERRor</li> <li>• DAUDio</li> <li>• DPOWer</li> <li>• FBERRor</li> <li>• ORFSpectrum</li> <li>• IQTuning</li> <li>• PFERror</li> <li>• PVTime</li> <li>• TXPower</li> </ul>
	GPRS	Range <ul style="list-style-type: none"> <li>• ORFSpectrum</li> <li>• PFERror</li> <li>• PVTime</li> <li>• TXPower</li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"ABORT:PVTIME" !Aborts a PVT measurement.</pre>		



## **AFGenerator Subsystem**

This section is *not* applicable to GPRS.

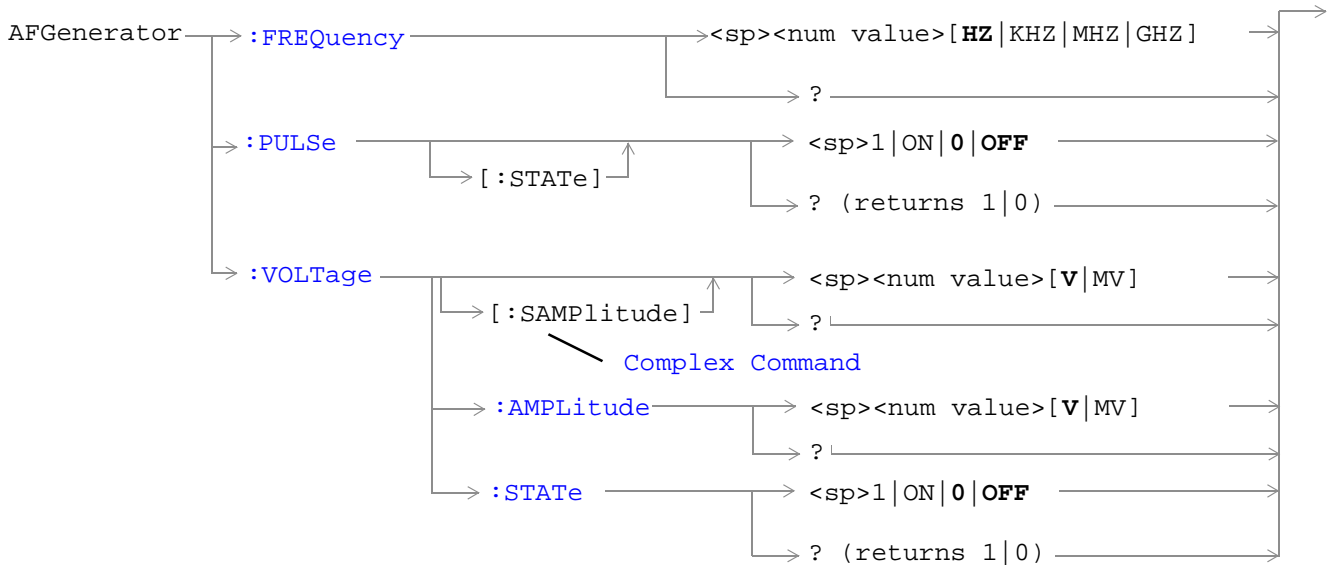
### **Description**

The AFGenerator subsystem is used to control the audio source that is available at the Audio Output connector.

### **Syntax Diagram and Command Descriptions**

“AFGenerator”

# AFGenerator



These commands are not applicable to GPRS.

“Diagram Conventions” on page 283

## 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 Resolution: .1 Hz
Query		Range: 1 Hz to 20 kHz Resolution: .1 Hz
*RST setting		1 kHz
Programming Example		
OUTPUT 714;"AFGENERATOR:FREQUENCY 1000" !Sets the audio generator frequency to 1000 Hz.		

**AFGenerator:PULSe[:STATe]**

Function	GSM	Sets/queries the audio generator pulse state.  The pulse state must be on when the test set's audio generator is used for audio stimulation during a decoded audio measurement.  When the state is on, the audio signal from the test set is pulsed at a 10 Hz rate with a 50% duty cycle.  The amplitude and frequency of the pulse is set with afgenerator commands. See <a href="#">“AFGenerator” on page 290</a> .
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0   OFF   1   ON	
Query	Range: 0   1	
*RST setting	0   off	
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:PULSE ON" !Sets the audio generator pulse to ON.</pre>		

**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. Resolution: <ul style="list-style-type: none"> <li>• .5 mV pk. &lt;= 1 V pk. output</li> <li>• 5 mV pk. &gt; 1 V pk. output</li> </ul>	
Query	Range: 0 - 9 v peak Resolution: <ul style="list-style-type: none"> <li>• .5 mV pk. &lt;= 1 V pk. output</li> <li>• 5 mV pk. &gt; 1 V pk. output</li> </ul>	
*RST setting	zero volts	
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output !voltage to 2.1 volts.</pre>		

**AFGenerator:VOLTage:AMPLitude**

Function	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. Resolution: <ul style="list-style-type: none"> <li>• .5 mV pk. &lt;= 1 V pk. output</li> <li>• 5 mV pk. &gt; 1 V pk. output</li> </ul>
Query		Range: 0 - 9 V pk. Resolution: <ul style="list-style-type: none"> <li>• .5 mV pk. &lt;= 1 V pk. output</li> <li>• 5 mV pk. &gt; 1 V pk. output</li> </ul>
*RST setting		zero volts
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output !voltage to 1.414 volts peak.</pre>		

**AFGenerator: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
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:STATE ON" !Set the audio generator state to ON.</pre>		

## CALibration Subsystem

### Description

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

### Syntax Diagram and Command Descriptions

“CALibration”



**CALibration:IQ2?**

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

---

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

---

**CALibration:DATE**

Function	GSM	Sets/queries the date of the last system calibration done to the test set not the IQ calibration date.
	GPRS	Returns a comma separated list YYYY,MM,DD in that order.
Setting		Sets the system calibration date. <b>Range</b> <ul style="list-style-type: none"> <li>• Year = 0000 to 9999</li> <li>• Month = 01 to 12</li> <li>• Day = 01 to 31</li> </ul>
Query		Returns the date when system calibration was performed. <b>Range</b> <ul style="list-style-type: none"> <li>• Year = 0000 to 9999</li> <li>• Month = 1 to 12</li> <li>• Day = 1 to 31</li> </ul>
<b>Programming Example</b> <pre>OUTPUT 714;"CALIBRATION:DATE 1999,01,04" !Sets the date of the last system   !calibration year, month and day.</pre>		

---

## 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 297](#)

[“CALL:BA” on page 298](#)

[“CALL:BAND” on page 304](#)

[“CALL:BCCode” on page 305](#)

[“CALL:BCHannel” on page 306](#)

[“CALL:BURSt” on page 309](#)

[“CALL:CONNected” on page 310](#)

[“CALL:COUNT” on page 313](#)

[“CALL:END” on page 317](#)

[“CALL:FUNCTion” on page 320](#)

[“CALL:IMEI” on page 323](#)

[“CALL:LACode” on page 324](#)

[“CALL:MCCode” on page 325](#)

[“CALL:MNCode” on page 326](#)

[“CALL:MS” on page 327](#)

[“CALL:NCCode” on page 339](#)

[“CALL:OPERating” on page 340](#)

[“CALL:ORIGinate” on page 341](#)

[“CALL:PAGing” on page 342](#)

[“CALL:PDTCH | PDTChannel” on page 345](#)

[“CALL:PMNCode” on page 353](#)

[“CALL:POWer” on page 355](#)

[“CALL:RFGenerator” on page 357](#)

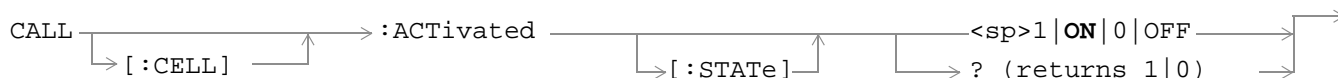
[“CALL:SIGNaling” on page 364](#)

[“CALL:STATus” on page 365](#)

[“CALL:TCHannel” on page 370](#)



## CALL:ACTivated

CALL  :ACTivated <sp>1 | ON | 0 | OFF ? (returns 1|0)

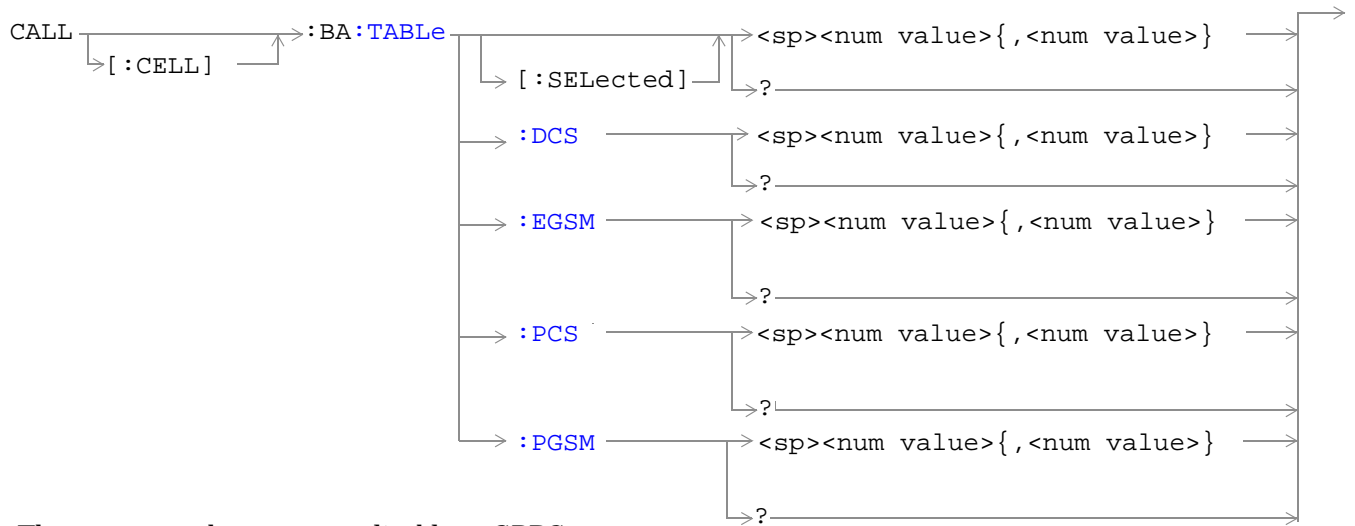
This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

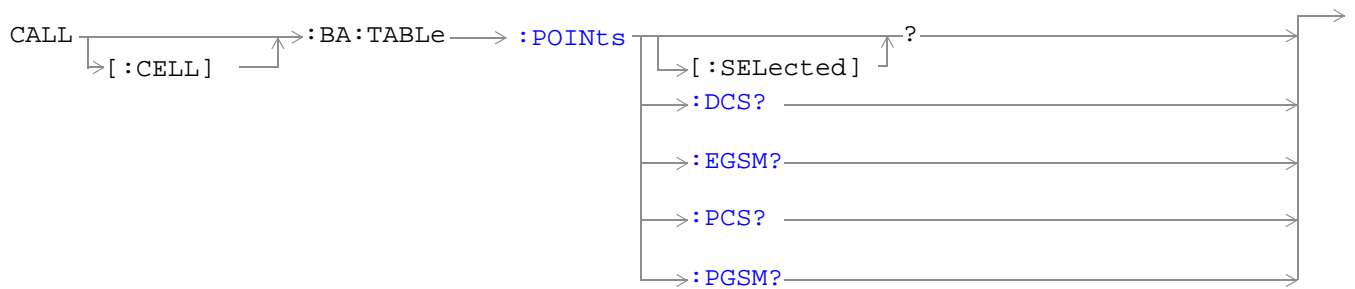
### CALL[:CELL]:ACTivated[:STATe]

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).  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 <a href="#">“CALL:BURSt:TYPE” on page 309</a> .
	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	<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a>	
<b>Programming Example</b>  <pre>OUTPUT 714;"CALL:CELL:ACTIVATED:STATE OFF" !Turns all signalling operations, !uplink demodulation and downlink !(BCH &amp; TCH) generation off.</pre>		

## CALL:BA



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

**CALL[:CELL]:BA:TABLE[:SElected]**

Function	GSM	Sets/queries the BA Table entries for the selected broadcast band. 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: range: <ul style="list-style-type: none"> <li>• PGSM broadcast band range: 1 to 124</li> <li>• EGSM broadcast band range: 0 to 124   975 to 1023</li> <li>• DCS broadcast band range: 512 to 885</li> <li>• PCS broadcast band range: 512 to 810</li> </ul> resolution: 1	
Query	range: 0 to 9.91 E +37	
*RST Setting	Depends upon the selected broadcast band: entries: <ul style="list-style-type: none"> <li>• PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117</li> <li>• EGSM BA Table: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110</li> <li>• DCS BA Table: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862</li> <li>• PCS BA Table: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790</li> </ul> states: <ul style="list-style-type: none"> <li>• first entry = ON, all others = OFF</li> </ul>	
<b>Programming Example</b>  <pre> 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. </pre>		

**CALL[:CELL]:BA:TABLE:DCS**

Function	GSM	Sets/queries the BA Table entries for the DCS broadcast band. 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: 512 to 885 resolution: 1
Query		range: 0 to 9.91E+37
*RST Setting		entries: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862 states: 512 = ON, all others = OFF
<b>Programming Example</b> <pre> 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. </pre>		

**CALL[:CELL]:BA:TABLE:EGSM**

Function	GSM	Sets/queries the BA Table entries for the EGSM broadcast band. 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   975 to 1023 resolution: 1
Query		range: 0 to 9.91E+37
*RST Setting		entries: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110 states: 20 = ON, all others = OFF
<b>Programming Example</b> <pre> 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. </pre>		

**CALL[:CELL]:BA:TABLE:PCS**

Function	GSM	Sets/queries the BA Table entries for the PCS broadcast band. 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: 512 to 810 resolution: 1
Query		range: 0 to 9.91E+37
*RST Setting		entries: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790 states: 512 = ON, all others = OFF
<b>Programming Example</b> <pre> 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. </pre>		

**CALL[:CELL]:BA:TABLE:PGSM**

Function	GSM	Sets/queries the BA Table entries for the PGSM broadcast band. 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: 1 to 124 resolution: 1
Query		range: 0 to 9.91E+37
*RST Setting		entries: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 states: 20 = ON, all others = OFF
<b>Programming Example</b> <pre> 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. </pre>		

**CALL[:CELL]:BA:TABLE:POINTS[:SElected]?**

Function	GSM	Queries the number of entries that are in the ON state in the selected broadcast band's BA Table. 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 resolution: 1
*RST Setting		1
<b>Programming Example</b> <pre>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.</pre>		

**CALL[:CELL]:BA:TABLE:POINTS:DCS?**

Function	GSM	Queries the number of entries that are in the ON state in the DCS broadcast band BA Table. 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 resolution: 1
*RST Setting		1
<b>Programming Example</b> <pre>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.</pre>		

**CALL[:CELL]:BA:TABLE:POINTS:EGSM?**

Function	GSM	Queries the number of entries that are in the ON state in the EGSM broadcast band BA Table. 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 resolution: 1
*RST Setting		1
<b>Programming Example</b> <pre>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.</pre>		

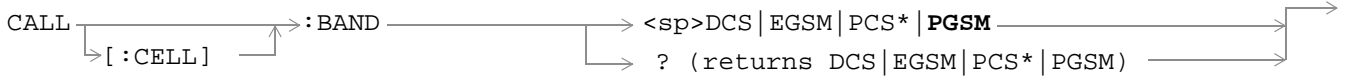
**CALL[:CELL]:BA:TABLE:POINTS:PCS?**

Function	GSM	Queries the number of entries that are in the ON state in the PCS cellband BA Table. 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 resolution: 1
*RST Setting		1
<b>Programming Example</b> <pre>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.</pre>		

**CALL[:CELL]:BA:TABLE:POINTS:PGSM?**

Function	GSM	Queries the number of entries that are in the ON state in the PGSM broadcast band BA Table. 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 resolution: 1
*RST Setting		1
Related Topics		See <a href="#">"Configuring the Broadcast Channel (BCH)" on page 609</a>
<b>Programming Example</b> <pre>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.</pre>		

## CALL:BAND



\* Not applicable to GPRS

[“Diagram Conventions” on page 283](#)

### CALL[:CELL]:BAND

Function	GSM	This command sets/queries the band in which the broadcast channel (BCH) is transmitted. Setting the BCH will change the receiver control to auto (see <a href="#">“RFANalyzer:CONTROL:AUTO” on page 455</a> ).
	GPRS	This command sets/queries the band in which the broadcast channel (BCH) is transmitted. Note that the PCS band is not currently supported for GPRS.
Setting	GSM	range: PGSM   EGSM   DCS   PCS
	GPRS	range: PGSM   EGSM   DCS
Query	GSM	range: PGSM   EGSM   DCS   PCS
	GPRS	range: PGSM   EGSM   DCS
*RST Setting		PGSM
Related Topics		See <a href="#">“Cell Band Parameter” on page 599</a> .
Programming Example		
OUTPUT 714; "CALL:CELL:BAND PGSM" !Sets the band for the BCH to PGSM.		



## CALL:BCCode



This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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 <a href="#">“CALL:ACTivated” on page 297</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 7 resolution: 1
Query		range: 0 to 7 resolution: 1
*RST Setting		5
Related Topics		See <a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a> .
Programming Example		
OUTPUT 714;"CALL:CELL:BCCODE 4" !Sets the cell's base station color code to 4.		



**CALL[:CELL]:BCHannel[:ARFCn]:DCS**

Function	GSM	Sets/queries the Broadcast Channel number for the DCS broadcast band.
	GPRS	This command is not applicable to GPRS.
Setting		range: 512 to 885 resolution: 1
Query		range: 512 to 885 resolution: 1
*RST Setting		512
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609.</a>
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:DCS 810" !Sets BCH ARFCN for DCS broadcast !band to 810.</pre>		

**CALL[:CELL]:BCHannel[:ARFCn]:EGSM**

Function	GSM	Sets/queries the Broadcast Channel number for the EGSM broadcast band.
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 124   975 to 1023 resolution: 1
Query		range: 0 to 124   975 to 1023 resolution: 1
*RST Setting		20
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:EGSM 120" !Sets BCH ARFCN for EGSM broadcast !band to 120.</pre>		

**CALL[:CELL]:BCHannel[:ARFCn]:PCS**

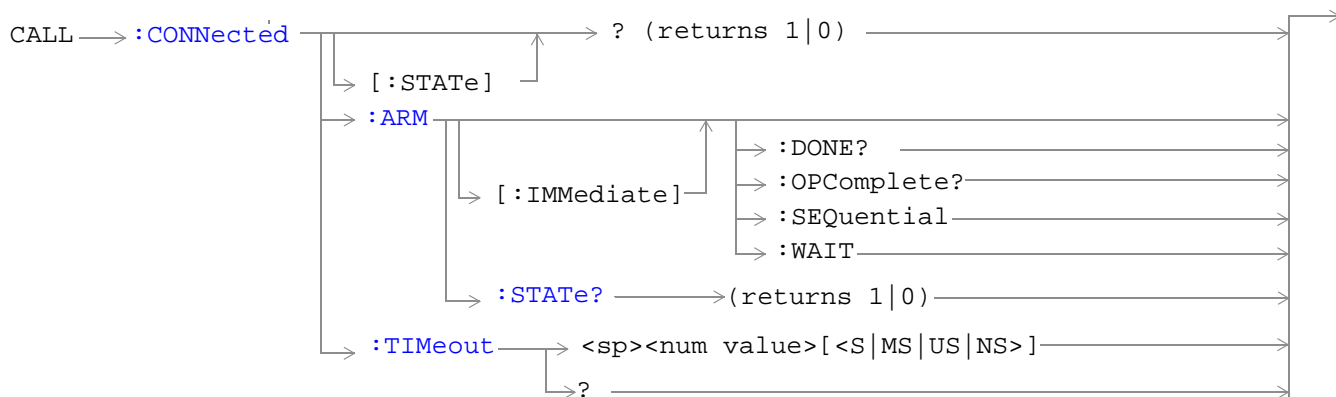
Function	GSM	Sets/queries the Broadcast Channel number for the PCS broadcast band.
	GPRS	This command is not applicable to GPRS.
Setting		range: 512 to 810 resolution: 1
Query		range: 512 to 810 resolution: 1
*RST Setting		512
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609.</a>
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PCS 800" !Sets BCH ARFCN for PCS broadcast !band to 800.</pre>		

**CALL[:CELL]:BCHannel[:ARFCn]:PGSM**

Function	GSM	Sets/queries the Broadcast Channel number for the PGSM broadcast band.
	GPRS	This command is not applicable to GPRS.
Setting		range: 1 to 124 resolution: 1
Query		range: 1 to 124 resolution: 1
*RST Setting		20
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609.</a>
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PGSM 113" !Sets BCH ARFCN for PGSM broadcast !band to 113.</pre>		



## CALL:CONNeCTed



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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 <a href="#">“Call Processing State Synchronization” on page 37</a> .
	GPRS	This command is not applicable to GPRS.
Query	Range: 0   1	
*RST Setting	0	
<b>Programming Example</b> OUTPUT 714;"CALL:CONNECTED:STATE?" !Returns 1 if call connected, !0 if call disconnected.		

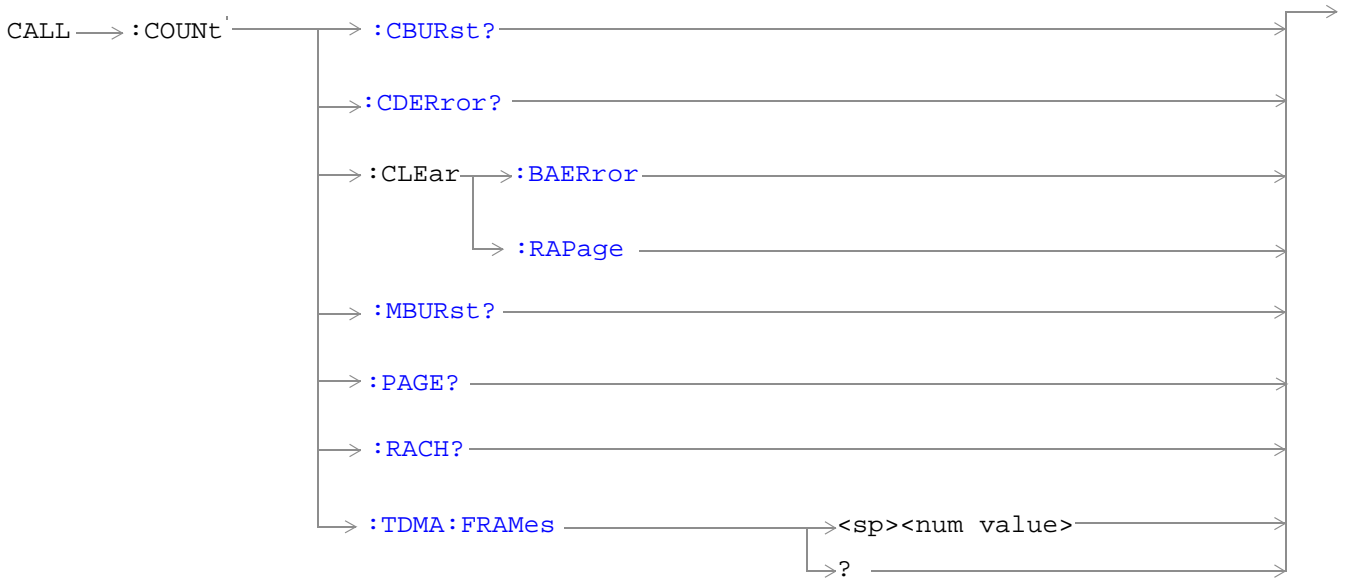


**CALL:CONNeCted:TIMEout**

Function	GSM	<p>Sets/queries the maximum time the test set will wait for a hanging CALL:CONNeCted:STATe? query to complete. Default setting units are seconds. To set timeout time in units other than seconds include optional unit specifier in command string.</p> <p>A timeout timer is started whenever the call-state-change-detector becomes armed or gets rearmed when already armed. The duration of this timeout is 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 <a href="#">“Call Processing State Synchronization” on page 37</a>.</p>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0 to 100 seconds Resolution: 0.1 seconds	
Query	Range: 0 to 100 seconds Resolution: 0.1 seconds	
*RST Setting	10 seconds	
Related Topics	<a href="#">“Call Processing State Synchronization” on page 37</a>	
	<a href="#">“Call Processing Event Synchronization” on page 32</a>	
<b>Programming Example</b>  <pre> OUTPUT 714;"CALL:CONNECTED:TIMEOUT 3" !Sets the CALL:CONNeCted:STATe? query                                 !timeout time to 3 seconds.  OUTPUT 714;"CALL:CONNECTED:TIMEOUT 500 MS" !Sets the CALL:CONNeCted:STATe? query                                 !timeout time to 500 ms. </pre>		



## CALL:COUNT



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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 Resolution: 1
*RST Setting		0
Programming Example		
OUTPUT 714;"CALL:COUNT:CBURST?" !Queries the corrupt burst counter.		

## CALL:COUNT

### 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 Resolution: 1
*RST Setting		0
<b>Programming Example</b>		
OUTPUT 714;"CALL:COUNT:CDERROR?" !Queries the channel decode error counter.		

**CALL:COUNT:CLEAR:BAERror**

Function	GSM	Sets the corrupt burst, missing burst, and decode error counters' count to zero.
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714; "CALL:COUNT:CLEAR:BAERror"		

**CALL:COUNT:CLEAR:RAPage**

Function	GSM	Sets the RACH and page counters' count to zero.
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714; "CALL:COUNT:CLEAR:RAPAGE"		

**CALL:COUNT:MBURst?**

Function	GSM	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 Resolution: 1
*RST Setting		0
Programming Example		
OUTPUT 714; "CALL:COUNT:MBURST?"		

**CALL:COUNT:PAGE?**

Function	GSM	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 Resolution: 1
*RST Setting		0
Programming Example		
OUTPUT 714; "CALL:COUNT:PAGE?"		

## CALL:COUNT

### CALL:COUNT:RACH?

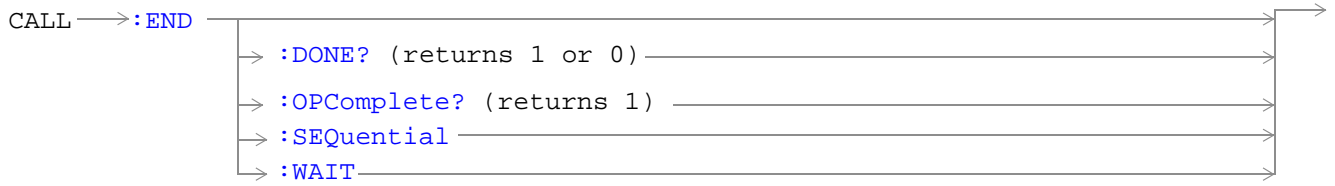
Function	GSM	Queries the RACH counter. The RACH counter keeps track of the number of RACH bursts received by the base station emulator during call setup attempts.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 9999 Resolution: 1
*RST Setting		0
Programming Example		
OUTPUT 714; "CALL:COUNT:RACH?"		

### CALL:COUNT:TDMA:FRAMES

Function	GSM	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 Resolution: 1
Query		Range: 15 to 999 Resolution: 1
*RST Setting		28
Programming Example		
OUTPUT 714; "CALL:COUNT:TDMA:FRAMES 15" !Sets the number of TDMA frames allowed !before transmitting the new TCH.		

---

## CALL:END



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

## CALL:END

## 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.		

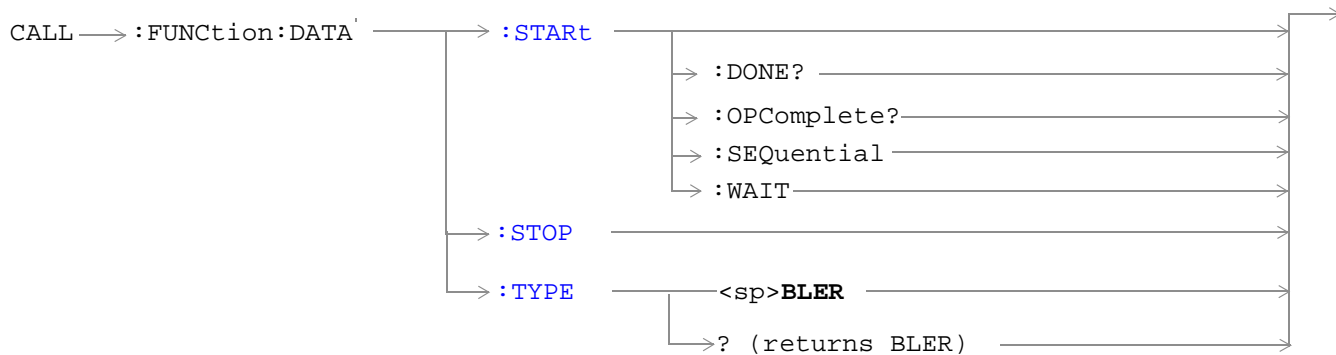
**CALL:END:SEQuential**

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.
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:END:SEQUENTIAL" !Terminate the active call with                                 !sequential operation.</pre>		

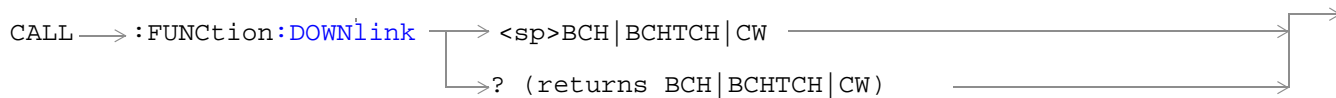
**CALL:END:WAIT**

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	<a href="#">"Call Processing Event Synchronization" on page 32</a> <a href="#">"Call Processing State Synchronization" on page 37</a>	
<b>Programming Example</b> <pre>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.</pre>		

## CALL:FUNCTION



These commands are not applicable to GSM.



This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)



**CALL:FUNCTION:DATA:START**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command attempts to start the data connection. See <a href="#">“Data Connection Processing Event Synchronization” on page 50.</a>  Additional commands can be appended to aid in controller/Mobile Station synchronization.
Programming Example		
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. See <a href="#">“Data Connection Processing Event Synchronization” on page 50.</a>
Programming Example		
OUTPUT 714; "CALL:FUNCTION:DATA:STOP" !Ends data connection.		

**CALL:FUNCTION:DATA:TYPE**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the type of data connection that is used when you use the command <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a> to start a data connection.  Currently, this parameter can only be set to BLER. This setting 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 <a href="#">“BLER Reports Measurement Description” on page 73</a> ).
Setting	Range: BLER	
Query	Range: BLER	
*RST Setting	BLER	
Programming Example		
OUTPUT 714; "CALL:FUNCTION:DATA:TYPE BLER" !Sets the data connection type to BLER.		

## CALL:FUNCTION

### 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	<a href="#">"Test Mode Operating Mode" on page 621</a>	
<b>Programming Example</b>		
<pre>OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCHTCH" !Sets Test Mode downlink  !configuration to generate a  !broadcast channel (BCH) and a  !traffic channel (TCH).</pre>		

## CALL:IMEI

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

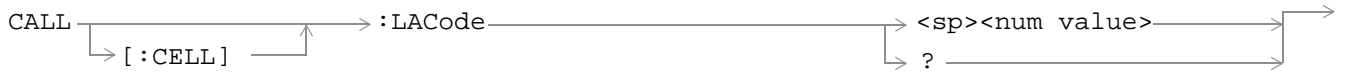
This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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	<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a>	
<b>Programming Example</b> OUTPUT 714;“CALL:IMEI:AUTO OFF” !Sets automatically get IMEI state to OFF.		

## CALL:LACode



This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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 <a href="#">“CALL:ACTivated” on page 297</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 65535 resolution: 1
Query		range: 0 to 65535 resolution: 1
*RST Setting		1
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a>
Programming Example		
OUTPUT 714;“CALL:CELL:LACODE 456” !Sets the cell's location area code 456.		

## CALL:MCCode



This command is not applicable to GPRS.

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### CALL[:CELL]:MCCode

Function	GSM	Sets/queries the value of the Mobile Country Code (MCC). This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 297</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 999 resolution: 1
Query		range: 0 to 999 resolution: 1
*RST Setting		1
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a>
Programming Example		
OUTPUT 714; "CALL:CELL:MCCODE 4" !Sets the cell's mobile country code to 4.		

## CALL:MNCCode



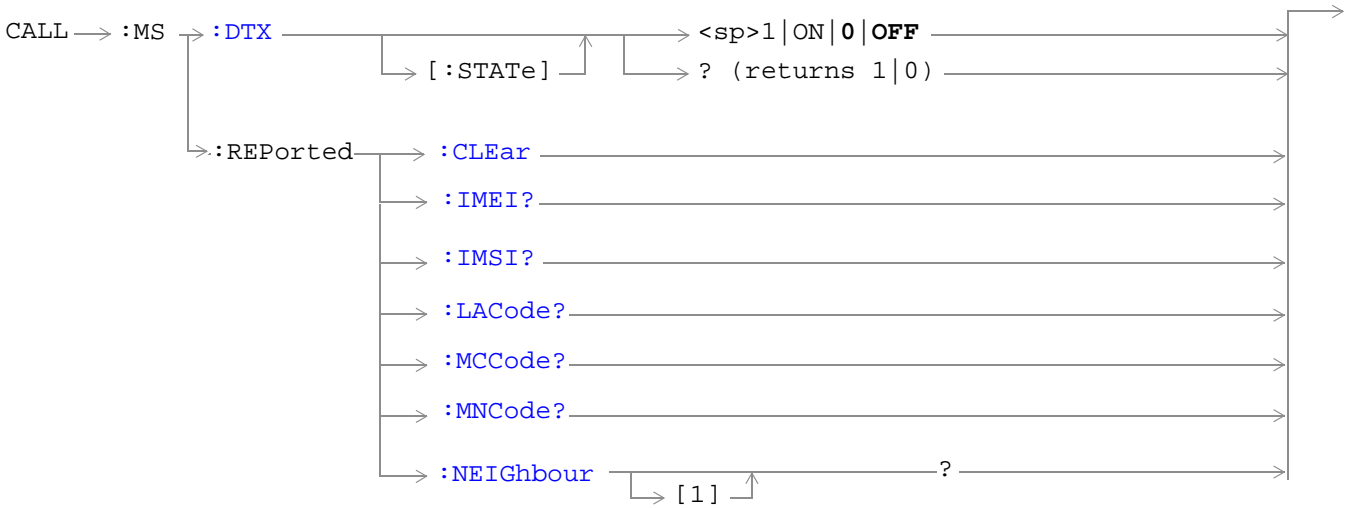
This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

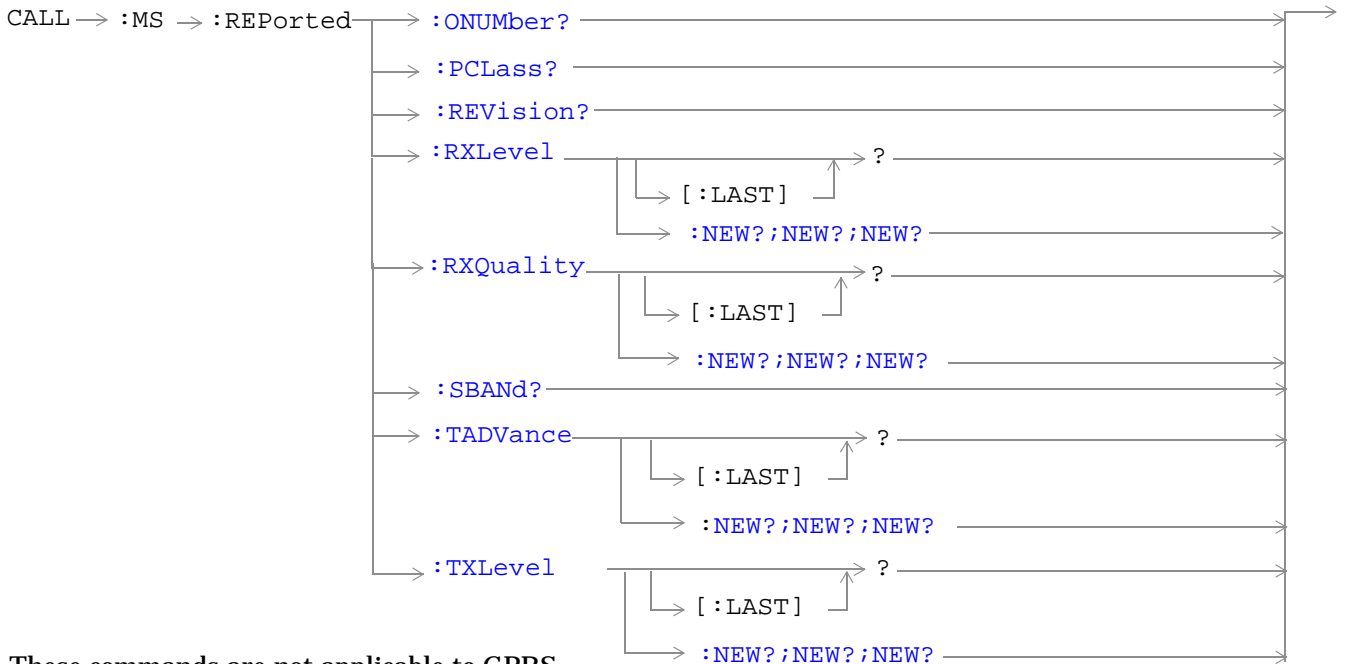
### CALL[:CELL]:MNCCode

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 <a href="#">“CALL:ACTivated” on page 297</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 99 resolution: 1
Query		range: 0 to 99 resolution: 1
*RST Setting		1
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a>
Programming Example		
OUTPUT 714; "CALL:CELL:MNCODE 45" !Sets the cell's mobile network code to 45.		

**CALL:MS**

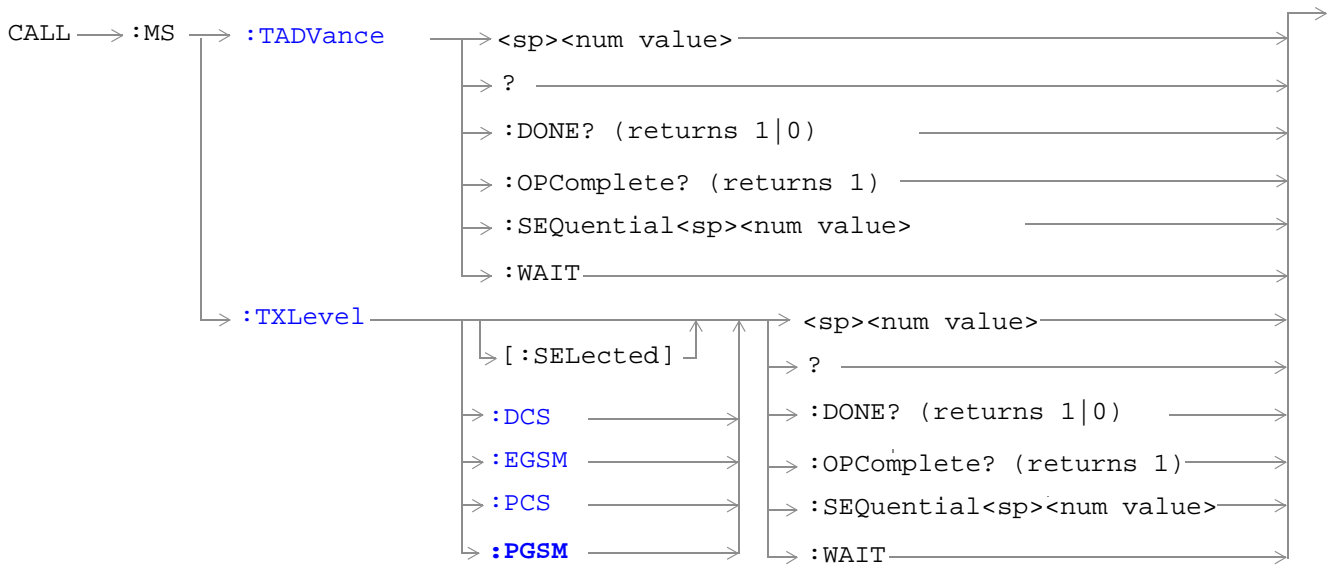


These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

## CALL:MS



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)



**CALL:MS:DTX[:STATE]**

Function	GSM	Turns mobile station Discontinuous Transmission (DTX) on or off. Query form returns a 1 (state = on) or a 0 (state = off). See <a href="#">“Configuring Mobile Station Operating Parameters” on page 613</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: 1   ON   0   OFF	
Query	range: 0   1	
*RST Setting	0 (state = OFF)	
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:MS:DTX OFF" !Turns mobile station discontinuous !transmission OFF.</pre>		

**CALL:MS:REPorted:CLEAr**

Function	GSM	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.
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:MS:REPORTED:CLEAR"</pre>		

**CALL:MS:REPorted:IMEI?**

Function	GSM	Query of the International Mobile Equipment Identity of the ME. ME is an MS without a SIM. This parameter is reported if the IMEI:AUTO state is ON, see <a href="#">“CALL:IMEI” on page 323</a> or the MS has no SIM.
	GPRS	This command is not applicable to GPRS.
Query	range: up to 15 decimal digits and "" resolution: 1	
*RST Setting	"" (null string)	
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:MS:REPORTED:IMEI?"</pre>		

**CALL:MS:REPorted:IMSI?**

Function	GSM	Query of the International Mobile Subscriber Identity of the SIM in the MS.
	GPRS	This command is not applicable to GPRS.
Query		range: up to 15 decimal digits and "" resolution: 1
*RST Setting		"" (null string)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:IMSI?"		

**CALL:MS:REPorted:LACode?**

Function	GSM	Query of the last Location Area Code the MS 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 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:LACODE?"		

**CALL:MS:REPorted:MCCode?**

Function	GSM	Query of the last Mobile Country Code the MS was camped on.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 999 and 9.91E+37 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:MCCODE?"		

**CALL:MS:REPorted:MNCode?**

Function	GSM	Query of the last Mobile Network Code the MS was camped on.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 99 and 9.91E+37 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:MNCODE?"		

**CALL:MS:REPorted:NEIGHbour[1]?**

Function	GSM	This query will return 4 data items separated by commas for neighbour cell one. 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 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:NEIGHBOUR?"!Returns ARFCN,RFLEVEL,NCC,BCC in !that order.		

**CALL:MS:REPorted:ONUMber?**

Function	GSM	Query the MS for the originated number keyed in on the MS.
	GPRS	This command is not applicable to GPRS.
Query		range: up to 21 ASCII characters and "" resolution: 1
*RST Setting		"" (null string)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:ONUMBER?"		

**CALL:MS:REPorted:PCLass?**

Function	GSM	Query the MS for its Power Class mark.
	GPRS	This command is not applicable to GPRS.
Query	range: PGSM   EGSM = 1 to 5 and 9.91E+37 DCS   PCS = 1 to 3 and 9.91E+37 resolution: 1	
*RST Setting	9.91E+37 (NAN)	
Programming Example OUTPUT 714 ; "CALL:MS:REPORTED:PCLASS?		

**CALL:MS:REPorted:REVIsion?**

Function	GSM	Query the MS to determine which Phase of GSM standards it complies with.
	GPRS	This command is not applicable to GPRS.
Query	range: UNKNown   PHASe1   PHASe2	
*RST Setting	PHAS2	
Programming Example OUTPUT 714 ; "CALL:MS:REPORTED:REVISION?"		

**CALL:MS:REPorted:RXLevel[:LAST]?**

Function	GSM	Received level of the TCH in dB (relative to -110 dBm) which the MS measured during the last SACCH multiframe.
	GPRS	This command is not applicable to GPRS.
Query	range: 0 to 63 and 9.91E+37 resolution: 1	
*RST Setting	9.91E+37 (NAN)	
Programming Example OUTPUT 714 ; "CALL:MS:REPORTED:RXLEVEL:LAST?"		

**CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?**

Function	GSM	Queries the received level of the TCH in dB (relative to -110 dBm) which the MS measured. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the MS reports a new SACCH message to test set. 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 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:RXLEVEL:NEW?;NEW?;NEW?" !The third result is valid.		

**CALL:MS:REPorted:RXQuality[:LAST]?**

Function	GSM	The MS 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 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:RXQUALITY:LAST?"		

**CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?**

Function	GSM	Queries the MS 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. A hanging query that will not return until the MS reports a new SACCH message to test set. 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 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:RXQUALITY:NEW?;NEW?;NEW?" ! The third result is valid.		

**CALL:MS:REPorted:SBANd?**

Function	GSM	Query for the frequency band supported by the MS.
	GPRS	This command is not applicable to GPRS.
Query	range: PGSM   EGSM   DCS   PCS   ""	
*RST Setting	"" (null string)	
Programming Example		
OUTPUT 714; "CALL:MS:REPORTED:SBAND?"		

**CALL:MS:REPorted:TADVance[:LAST]?**

Function	GSM	Query the MS for the last TCH Timing Advance actually used by the MS.
	GPRS	This command is not applicable to GPRS.
Query	range: 0 to 63 and 9.91E+37 resolution: 1	
*RST Setting	9.91E+37 (NAN)	
Programming Example		
OUTPUT 714; "CALL:MS:REPORTED:TADVANCE:LAST?"		

**CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?**

Function	GSM	Queries the MS 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.  A hanging query that will not return until the MS reports a new SACCH message to test set. 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 resolution: 1	
*RST Setting	9.91E+37 (NAN)	
Programming Example		
OUTPUT 714; "CALL:MS:REPORTED:TADVANCE:NEW?;NEW?;NEW?" ! The third result is valid.		

**CALL:MS:REPorted:TXLevel[:LAST]?**

Function	GSM	Query the MS for the last reported transmit level.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 31 and 9.91E+37 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:TXLEVEL:LAST?"		

**CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?**

Function	GSM	Queries the MS 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.  A hanging query that will not return until the MS reports a new SACCH message to test set.  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 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?" The third result is valid.		

**CALL:MS:TADVance**

Function	GSM	Commands the MS what TCH timing advance to use on the uplink.  Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">"Call Processing Subsystem Overlapped Commands"</a> on page 35.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 63 resolution: 1
*RST Setting		zero
Programming Example		
OUTPUT 714;"CALL:MS:TADVANCE 3" !Sets the MS TCH Timing Advance to 3 on !the uplink.		

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

Function	GSM	Selects the MS uplink power control level for the band already selected. See <a href="#">“GSM Frequency Banded Parameters” on page 597</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 31 resolution: 1	
Query	range: 0 to 31 resolution: 1	
*RST Setting	Band: PGSM TXLevel: 15	
Programming Example		
OUTPUT 714; "CALL:MS:TXLEVEL:SELECTED 10"		

**CALL:MS:TXLevel:DCS**

Function	GSM	Selects the mobile station uplink power control level for the DCS band. See <a href="#">“GSM Frequency Banded Parameters” on page 597</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 31 (default 10) resolution: 1	
Query	range: 0 to 31 resolution: 1	
*RST Setting	Band: PGSM TXLevel: 15	
Programming Example		
OUTPUT 714; "CALL:MS:TXLEVEL:DCS 8"		



**CALL:MS:TXLevel:EGSM**

Function	GSM	Selects the mobile station uplink power control level for the EGSM band. See <a href="#">“GSM Frequency Banded Parameters”</a> on page 597. Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands”</a> on page 35.
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 31 (default 15) resolution: 1	
Query	range: 0 to 31 resolution: 1	
*RST Setting	Band: PGSM TXLevel: 15	
Programming Example		
OUTPUT 714; "CALL:MS:TXLEVEL:EGSM 20"		

**CALL:MS:TXLevel:PCS**

Function	GSM	Selects the mobile station uplink power control level for the PCS band. See <a href="#">“GSM Frequency Banded Parameters”</a> on page 597. Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands”</a> on page 35.
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 31 (default 10) resolution: 1	
Query	range: 0 to 31 resolution: 1	
*RST Setting	Band: PGSM TXLevel: 15	
Programming Example		
OUTPUT 714; "CALL:MS:TXLEVEL:PCS 31"		

CALL:MS

CALL:MS:TXLevel:PGSM

Function	GSM	Selects the mobile station uplink power control level for the PGSM band. See <a href="#">“GSM Frequency Banded Parameters” on page 597</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> .
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 31 (default 15) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		Band: PGSM TXLevel: 15
Programming Example		
OUTPUT 714 ; "CALL:MS:TXLEVEL:PGSM 22"		

## CALL:NCCode



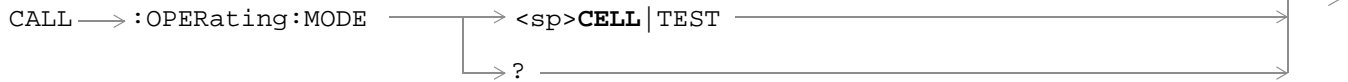
This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### CALL[:CELL]:NCCode

Function	GSM	Sets/queries the Network Color Code. See <a href="#">“Configuring the Broadcast Channel (BCH)” on page 609</a> . This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 297</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 7 resolution: 1
Query		range: 0 to 7 resolution: 1
*RST Setting		1
Programming Example		
OUTPUT 714;"CALL:CELL:NCCODE 2"		

## CALL:OPERating



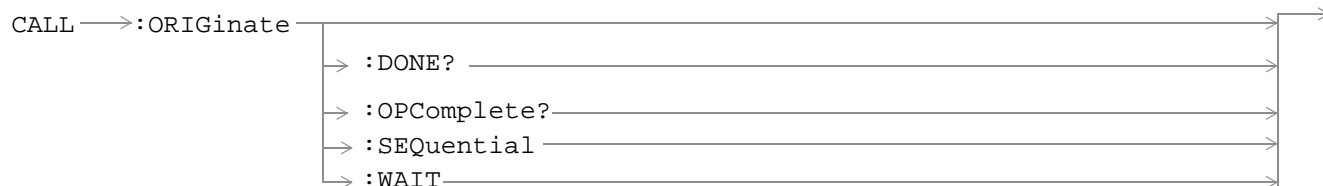
This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### CALL:OPERating:MODE

Function	GSM	Sets/queries the operating mode (behavior) of the test set. See <a href="#">“Test Mode Operating Mode” on page 621</a> or <a href="#">“Active Cell Operating Mode” on page 607</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: cell   test	
Query	range: CELL   TEST	
*RST Setting	CELL	
<b>Programming Example</b> OUTPUT 714; "CALL:OPERATING:MODE TEST" !Places the Test Set into Test Mode.		

## CALL:ORIGinate



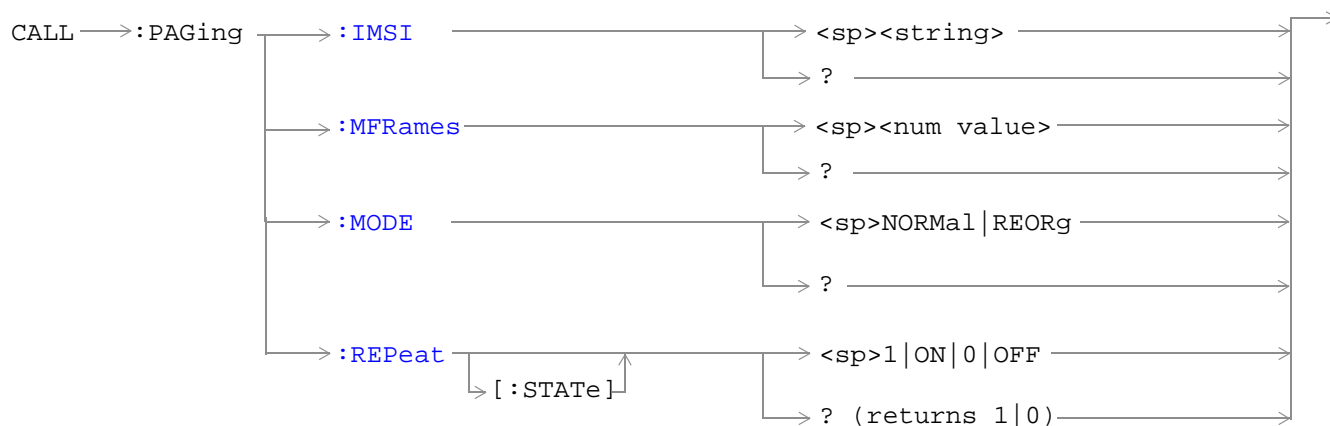
These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### CALL:ORIGinate

Function	GSM	Performs a BS Originated call. See <a href="#">“Call Processing Event Synchronization” on page 32</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization.
	GPRS	This command is not applicable to GPRS.
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:ORIGINATE:SEQUENTIAL" !Orignates a base station call.  !Appending SEQUENTIAL to this command  !causes the command to be  !performed sequentially.</pre>		

## CALL:PAGing



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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 <a href="#">“Call Processing State Synchronization” on page 37</a> until the paging IMSI is returned if the state is on.  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 resolution: 1
Query		range: up to 15 decimal digits resolution: 1
*RST Setting		001012345678901
Programming Example		
<pre> OUTPUT 714;"CALL:PAGing:IMSI `01012345678901`"!Set paging IMSI                                      !to 01012345678901. </pre>		

**CALL:PAGIng:REPeat[:STATe]**

Function	GSM	Sets/queries repeat paging state. 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 <a href="#">“Fixed Timer Messages” on page 687</a> .
	GPRS	This command is not applicable to GPRS.
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"CALL:PAGING:REPEAT:STATE ON" !Turns paging repeat ON.		

**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.  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.  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		
OUTPUT 714;"CALL:PAGING:MODE REOR" ! MS will be sent a page on the ! next available paging subchannel		

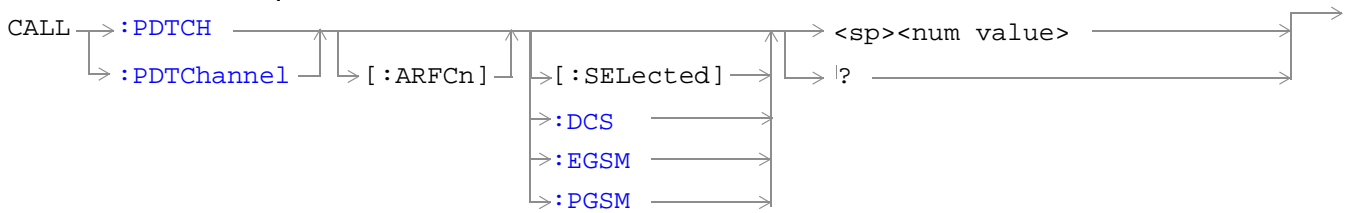
## CALL:PAGing

### CALL:PAGing:MFRames

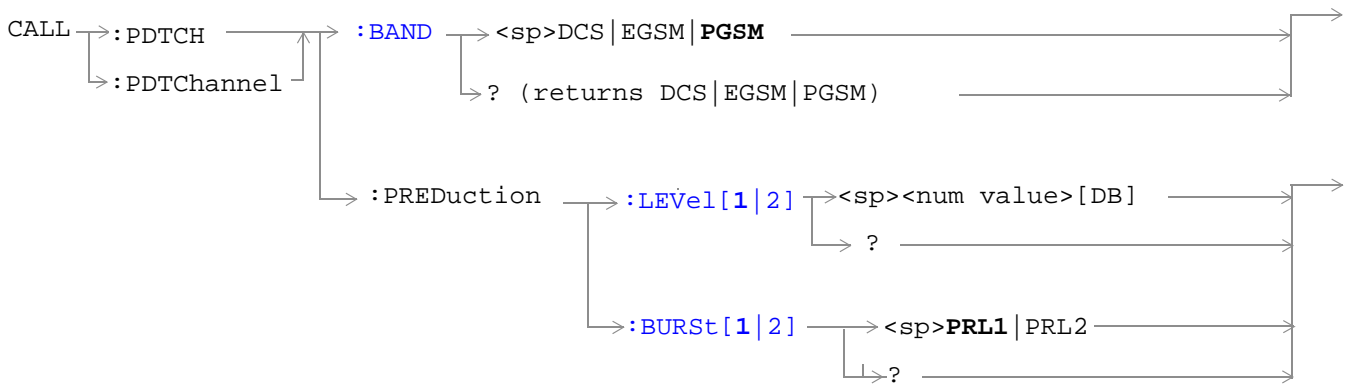
Function	GSM	Sets/queries the number of multiframes between paging subchannels.  This parameter is used when the paging mode is normal. MFRames and IMSI are used to define the mobile station's paging group. The paging group determines when an MS can expect a page if paging mode is normal.
	GPRS	This command is not applicable to GPRS.
Setting		range: 2 to 9 resolution: 1
Query		range: 2 to 9 resolution: 1
*RST Setting		2
<b>Programming Example</b>  OUTPUT 714;"CALL:PAGING:MFRAMES 5" ! Sets the number of multiframes ! between paging subchannels.		



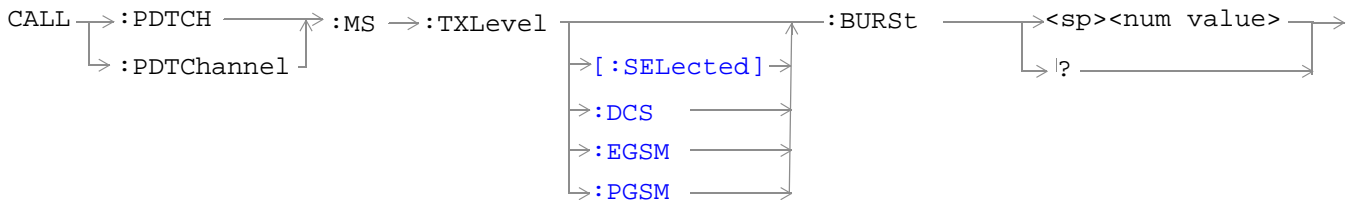
## CALL:PDTCH | PDTChannel



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 283](#)

**CALL:PDTCH | PDTChannel[:ARFCn][:SElected]**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the channel number of the downlink and uplink PDTCH for the band already selected.  Note that the PCS band is not currently supported for GPRS.  For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a> ) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a> ).
Setting		range: <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885 (default: 698)</li> <li>• EGSM band, channels 0 to 124 and 975 to 1023 (default: 30)</li> <li>• PGSM band, channels 1 to 124 (default: 30)</li> </ul> resolution: 1
Query		range: <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 0 to 124 and 975 to 1023</li> <li>• PGSM band, channels 1 to 124</li> </ul> resolution: 1
*RST setting		PGSM and EGSM bands: 30, DCS band: 698
<b>Programming Example</b>  <pre>OUTPUT 714;"CALL:PDTCH:ARFCN:SELECTED 512" !Sets the ARFCN of the selected band to !512, if 512 is valid for the selected band.</pre>		

## CALL:PDTCH | PDTChannel[:ARFCn]:DCS

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the channel number for downlink and uplink PDTCH for the DCS band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 615</a>.</p> <p>The value you set for the channel number will only be applied when the data connection state changes to TRAN (transferring). See <a href="#">“CALL:STATUs[:STATe]:DATA?” on page 366</a>.</p> <p>For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNction:DATA:STOP” on page 321</a>) and then restart it (using <a href="#">“CALL:FUNction:DATA:START” on page 321</a>). The PDTCH band must also be set to DCS.</p>
Setting		<p>range: 512 to 885 (default: 698)</p> <p>resolution: 1</p>
Query		<p>range: 512 to 885</p> <p>resolution: 1</p>
*RST setting		698
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:ARFCN:DCS 512" !Sets the PDTCH for the DCS band to ARFCN !512.</pre>		

## CALL:PDTCH | PDTChannel[:ARFCn]:EGSM

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the channel number for downlink and uplink PDTCH for the EGSM band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 615</a>.</p> <p>The value you set for the channel number will only be applied when the data connection state changes to TRAN (transferring). See <a href="#">“CALL:STATUs[:STATe]:DATA?” on page 366</a>.</p> <p>For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a>) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a>). The PDTCH band must also be set to EGSM.</p>
Setting	range: 0 to 124   975 to 1023 (default: 30) resolution: 1	
Query	range: 0 to 124   975 to 1023 resolution: 1	
*RST setting	30	
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:ARFCN:EGSM 124" !Sets the PDTCH for the EGSM band to ARFCN !124.</pre>		

**CALL:PDTCH | PDTChannel[:ARFCn]:PGSM**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the channel number for downlink and uplink PDTCH for the PGSM band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 615</a>.</p> <p>The value you set for the channel number will only be applied when the data connection state changes to TRAN (transferring). See <a href="#">“CALL:STATus[:STATE]:DATA?” on page 366</a>.</p> <p>For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a>) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a>). The PDTCH band must also be set to PGSM.</p>
Setting		<p>range: 1 to 124 (default: 30)</p> <p>resolution: 1</p>
Query		<p>range: 1 to 124</p> <p>resolution: 1</p>
*RST setting		30
<b>Programming Example</b> OUTPUT 714;"CALL:PDTCH:PGSM 124" !Sets the PDTCH for the PGSM band to ARFCN 124.		

**CALL:PDTCH | PDTChannel:BAND**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the PDTCH band, therefore constraining the range of PDTCH ARFCNs.</p> <p>Note that the PCS band is not currently supported for GPRS.</p> <p>For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a>) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a>).</p>
Setting		range: PGSM   EGSM   DCS
Query		range: PGSM   EGSM   DCS
*RST setting		PGSM
<b>Programming Example</b> OUTPUT 714;"CALL:PDTCH:BAND DCS" !Sets the band to DCS.		

**CALL:PDTCH | PDTChannel:MS:TXLevel[:SElected]:BURSt**

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 <a href="#">“GPRS Frequency Banded Parameters” on page 598</a> .  Note that the PCS band is not currently supported for GPRS.  For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a> ) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a> ).
Setting		range: 0 to 31 resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		PGSM and EGSM bands: 15, DCS band: 10
Programming Example		
OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST 10" !Sets the uplink power level of the burst in the !selected band to 10.		

**CALL:PDTCH|PDTChannel:MS:TXLevel:DCS:BURSt**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command selects/queries the mobile station uplink power control level for the DCS band. See <a href="#">“GPRS Frequency Banded Parameters” on page 598</a> .  For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a> ) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a> ).
Setting		range: 0 to 31 (default 10) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		10
Programming Example		
OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:DCS:BURST 8" !Sets the uplink power level of the burst in !the DCS band to 8.		

**CALL:PDTCH|PDTChannel:MS:TXLevel:EGSM:BURSt**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command selects/queries the mobile station uplink power control level for the EGSM band. See <a href="#">“GPRS Frequency Banded Parameters” on page 598</a> .  For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a> ) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a> ).
Setting		range: 0 to 31 (default 15) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		15
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:EGSM:BURST 15" !Sets the uplink power level of the burst !in the EGSM band to 15.</pre>		

**CALL:PDTCH|PDTChannel:MS:TXLevel:PGSM:BURSt**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command selects/queries the mobile station uplink power control level for the PGSM band. See <a href="#">“GPRS Frequency Banded Parameters” on page 598</a> .  For this setting to be implemented, you must stop the data connection (using <a href="#">“CALL:FUNCTION:DATA:STOP” on page 321</a> ) and then restart it (using <a href="#">“CALL:FUNCTION:DATA:START” on page 321</a> ).
Setting		range: 0 to 31 (default 15) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		15
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:PGSM:BURST 8" !Sets the uplink power level of the burst in !the PGSM band to 8.</pre>		

**CALL:PDTCH | PDTChannel:PREduction:BURSt[1|2]**

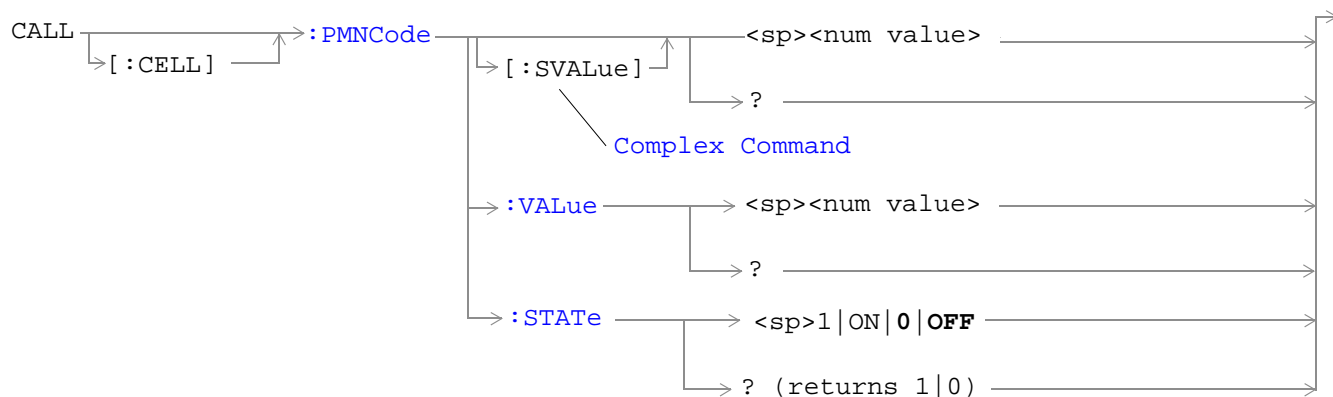
Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the power reduction level for any of the two downlink bursts. You can define the levels of PRL1 and PRL2 using “ <a href="#">CALL:PDTCH   PDTChannel:PREduction:LEVel[1   2]</a> ” on page 352.  If you do not specify a burst then burst one is assumed.
Setting	range: PRL1   PRL2	
Query	range: PRL1   PRL2	
*RST setting	PRL1	
Programming Example		
<pre>OUTPUT 714;"CALL:PDTCH:PREd:BURS PRL1" !Sets the power reduction level of the first burst to !PRL1.</pre>		

**CALL:PDTCH | PDTChannel:PREduction:LEVel[1|2]**

Function	GSM	This command is not applicable to GSM.
	GPRS	In GPRS, power levels are often 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 two bursts using “ <a href="#">CALL:PDTCH   PDTChannel:PREduction:BURSt[1   2]</a> ” on page 352.
Setting	range: 0 to 12 dB resolution: 0.1 dB	
Query	range: 0 to 12 dB resolution: 0.1 dB	
*RST setting	0 dB	
Programming Example		
<pre>OUTPUT 714;"CALL:PDTCH:PREd:LEV2 3" !Sets the second power reduction level (PRL2) to 3 dB.</pre>		



## CALL:PMNCode



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### 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 <a href="#">“CALL:ACTivated” on page 297</a> ).
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 999 resolution: 1	
Query	range: 0 to 999 resolution: 1	
*RST Setting	1	
Programming Example		
<pre> OUTPUT 714;"CALL:CELL:PMNCODE:SVALUE 798" !Sets the value to 798 and the state !to ON. Only used for PCS 1900 band. </pre>		

CALL:PMNCode

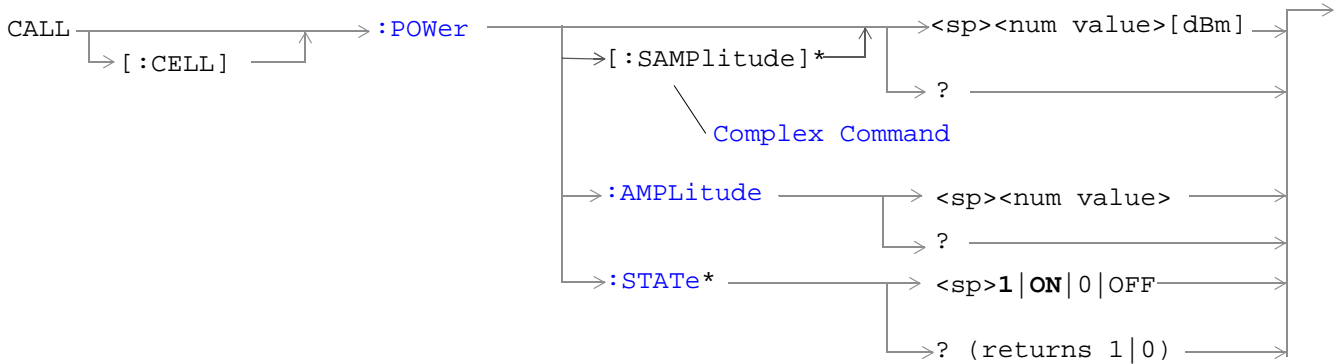
**CALL[:CELL]:PMNCode:VALue**

Function	GSM	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 resolution: 1
Query		range: 0 to 999 resolution: 1
*RST Setting		1
<b>Programming Example</b> OUTPUT 714;"CALL:CELL:PMNCode 798" !Sets the 3 digit MNCCode for PCS 1900 to 798.		

**CALL[:CELL]:PMNCode:STATe**

Function	GSM	Sets/queries the MNC state. This command is used for the PCS band only. Setting it to ON will configure the BCCH to use the 3 digit MNC.
	GPRS	This command is not applicable to GPRS.
Setting		range: 0   OFF   1   ON
Query		range: 0   OFF   1   ON
*RST Setting		OFF
<b>Programming Example</b> OUTPUT 714;"CALL:CELL:PMNCode:STATE ON"		

## CALL:POWer



\* These commands are not applicable to GPRS.

“Diagram Conventions” on page 283

### CALL[:CELL]:POWer[:SAMPLitude]

Function	GSM	This command sets/queries the value for Cell Power and turns the state to ON. This is the same for BCH and TCH. The suffix dBm is optional. The Cell Power field is affected when there is an amplitude offset, see “Measurement Related Configuration” on page 670.
	GPRS	This command is not applicable to GPRS.
Setting	range: -10 dBm to -127 dBm resolution: .01 dBm	
Query	range: -10 dBm to -127 dBm resolution: .01 dBm	
*RST Setting	-60 dBm	
Programming Example		
<pre>OUTPUT 714; "CALL:CELL:POWER:SAMPLITUDE -50dBm" !Sets the value to -50dBm !and the state to ON.</pre>		

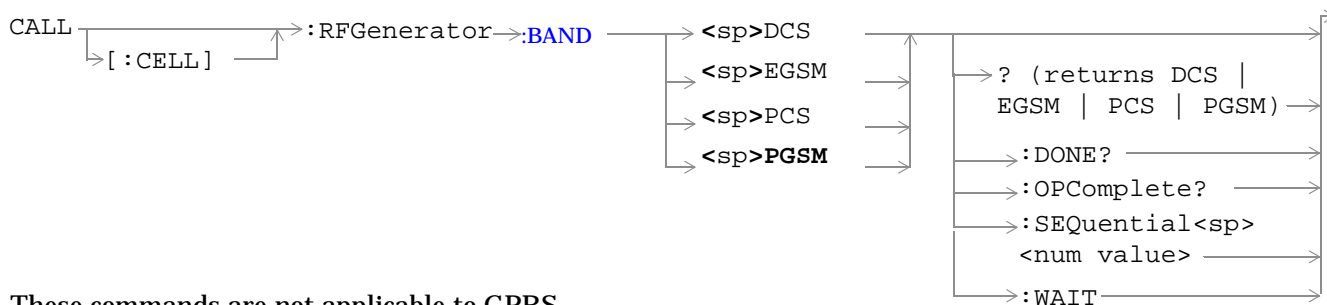
## CALL[:CELL]:POWer:AMPLitude

Function	GSM	This command sets/queries the Cell Power of the test set. This is the same for the BCH and TCH. The suffix dBm is optional. The Cell Power field is affected when there is an amplitude offset, see <a href="#">“Measurement Related Configuration” on page 670</a> .
	GPRS	This command sets/queries the Cell Power (BCH). The suffix dBm is optional. 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 <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 615</a> . The Cell Power is affected when there is an amplitude offset, see <a href="#">“Measurement Related Configuration” on page 670</a> .
Setting		range: -10 dBm to -127 dBm resolution: .01 dBm
Query		range: -10 dBm to -127 dBm resolution: .01dBm
*RST Setting		-60 dBm
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:POWER:AMPLITUDE -50dBm" !Set the cell power from test !set to -50dBm.</pre>		

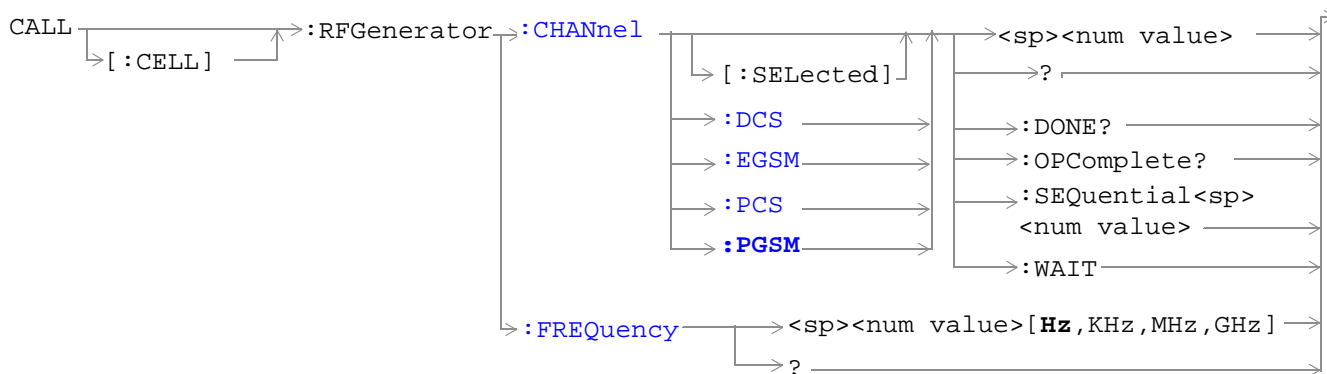
## CALL[:CELL]:POWer:STATE

Function	GSM	This command sets/queries the RF Power state.
	GPRS	This command is not applicable to GPRS.
Setting		range: 0   OFF   1   ON
Query		range: 0   1
*RST Setting		ON
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:POWER:STATE 1" !Sets the cell power state to ON.</pre>		

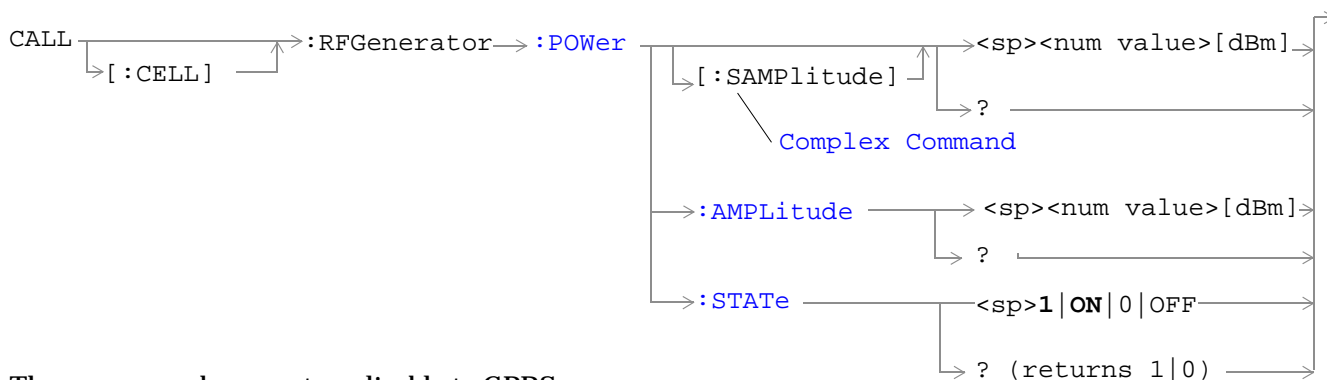
## CALL:RFGenerator



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 283](#)

**CALL[:CELL]:RFGenerator:BAND**

Function	GSM	Sets/queries the RF Gen Channel band. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
Query		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
*RST Setting		20 (PGSM band)
<b>Programming Example</b>		
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. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
Query		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
*RST Setting		20 (PGSM band)
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:SELECTED 512" !Sets the RF Generator !channel to 512 for the !band already selected.</pre>		

**CALL[:CELL]:RFGenerator:CHANnel:DCS**

Function	GSM	Sets/queries the RF Gen Channel for the DCS band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting	range: 512 to 885 (default 512) resolution: 1	
Query	range: 512 to 885 resolution: 1	
*RST Setting	20 (PGSM band)	
Programming Example		
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. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 124   975 to 1023 (default: 20) resolution: 1	
Query	range: 0 to 124   975 to 1023 resolution: 1	
*RST Setting	20 (PGSM band)	
Programming Example		
OUTPUT 714; "CALL:CELL:RFGENERATOR:CHANNEL:EGSM 124"		



**CALL[:CELL]:RFGenerator:CHANnel:PCS**

Function	GSM	Sets/queries the RF Gen Channel for the PCS band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: 512 to 810 (default: 512) resolution: 1
Query		range: 512 to 810 resolution: 1
*RST Setting		20 (PGSM band)
Programming Example		
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. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 35</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: 1 to 124 (default: 20) resolution: 1
Query		range: 1 to 124 resolution: 1
*RST Setting		20 (PGSM band)
Programming Example		
OUTPUT 714; "CALL:CELL:RFGENERATOR:CHANNEL:PGSM 124"		

**CALL[:CELL]:RFGenerator:FREQUENCY**

Function	GSM	Sets/queries the RF Gen Frequency selection. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628.</a> 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 resolution: 1
Query		range: 292 MHz to 2700 MHz resolution: 1
*RST Setting		939 MHz
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : FREQUENCY 896 . 2MHZ"		

**CALL[:CELL]:RFGenerator:POWER[:SAMPLitude]**

Function	GSM	Sets/queries the value for RF Gen Power and turns the state to ON. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628.</a> The RF Gen Power field is affected when there is an amplitude offset, see <a href="#">“Measurement Related Configuration” on page 670.</a>
	GPRS	This command is not applicable to GPRS.
Setting		range: -10 to -100 dBm resolution: .01 dBm
Query		range: -10 to -100 dBm resolution: .01 dBm
*RST Setting		-85 dBm
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : POWER : SAMPLITUDE -50DBM"		

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

Function	GSM	Set/queries Rf Gen Power. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. see <a href="#">“CW Test Function Behavior” on page 628.</a> The RF Gen Power field is affected when there is an amplitude offset, see <a href="#">“Measurement Related Configuration” on page 670.</a>
	GPRS	This command is not applicable to GPRS.
Setting		range: -10 to -100 dBm resolution: .01 dBm
Query		range: -10 to -100 dBm resolution: .01 dBm
*RST Setting		-85 dBm
Programming Example		
OUTPUT 714 ; "CALL:CELL:RFGENERATOR:POWER:AMPLITUDE -50DBM"		

**CALL[:CELL]:RFGenerator:POWer:STATE**

Function	GSM	Sets/queries the RF Gen Power State. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 628.</a>
	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		
OUTPUT 714 ; "CALL:CELL:RFGENERATOR:POWER:STATE OFF"		

## CALL:SIGNaling

CALL → :SIGNaling → :MS → :TXLevel → :FACCH → <sp><1|ON|0|OFF> →  
 ↳ ? (returns 1|0) →

This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### CALL:SIGNaling:MS:TXLevel:FACCH

Function	GSM	Sets/queries the TX Level FACCH Signaling parameter.  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.  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.  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		
OUTPUT 714; "CALL:SIGNaling:MS:TXLevel:FACCH 0"		

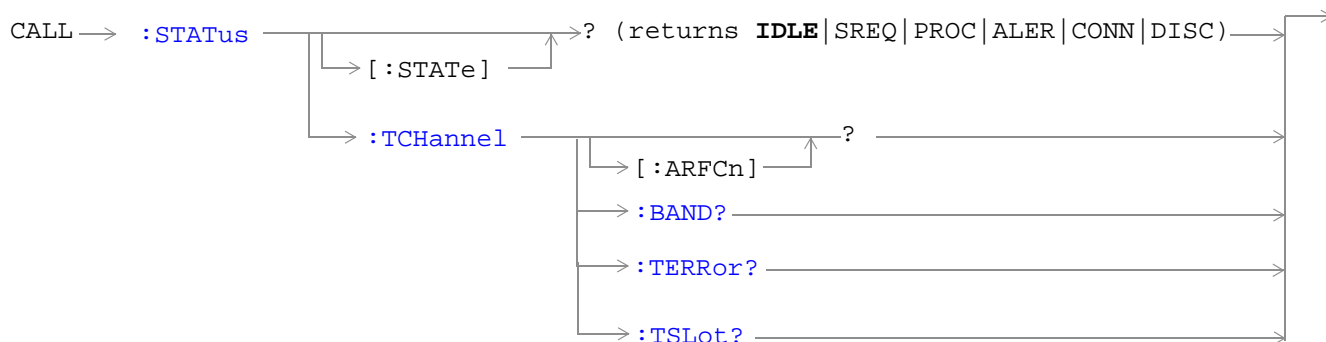
## Related Topics

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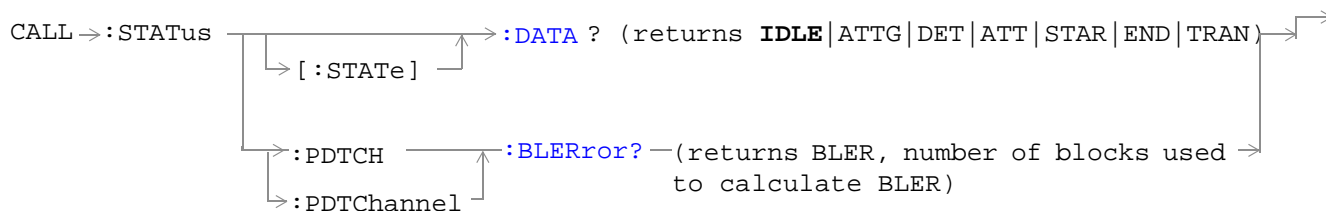
[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

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## CALL:STATUS



These commands are not applicable to GPRS.



These commands are not applicable to GSM.

[“Diagram Conventions” on page 283](#)

## CALL:STATus

### CALL:STATus[:STATe]?

Function	GSM	This query returns the status of the call. See <a href="#">“Call Processing State Synchronization” on page 37.</a>
	GPRS	This command is not applicable to GPRS.
Query	range: IDLE   SREQ   PROC   ALER   CONN   DISC	
*RST setting	IDLE	
Programming Example		
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. See <a href="#">“Data Connection Processing State Synchronization” on page 53.</a>
Query	range: IDLE   ATTG   DET   ATT   STAR   END   TRAN	
*RST setting	IDLE	
Programming Example		
OUTPUT 714; "CALL:STATUS:DATA?"		

**CALL:STATUS:PDTCH | PDTChannel:BLERror?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This query returns the block error rate (BLER) result and the number of blocks tested to calculate the BLER result.</p> <p>The BLER result is only available when the data connection state is transferring (TRAN). See <a href="#">“CALL:STATUS[:STATe]:DATA?”</a> on page 366.</p> <p>The BLER results are reset using <a href="#">“SYSTEM:MEASUREMENT:RESet”</a> on page 587.</p> <p>If you require more details on BLER, see <a href="#">“BLER Reports Measurement Description”</a> on page 73.</p>
Query		<p>Block error rate</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Blocks tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>
*RST setting		Block error rate: 9.91E+37 (NAN), Blocks tested: 9.91E+37 (NAN)
<b>Programming Example</b> OUTPUT 714 ; "CALL:STATUS:PDTCH:BLERror?"		

**CALL:STATUS:TCHannel[:ARFCN]?**

Function	GSM	<p>This query returns the TCH ARFCN for the current band.</p> <p>The call status must be connected (CONN), see <a href="#">“CALL:STATUS[:STATe]?”</a> on page 366.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>range:</p> <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 975 to 1023 and 0 to 124</li> <li>• PCS band, channels 512 to 810</li> <li>• PGSM band, channels 1 to 124</li> <li>• 9.91E+37</li> </ul> <p>resolution: 1</p>
*RST setting		9.91E+37 (NAN)
<b>Programming Example</b> OUTPUT 714 ; "CALL:STATUS:TCHANNEL:ARFCN?"		

**CALL:STATUS:TCHannel:BAND?**

Function	GSM	This query returns the current TCH band. See <a href="#">“Configuring the Traffic Channel (TCH)” on page 619</a> .  The CALL:STATUS:STATE must be connected, see <a href="#">“CALL:STATUS[:STATE]?” on page 366</a> .
	GPRS	This command is not applicable to GPRS.
Query	range: DCS   EGSM   PCS   PGSM   ”	
*RST setting	“” (null string)	
Programming Example		
OUTPUT 714 ; "CALL:STATUS:TCHANNEL:BAND?"		

**CALL:STATUS:TCHannel:TERRor?**

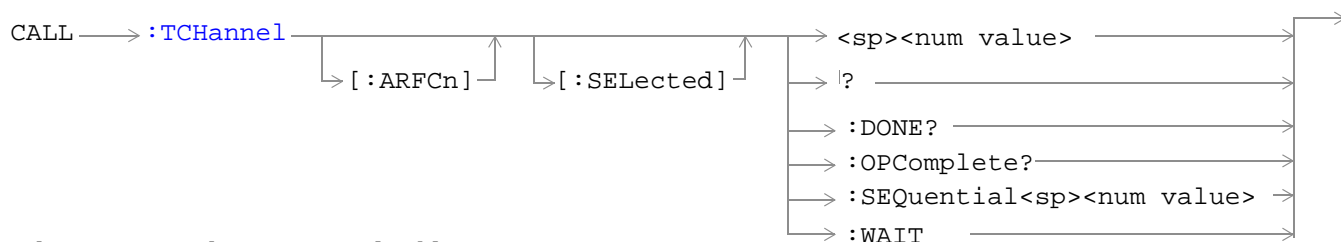
Function	GSM	This query returns the last burst timing error measurement.  This indicates the worst case timing error of all bursts received in a reporting period. If all of the bursts reporting in a period are missing, the query returns 9.91E+37 (NAN).  The reference for burst timing error measurements is with respect to the (downlink TCH slot) + (3 slot TX/RX delay [468.75 bits]) - (TCH Timing Advance).  The CALL:STATUS:STATE must be connected, see <a href="#">“CALL:STATUS[:STATE]?” on page 366</a> .  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 [T=48/13,000,000 seconds approximately 3.69 <sup>us</sup> ] and 9.91E+37  resolution: .25 T [approximately .923 <sup>us</sup> ]	
*RST setting	9.91E+37 (NAN)	
Programming Example		
OUTPUT 714 ; "CALL:STATUS:TCHANNEL:TERROR?" ! Returns Burst Timing Error.		



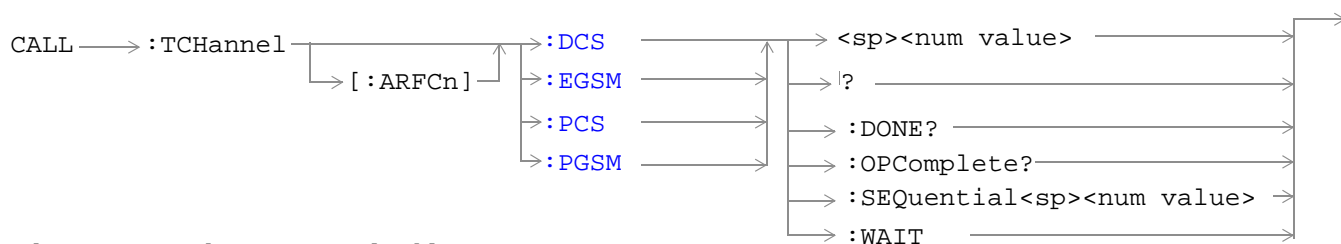
**CALL:STATUS:TCHannel:TSLOT?**

Function	GSM	This query returns the Timeslot that the BS Emulator is using for the TCH. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 619. The CALL:STATUS:STATE must be connected, see <a href="#">“CALL:STATUS[:STATE]?”</a> on page 366.
	GPRS	This command is not applicable to GPRS.
Query	range: 3   4   5   9.91E+37	
*RST setting	9.91E+37 (NAN)	
<b>Programming Example</b>		
OUTPUT 714 ; "CALL:STATUS:TCHANNEL:TSLOT?"		

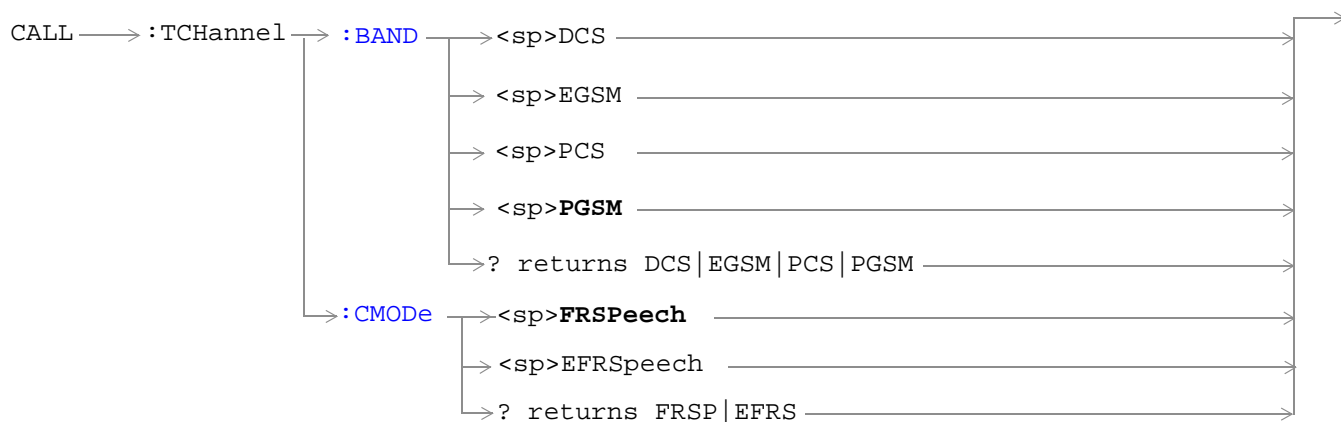
## CALL:TCHannel



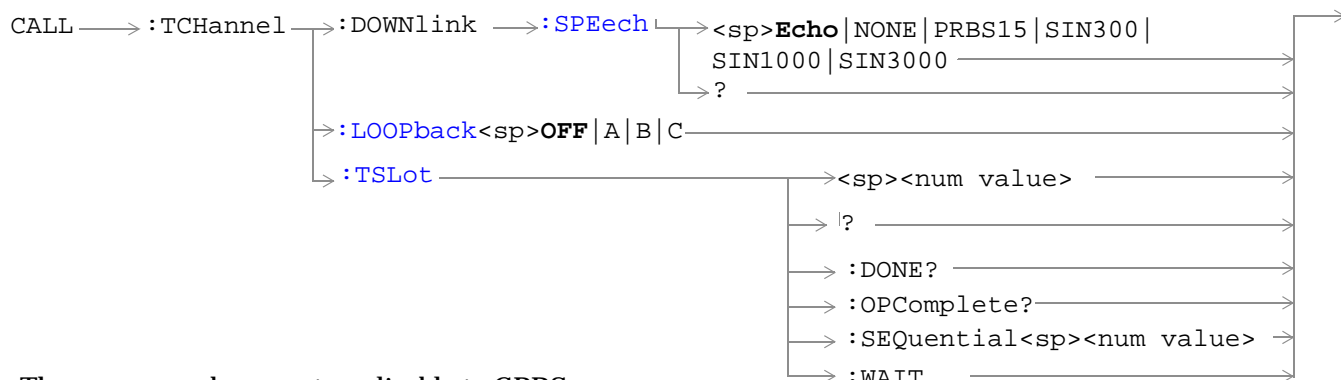
These commands are not applicable to GPRS.



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 283](#)

### CALL:TCHannel[:ARFCn][:SElected]

Function	GSM	Sets/queries the channel number of downlink and uplink TCH for the band already selected. Additional commands can be appended to aid in controller/Mobile Station synchronization. See for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: <ul style="list-style-type: none"> <li>DCS band, channels 512 to 885 (default: 698)</li> <li>EGSM band, channels 0 to 124 and 975 to 1023 (default: 30)</li> <li>PCS band, channels 512 to 810 (default: 698)</li> <li>PGSM band, channels 1 to 124 (default: 30)</li> </ul> resolution: 1
Query		range: <ul style="list-style-type: none"> <li>DCS band, channels 512 to 885</li> <li>EGSM band, channels 0 to 124 and 975 to 1023</li> <li>PCS band, channels 512 to 810</li> <li>PGSM band, channels 1 to 124</li> </ul> resolution: 1
*RST Setting		PGSM and EGSM bands: 30, DCS and PCS bands: 698
<b>Programming Example</b> OUTPUT 714;"CALL:TCHANNEL:ARFCN:SELECTED 512" !Selects ARFCN of 512 on the !test set.		

**CALL:TCHannel[:ARFCn]:DCS**

Function	GSM	<p>Sets/queries the channel number for downlink and uplink TCH for DCS band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 619.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUs[:STATe]?”</a> on page 366.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 33 for examples.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>range: 512 to 885 (default: 698)</p> <p>resolution: 1</p>	
Query	<p>range: 512 to 885</p> <p>resolution: 1</p>	
*RST Setting	698	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:DCS 512"		

**CALL:TCHannel[:ARFCn]:EGSM**

Function	GSM	<p>Sets/queries channel number for downlink and uplink TCH for EGSM band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 619.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUs[:STATe]?”</a> on page 366.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 33 for examples.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>range: 0 to 124   975 to 1023 (default: 30)</p> <p>resolution: 1</p>	
Query	<p>range: 0 to 124   975 to 1023</p> <p>resolution: 1</p>	
*RST Setting	30	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:EGSM 124"		

**CALL:TCHannel[ARFCN]:PCS**

Function	GSM	<p>Sets/queries channel number for downlink and uplink TCH for PCS band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 619.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUs[:STATe]?”</a> on page 366.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 33 for examples.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>range: 512 to 810 (default: 698)</p> <p>resolution: 1</p>
Query		<p>range: 512 to 810</p> <p>resolution: 1</p>
*RST Setting		698
Programming Example		
OUTPUT 714; "CALL:TCHANNEL:ARFCN:PCS 512"		

**CALL:TCHannel[:ARFCn]:PGSM**

Function	GSM	<p>Set channel number for downlink and uplink TCH for PGSM band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 619.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUs[:STATe]?”</a> on page 366.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 33 for examples.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>range: 1 to 124 (default: 30)</p> <p>resolution: 1</p>
Query		<p>range: 1 to 124</p> <p>resolution: 1</p>
*RST Setting		30
Programming Example		
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.  The test set may be queried for the current TCH band when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUS[:STATE]?” on page 366</a> .  The test set uses this command to perform a channel assignment, see <a href="#">“How the Test Set Performs a Dualband Handover” on page 140</a> 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   PCS   PGSM bands resolution: 1	
Query	range: DCS   EGSM   PCS   PGSM bands resolution: 1	
*RST Setting	PGSM	
Related Topic	See <a href="#">“Traffic Band Parameter” on page 599</a> .	
<b>Programming Example</b> 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 <a href="#">“Programming a Channel Mode Change” on page 138</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: FRSPeech   EFRSPeech	
Query	range: FRSP   EFRS	
*RST Setting	FRSPeech	
<b>Programming Example</b> OUTPUT 714 ; "CALL:TCHANNEL:CMODE EFRSPEECH"		

**CALL:TCHannel:DOWNlink:SPEech**

Function	GSM	Set which kind of Speech data is transmitted on the downlink TCH. See <a href="#">“Configuring the Traffic Channel (TCH)” on page 619</a> or <a href="#">“Fast Bit Error Measurement Description” on page 90</a> or <a href="#">“Test Mode Operating Mode” on page 621</a> .
	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		
OUTPUT 714; "CALL:TCHANNEL:DOWNLINK:SPEECH ECHO"		

**CALL:TCHannel:LOOPback**

Function	GSM	Sets traffic channel loopback state and type for the MS.  The loopback type must be set before a Fast Bit Error or a Bit Error measurement will function.  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 <a href="#">“SETup:BERror:SLControl” on page 474</a> or <a href="#">“SETup:FBError:SLControl” on page 480</a> .  See <a href="#">“Fast Bit Error Measurement Description” on page 90</a> or <a href="#">“Bit Error Measurement Description” on page 66</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: <ul style="list-style-type: none"> <li>• OFF - Sets the TCH Loop state for the MS to OFF. The loop back is open.</li> <li>• A- Sets the TCH Loop state for the MS to type A. Full-rate speech TCH loopback with signalling of erased frames, (residual).</li> <li>• B- Sets the TCH Loop state for the MS to type B. Full-rate speech TCH loopback without signalling of erased frames, (non-residual).</li> <li>• C - Sets the TCH Loop state for the MS to type C. TCH burst by burst loopback.</li> </ul>	
*RST Setting	OFF	
Programming Example		
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. See <a href="#">“Configuring the Traffic Channel (TCH)” on page 619</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 33</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting	range: 3   4   5 resolution: 1	
Query	range: 3   4   5 resolution: 1	
*RST Setting	4	
<b>Programming Example</b> OUTPUT 714;"CALL:TCHANNEL:TSLot 5" !Sets time slot number.		



## 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.

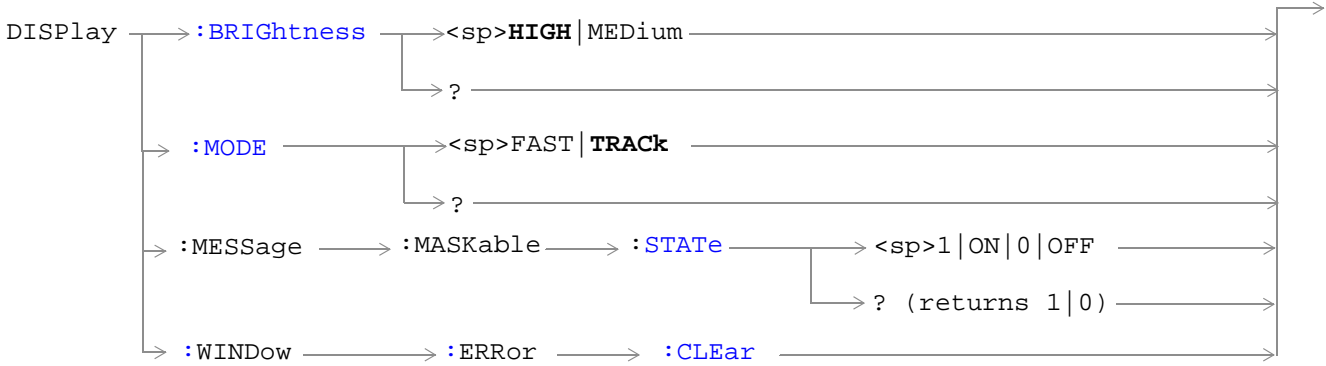
### Display Backlight Dimming

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 283

**DISPlay:BRIGhtness**

Function	Sets/queries the test set's display brightness. A display backlight dimming feature lowers the display brightness after approximately 10 minutes without any manual user interaction with the test set. See <a href="#">"Display Backlight Dimming" on page 377</a> .
Setting	Range: MEdium   HIGH
Query	Range: MED   HIGH
Factory setting	HIGH (this parameter is not affected by any reset operation and can only be changed by direct user access)
Programming Example	
OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" !Sets display brightness to medium.	

**DISPlay:MODE**

Function	Sets/queries the test set's display mode. See <a href="#">"Display Mode (Track/Fast)" on page 676</a> .
Setting	Range: FAST   TRACK
Query	Range: FAST   TRAC
*RST setting	TRACK
Programming Example	
OUTPUT 714;"DISPLAY:MODE FAST" !Sets display mode to fast.	

**DISPlay:MESSAge:MASKable:STATe**

Function	Blocks maskable messages from appearing on the test set display display screen but not from the Message Log. Maskable messages are reported to the Message Log in either state.
Setting	Range: On   Off
Query	Range: On   Off
Factory setting	On
Programming Example	
OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.	

**DISPlay:WINDow:ERRor:CLEar**

Function	Clears the error message from the display screen but not from the Message Log.
Programming Example	
OUTPUT 714;"DISPLAY:WINDOW:ERROR:CLEAR" !Clears an error message from the display.	

---

## 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 381](#)

[“FETCh:BERRor” on page 385](#)

[“FETCh:DAUDio” on page 393](#)

[“FETCh:DPOWer” on page 397](#)

[“FETCh:FBERRor” on page 399](#)

[“FETCh:IQTuning” on page 403](#)

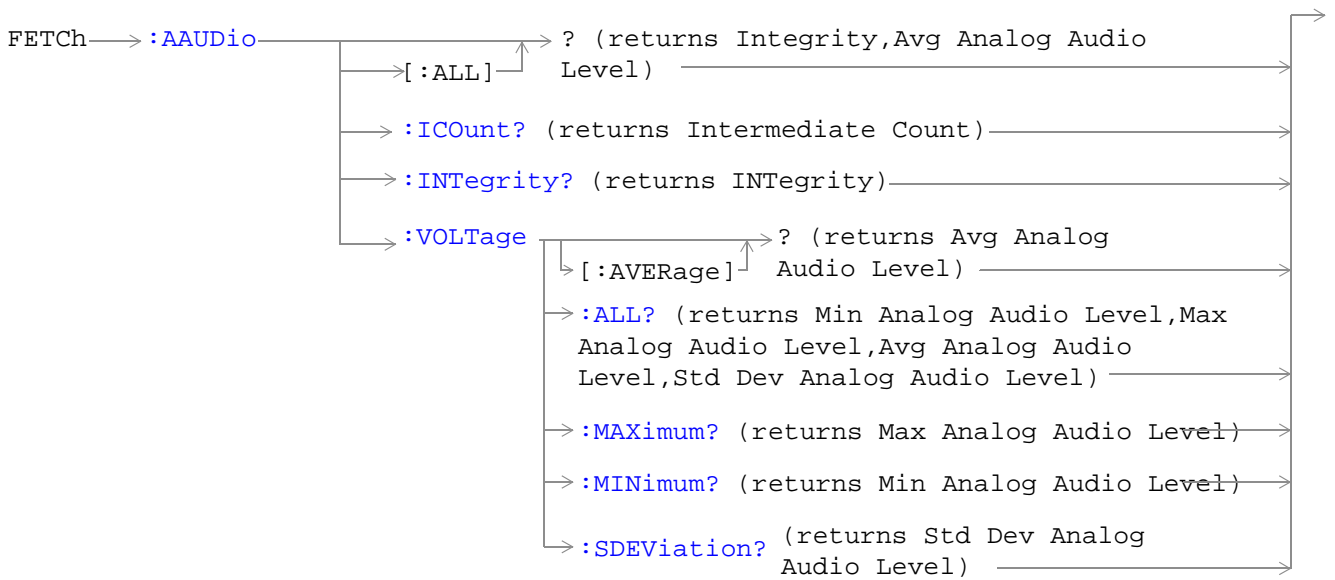
[“FETCh:ORFSpectrum” on page 407](#)

[“FETCh:PFERRor” on page 414](#)

[“FETCh:PVTime” on page 421](#)

[“FETCh:TXPower” on page 433](#)

## FETCh:AAUDio



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

**FETCh:AAUDio[:ALL]?**

Function	GSM	Queries the analog audio measurement results. This query returns an integrity indicator and average analog audio level. Values are returned in a comma-separated list.  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 <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> Analog audio level <ul style="list-style-type: none"> <li>• Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></li> <li>• Resolution: 0.1 mV<sub>rms</sub></li> </ul>

**FETCh:AAUDio:ICount?**

Function	GSM	Queries the intermediate count of analog audio multi-measurements completed. This value is not displayed on the test set.
	GPRS	This command is not applicable to GPRS.
Query		Range: 1 to 999 Resolution: 1

**FETCh:AAUDio:INTEgrity?**

Function	GSM	Queries the integrity indicator for the last analog audio measurement completed. Zero indicates a normal measurement. See <a href="#">“Integrity Indicator” on page 146</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 16 Resolution: 1

## FETCh:AAUDio:VOLTage[:AVERage]?

Function	GSM	Queries the average analog audio level. Value is returned in units of $V_{\text{rms}}$ .  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		Range: 10 $mV_{\text{rms}}$ to 20 $V_{\text{rms}}$  Resolution: 0.1 $mV_{\text{rms}}$

## FETCh:AAUDio:VOLTage:ALL?

Function	GSM	Queries the analog audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list  The values returned are displayed in the Analog Audio Minimum, Maximum, Average, and Std. Dev. fields, which are displayed when the Analog Audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		<p>Minimum</p> <ul style="list-style-type: none"> <li>Range: 10 <math>mV_{\text{rms}}</math> to 20 <math>V_{\text{rms}}</math></li> <li>Resolution: 0.1 <math>mV_{\text{rms}}</math></li> </ul> <p>Maximum</p> <ul style="list-style-type: none"> <li>Range: 10 <math>mV_{\text{rms}}</math> to 20 <math>V_{\text{rms}}</math></li> <li>Resolution: 0.1 <math>mV_{\text{rms}}</math></li> </ul> <p>Average</p> <ul style="list-style-type: none"> <li>Range: 10 <math>mV_{\text{rms}}</math> to 20 <math>V_{\text{rms}}</math></li> <li>Resolution: 0.1 <math>mV_{\text{rms}}</math></li> </ul> <p>Standard deviation</p> <ul style="list-style-type: none"> <li>Range: 0 V to 14.14214 V</li> <li>Resolution: 0.01 mV</li> </ul>

**FETCh:AAUDio:VOLTage:MAXimum?**

Function	GSM	Queries the analog audio multi-measurement maximum analog audio voltage. The value returned is displayed in the Analog Audio Maximum field, which is displayed when the analog audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		Range: 10 mV <sub>rms</sub> to 20 V <sub>rms</sub> Resolution: 0.1 mV <sub>rms</sub>

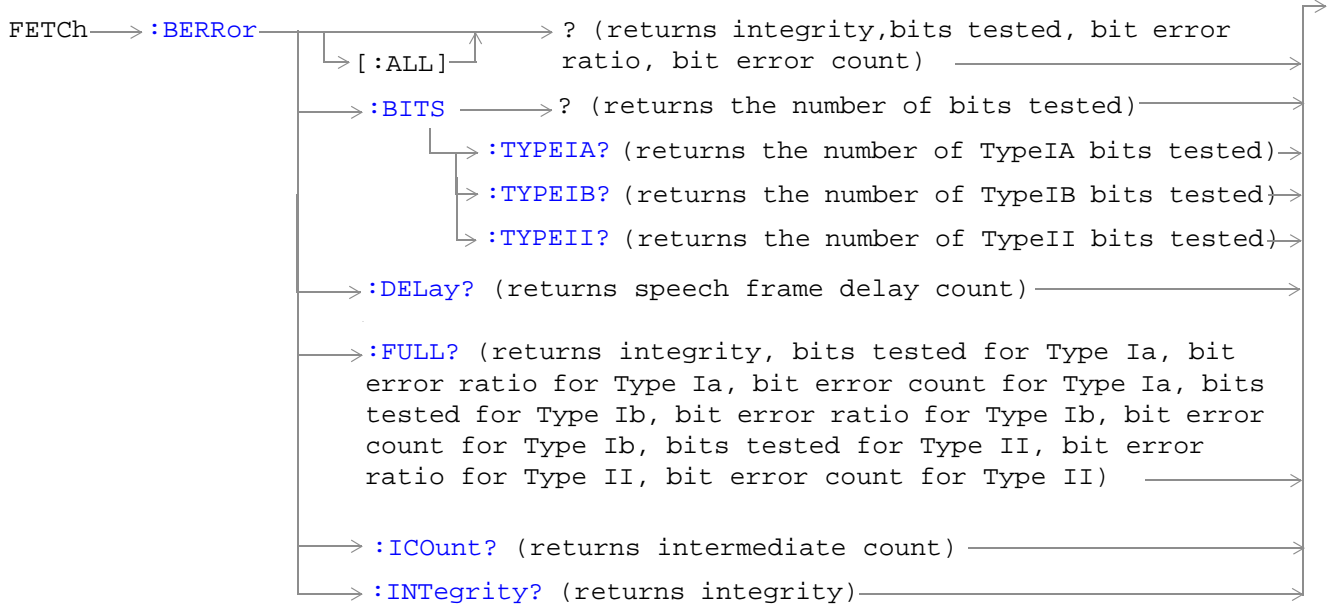
**FETCh:AAUDio:VOLTage:MINimum?**

Function	GSM	Queries the analog audio multi-measurement minimum analog audio voltage The value returned is displayed in the Analog Audio Minimum field, which is displayed when the analog audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		Range: 10 mV <sub>rms</sub> to 20 V <sub>rms</sub> Resolution: 0.1 mV <sub>rms</sub>

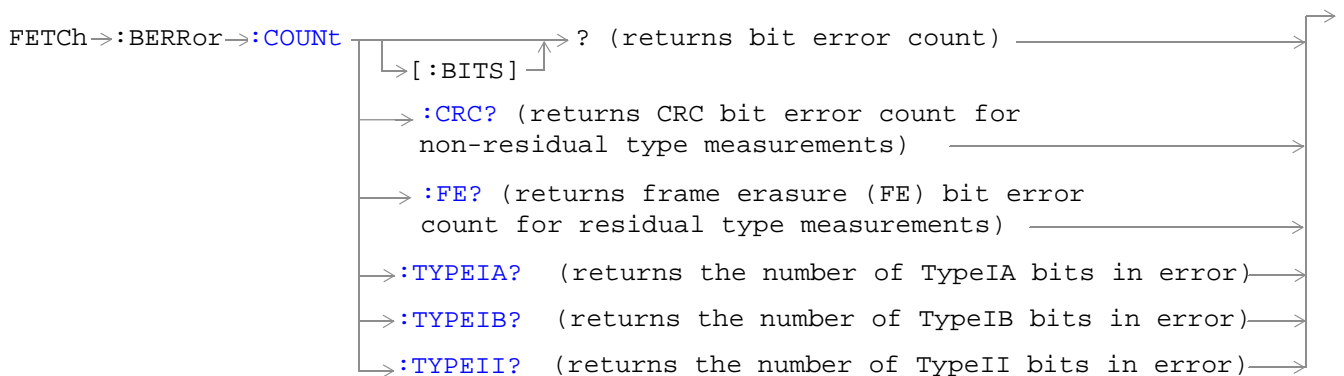
**FETCh:AAUDio:VOLTage:SDEVIation?**

Function	GSM	Queries the analog audio multi-measurement standard deviation. The value returned is displayed in the Analog Audio Std Dev. field, which is displayed when the Analog Audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 V to 14.14214 V Resolution: 0.01 mV



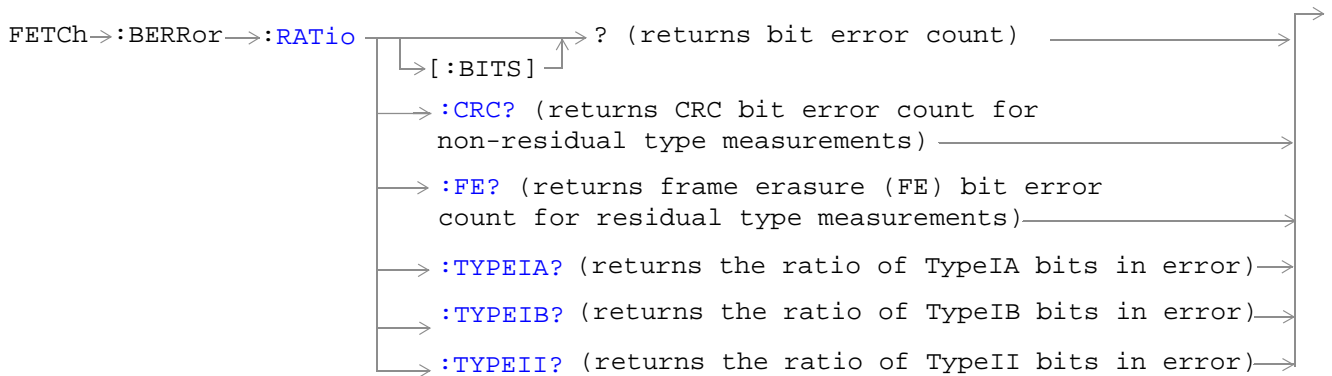
**FETCh:BERRor**

These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

## FETCh:BERRor



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

## 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 390, returns the same results but for all bit types simultaneously.) See "Bit Error Measurement Description" on page 66.
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,131 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 1 to 999,131 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

## FETCh:BERRor:BITS?

Function	GSM	<p>Queries the number of bits actually tested. This query only returns the result of the bit type set using the SETup:BERRor[:TYPE] command.</p> <p>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 66</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,131 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>
*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 <a href="#">“Bit Error Measurement Description” on page 66</a>
	GPRS	This command is not applicable to GPRS.
Query		Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN) Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN) Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN) Resolution: 1

**FETCh:BERRor:COUNt[:BITS]?**

Function	GSM	Queries the number of bits that were in error during the last bit error test. See <a href="#">“Bit Error Measurement Description” on page 66</a> 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) 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 <a href="#">“Bit Error Measurement Description” on page 66</a> The mobile station re-transmits the CRC it received from the test set on the uplink. A bad CRC occurs when the CRC transmitted by the test set does not match what is received back from the mobile station. 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) Resolution: 1

**FETCh:BERRor:COUNt:FE?**

Function	GSM	Queries the number of frames erased during a residual measurement type, looback type A test. 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) 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 <a href="#">“Bit Error Measurement Description” on page 66</a>
	GPRS	This command is not applicable to GPRS.
Query		Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN) Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN) Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN) 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.  This value is displayed in the Speech Frames Delay field.  This value can be determined automatically, or manually set by the user. See <a href="#">“SETup:BERRor:MANual:DELay” on page 473</a> and <a href="#">“SETup:BERRor:LDControl:AUTO” on page 473</a> .  Refer also to the <a href="#">“Bit Error Measurement Description” on page 66</a> 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) Resolution: 1
*RST Setting		Auto

**FETCH:BERRor:FULL?**

Function	GSM	<p>Queries the bit error measurement.</p> <p>Returns Integrity Indicator see “<a href="#">Integrity Indicator</a>” on page 146, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II bits. (A similar query, “<a href="#">FETCH:BERRor[:ALL]?</a>” on page 387, returns the same results but only for the bit type previously set using the <a href="#">SETup:BERRor[:TYPE]</a> command.) See “<a href="#">Bit Error Measurement Description</a>” on page 66</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2,637,369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2,637,369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 15,584,400 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type II Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 1,558,440 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**FETCh:BERRor:ICount?**

Function	GSM	Queries the intermediate count of bits tested (measurement progress report). See <a href="#">“Measurement Progress Report” on page 152</a>
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 999 Resolution: 1

**FETCh:BERRor:INTEGRity?**

Function	GSM	Returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result. See <a href="#">“Integrity Indicator” on page 146</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 16 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 <a href="#">“Bit Error Measurement Description” on page 66</a> 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) Resolution: 0.01

**FEtCh:BErRor:RAtio:CRc?**

Function	GSM	<p>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 <a href="#">“Bit Error Measurement Description” on page 66</a></p> <p>The mobile station re-transmits the CRC it received from the test set on the uplink.</p> <p>A bad CRC occurs when the CRC transmitted by the test set does not match what is received back from the mobile station.</p> <p>The manual user must set the measurement’s unit to %.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 100 and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01</p>

**FEtCh:BErRor:RAtio:FE?**

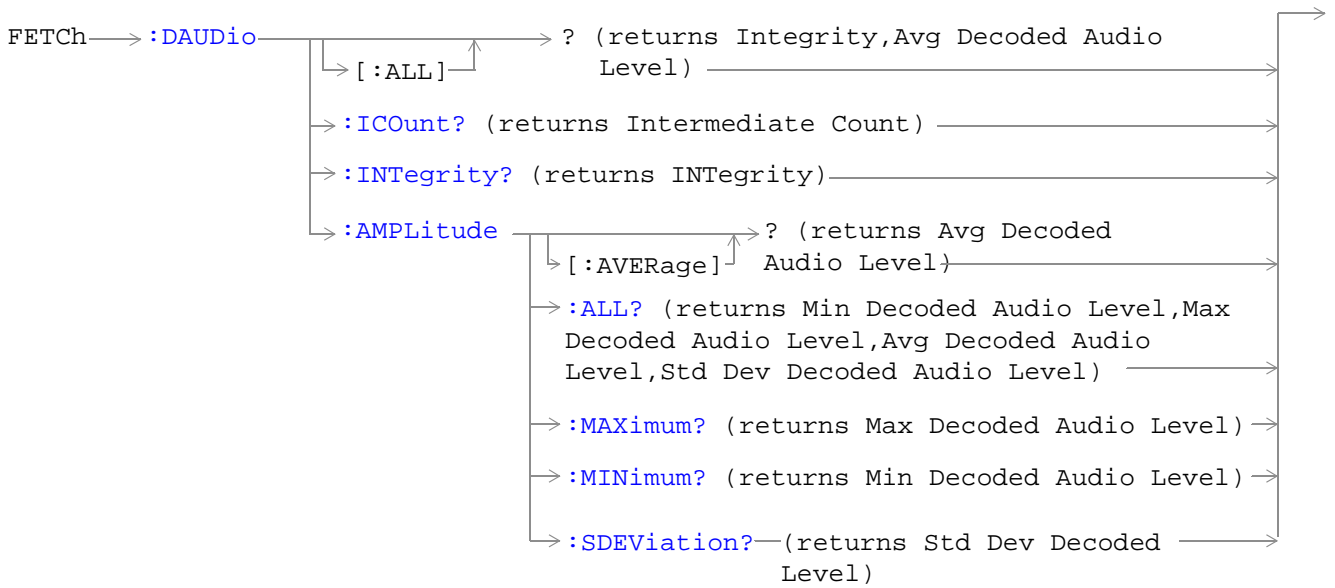
Function	GSM	<p>Queries the ratio of erased frames to the total number of frames received for a residual measurement type, looback type A test and returns them as a percentage. See <a href="#">“Bit Error Measurement Description” on page 66</a></p> <p>The manual user must set the measurement’s unit to %.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 100 and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01</p>

**FEtCh:BErRor:RAtio:TYPEIA|TYPEIB|TYPEII?**

Function	GSM	<p>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 <a href="#">“Bit Error Measurement Description” on page 66</a></p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 100 and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01</p>



## FETCh:DAUDio



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

**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: <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> Decoded audio: <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul>

**FETCH:DAUDio:ICount?**

Function	GSM	Queries the intermediate count of decoded audio multi-measurements completed. This value is not displayed on the test set.
	GPRS	This command is not applicable to GPRS.
Query		Range: 1 to 999 Resolution: 1

**FETCH:DAUDio:INTEGRity?**

Function	GSM	Queries the integrity indicator for the last decoded audio measurement completed. Zero indicates a normal measurement. See <a href="#">“Integrity Indicator” on page 146</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 16 Resolution: 1

**FETCh:DAUDio:AMPLitude[:AVERage]?**

Function	GSM	Queries the average decoded audio result from an uplink speech level measurement in percent full scale.  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% 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.  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		<p>Minimum:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul> <p>Maximum:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul> <p>Average:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul> <p>Standard deviation:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 71%</li> <li>• Resolution: 0.001% FS</li> </ul>

**FETCh:DAUDio:AMPLitude:MAXimum?**

Function	GSM	Queries the decoded audio multi-measurement maximum decoded audio voltage. 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% Resolution: 0.01% FS

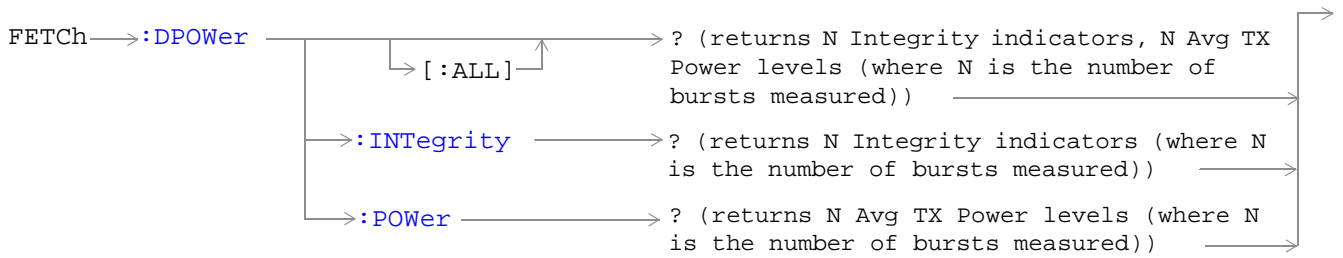
**FETCh:DAUDio:AMPLitude:MINimum?**

Function	GSM	Queries the decoded audio multi-measurement minimum decoded audio voltage 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% Resolution: 0.01% FS

**FETCh:DAUDio:AMPLitude:SDEVIation?**

Function	GSM	Queries the decoded audio multi-measurement standard deviation. 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% Resolution: 0.001% FS

## FETCh:DPOWer



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

**FETCh: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 <a href="#">“SETUp:DPOWer:COUNT:NUMBER” on page 490</a> .
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicators for each individual burst</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Average TX power levels for each individual burst</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dBm</li> </ul>

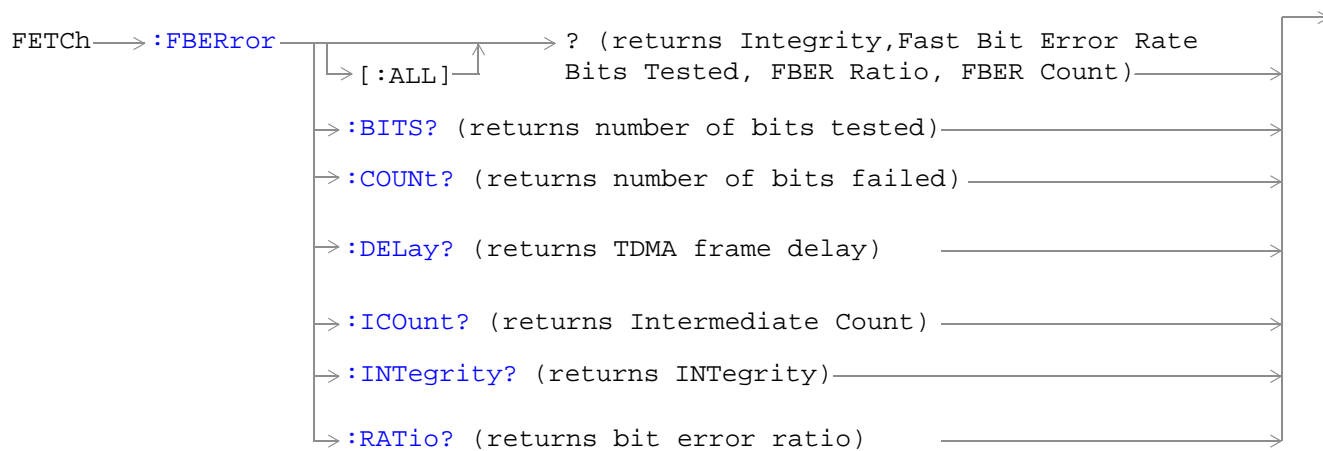
**FETCh:DPOWer:INTegrity?**

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 <a href="#">“SETUp:DPOWer:COUNT:NUMBER” on page 490</a> .
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 16</p> <p>Resolution: 1</p>

**FETCh:DPOWer:POWER?**

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 <a href="#">“SETUp:DPOWer:COUNT:NUMBER” on page 490</a> .
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: -100 to +100 dB and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

## FETCh:FBERror



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

**FEtCh:FBERror[:ALL]?**

Function	GSM	<p>Queries the fast bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Bits tested:</p> <ul style="list-style-type: none"> <li>• Range: 1 to 999,455 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Fast bit error count:</p> <ul style="list-style-type: none"> <li>• Range: 1 to 999,455 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**FEtCh:FBERror:BITS?**

Function	GSM	<p>Queries the total number of information bits tested during the last fast bit error measurement. See <a href="#">“SETup:FBERror:COUNT” on page 479</a></p> <p>This value is not available on the front panel display.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 1 to 999,455 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>



**FETCh:FBERror:COUNt?**

Function	GSM	Queries the number of information bits that were deemed errors during the last fast bit error test. 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) 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.  This value is displayed in the TDMA Frame Delay field.  This value can be determined automatically, or set by the user. See <a href="#">“SETup:FBERror:MANual:DELay” on page 480</a> and <a href="#">“SETup:FBERror:LDControl:AUTO” on page 479</a> for setting this value manually.  Refer also to the <a href="#">“Fast Bit Error Measurement Description” on page 90</a> 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 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

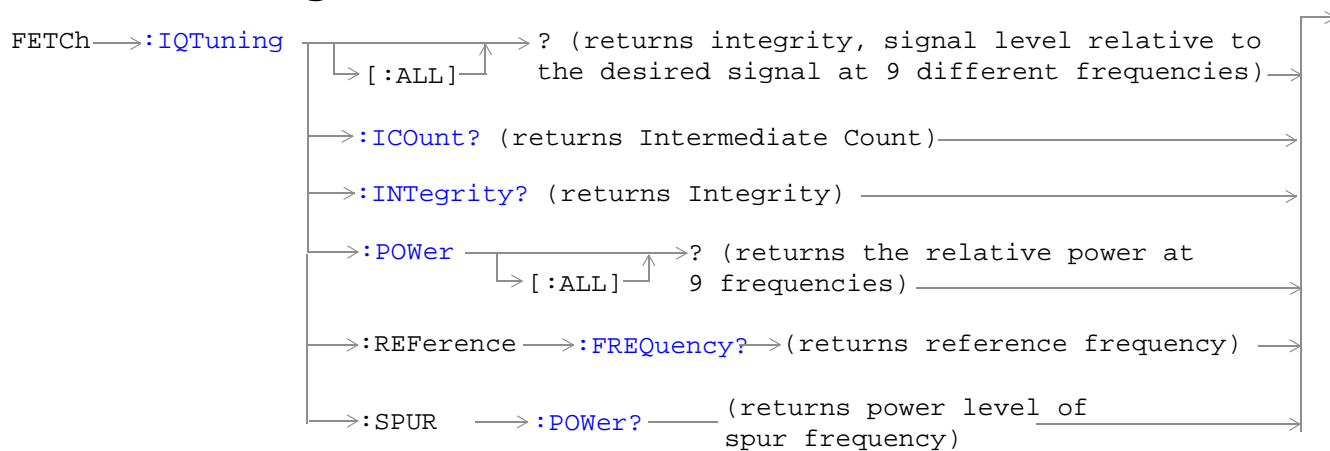
**FETCh:FBERror:INTegrity?**

Function	GSM	Returns the integrity indicator value for the last fast bit error measurement performed. Zero indicates a normal result. See <a href="#">“Integrity Indicator” on page 146</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 16 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 Resolution: 0.01

## FETCh:IQTuning



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

**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		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> <li>• -270.833 kHz</li> <li>• -203.125 kHz</li> <li>• -135.417 kHz</li> <li>• -67.7083 kHz</li> <li>• carrier frequency</li> <li>• +67.7083 kHz</li> <li>• +135.417 kHz</li> <li>• +203.125 kHz</li> <li>• +270.833 kHz</li> </ul> <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**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		<p>Range: 0 to 999</p> <p>Resolution: 1</p>

**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: 0 to 16 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, $\pm 67.7083$ kHz, $\pm 135.417$ kHz, $\pm 203.125$ kHz, $\pm 270.833$ kHz. The spur measurement result is also returned.
	GPRS	This command is not applicable to GPRS.
Query		<p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> <li>• -270.833 kHz</li> <li>• -203.125 kHz</li> <li>• -135.417 kHz</li> <li>• -67.7083 kHz</li> <li>• carrier frequency</li> <li>• +67.7083 kHz</li> <li>• +135.417 kHz</li> <li>• +203.125 kHz</li> <li>• +270.833 kHz</li> </ul> <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

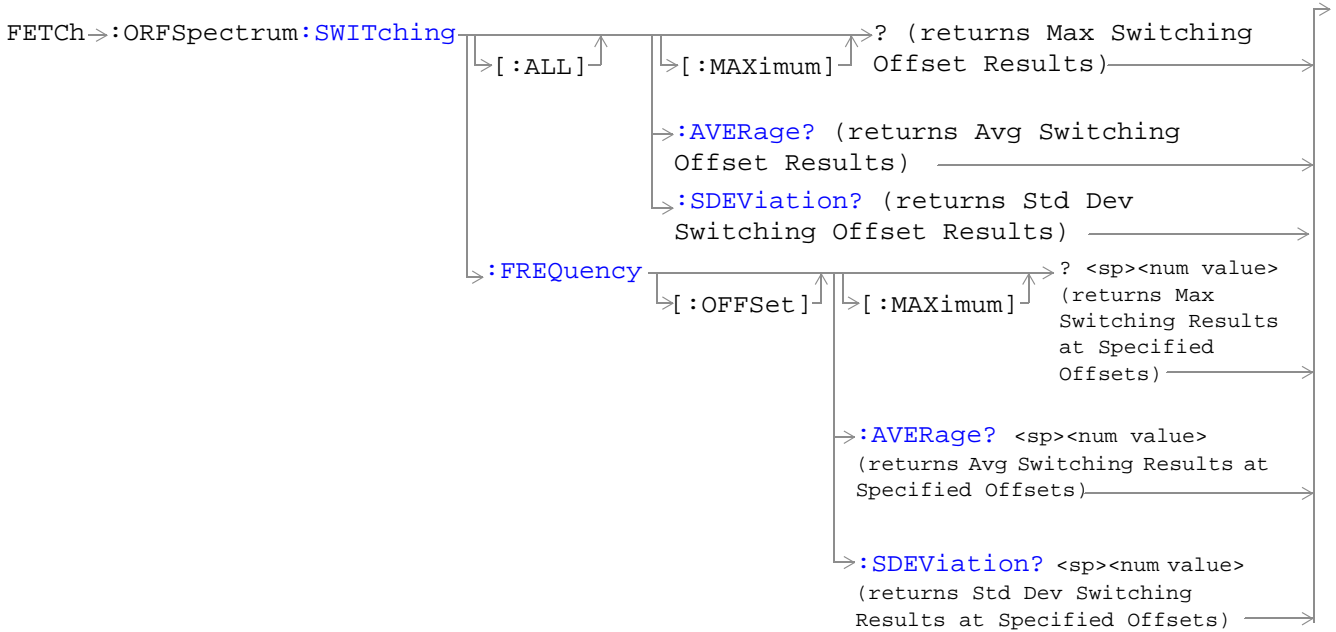
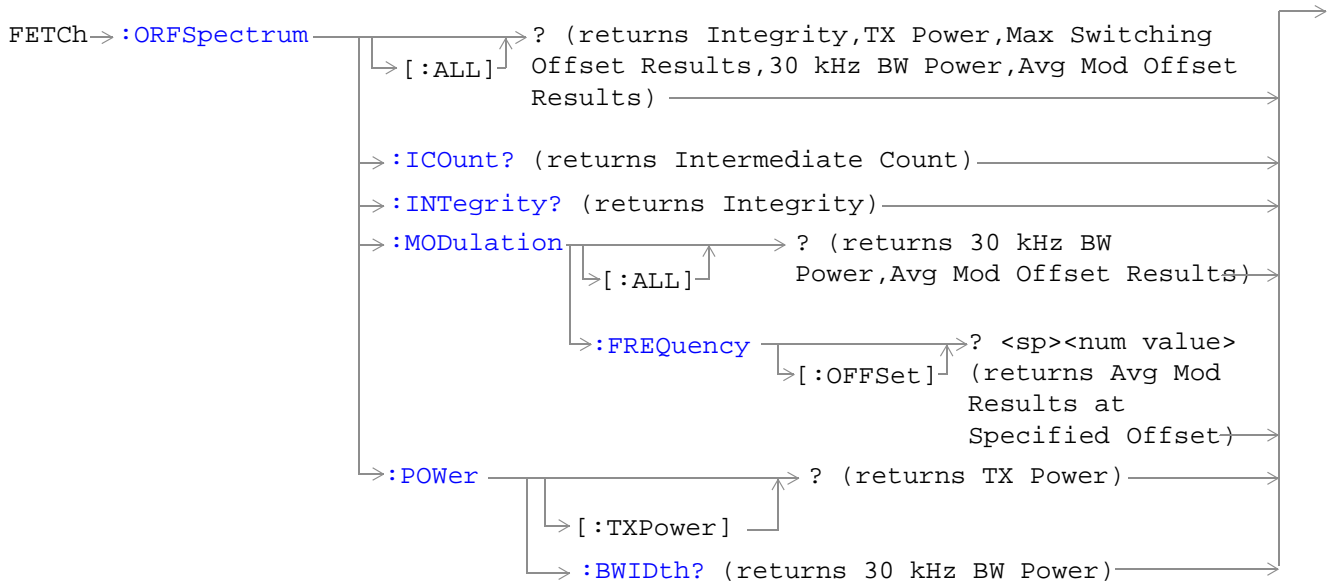
**FETCh:IQTuning:REFeRence:FREQuency?**

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) Resolution: 0.01 dB	

## FETCh:ORFSpectrum



“Diagram Conventions” on page 283

**FETCh:ORFSpectrum[:ALL]?**

Function	GSM	<p>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.</p> <p>The “SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]” 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?” 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.</p> <p>The “SETup:ORFSpectrum:MODulation:FREQUency[:OFFSet]” 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?” 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.</p>
	GPRS	
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>TX Carrier Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF Spectrum Due to Switching (Max)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>30 kHz Bandwidth Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF Spectrum due to Modulation (Average)</p> <ul style="list-style-type: none"> <li>• Range: -200 dB to +100 dB and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:ORFSpectrum:ICount?**

Function	GSM	<p>Queries the intermediate count of ORFS multi-measurements completed. This number will climb to the number returned by “SETup:ORFSpectrum:ICount:MAXimum?” on page 501.</p>
	GPRS	
Query		<p>Range: 0 to 29971</p> <p>Resolution: 1</p>



## FETCh:ORFSpectrum:INTEgrity?

Function	GSM	Queries the integrity indicator for the output RF spectrum analyzer measurement. Zero indicates a normal result.
	GPRS	See <a href="#">“Integrity Indicator” on page 146</a> for descriptions of non-zero integrity indicators.
Query		Range: 0 to 16 Resolution: 1

## FETCh:ORFSpectrum:MODulation[:ALL]?

Function	GSM	Queries TX Carrier Power, 30 kHz BW Power, and up to 22 comma-separated output RF spectrum due to modulation (average) results
	GPRS	The <a href="#">“SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]”</a> command sets up the number of output RF spectrum due to modulation offsets that are turned on and their frequency values. The <a href="#">“SETup:ORFSpectrum:MODulation:FREQuency:POINts?”</a> 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		<p>TX Carrier Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>30 kHz Bandwidth Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF Spectrum due to Modulation (Average)</p> <ul style="list-style-type: none"> <li>• Range: -200 dB to +100 dB and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:ORFSpectrum:MODulation:FREQuency[:OFFSet]?**

Function	GSM	<p>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.</p> <p>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 <a href="#">“SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]”</a> for the command that turns on frequency offsets.)</p> <p>Each frequency value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>
	GPRS	
Query	<p>Range: -200 dB to +100 dB and 9.91 E+37</p> <p>Resolution: 0.01 dB</p>	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCH:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET? 200 KHZ, 400 KHZ" !Returns the ORFS due to modulation (average) measurement !results at the 200 kHz and 400 kHz offsets only, assuming these offsets are turned on.</pre>		

**FETCh:ORFSpectrum:POWer?**

Function	GSM	<p>Returns the TX carrier power measurement result from the last ORFS measurement. This measurement is made using the method described in the <a href="#">“Transmit Power Measurement Description”</a> on page 127.</p>
	GPRS	
Query	<p>Range: -100 dBm to +100 dBm and NAN.</p> <p>Resolution: 0.01 dB</p>	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCH:ORFSPECTRUM:POWER:TXPOWER?" !Returns TX carrier power.</pre>		

**FETCh:ORFSpectrum:POWer:BWIDth?**

Function	GSM	<p>Queries the ORFS 30 kHz bandwidth power measurement. See <a href="#">“Output RF Spectrum Measurement Description”</a> on page 96.</p>
	GPRS	
Query	<p>Range: -100 dBm to +100 dBm and NAN.</p> <p>Resolution: 0.01 dB</p>	

## FETCh:ORFSpectrum:SWITChing[:ALL][:MAXimum]?

Function	GSM	Queries output RF spectrum due to switching (maximum) measurement results at all frequency offsets currently turned on (there can be up to eight).
	GPRS	The "SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]" 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?" 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 Resolution: 0.01 dB
Programming Example		
<pre>OUTPUT 714;"FETCh:ORFSPECTRUM:SWITChing:ALL:MAXIMUM?" !Returns the ORFS due to !switching (maximum) !measurement results at !all frequency offsets !currently turned on.</pre>		

## FETCh:ORFSpectrum:SWITChing[:ALL]:AVERAge?

Function	GSM	Queries output RF spectrum due to switching (average) measurement results at all frequency offsets currently turned on (there can be up to eight).
	GPRS	The "SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]" 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?" 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 Resolution: 0.01 dB
Programming Example		
<pre>OUTPUT 714;"FETCh:ORFSPECTRUM:SWITChing:ALL:AVERAGE?" !Returns the ORFS due to !switching (average) !measurement results at !all frequency offsets !currently turned on.</pre>		

**FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet][:MAXimum]?**

Function	GSM	<p>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.</p> <p>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 <a href="#">"SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]"</a> for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>
	GPRS	
Query	<p>Range: -100 dB to +100 dB and 9.91 E+37</p> <p>Resolution: 0.01 dB</p>	
<p><b>Programming Example</b></p> <pre>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</pre>		

**FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet]:AVERAge?**

Function	GSM	<p>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.</p> <p>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 <a href="#">"SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]"</a> for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>
	GPRS	
Query	<p>Range: -100 dB to +100 dB and 9.91 E+37</p> <p>Resolution: 0.01 dB</p>	
<p><b>Programming Example</b></p> <pre>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.</pre>		

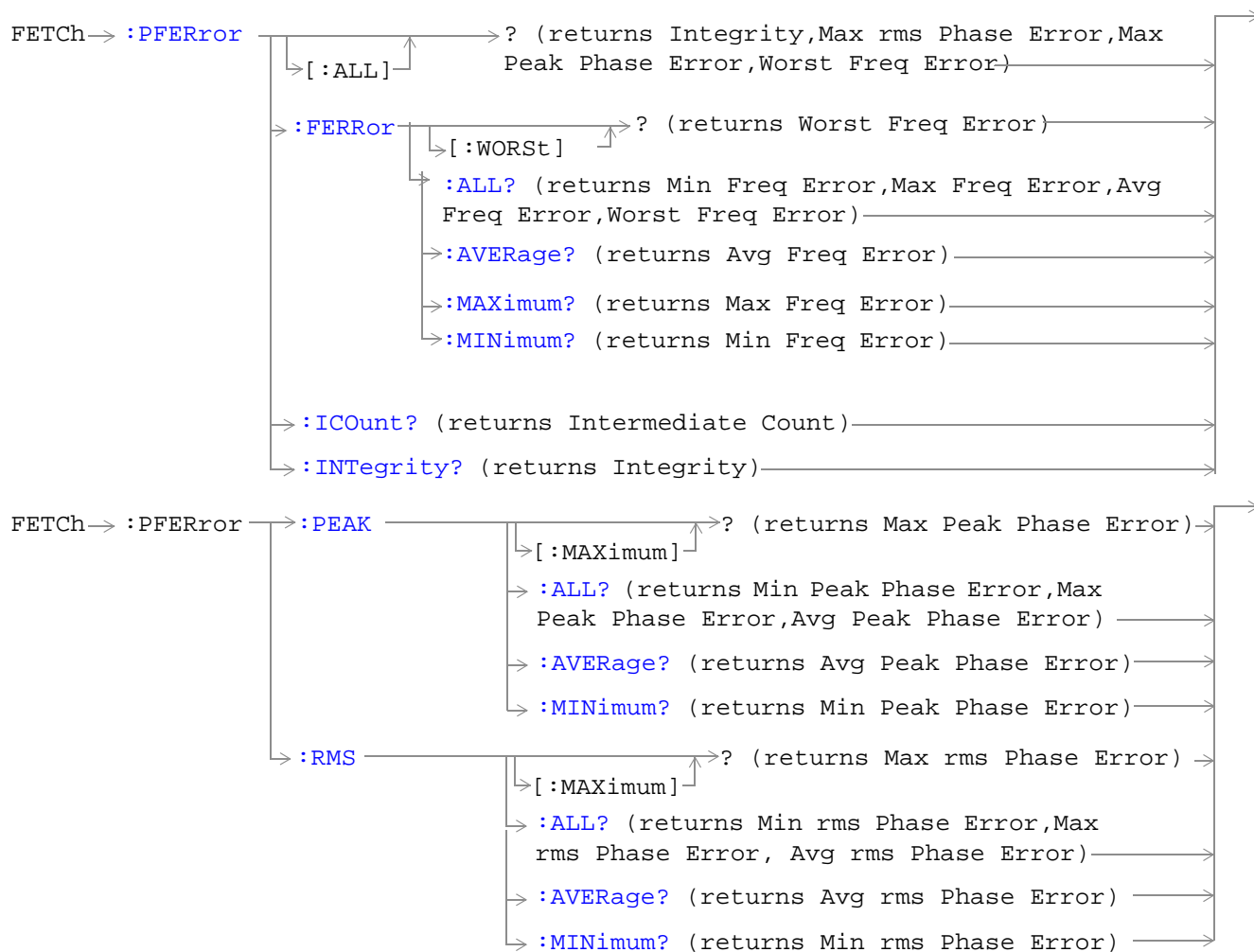
**FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet]:SDEVIation?**

Function	GSM	<p>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.</p> <p>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 <a href="#">"SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]"</a> for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>
	GPRS	
Query	<p>Range: 0 dB to +150 dB and 9.91 E+37</p> <p>Resolution: 0.001 dB</p>	
<p><b>Programming Example</b></p> <pre>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.</pre>		

**FETCh:ORFSpectrum:SWITChing[:ALL]:SDEVIation?**

Function	GSM	<p>Queries output RF spectrum due to switching (standard deviation) measurement results at all frequency offsets currently turned on (there can be up to eight).</p> <p>The <a href="#">"SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]"</a> command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The <a href="#">"SETup:ORFSpectrum:SWITChing:FREQUency:POINts?"</a> 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.</p>
	GPRS	
Query	<p>Range: -100 dBm to +100 dBm and 9.91 E+37</p> <p>Resolution: 0.01 dB</p>	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCh:ORFSpectrum:SWITChing:ALL:SDEVIATION?" !Returns the ORFS due !to switching !(standard !deviation) !measurement !results at all !frequency offsets !currently turned on.</pre>		

## FETCh:PFERror



“Diagram Conventions” on page 283

**FETCh:PFERror[:ALL]?**

Function	GSM	Queries integrity indicator, maximum rms phase error, maximum peak phase error and worst frequency error.
	GPRS	
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Worst Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCH:PFERROR:ALL?" !Returns integrity, maximum rms phase error,                                 !maximum peak phase error and worst                                 !frequency error.</pre>		

**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		<p>Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</p> <p>Resolution: 0.1 kHz</p>

**FETCh:PFERror:FERRor:ALL?**

Function	GSM	Queries minimum, maximum, average, and worst frequency error, in Hz.
	GPRS	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.
Query		<p>Minimum Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul> <p>Maximum Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul> <p>Average Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul> <p>Worst Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCh:PFERror:FERRor:ALL?" !Returns minimum, maximum, average and !worst frequency error results.</pre>		

**FETCh:PFERror:FERRor AVERAge?**

Function	GSM	Queries the single or average (from a multi-measurement) frequency error measurement result, in Hz.
	GPRS	
Query		<p>Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</p> <p>Resolution: 0.1 kHz</p>

**FETCh:PFERror:FERRor: MAXimum?**

Function	GSM	Queries the maximum (from a multi-measurement) frequency error measurement result, in Hz.
	GPRS	
Query		<p>Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</p> <p>Resolution: 0.1 kHz</p>



**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) 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 <a href="#">“SETup:PFERror:COUNT:NUMBer”</a> on page 510.
	GPRS	
Query		Range: 0 to 999 Resolution: 1

**FETCh:PFERror:INTegrity?**

Function	GSM	Queries the integrity indicator for the phase and frequency error measurement. Zero indicates a normal result. See <a href="#">“Integrity Indicator”</a> on page 146 for descriptions of non-zero integrity indicators.
	GPRS	
Query		Range: 0 to 16 Resolution: 1

**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) Resolution: 0.01 degrees

**FETCH:PFERror:PEAK:ALL?**

Function	GSM	Queries the minimum, maximum, and average peak phase error measurement result, in degrees.
	GPRS	
Query		<p>Minimum Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Average Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul>
<p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PFERror:PEAK:ALL?" !Returns minimum, maximum, and average peak phase error results.</pre>		

**FETCH:PFERror:PEAK:AVERAge?**

Function	GSM	Queries the single or average (from a multi-measurement) peak phase error measurement result, in degrees.
	GPRS	
Query		<p>Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 degrees</p>

**FETCH:PFERror:PEAK:MINImun?**

Function	GSM	Queries the minimum (from a multi-measurement) peak phase error measurement result, in degrees.
	GPRS	
Query		<p>Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 degrees</p>

**FETCh:PFERror:rms[:MAXimum]?**

Function	GSM	Queries the Maximum (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) Resolution: 0.01 degrees	
Programming Example		
OUTPUT 714;"FETCh:PFERror:rms:MAXimum?" !Returns the maximum rms phase error.		

**FETCh:PFERror:rms:ALL?**

Function	GSM	Queries the minimum, maximum, and average rms phase error measurement result, in degrees.
	GPRS	
Query	<p>Minimum rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Average rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul>	
Programming Example		
OUTPUT 714;"FETCh:PFERror:rms:ALL?" !Returns minimum, maximum, and average !rms phase error.		

**FETCh:PFERror:rms:AVERage?**

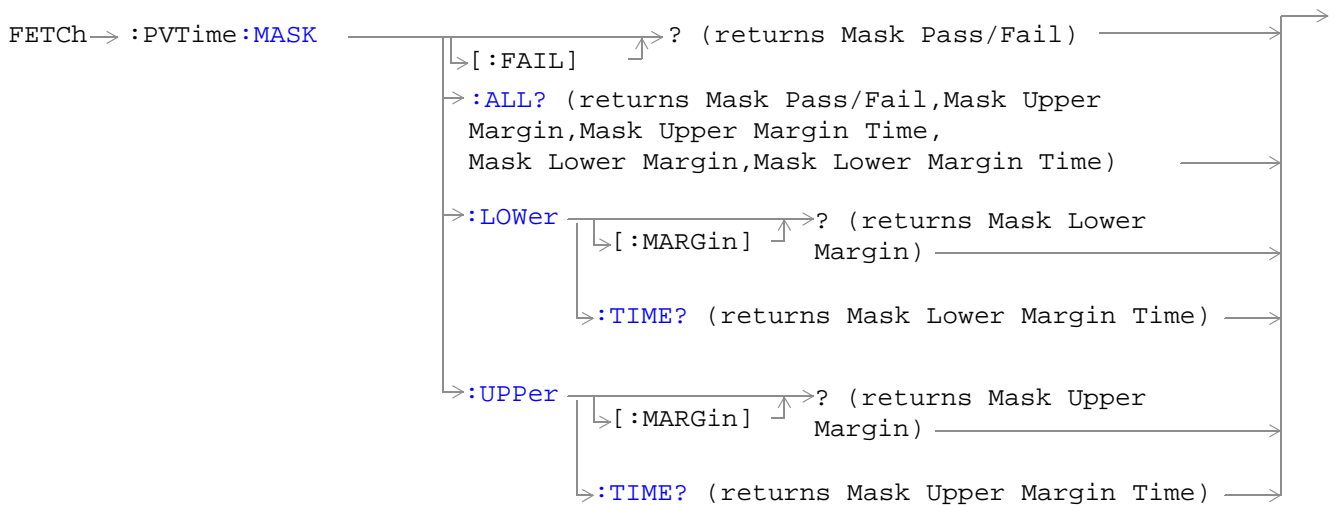
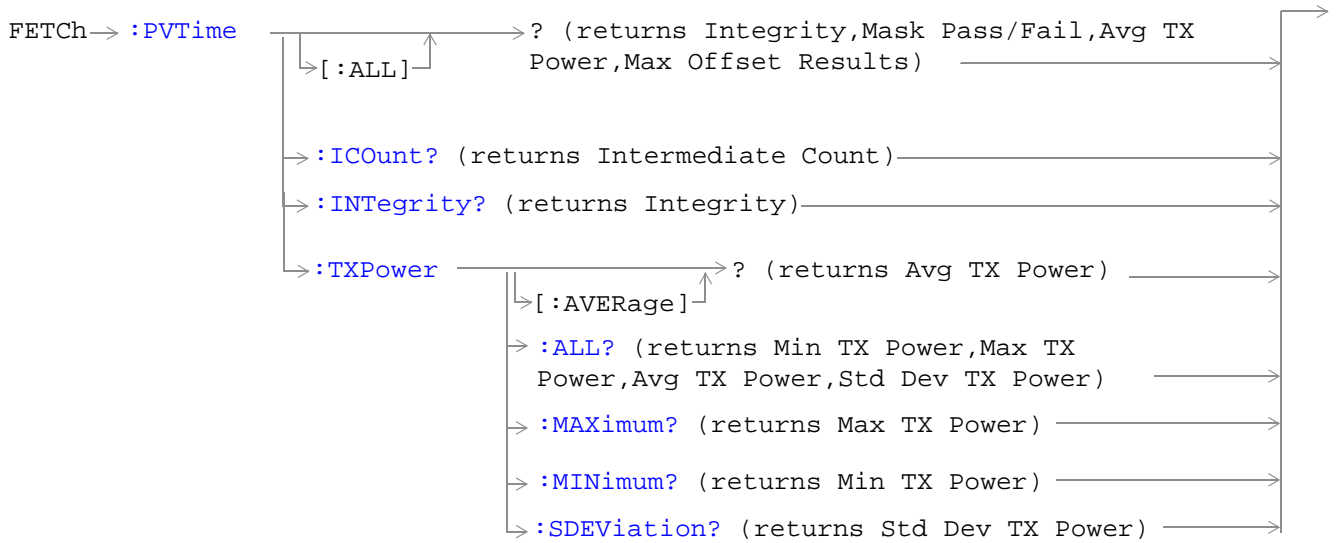
Function	GSM	Queries the single or average (from a multi-measurement) rms phase error measurement result, in degrees.
	GPRS	
Query	Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees	

FETCh:PFERror

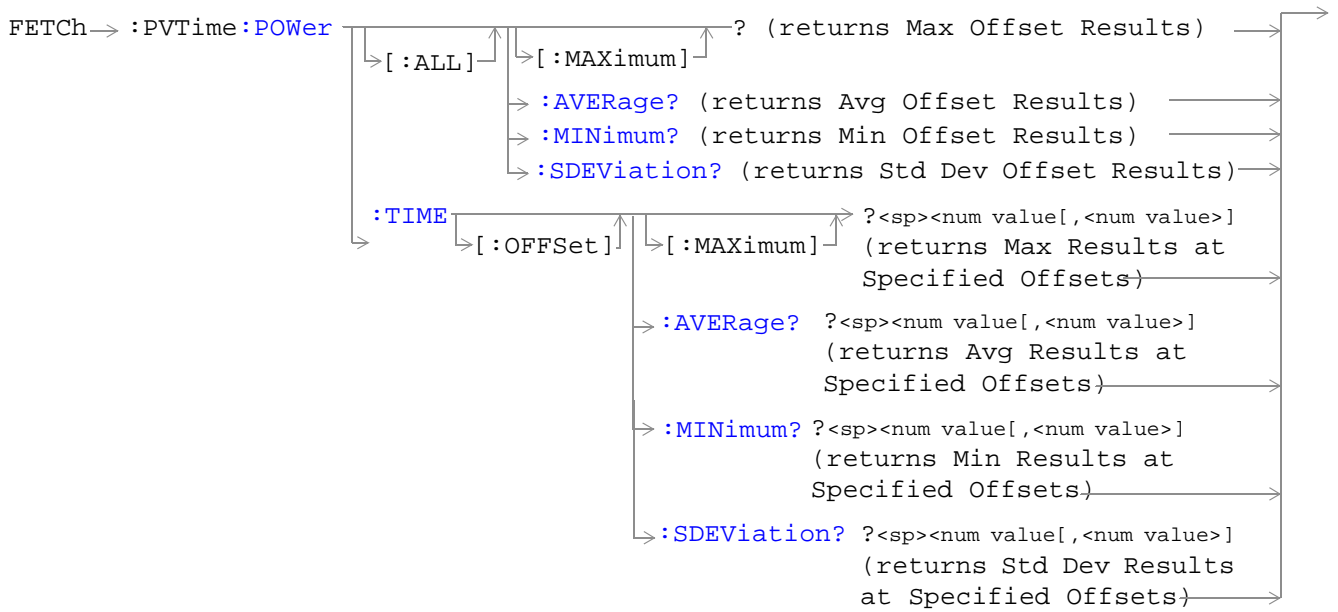
**FETCh:PFERror:rms:MINimum?**

Function	GSM	Queries the minimum (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) Resolution: 0.01 degrees

## FETCh:PVTime



## FETCh:PVTime



“Diagram Conventions” on page 283

## 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.  The number of PvT measurement offsets that will be returned can be queried using the “SETup:PVTime:TIME:POINts?” on page 517. The time offsets are set up using the command “SETup:PVTime:TIME[:OFFSet]” on page 516.
	GPRS	
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)</li> </ul> <p>Power versus time TX carrier power</p> <ul style="list-style-type: none"> <li>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time power (maximum)</p> <ul style="list-style-type: none"> <li>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**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	
Query		<p>Power versus time carrier power (average)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (minimum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (maximum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (standard deviation)</p> <ul style="list-style-type: none"> <li>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul>

**FETCH:PVTime:TXPower:MINimum?**

Function	GSM	Queries power versus time carrier power (minimum).
	GPRS	
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCH:PVTime:TXPower:MAXimum?**

Function	GSM	Queries power versus time carrier power (maximum).
	GPRS	
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>



**FETCh:PVTime:TXPower[:AVERage]?**

Function	GSM	Queries power versus time carrier power (average).
	GPRS	
Query		Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB

**FETCh:PVTime:TXPower:SDEVIation?**

Function	GSM	Queries power versus time carrier power (standard deviation).
	GPRS	
Query		Range: 0 dB to 100 dB and 9.91 E+37 (9.91 E+37 (NAN)) Resolution: 0.001 dB

**FETCH:PVTime:MASK:ALL?**

Function	GSM	<p>Queries the power versus time measurement mask pass/fail indicator and the following worst case margins:</p> <ul style="list-style-type: none"> <li>• Upper limit margin time</li> <li>• Upper limit margin result</li> <li>• Lower limit margin time</li> <li>• Lower limit margin result</li> </ul> <p>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 <a href="#">“Typical GSM/GPRS PvT Measurement” on page 112</a>.</p> <p>Margin result is the difference between the measured power and the power level boundary specified by the power versus time mask. See the <a href="#">“Typical GSM/GPRS PvT Measurement” on page 112</a>.</p>
	GPRS	
Query		<p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)</li> </ul> <p>Power versus time upper limit margin time worst case result</p> <ul style="list-style-type: none"> <li>• Range: -50 μs to 593 μs and 9.91 E+37 (NAN)</li> <li>• Resolution: 1 ns</li> </ul> <p>Power versus time upper limit margin worst case result:</p> <ul style="list-style-type: none"> <li>• Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time lower limit margin time worst case result</p> <ul style="list-style-type: none"> <li>• Range: -50 μs to 593 μs and 9.91 E+37 (NAN)</li> <li>• Resolution: 1 ns</li> </ul> <p>Power versus time lower limit margin worst case result</p> <ul style="list-style-type: none"> <li>• Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**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:UPPer[:MARGin]?**

Function	GSM	Queries the power versus time measurement upper limit margin worst case result.
	GPRS	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 <a href="#">“Typical GSM/GPRS PvT Measurement” on page 112.</a>
Query		Range: –100 dB to 0 dB and 9.91 E+37 (NAN) 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.
	GPRS	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 <a href="#">“Typical GSM/GPRS PvT Measurement” on page 112.</a>
Query		Range: –50 $\mu$ s to 593 $\mu$ s and 9.91 E+37 (NAN) Resolution: 1 ns

**FETCh:PVTime:MASK:LOWer[:MARGin]?**

Function	GSM	Queries the power versus time measurement’s lower limit margin, worst case result.
	GPRS	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 <a href="#">“Typical GSM/GPRS PvT Measurement” on page 112.</a>
Query		Range: –100 dB to 0 dB and 9.91 E+37 (NAN) 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.
	GPRS	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 <a href="#">“Typical GSM/GPRS PvT Measurement” on page 112.</a>
Query		Range: –50 $\mu$ s to 593 $\mu$ s and 9.91 E+37 (NAN) Resolution: 1 ns

**FETCh:PVTime:POWer[:ALL]:MINimum?**

Function	GSM	<p>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.</p> <p>The “SETup:PVTime:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime:TIME:POINts?” queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p>
	GPRS	
Query	<p>Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>	

**FETCh:PVTime:POWer[:ALL][:MAXimum]?**

Function	GSM	<p>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.</p> <p>The “SETup:PVTime:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime:TIME:POINts?” queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p>
	GPRS	
Query	<p>Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>	

**FETCh:PVTime:POWer[:ALL]:AVERage?**

Function	GSM	<p>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.</p> <p>The “SETup:PVTime:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime:TIME:POINts?” queries the number of offset points that are turned on, indicating the number of values to expect when you send this command.</p>
	GPRS	
Query	<p>Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>	

**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.
	GPRS	The "SETup:PVTime:TIME[:OFFSet]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime:TIME:POINts?" 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) 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).  Power levels are relative to the power versus time carrier power measurement.  The "SETup:PVTime:TIME[:OFFSet]" 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	
Query		Power levels: <ul style="list-style-type: none"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> Time offsets: <ul style="list-style-type: none"> <li>• 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).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet]" query.</li> </ul>
<b>Programming Example</b>  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 GPRS	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).  Power levels are relative to the power versus time carrier power measurement.  The “SETup:PVTime:TIME[:OFFSet]” 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: <ul style="list-style-type: none"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> </ul> Resolution: 0.01 dB  Time offsets: <ul style="list-style-type: none"> <li>• 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).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query.</li> </ul>	
<p><b>Programming Example</b></p> <pre> 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.                     </pre>		

**FETCh:PVTime:POWer:TIME[:OFFSet]:AVERage?**

Function	GSM GPRS	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). Power levels are relative to the power versus time carrier power measurement. The <b>“SETup:PVTime:TIME[:OFFSet]”</b> 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: <ul style="list-style-type: none"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> </ul> Resolution: 0.01 dB Time offsets: <ul style="list-style-type: none"> <li>• 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).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the <b>“SETup:PVTime:TIME[:OFFSet]”</b> query.</li> </ul>	
<p><b>Programming Example</b></p> <pre>                 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.             </pre>		

**FETCh:PVTime:POWer:TIME[:OFFSet]:SDEVIation?**

Function	GSM	<p>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).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The <b>"SETup:PVTime:TIME[:OFFSet]"</b> 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.</p>
	GPRS	
Query		<p>Power levels:</p> <ul style="list-style-type: none"> <li>• Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the <b>"SETup:PVTime:TIME[:OFFSet]"</b> query.</li> </ul>
<p><b>Programming Example</b></p> <pre>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.</pre>		

**FETCh:PVTime:ICount?**

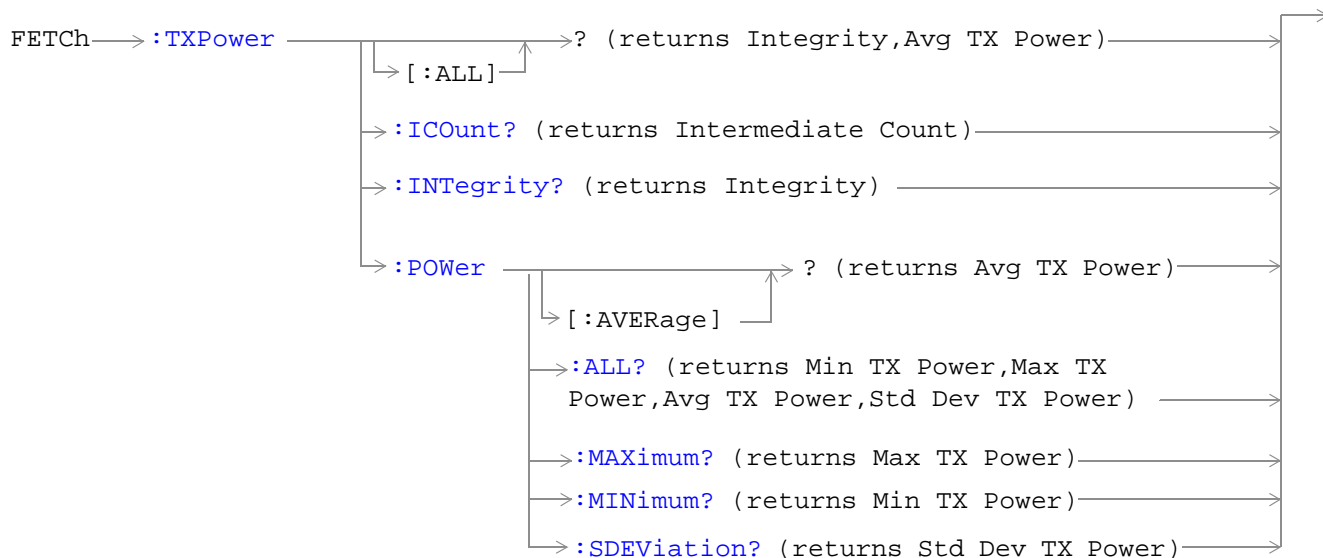
Function	GSM	<p>Queries the intermediate count of power versus time multi-measurements completed.</p>
	GPRS	
Query		<p>Range: 0 to 999</p> <p>Resolution: 1</p>

**FETCh:PVTime:INTegrity?**

Function	GSM	<p>Queries the integrity indicator for the power versus time measurement. Zero indicates a normal result.</p> <p>See <b>"Integrity Indicator"</b> on page 146 for descriptions of non-zero integrity indicators.</p>
	GPRS	
Query		<p>Range: 0 to 16</p> <p>Resolution: 1</p>



## FETCh:TXPower



“Diagram Conventions” on page 283

**FETCh:TXPower[:ALL]?**

Function	GSM	Queries integrity indicator and average transmit power.
	GPRS	A value of zero for the integrity indicator is normal. See <a href="#">“Integrity Indicator” on page 146</a> for non-zero integrity indicators.
Query		Integrity: <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> Transmit power: <ul style="list-style-type: none"> <li>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:TXPower:ICount?**

Function	GSM	Queries the intermediate count of transmit power measurements completed.
	GPRS	
Query		Range: 1 to 999 Resolution: 1

**FETCh:TXPower:INTEgrity?**

Function	GSM	Queries the integrity indicator. Zero indicates normal.
	GPRS	For non-zero integrity indicators, refer to <a href="#">“Integrity Indicator” on page 146</a> .
Query		Range: 0 to 16 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) Resolution: 0.01 dB

**FETCh:TXPower:POWer:ALL?**

Function	GSM	Queries average, minimum, maximum and standard deviation of transmit power multi-measurement results.
	GPRS	
Query		<p>Average:</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Minimum:</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Maximum:</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Standard deviation:</p> <ul style="list-style-type: none"> <li>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul>

**FETCh:TXPower:POWer:MAXimum?**

Function	GSM	Queries maximum transmit power results from a multi-measurement.
	GPRS	
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCh:TXPower:MINimum?**

Function	GSM	Queries minimum transmit power results from a multi-measurement.
	GPRS	
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCh:TXPower:SDEVIation?**

Function	GSM	Queries the standard deviation from a transmit power multi-measurement.
	GPRS	
Query		<p>Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</p> <p>Resolution: 0.001 dB</p>

---

# INITiate Subsystem

## Syntax Diagrams and Command Descriptions

[“INITiate” on page 438](#)

### 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 153](#).

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 170](#).

---

**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.**

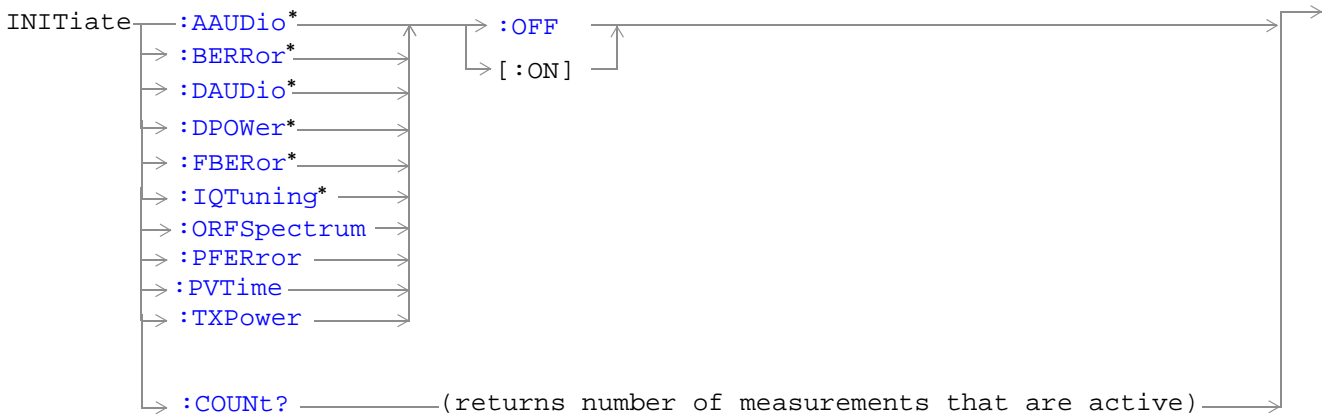
```
OUTPUT 714;"CALL:TCH:SEQ 65"
```

!Hands over traffic channel to channel 65, waits for process to complete before accepting next command

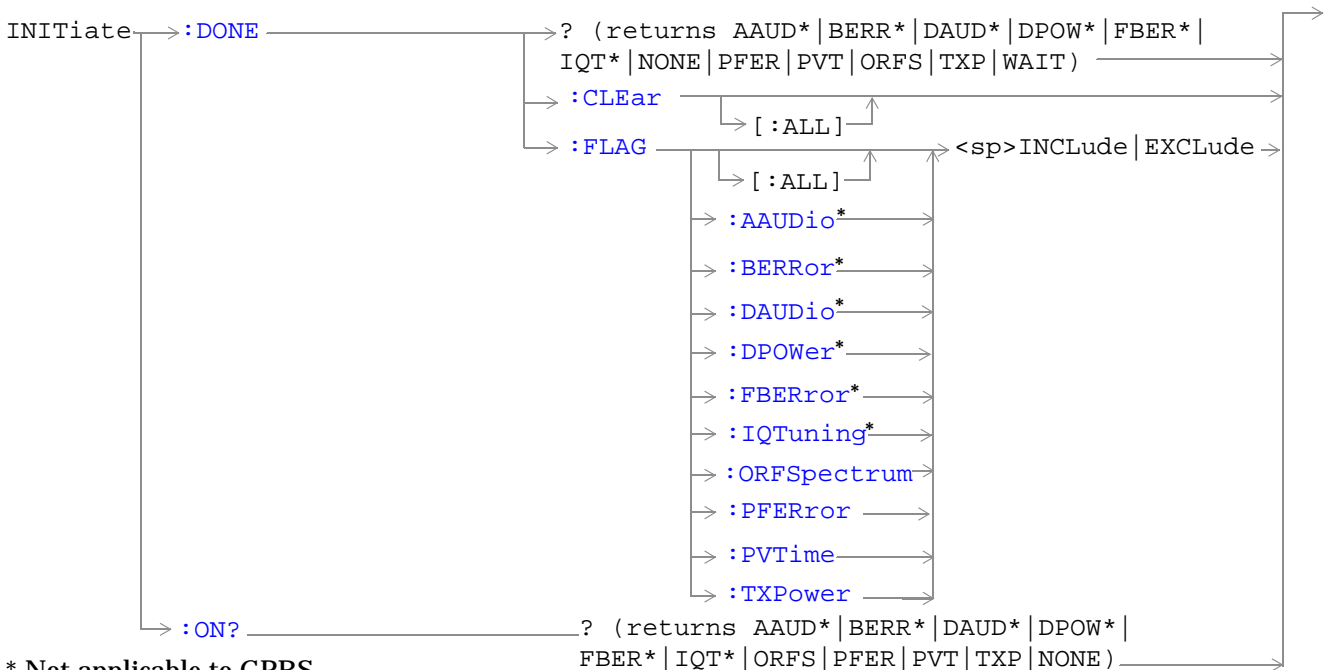
```
OUTPUT 714;"INITiate:TXPower"
```

!Initiates TX power measurement

# INITiate



\* Not applicable to GPRS.



\* Not applicable to GPRS.

“Diagram Conventions” on page 283

**INITiate:<measurement mnemonic>[:ON]**

Function	GSM	Starts measurements with the test set.
	GPRS	The INITiate command is associated with the SETup command, and the FETCh? command, see <a href="#">“SETup Subsystem” on page 462</a> and <a href="#">“FETCh? Subsystem” on page 380</a> .  One or more measurements may be initiated on the same program line. See <a href="#">“Concurrent Measurements” on page 143</a> .  This command is also used to activate a measurement. See <a href="#">“INITiate Programming Examples (how INIT commands are used)” on page 436</a> .

**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 <a href="#">“Measurement States” on page 170</a> .
	GPRS	Only one measurement can be deactivated at a time, to stop one or more measurements and leave them in the active state, see <a href="#">“ABORT” on page 286</a> .

**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 <a href="#">“Measurement States” on page 170</a> .
	GPRS	
Query		Range: 0 to 10 Resolution: 1

**INITiate:DONE?**

Function	GSM	Queries (one at a time) which measurements if any are available or have timed out.  See <a href="#">“Measurement Event Synchronization” on page 153</a> for how to use this command.  See <a href="#">“Measurement States” on page 170</a> to understand the test set’s measurement states.  See <a href="#">“INITiate:DONE:FLAG&lt;measurement mnemonic&gt;” on page 441</a> for include or exclude commands.
	GPRS	
Query	GSM	Range: NONE   TXP   PVT   PFER   ORFS   AAUD   DAUD   DPOW   FBER   BERR   IQT   WAIT
	GPRS	Range: NONE   TXP   PVT   PFER   ORFS   WAIT

## INITiate

### INITiate:DONE:CLEAr

Function	GSM	Clears the done flag from all measurements. See <a href="#">“INITiate:DONE?” on page 439</a> .
	GPRS	
Programming Example		
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.  If a measurements trigger arm, see <a href="#">“Trigger Arm (Single or Continuous) Description” on page 171</a> , has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see <a href="#">“INITiate:DONE?” on page 153</a> . 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.  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 <a href="#">“Preset Descriptions” on page 640</a> .
	GPRS	
Setting	Range	<ul style="list-style-type: none"><li>• INCLude: include all measurements</li><li>• EXCLude: exclude all measurements</li></ul>
Programming Example		
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	Specifies which measurements are considered, (included or excluded) when the DONE? query is sent.
	GPRS	<p>If a measurements trigger arm, see <a href="#">“Trigger Arm (Single or Continuous) Description” on page 171</a>, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see <a href="#">“INITiate:DONE?” on page 153</a>. 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.</p> <p>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 <a href="#">“Preset Descriptions” on page 640</a>.</p>
Setting	GSM	<p>Range</p> <ul style="list-style-type: none"> <li>INCLude           <ul style="list-style-type: none"> <li>:AAUDio   :BERRor   :DAUDio   :DPOWer   :FBERRor   :IQTuning   :ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> <li>EXCLude           <ul style="list-style-type: none"> <li>:AAUDio   :BERRor   :DAUDio   :DPOWer   :FBERRor   :IQTuning   :ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> </ul>
	GPRS	<p>Range</p> <ul style="list-style-type: none"> <li>INCLude           <ul style="list-style-type: none"> <li>:ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> <li>EXCLude           <ul style="list-style-type: none"> <li>:ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> </ul>
Related Topics		<a href="#">“INITiate:DONE?”</a> .
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"INITIATE:DONE:FLAG:AAUDIO EXCLUDE" !excludes AAUDIO measurements !from contributing the !INITIATE:DONE? query.</pre>		

**INITiate:ON?**

Function	GSM	Queries the names of the measurements (none, one, or more than one) that are ON in a comma separated list of measurement mnemonics. See <a href="#">“INITiate:&lt;measurement mnemonic&gt;[:ON]” on page 439</a> .
	GPRS	
Query		Range: ORFS   PFER   PVT   TXP   NONE

## 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.

---

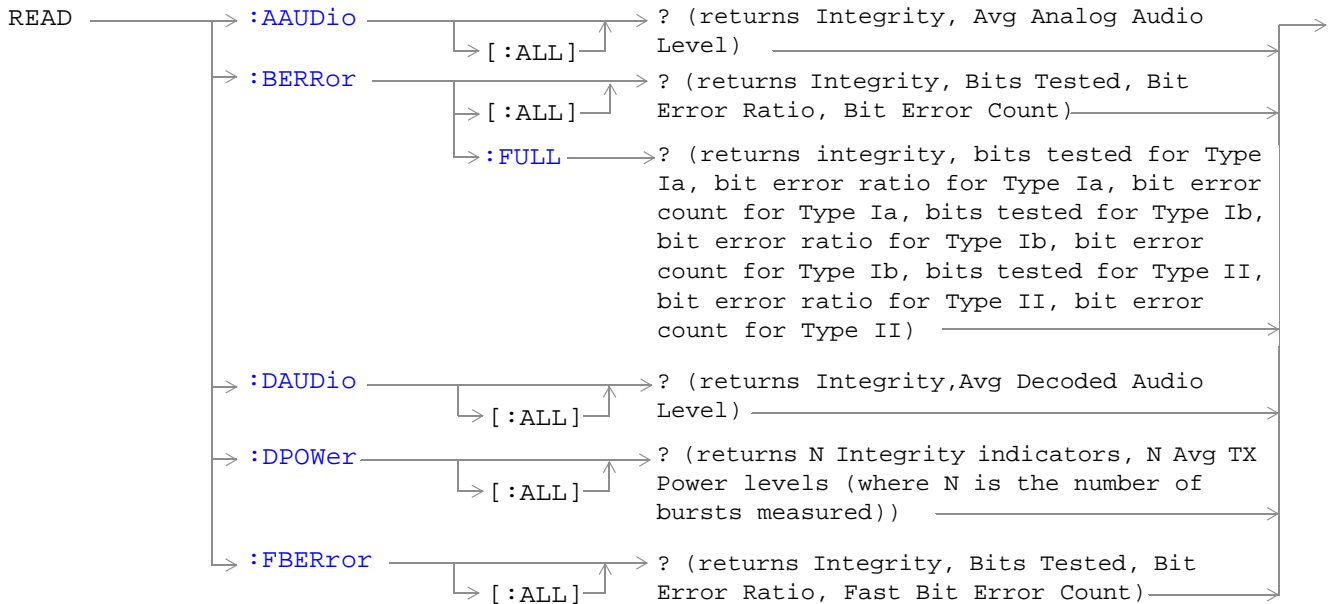
**NOTE**      Trigger arming for each measurement is controlled in the SETUp subsystem. Best practice during remote operation is to set trigger arm to single (Continuous Off).

---

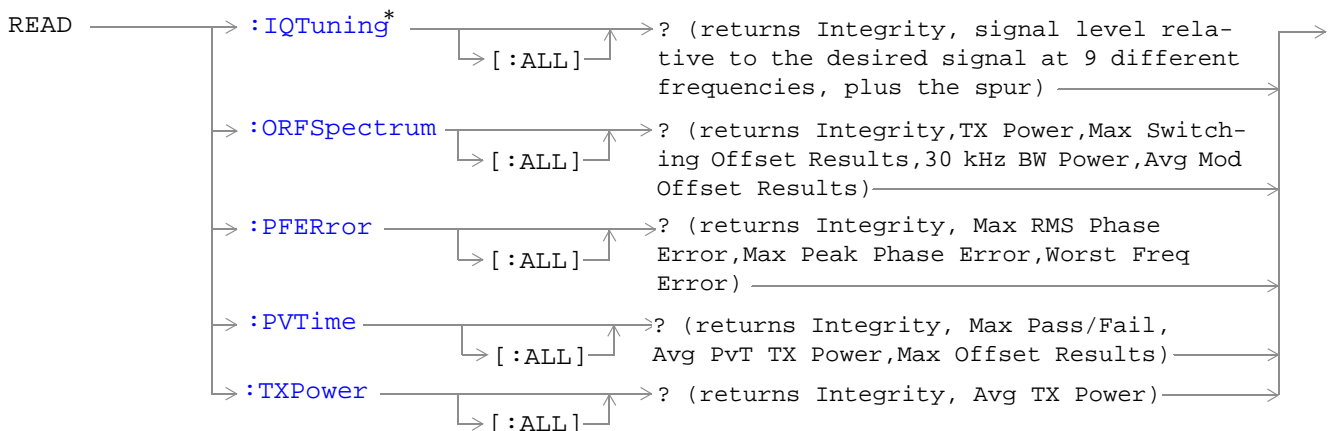
### Programming Example

```
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 integrity indicator and
                                       !TX carrier power measurement into
                                       !controlling application.
```

## READ



These commands are not applicable to GPRS.



\* Not applicable to GPRS.

“Diagram Conventions” on page 283

**READ:AAUDio[:ALL]?**

Function	GSM	Queries (initiates and fetches) one analog audio measurement as a sequential operation. Returns Integrity Indicator, see <a href="#">“Integrity Indicator” on page 146</a> and analog audio (average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:AAUDio” on page 381</a> .
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Analog audio (average)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 20 volts</li> <li>• Resolution: 0.1mv</li> </ul>

**READ:BERRor[:ALL]?**

Function	GSM	Queries (initiates and fetches) one RX bit error measurement as a sequential operation. Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 146</a> , Bits Tested, Bit Error Ratio and Bit Error Count for the bit type set using the SETUp:BERRor[:TYPE] command. (A similar query, <a href="#">“READ:BERRor:FULL?” on page 445</a> , returns the same results but for all bit types simultaneously.) The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:BERRor” on page 385</a> .
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to (&lt;RX bits to test +131) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to (&lt;RX bits to test +131) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**READ:BERRor:FULL?**

Function	GSM	<p>Queries (initiates and fetches) one RX bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator, see <a href="#">“Integrity Indicator” on page 146</a>, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II. (A similar query, <a href="#">“READ:BERRor[:ALL]?” on page 444</a>, returns the same results but only for the bit type previously set using the <code>SETup:BERRor[:TYPE]</code> command.) The <code>FETCh</code> command should be used to obtain other measurement results. See <a href="#">“FETCh:BERRor” on page 385</a>.</p>
	GPRS	This command is not applicable to GPRS.

<p>Query</p>	<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2637369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2637369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 15584400 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type II Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 1558440 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>
--------------	---

**READ:DAUDio[:ALL]?**

Function	GSM	Queries (initiates and fetches) one decoded audio (uplink speech level) measurement as a sequential operation.  Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 146</a> and decoded audio (average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:DAUDio” on page 393</a> .
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicator <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> Decoded audio (average) <ul style="list-style-type: none"> <li>• Range: 0 to 100% FS (full scale)</li> <li>• Resolution: 0.01% FS</li> </ul>

**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 <a href="#">“SETup:DPOWer:COUNT:NUMBer” on page 490</a> .
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicators for each individual burst <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> Average TX power levels for each individual burst <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dBm</li> </ul>

READ

READ:FBError[:ALL]?

Function	GSM	<p>Queries (initiates and fetches) one fast bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 146</a>, Bits Tested, Bit Error Ratio, and Fast Bit Error Count using mobile station burst-by-burst loopback (type C loopback). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:FBError” on page 399</a>.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Fast bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>



**READ:IQTuning[:ALL]?**

Function	GSM	<p>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, <math>\pm 67.7083</math> kHz, <math>\pm 135.417</math> kHz, <math>\pm 203.125</math> kHz, <math>\pm 270.833</math> kHz. The spur measurement result is also returned.</p> <p>The FETCh command should be used to return other measurement results. See <a href="#">“FETCh:IQTuning” on page 403</a>.</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> <li>• -270.833 kHz</li> <li>• -203.125 kHz</li> <li>• -135.417 kHz</li> <li>• -67.7083 kHz</li> <li>• carrier frequency</li> <li>• +67.7083 kHz</li> <li>• +135.417 kHz</li> <li>• +203.125 kHz</li> <li>• +270.833 kHz</li> </ul> <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

READ

READ:ORFSpectrum[:ALL]?

Function	GSM	Queries (initiates and fetches) one output RF spectrum measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see “ <a href="#">Integrity Indicator</a> ” on page 146, 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 “ <a href="#">FETCh:ORFSpectrum</a> ” on page 407.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>TX power</p> <ul style="list-style-type: none"> <li>• Range: –100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RFspectrum due to switching (Max)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 8 comma separated values –100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>30 kHz bandwidth power</p> <ul style="list-style-type: none"> <li>• Range: –100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF spectrum due to modulation (average)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 22 comma separated values –200 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

READ:PFERror[:ALL]?

Function	GSM	Queries (initiates and fetches) one Phase and Frequency Error measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 146</a> , RMS Phase Error (Max), Peak Phase Error(Max), Frequency Error (Worst). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:PFERror” on page 414</a> .  Worst frequency error (negative or positive) is the value furthest from zero.
Query	<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>rms phase error (max)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 180 degrees and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Peak phase error (max)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 180 degrees and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Frequency error (worst)</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 Hz</li> </ul>	

READ

READ:PVTime?

Function	GSM	Queries (initiates and fetches) one power versus time measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 146</a> , 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 <a href="#">“FETCh:PVTime” on page 421</a> .
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0   1 and 9.91E+37 (NAN)</li> </ul> <p>Power versus time transmit power</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time offset (max)</p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• Resolution: 0.01 dB</li> </ul>

READ:TXPower[:ALL]?

Function	GSM	Queries (initiates and fetches) one TX power measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 146</a> and transmit power (average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:TXPower” on page 433</a> .
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: 0 to 16</li> <li>• Resolution: 1</li> </ul> <p>Transmit power (average)</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

---

## RFANalyzer Subsystem

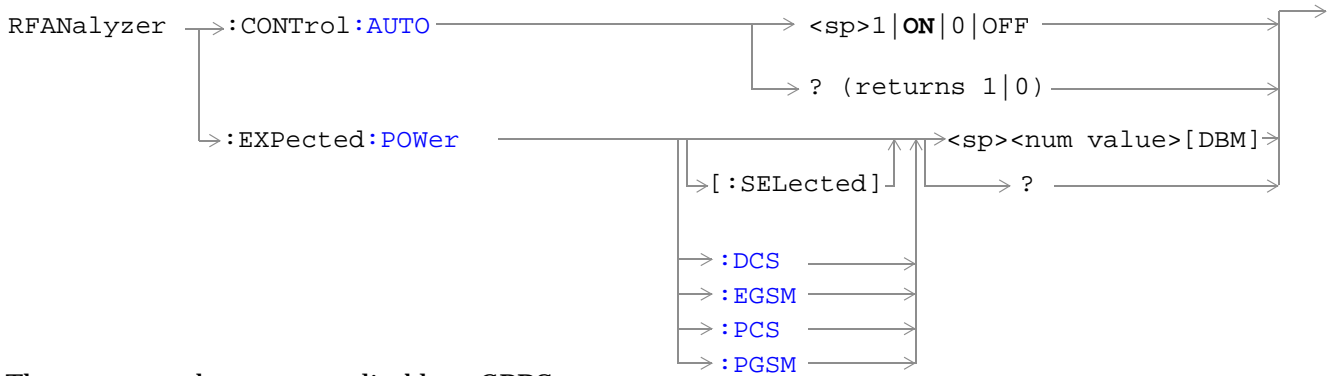
### Description

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.

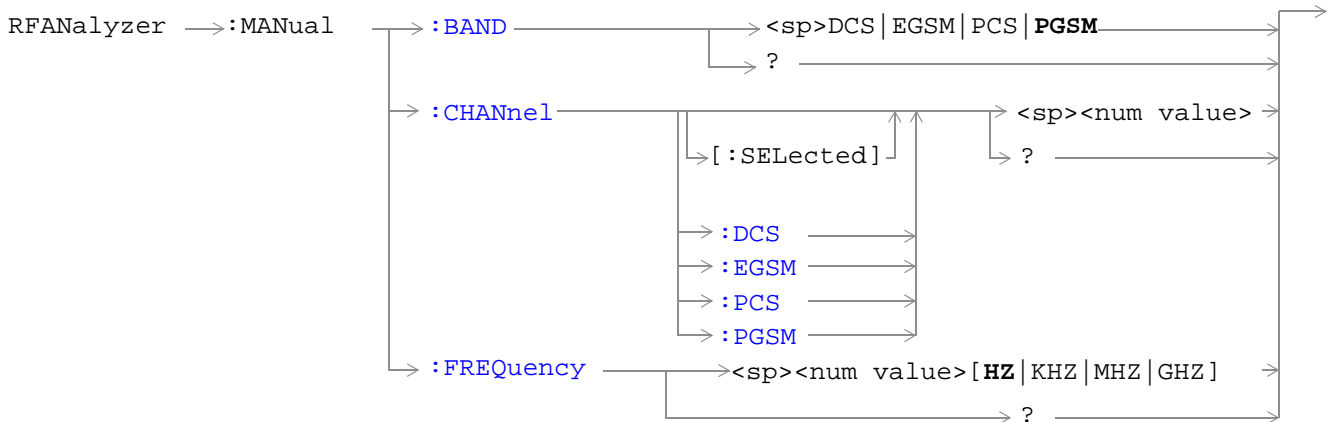
### Syntax Diagrams and Command Descriptions

[“RFANalyzer” on page 454](#)

# RFAnalyzer



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 283

**RFAnalyzer:CONTROL:AUTO**

Function	GSM	<p>Sets/queries the test set's receiver control. The measuring receiver is under the control of the test set's base station emulator (auto) or under the control of the user (manual). see <a href="#">"Receiver Control" on page 616</a></p> <p>Setting the manual band will change the receiver control to manual. see <a href="#">"RFAnalyzer:MANual:BAND" on page 458</a></p> <p>Setting the manual channel in the band that is currently active will change the receiver control to manual. see <a href="#">"RFAnalyzer:MANual:CHANnel[:SElected]" on page 458</a></p> <p>Setting the manual frequency will change the receiver control to manual. see <a href="#">"RFAnalyzer:MANual:FREQuency" on page 461</a></p> <p>Setting the broadcast band will change the receiver control to auto. See <a href="#">"CALL:BAND" on page 304</a></p>
	GPRS	This command is not applicable to GPRS.
Setting	Manual = 0   OFF , Auto = 1   ON (default ON)	
Query	0   1	
*RST setting	0   on	
<b>Programming Example</b>		
OUTPUT 714;"RFANALYZER:CONTROL:CONTROL:AUTO 0" !Sets receiver control to manual.		

**RFAnalyzer:EXPEcted:POWer[:SElected]**

Function	GSM	<p>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 <a href="#">"Expected Power" on page 618</a>.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a></p> <p>Resolution: .01 DBM</p>	
Query	<p>Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a></p> <p>Resolution: .01 DBM</p>	
*RST setting	<p>Sets the receiver control to auto</p> <p>Band: PGSM</p> <p>Expected Power: +13DBM</p>	
<b>Programming Example</b>		
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10" !Sets the test set expected !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 <a href="#">"Receiver Control" on page 616</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
*RST setting		Sets the receiver control to auto  Band: PGSM  Expected Power: +13DBM
<b>Programming Example</b>		
<pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:DCS -10" !Sets expected power in DCS band !to -10 DBM.</pre>		

**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 <a href="#">"Receiver Control" on page 616</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
*RST setting		Sets the receiver control to auto  Band: PGSM  Expected Power: +13DBM
<b>Programming Example</b>		
<pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:EGSM -10" !Sets expected power in EGSM !band to -10 DBM.</pre>		



**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 <a href="#">"Receiver Control" on page 616</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
*RST setting		Sets the receiver control to auto  Band: PGSM  Expected Power: +13DBM
<b>Programming Example</b>		
<pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PCS -10" !Sets expected power in PCS band !to -10 DBM.</pre>		

**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 <a href="#">"Receiver Control" on page 616</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 670</a>  Resolution: .01 DBM
*RST setting		Sets the receiver control to auto  Band: PGSM  Expected Power: +13DBM
<b>Programming Example</b>		
<pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PGSM -10" !Sets expected power in PGSM !band to -10 DBM.</pre>		

**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 <a href="#">“Receiver Control” on page 616</a>  The receiver control is set to manual when a manual band is selected. see <a href="#">“RFAnalyzer:CONTRol:AUTO” on page 455</a>  The manual band must be set before manual channel will update.
	GPRS	This command is not applicable to GPRS.
Setting	Range: DCS   EGSM   PCS   PGSM	
Query	Range: DCS   EGSM   PCS   PGSM	
*RST setting	PGSM	
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:BAND DCS" !Sets the band in manual                                      !receiver control.</pre>		

**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 <a href="#">“Receiver Control” on page 616</a>  The manual band must be set before 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  Band: PGSM  Traffic Channel: 30	
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:SELECTED 512" !Configures the test set to                                      !ARFCN 512.</pre>		

**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 <a href="#">“Receiver Control” on page 616</a>  The manual band must be set before manual channel will update. see <a href="#">“RFAnalyzer:MANual:BAND” on page 458</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 512 to 885 Resolution: 1
Query		Range: 512 to 885 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:DCS 512" !Sets ARFCN for DCS in manual !receiver mode.</pre>		

**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 <a href="#">“Receiver Control” on page 616</a>  The manual band must be set before manual channel will update. see <a href="#">“RFAnalyzer:MANual:BAND” on page 458</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 124 and 975 to 1023 Resolution: 1
Query		Range: 0 to 124 and 975 to 1023 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:EGSM 975" !Sets ARFCN for EGSM in manual !receiver mode.</pre>		

**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 <a href="#">“Receiver Control” on page 616</a> .  The manual band must be set before manual channel will update. see <a href="#">“RFAnalyzer:MANual:BAND” on page 458</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 512 to 810 Resolution: 1
Query		Range: 512 to 810 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
<b>Programming Example</b> <pre>OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:PCS 512" !Sets ARFCN for PCS in manual !receiver mode.</pre>		

**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 <a href="#">“Receiver Control” on page 616</a> .  The manual band must be set before manual channel will update. see <a href="#">“RFAnalyzer:MANual:BAND” on page 458</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 124 Resolution: 1
Query		Range: 1 to 124 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
<b>Programming Example</b> <pre>OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:PGSM 124" !Sets ARFCN for PGSM in manual !receiver mode.</pre>		

**RFAnalyzer:MANual:FREQuency**

Function	GSM	Sets/queries the frequency that the mobile station is expected to transmit on. See <a href="#">“Receiver Control” on page 616</a> .  The units (HZ   KHZ   MHZ   GHZ) are optional, if no units are specified then units default to HZ.  Setting the manual frequency changes the receiver control to manual. see <a href="#">“RFAnalyzer:CONTRol:AUTO” on page 455</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 292.5 MHz to 2700 MHz Resolution: .01 Hz
Query		Range: 292.5 MHz to 2700 MHz Resolution: .01 Hz
*RST setting		896 MHz
<b>Programming Example</b> <pre>OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 942.6MHZ" !Sets the expected frequency !to 942.6 MHz in manual !receiver mode.</pre>		

---

# SETup Subsystem

## Description

The SETup subsystem is used to configure the test set for each measurement. Typical settings include:

- Multi-Measurement Count, how many measurements will be made each time a measurement is initiated.
- Trigger Arm, determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).
- Trigger Source, how a measurement is triggered.
- Trigger Delay, controls the delay time between the trigger and the start of sampling.
- Measurement Timeout, length of time before a measurement times out.

---

**NOTE** Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. In most cases, it is a best practice (during remote operation) to use “single” measurement mode. This simplifies the tasks of starting concurrent measurements, using the INIT subsystem commands to determine which measurements are ready to be fetched, then using the FETCh subsystem to obtain results. The command “SETup:CONTInuous:OFF sets all measurements to “single” trigger mode.

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## Syntax Diagrams and Command Descriptions

[“SETup:AAUDio” on page 463](#)

[“SETup:BERRor” on page 469](#)

[“SETup:CONTInuous” on page 483](#)

[“SETup:DAUDio” on page 484](#)

[“SETup:DPOWer” on page 489](#)

[“SETup:FBERror” on page 476](#)

[“SETup:IQTuning” on page 493](#)

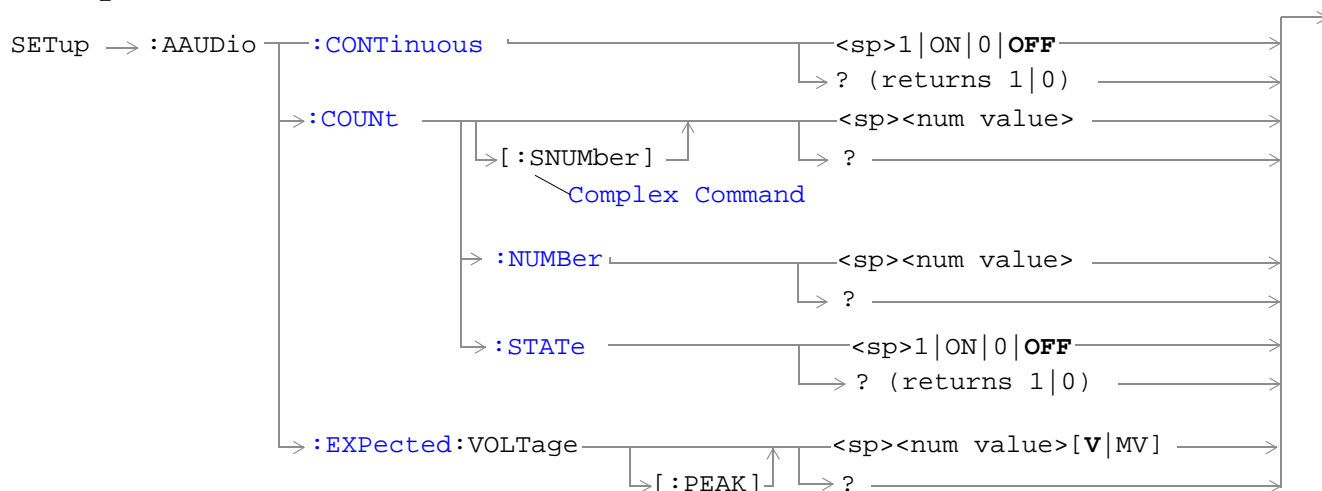
[“SETup:ORFSpectrum” on page 499](#)

[“SETup:PFERror” on page 508](#)

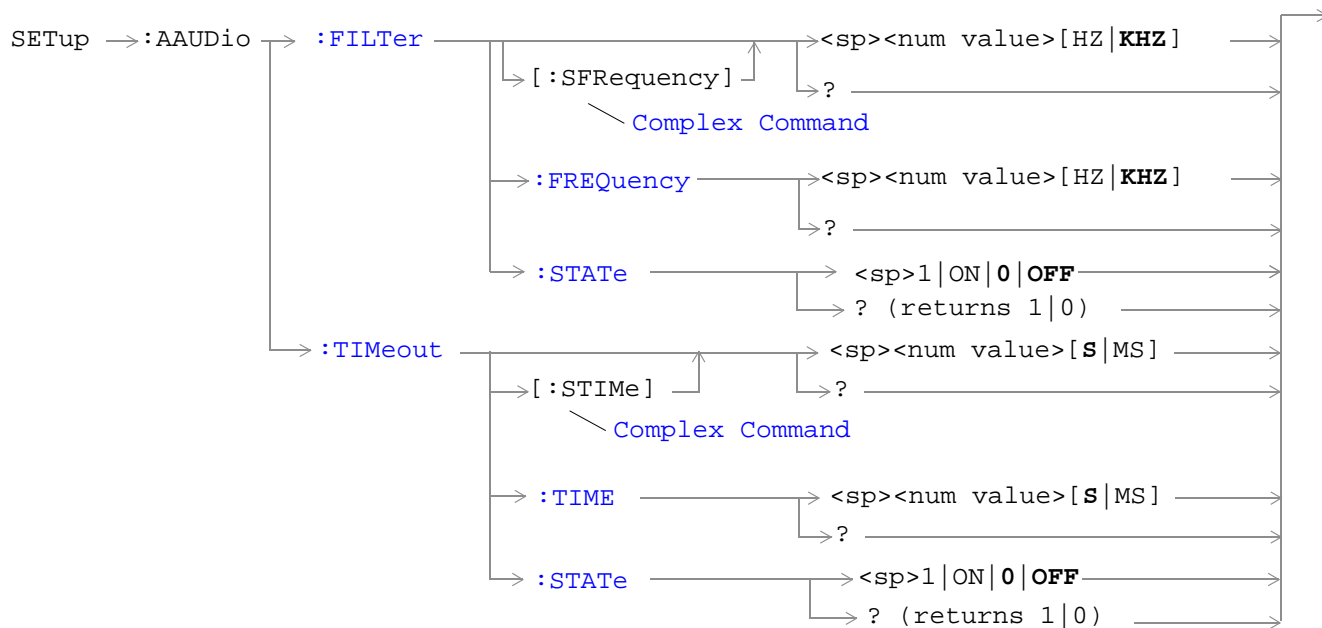
[“SETup:PVTime” on page 513](#)

[“SETup:TXPower” on page 519](#)

## SETup:AAUDio



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

## SETup:AAUDio

### SETup:AAUDio:CONTInuous

Function	GSM	Selects/queries the trigger arm state for Analog Audio measurements.
	GPRS	This command is not applicable to GPRS.
Setting	Continuous trigger arm mode = 1   ON   Single trigger arm mode = 0   OFF	
Query	0   1	
*RST setting	Single	
Programming Example		
10 OUTPUT 714;"AAUDIO:COUNTINUOUS 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 Resolution: 1	
*RST setting	OFF	
Programming Example		
OUTPUT 714;"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 Resolution: 1	
Query	Range: 1 to 999 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.		





**SETup:AAUDio:FILTer[:SFRequency]**

Function	GSM	Sets/queries the state to on and 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 <a href="#">“Analog Audio Measurement Description” on page 62</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 200 Hz to 8.0 kHz Resolution: 1 Hz
Query		Range: 200 Hz to 8.0 kHz Resolution: 1 Hz
*RST setting		1000 Hz
<b>Programming Example</b> <pre> OUTPUT 714;"SETUP:AAUDIO:FILTER :SFREQUENCY 1000" !This is a complex command that   !sets the aaudio filter state   !to on and sets the bandpass   !filter frequency to 1 kHz. </pre>		

**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 <a href="#">“SETup:AAUDio” on page 463</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 200 Hz to 8.0 kHz Resolution: 1 Hz
Query		Range: 200 Hz to 8.0 kHz Resolution: 1 Hz
*RST setting		1 kHz
<b>Programming Example</b> <pre> OUTPUT 714;"SETUP:AAUDIO:FREQUENCY 217HZ" !Set aaudio bandpass filter to 217 hz. </pre>		

**SETup:AAUDio:FILTer:STATe**

Function	GSM	Selects/queries the state of the Analog Audio bandpass filter. see <a href="#">“SETup:AAUDio” on page 463</a>
	GPRS	This command is not applicable to GPRS.
Setting	1   ON   0   OFF	
Query	1   0	
*RST setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:FILTER:STATE ON" !Sets filter 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: .1 to 999 seconds Resolution: .1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST setting	10 seconds	
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STIME 3" !A complex command that sets timeout !state to on and sets the !timeout value.		

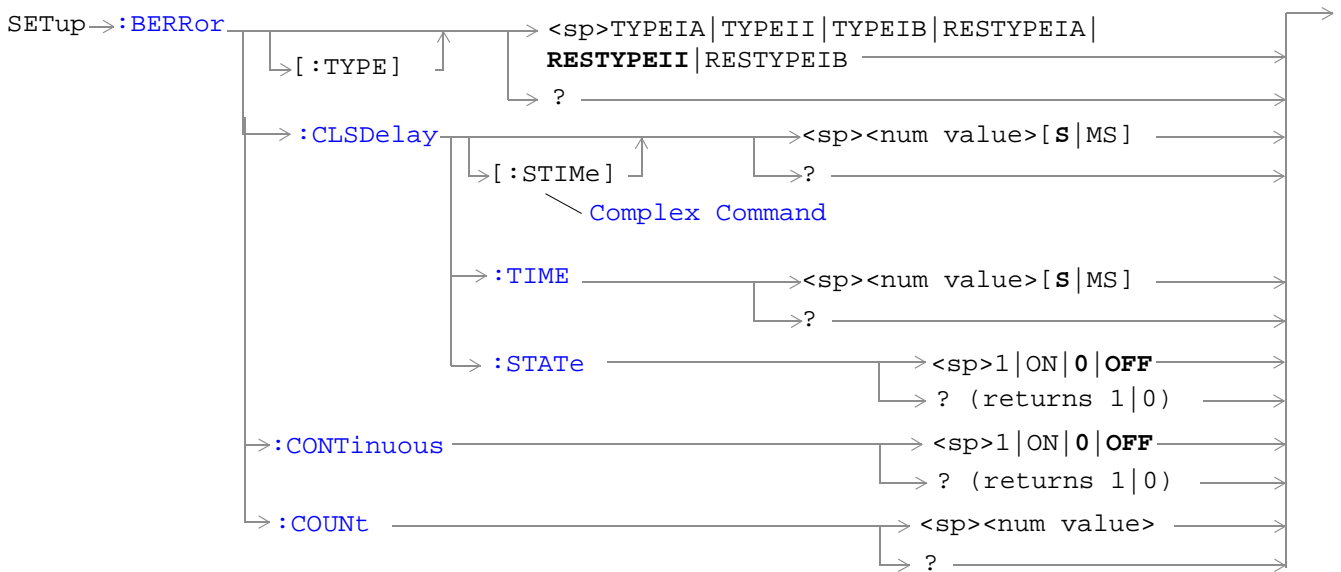
**SETup:AAUDio:TIMEout:STATe**

Function	GSM	Selects/queries the Analog Audio measurement timeout state.
	GPRS	This command is not applicable to GPRS.
Setting	1   ON   0   OFF	
Query	1   0	
*RST setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.		

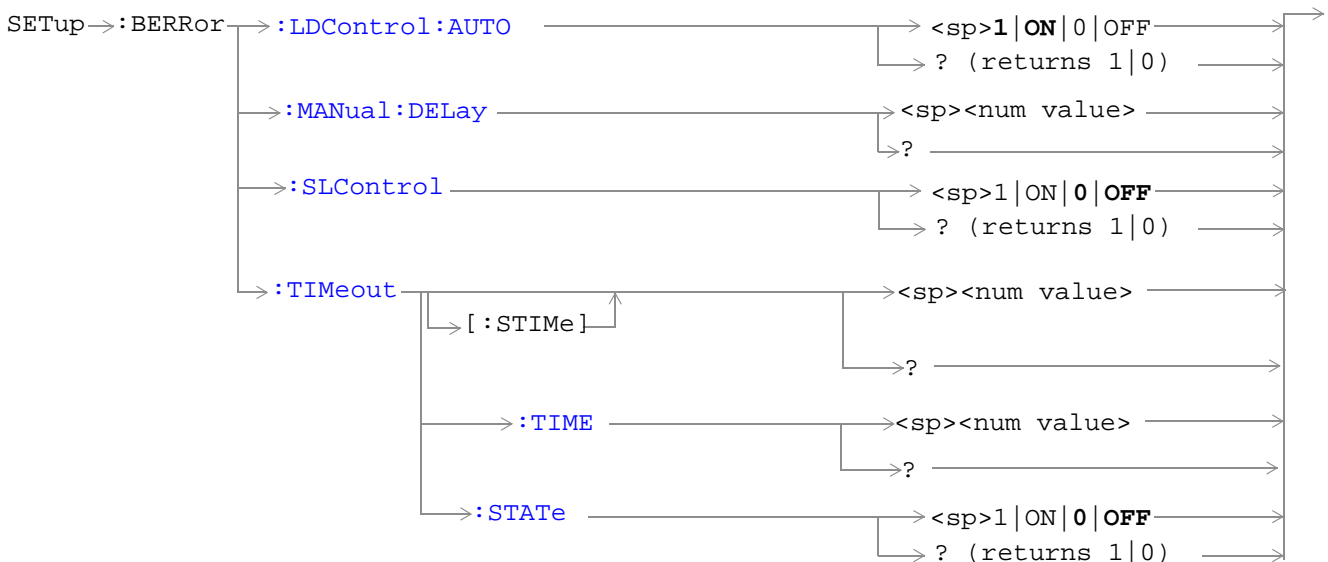
**SETup:AAUDio:TIMEout:TIME**

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: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST setting		10 seconds
<b>Programming Example</b> 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 283

**SETup:BERRor:CLSDelay[:STIME]**

Function	GSM	<p>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.</p> <p>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.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
Query		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
*RST Setting		500 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:CLSDelay:STIME 400 MS" ! Set state to on ! and delay time</pre>		

**SETup:BERRor:CLSDelay:TIME**

Function	GSM	<p>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.</p> <p>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.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
Query		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
*RST Setting		500 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:CLSDelay:TIME 600MS" ! Set delay time</pre>		

**SETup:BERRor:CLSDElay:STATe**

Function	GSM	<p>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.</p> <p>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.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1   ON   0   OFF
Query		Range: 1   0
*RST Setting		1   ON
<b>Programming Example</b> 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: TYPEIA   TYPEII   TYPEIB   RESTYPEIA   RESTYPEII   RESTYPEIB
Query		Range: TYPEIA   TYPEII   TYPEIB   RESTYPEIA   RESTYPEII   RESTYPEIB
*RST Setting		RESTYPEII
<b>Programming Example</b> OUTPUT 714;"SETUP:BERROR:TYPE TYPEIA" !Sets type of BER measurement.		

## SETup:BERror

### 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	0   1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714;"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 Resolution: 1	
Query	Range: 1 to 999,000 Resolution: 1	
*RST Setting	10,000	
Programming Example		
OUTPUT 714;"SETUP:BERROR:COUNT 880" !Set BER multi-measurement count !to 880.		



**SETup:BERRor:LDControl:AUTO**

Function	GSM	<p>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.</p> <p>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 <a href="#">“SETup:BERRor:MANual:DElay” on page 473</a></p> <p>Refer also to the <a href="#">“Bit Error Measurement Description” on page 66</a> for a description of frame delay and its use in the BER measurement.</p>
	GPRS	
Setting	Range: 0   OFF   1   ON	
Query	0   1	
*RST Setting	1   auto	
Related Topics	<a href="#">“SETup:BERRor:MANual:DElay” on page 473</a>	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:LDCONTROL:AUTO OFF" !sets BER delay to manual the user !must select the manual frame !delay number.</pre>		

**SETup:BERRor:MANual:DElay**

Function	GSM	<p>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 <a href="#">“SETup:BERRor:LDControl:AUTO” on page 473</a>.</p> <p>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).</p> <p>Refer to <a href="#">“Bit Error Measurement Description” on page 66</a> for a description of frame delay and how it is used in this measurement.</p>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 to 15 Resolution : 1	
Query	Range: 1 to 15 Resolution : 1	
*RST Setting	5	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:MANUAL:DELAY 4" !Set delay of 4 speech frames.</pre>		

## SETup:BERror

### SETup:BERror:SLControl

Function	GSM	Selects/queries the Signalling loopback control state for an BER measurement.  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.  The loopback type is controlled manually using <b>Mobile Loopback (F12)</b> on <b>Call Params</b> menu 1 of 4. See <b>"CALL:TChannel:LOOPback"</b> on page 375 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		
OUTPUT 714;"SETUP:BERror:SLCONTROL ON" ! Test set will send ! 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: .1 to 999 Resolution: .1	
Query	Range: .1 to 999 Resolution: .1	
*RST Setting	10 seconds	
Programming Example		
OUTPUT 714;"SETUP:BERror:TIMEOUT:STIME 8" !Sets BER measurement timeout to !8 seconds and the state to on.		

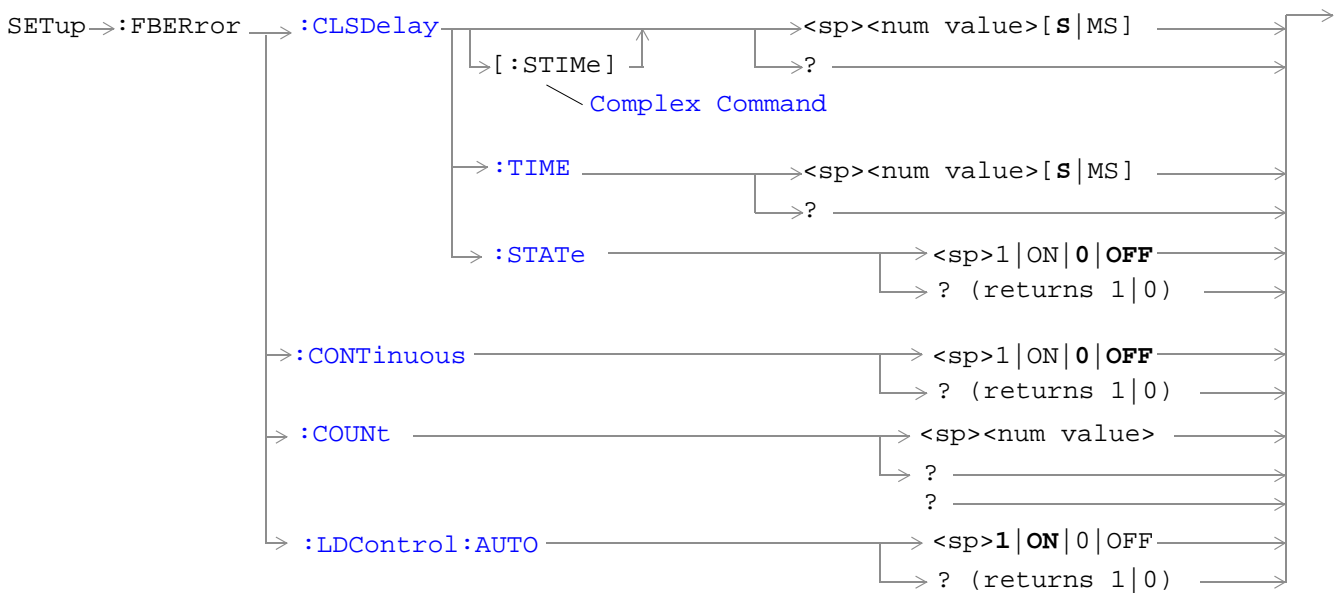
**SETup:BERRor:TIMEout:TIME**

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: .1 to 999 Resolution: .1
Query		Range: .1 to 999 Resolution: .1
*RST Setting		10 seconds
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERR:TIMEOUT:TIME 8" !Sets BER measurement timeout to !8 seconds.</pre>		

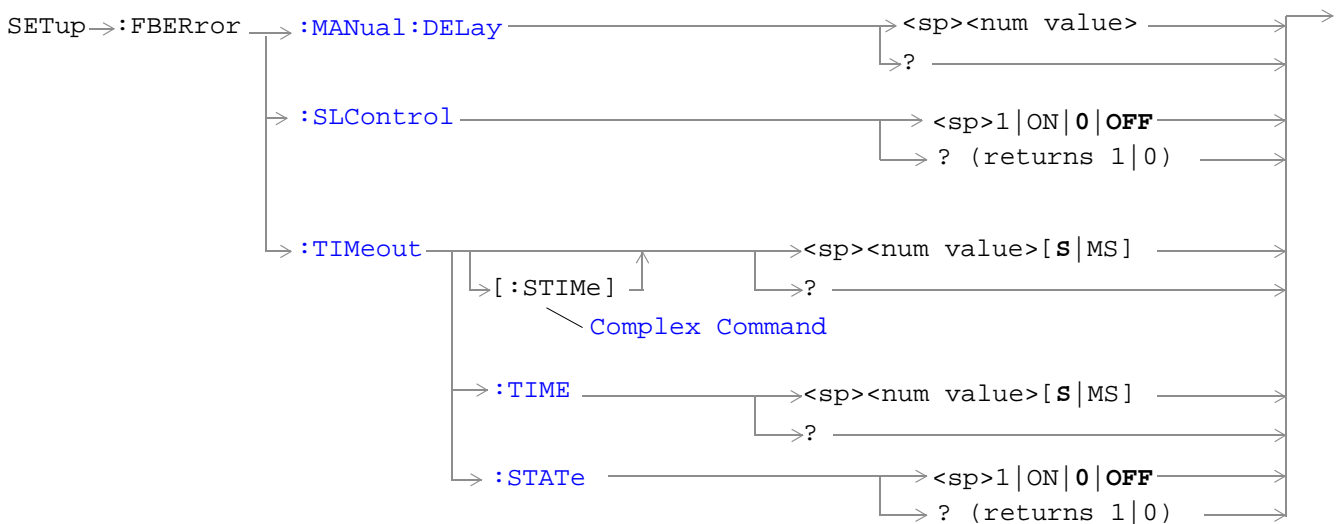
**SETup:BERRor:TIMEout:STATE**

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		0   1
*RST Setting		0   off
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:TIMEOUT:STATE ON" !Sets the timeout state to on.</pre>		

## SETup:FBError



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 283

**SETup:FBERror:CLSDelay[:STIME]**

Function	GSM	<p>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.</p> <p>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.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
Query		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
*RST Setting		500 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.</pre>		

**SETup:FBERror:CLSDelay:TIME**

Function	GSM	<p>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.</p> <p>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.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
Query		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100ms</p>
*RST Setting		500 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:TIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.</pre>		

**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.  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.  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	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:STATE ON" ! Sets the Close Loop Delay ! state to on.</pre>		

**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: 1   ON = Continuous trigger mode 0   OFF = Single trigger mode	
Query	Range: 1   0	
*RST Setting	0   single	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FBERROR:CONTINUOUS 0" !Specifies single trigger mode for Fast !BER measurements.</pre>		

**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 Resolution: 1
Query		Range: 1 to 999,000 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		
<pre>OUTPUT 714; ``SETUP:FBERROR:COUNT 10000" !Specifies the number of Fast BER bits !to test at 10,000 bits.</pre>		

**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. .  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 <a href="#">“SETup:FBError:MANual:DELay” on page 480</a> .  Refer also to the <a href="#">“Fast Bit Error Measurement Description” on page 90</a> 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   AUTO
Related Topics		see <a href="#">“SETup:FBError:MANual:DELay” on page 480</a>
Programming Example		
<pre>OUTPUT 714;"SETUP:FBERROR:LDCONTROL OFF" !Set delay control to manual the user !must select the manual frame !delay number.</pre>		

## 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 <a href="#">“SETup:FBERror:LDControl:AUTO” on page 479</a> .  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). Refer to <a href="#">“Fast Bit Error Measurement Description” on page 90</a> 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 Resolution: 1	
Query	Range: 0 to 26 Resolution: 1	
*RST Setting	5 (loopback delay control is reset to automatic (auto on)).	
Related Topics	see <a href="#">“SETup:FBERror:LDControl:AUTO” on page 479</a>	
Programming Example		
OUTPUT 714; "SETUP:FBERROR:MANUAL:DELAY 6" !Set frame delay to 6 frames.		

## SETup:FBERror:SLControl

Function	GSM	This command selects/queries the Signalling loopback control state for an FBER measurement.  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.  The loopback type is controlled manually from the Mobile Loopback F12 key, see <a href="#">“CALL:TCHannel:LOOPback” on page 375</a> 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		
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: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STIME 20" !Sets the timeout value to !20 seconds and the state to on.</pre>		

**SETup:FBERror:TIMEout:TIME**

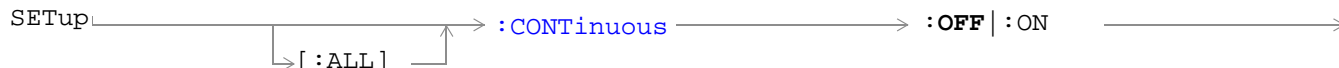
Function	GSM	This command selects/queries the timeout value in seconds for the trigger state during Fast Bit Error measurements. The units (S   MS) are optional, if no units are specified than units default to S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:FBERROR:TIMEOUT:TIME 20" !Sets the timeout value to !20 seconds.</pre>		

## SETup:FBERror

### 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
<b>Programming Example</b> OUTPUT 714; "SETUP:FBERROR:TIMEOUT:STATE ON" !Sets the timeout state to on.		

## SETup:CONTInuous

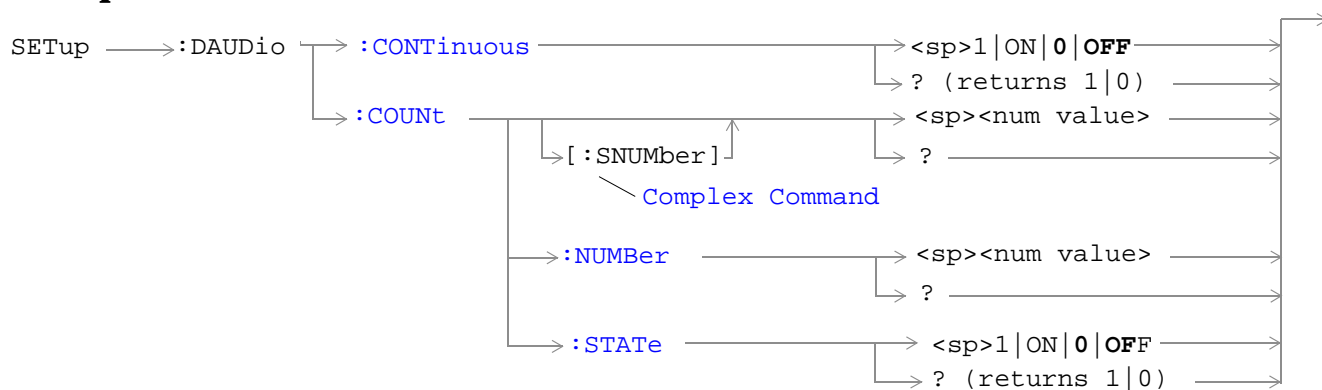


“Diagram Conventions” on page 283

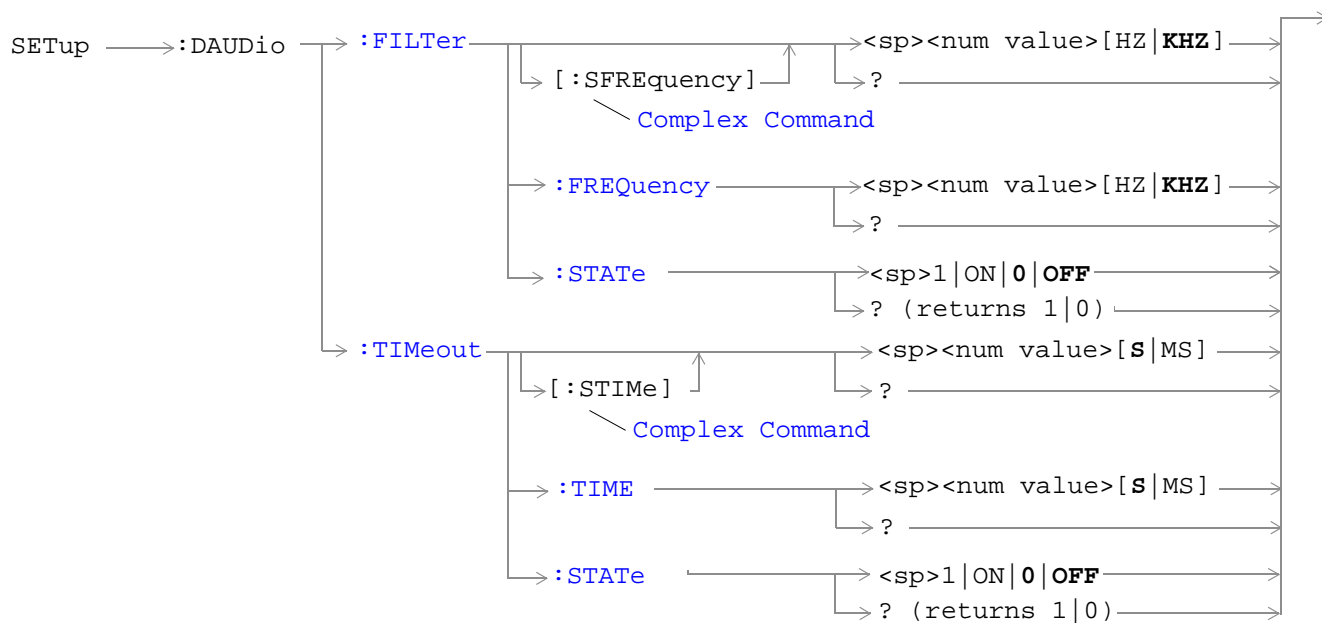
### SETup[:ALL]:CONTInuous

Function	GSM	This command sets trigger arm to OFF (single trigger) or ON (continuous trigger) for all measurements. See “ <a href="#">Trigger Arm (Single or Continuous) Description</a> ” on page 171. 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 “ <a href="#">Preset Descriptions</a> ” on page 640.
	GPRS	Remote full preset sets the trigger arm to single, this is the recommended trigger arm for any remote measurements. 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, “ <a href="#">SETup:PVTime:CONTInuous</a> ” on page 514 allows you to set the trigger arm for the Power versus Time measurement.)
Setting	Range	<ul style="list-style-type: none"> <li>• Continuous trigger = ON</li> <li>• Single trigger = OFF</li> </ul>
*RST Setting	Single	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:ALL:CONTINUOUS:OFF" !Sets trigger arm for all measurements !to single.</pre>		

## SETup:DAUDio



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 283

**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	Continuous 1   ON   Single 0   OFF	
Query	1   0	
*RST Setting	0   Single	
Programming Example		
<pre>OUTPUT 714;"SETUP:DAUDIO:CONTINUOUS OFF" !Set DAUDIO measurement to single !trigger mode.</pre>		

**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 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
<pre>OUTPUT 714;"SETUP:DAUDIO:COUNT:SNUMBER 10" !Sets the value to 10 and the state !to on.</pre>		

**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 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
<pre>OUTPUT 714;"SETUP:DAUDIO:COUNT:NUMBER 25" !Sets the number of DAUDIO !measurements that will be made.</pre>		

**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	1   ON   0   OFF	
Query	1   0	
*RST Setting	0   OFF	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DAUDIO:COUNT:STATE OFF" !Sets trigger state for !DAUDIO measurement.</pre>		

**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 <a href="#">"Decoded Audio Measurement Description" on page 76</a>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 200 Hz to 3.6 kHz Resolution: 1 Hz	
Query	Range: 200 Hz to 3.6 kHz Resolution: 1 Hz	
*RST Setting	1000 Hz	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DAUDIO:FILTER:SFREQUENCY 2.2KHZ" !This is a complex command !that sets the value and the !state to on.</pre>		

**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 <a href="#">"Decoded Audio Measurement Description" on page 76</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 200 Hz to 3.6 kHz Resolution: 1 Hz
Query		Range: 200 Hz to 3.6 kHz Resolution: 1 Hz
*RST Setting		1000 Hz
Programming Example		
OUTPUT 714;"DAUDIO:FILTER:FREQUENCY 217HZ" !Sets bandpass filter frequency.		

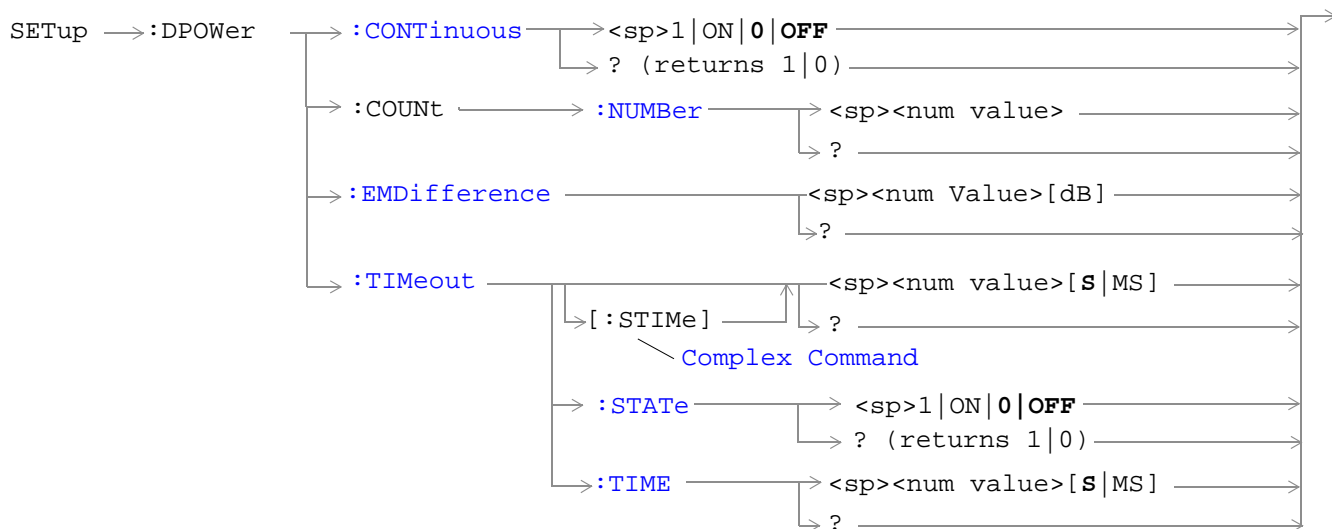
**SETup:DAUDio:FILTer:STATE**

Function	GSM	This command selects/queries the Decoded Audio bandpass filter state. see <a href="#">"Decoded Audio Measurement Description" on page 76</a>
	GPRS	This command is not applicable to GPRS.
Setting		1   ON   0   OFF
Query		1   0
Programming Example		
OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.		
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:FILTER:STATE OFF" !Sets bandpass filter state to off.		





## SETup:DPOWER



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### SETup:DPOWER:CONTInuous

Function	GSM	This command selects/queries the trigger state for Dynamic Power measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Continuous trigger mode: 1 ON Single trigger mode: 0 OFF
Query		1 0
*RST Setting		0 OFF
Programming Example		
OUTPUT 714;"SETUP:DPOWER:CONTINUOUS ON" !Sets trigger mode to continuous for a Dynamic Power measurement.		

SETup:DPOWer

SETup:DPOWer:COUNT:NUMBER

Function	GSM	This command sets/queries the number of bursts for the Dynamic Power measurement.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 100 Resolution: 1
Query		Range: 1 to 100 Resolution: 1
*RST Setting		10
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER 30" !Sets the number of bursts for the Dynamic Power measurement to 30.</pre>		

SETup:DPOWer:EMDifference

Function	GSM	<p>This command sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement. The units dB are optional.</p> <p>The Expected Maximum Difference from Previous Measurement parameter is used with the measured transmit power from the previous burst to set the maximum RF power that the base station emulator is expecting the mobile to transmit in the next burst.</p> <p>The setting of this parameter does not affect the receiver Expected Power parameter. See <a href="#">"RFAnalyzer:EXpected:POWer[:SElected]" on page 455.</a></p>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -30 dB to +30 dB Resolution: 0.01 dB
Query		Range: -30 dB to +30 dB Resolution: 0.01 dB
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE 3" !Sets the Expected Maximum ! Difference from previous measurement parameter ! to 3 dB. (Example: If the previous burst ! measures 30 dBm and you expect the maximum ! amplitude of the next burst to be 3 dB lower, set the ! Expected Maximum Difference parameter to 3).</pre>		

**SETup:DPOWER:TIMEout[:STIME]**

Function	GSM	This command sets/queries the Dynamic Power measurement timeout value in seconds and sets the time-out state to 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: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME 5" !Sets the timeout state to on and the timeout value to 5 seconds for the Dynamic Power measurement.</pre>		

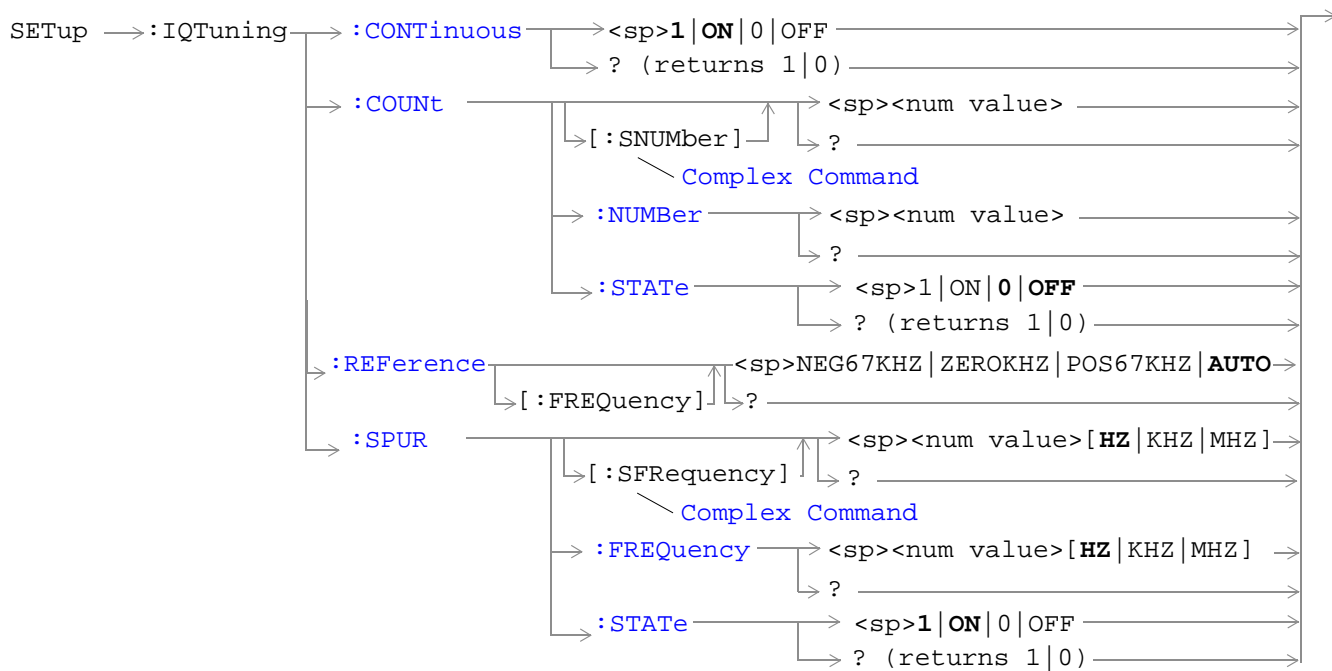
**SETup:DPOWER:TIMEout:STATe**

Function	GSM	This command sets/queries the time-out state for the Dynamic Power measurement.
	GPRS	This command is not applicable to GPRS.
Setting		0 OFF 1 ON
Query		0 1
*RST Setting		0 OFF
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DPOWER:IQTUNING:TIMEOUT:STATE ON" !Sets the timeout state to on for a Dynamic Power measurement.</pre>		

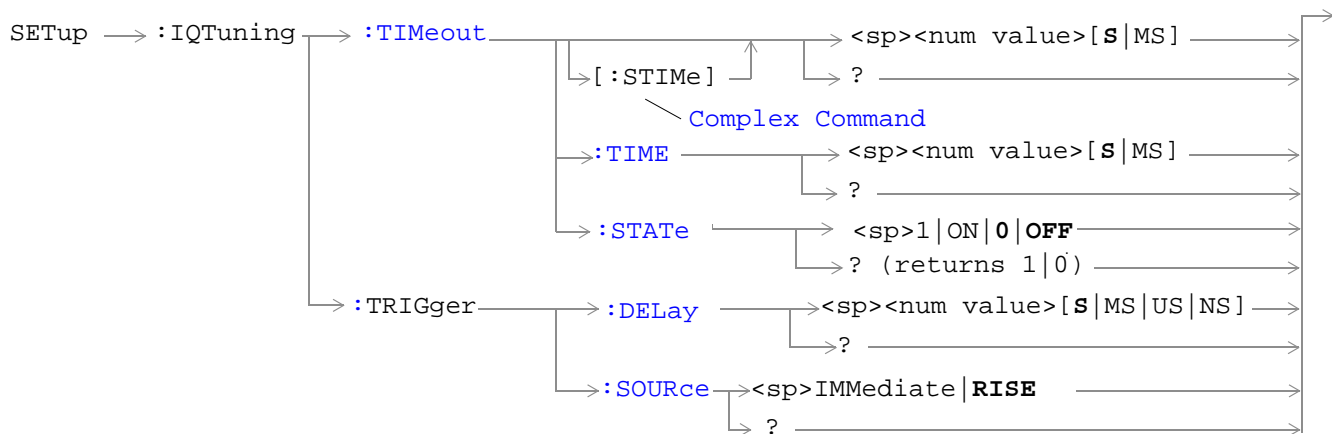
**SETup:DPOWer:TIMEout:TIME**

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. 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: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME 6" !Sets the timeout value to 6 seconds for a dynamic power measurement.		

## SETup:IQTuning



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

## SETup:IQTuning

### SETup:IQTuning:CONTInuous

Function	GSM	This command selects/queries the trigger state for I/Q Tuning measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Continuous trigger mode: 1   ON Single trigger mode: 0   OFF
Query		1   0
*RST Setting		1   ON
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:CONTINUOUS OFF" !Sets trigger mode to single for an I/Q Tuning measurement.		

### SETup:IQTuning:COUNt:STATe

Function	GSM	This command sets/queries the I/Q Tuning multi-measurement count state.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0   OFF   1   ON
Query		0   1
*RST Setting		0   OFF
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE ON" !Turns on the multi-measurement mode for I/Q Tuning measurements.		

### SETup:IQTuning:COUNt:NUMBer

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes when the multi-measurement count state is on. See <a href="#">"I/Q Tuning Measurement Description" on page 84.</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:COUNT:NUMBER 80" !Sets the multi-measurement count number for I/Q Tuning measurements to 80.		

**SETup:IQTuning:COUnT[:SNUMBer]**

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes. This command sets the count state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER 25" !Sets the state to ON and the multi-measurement count value to 25.		

**SETup:IQTuning:REFeRence[:FREQUency]**

Function	GSM	This command sets/queries the reference offset frequency to be used for the measurement. This means that if your mobile is transmitting all 1s you should set this command to NEG67KHZ, and if your mobile is transmitting all 0s 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
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:REFERENCE:FREQUENCY NEG67KHZ" !Sets the I/Q Tuning measurements reference frequency to -67 kHz.		

**SETup:IQTuning:SPUR:FREquency**

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement. 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 Resolution: 100 Hz
Query		Range: -19 MHz to +19 MHz Resolution: 100 Hz
*RST Setting		0 MHz
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY 10MHZ" !Sets the I/Q Tuning spur measurement to 10 MHz.		

**SETup:IQTuning:SPUR:STATE**

Function	GSM	This command sets/queries the spur state for the I/Q Tuning measurement.
	GPRS	This command is not applicable to GPRS.
Setting		0   OFF   1   ON
Query		0   1
*RST Setting		0   OFF
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE ON" !Sets the spur state to on.		

**SETup:IQTuning:SPUR[:SFREquency]**

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement. 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 Resolution: 100 Hz
Query		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz Resolution: 100 Hz
*RST Setting		0   OFF
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:SFREquency 10MHZ" !Sets the spur state on with a frequency of 10 MHz.		



**SETup:IQTuning:TIMEout:STATE**

Function	GSM	This command sets/queries the timeout state for the I/Q Tuning measurement.
	GPRS	This command is not applicable to GPRS.
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:TIMEout:STATE ON" !Sets the timeout state to on for an I/Q Tuning measurement.		

**SETup:IQTuning:TIMEout[:STIME]**

Function	GSM	This command sets/queries the I/Q Tuning measurement time-out value in seconds and sets the time-out state to 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: .1 to 999 seconds Resolution: .1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST Setting	10 seconds	
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME 3" !Sets the timeout state to on and the timeout value to 3 seconds.		

**SETup:IQTuning:TIMEout:TIME**

Function	GSM	This command sets/queries the time-out value in seconds that is used for the I/Q Tuning measurements when the time-out state is 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: .1 to 999 seconds Resolution: .1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST Setting	10 seconds	
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME 4" !Sets the timeout value to 4 seconds.		

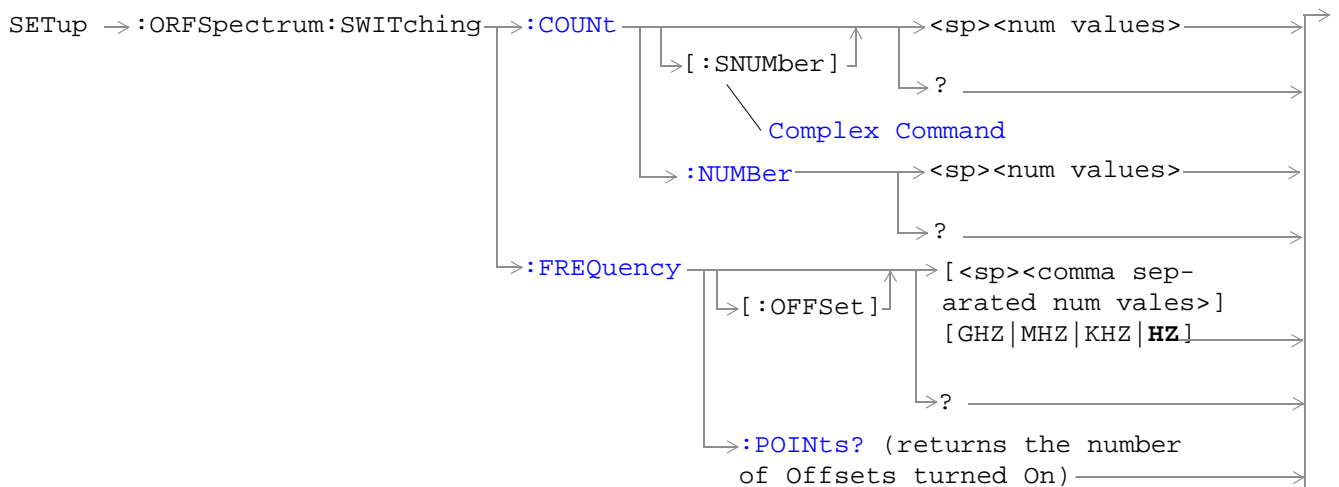
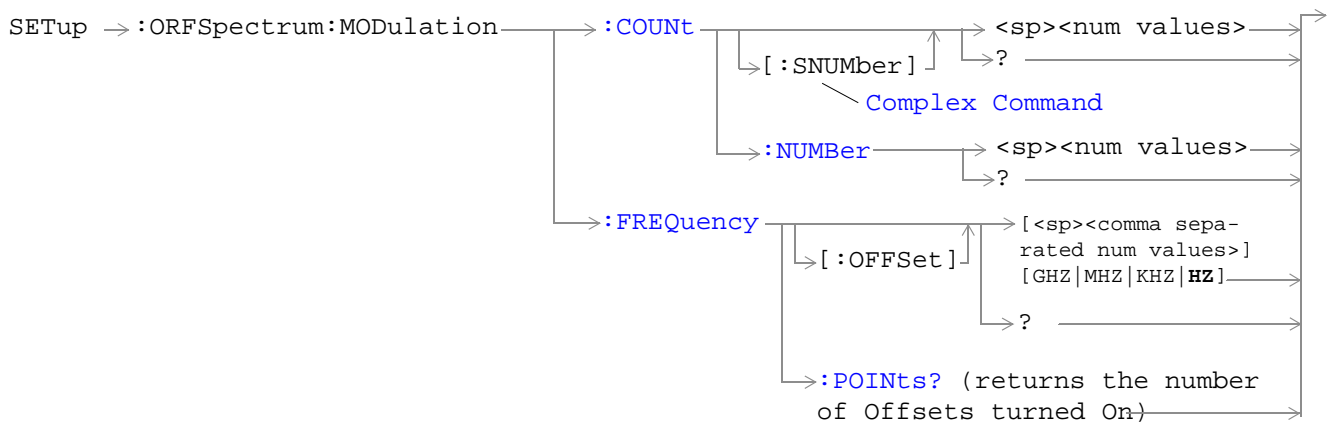
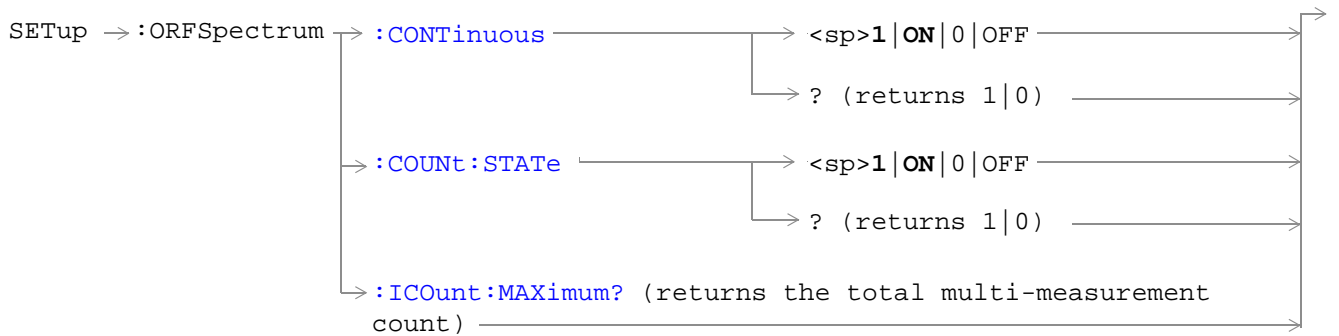
**SETup:IQTuning:TRIGger:DELay**

Function	GSM	This command sets/queries the trigger delay time in seconds for an I/Q Tuning measurement. 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 Resolution: 5 significant digits or 100 ns, whichever is greater
Query		Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater
*RST Setting		zero seconds
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY 1.2MS" !Sets the trigger delay time to 1.2 milli seconds.</pre>		

**SETup:IQTuning:TRIGger:SOURce**

Function	GSM	This command sets/queries the trigger source for an I/Q Tuning measurement.
	GPRS	This command is not applicable to GPRS.
Setting		RISE   IMMEDIATE See <a href="#">"Triggering of Measurements" on page 169.</a>
Query		RISE   IMM
*RST Setting		RISE
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE IMM" !Sets the trigger source to immediate.</pre>		

## SETup:ORFSpectrum





## SETup:ORFSpectrum:ICount:MAXimum?

Function	GSM	<p>This command queries the total number of measurements made each time an ORFS measurement is initiated. This number will vary depending on the number of offsets and number of multi-measurements that you choose.</p> <p>The total number of measurements is calculated using the following formula:</p> $\text{ICO MAX} = 1 + M + S$ <p><i>Where:</i></p> <p><math>M = (\text{the number of modulation offsets}) \times (\text{the number of multi-measurements for ORFS due to modulation}).</math></p> <p><math>S = (\text{the number of switching offsets}) \times (\text{the number of multi-measurements for ORFS due to switching}).</math></p> <p>See <a href="#">"Output RF Spectrum Measurement Description" on page 96</a> for a description of modulation and switching offsets.</p>
	GPRS	
Query		<p>Range: 1 to 29971</p> <p>Resolution: 1</p>

## SETup:ORFSpectrum:MODulation:COUNT[:SNUMBER]

Function	GSM	<p>This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make. This command sets the count state to ON.</p>
	GPRS	
Setting		<p>Range: 1 to 999</p> <p>Resolution: 1</p>
Query		<p>Range: 1 to 999</p> <p>Resolution: 1</p>
*RST Setting		20
<p>Programming Example</p> <pre>OUTPUT 714"SETUP:ORFSPECTRUM:MODULATION:COUNT:SNUMBER 99" !Sets the value to 99 !multi-measurements !and the state to on.</pre>		

**SETup:ORFSpectrum:MODulation:COUNT:NUMBER**

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. See <a href="#">“Output RF Spectrum Measurement Description” on page 96.</a>
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		20
<b>Programming Example</b> <pre> OUTPUT 714; "SETUP:ORFSPECTRUM:MODULATION:COUNT:NUMBER 75" !Sets the   !multi-measurement   !count number for ORFS   !due to modulation   !measurements to 75. </pre>		

## SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]

Function	GSM	This command sets/queries the list of ORFS due to modulation frequency offsets. 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 <a href="#">“Output RF Spectrum Measurement Description” on page 96.</a>
	GPRS	
Setting		Range: 0 to 22 comma-separated values ranging from -1.8 MHz to -10 Hz, and +10 Hz to +1.8 MHz 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 Resolution: 10 Hz
*RST Setting		Offset 1: 400.0 kHz Offset 2: 600.0 kHz Offsets 3 to 22: off

## 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

SETup:ORFSpectrum:MODulation:FREQuency:POINts?

Function	GSM	This command queries the number of frequency offsets currently on during an ORFS due to modulation measurement. See <a href="#">“Output RF Spectrum Measurement Description” on page 96.</a>
	GPRS	
Query		Range: 0 to 22 Resolution: 1

SETup:ORFSpectrum:SWITching:COUNT[:SNUMber]

Function	GSM	This command sets/queries the ORFS due to switching multi-measurement count value and turns the state on.
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
<b>Programming Example</b> <pre> OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:SNUMBER 55" !Sets the   !multi-measurment   !value to 10 and the   !state to on. </pre>		

SETup:ORFSpectrum:SWITching:COUNT:NUMBER

Function	GSM	This command sets/queries the ORFS due to switching multi-measurement count value. See <a href="#">“Output RF Spectrum Measurement Description” on page 96.</a>
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
<b>Programming Example</b> <pre> OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:COUNT:NUMBER 15" !Sets the   !multi-measurement   !count number for ORFS   !due to switching   !to 15. </pre>		



## SETup:ORFSpectrum:SWITching:FREQUency[:OFFSet]

Function	GSM	This command sets/queries the list of ORFS due to switching frequency offsets. 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 <a href="#">“Output RF Spectrum Measurement Description”</a> on page 96.
	GPRS	
Setting	Range: 0 to 8 comma-separated values ranging from -1.8 MHz to -10 Hz, and +10 Hz to +1.8 MHz 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 Resolution: 10 Hz	
*RST Setting	Offset 1 = 400.0 kHz Offset 2 = 600.0 kHz Offsets 3 to 8 off	
<b>Programming Example</b>  <pre> 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.</pre>		

SETup:ORFSpectrum

**SETup:ORFSpectrum:SWITching:FREQuency:POINts?**

Function	GSM	This command queries the number of frequency offsets currently on during an ORFS due to switching measurement. See <a href="#">“Output RF Spectrum Measurement Description” on page 96.</a>
	GPRS	
Query		Range: 0 to 8 Resolution: 1

**SETup:ORFSpectrum:TIMEout:TIME**

Function	GSM	This command selects/queries the timeout value in seconds that will be used for ORFS measurements when the <a href="#">“SETup:ORFSpectrum:TIMEout:STATe”</a> is ON. The units (S   MS) are optional. If no units are specified than units default to S.
	GPRS	
Setting		Range: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example		
<pre>OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:TIME 1" !Sets the timeout value to !15 seconds.</pre>		

**SETup:ORFSpectrum:TIMEout[:STIME]**

Function	GSM	This command sets/queries the timeout value in seconds that will be used for ORFS measurements and turns the timeout state on. The units (S   MS) are optional. If no units are specified than units default to S.
	GPRS	
Setting		Range: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example		
<pre>OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STIME 12" !Sets the timeout value to !10 seconds and the state to on.</pre>		

**SETup:ORFSpectrum:TIMEout:STATE**

Function	GSM	This command selects/queries the ORFS measurement timeout state.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STATE ON" !Sets timeout state to on.		

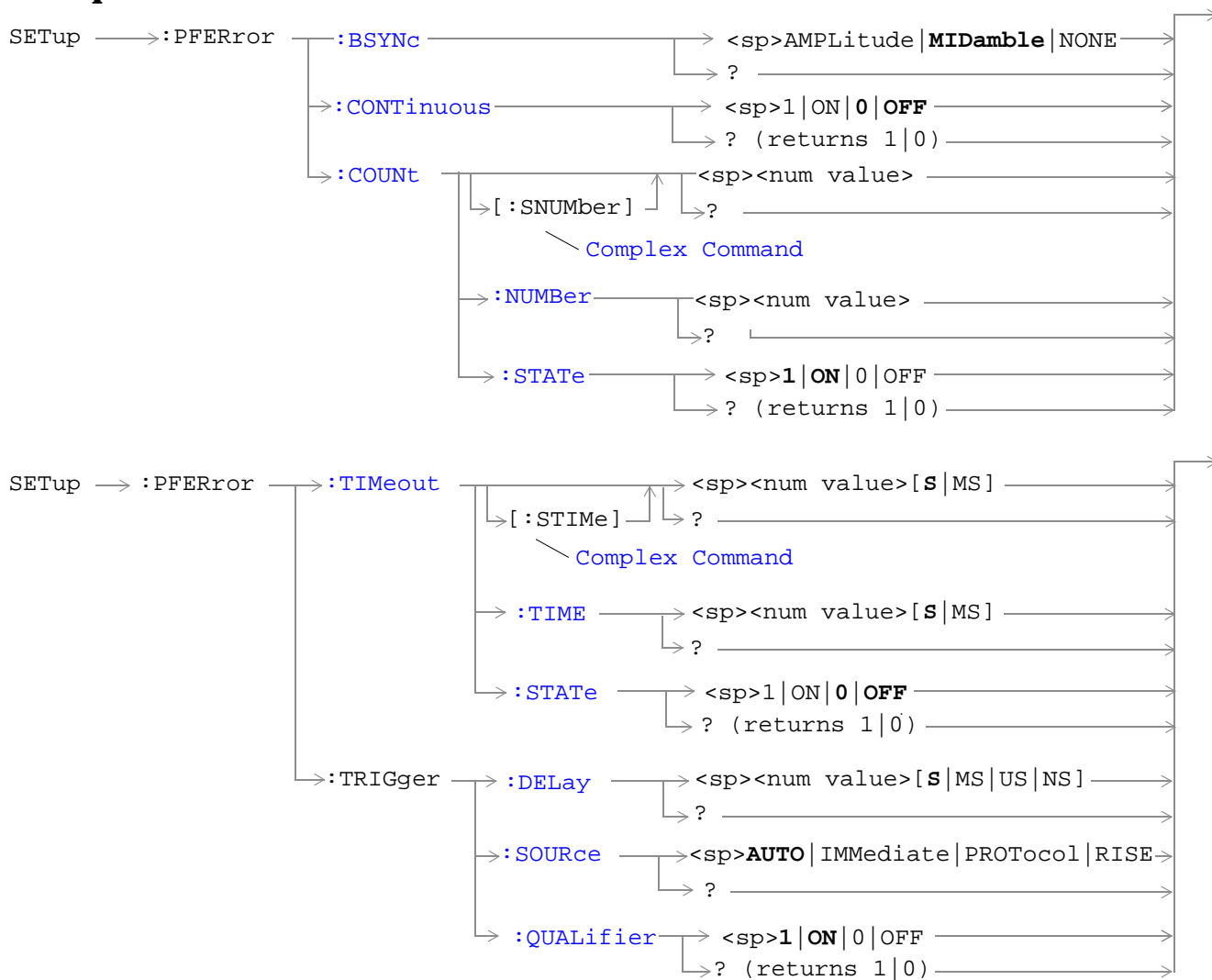
**SETup:ORFSpectrum:TRIGger:DELay**

Function	GSM	This command sets/queries the trigger delay for ORFS measurements. The units (S   MS   US   NS) are optional, if no units are specified than units default to S.
	GPRS	
Setting	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 nanoseconds whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 nanoseconds whichever is greater	
*RST Setting	0 seconds	
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:DELAY 1MS" !Sets the trigger delay value !to 1 millisecond.		

**SETup:ORFSpectrum:TRIGger:SOURce**

Function	GSM	This command selects/queries the trigger source for ORFS measurements. See <a href="#">"Output RF Spectrum Measurement Description"</a> on page 96.
	GPRS	
Setting	Range: AUTO   IMMEDIATE   PROTOCOL   RISE See <a href="#">"Triggering of Measurements"</a> on page 169.	
Query	Range: AUTO   IMM   PROT   RISE	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO" !Sets the trigger source to Auto.		

## SETup:PFERror



“Diagram Conventions” on page 283

**SETup:PFERror:BSYNc**

Function	GSM	This command sets/queries the burst synchronization mode for phase/frequency measurements. See <a href="#">“Burst Synchronization of Measurements”</a> on page 136.
	GPRS	
Setting	Range: MIDamble   AMPLitude   NONE	
Query	Range: MID   AMPL   NONE	
*RST Setting	MIDamble	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:BSYNC MIDAMBLE" !Sets the burst synchronization.		

**SETup:PFERror:CONTInuous**

Function	GSM	This command sets/queries the trigger state for phase/frequency measurements.
	GPRS	
Setting	Single trigger mode = 0   OFF Continuous trigger mode = 1   ON	
Query	0   1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714;"SETUP:PFERROR: CONTINUOUS OFF" !Specifies single trigger mode for !phase/frequency measurements.		

**SETup:PFERror:COUNT[:SNUMBER]**

Function	GSM	This command sets/queries the number of phase/frequency measurements the test set will make and turns the multi-measurement count state on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:COUNT:SNUMBER 100" !Sets the value to 100 and the !state to on		

## SETup:PFERror

### SETup:PFERror:COUNT:NUMBer

Function	GSM	This command sets/queries the number of phase/frequency measurements the Test Set will make when the multi-measurement count state is on.
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
Programming Example		
OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 55" !Sets the multi-measurement count !value to 55.		

### SETup:PFERror:COUNT:STATE

Function	GSM	This command sets/queries the phase/frequency multi-measurement count state.
	GPRS	
Setting		Range: 0 OFF   1 ON
Query		0 1
*RST Setting		0 off
Programming Example		
OUTPUT 714;"SETUP:PFERROR:COUNT:STATE ON" !Turns on multi-measurement mode for !the phase/frequency measurement.		

### SETup:PFERror:TIMEout[:STIME]

Function	GSM	This command sets/queries the phase/frequency measurement timeout value in seconds and sets the timeout state to on. The units (S MS) are optional, if no units are specified then unit default to S.
	GPRS	
Setting		Range: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STIME 3" !Sets the timeout state to on and the !timeout value to 3 seconds.		

**SETup:PFERror:TIMEout:TIME**

Function	GSM	This command sets/queries the timeout value in seconds that will be used for phase/frequency measurements when the timeout state is ON. The units (S MS) are optional, if no units are specified then unit default to S.
	GPRS	
Setting	Range: .1 to 999 seconds Resolution: .1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST Setting	10 seconds	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TIMEOUT:TIME 4" !Sets the timeout value to 4 seconds.		

**SETup:PFERror:TIMEout:STATE**

Function	GSM	This command selects/queries the timeout state for a phase/frequency measurement.
	GPRS	
Setting	0 OFF   1 ON	
Query	0 1	
*RST Setting	0 off	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TIMEOUT:STATE ON" !Sets the timeout state to on for a !Phase/Frequency measurement.		

**SETup:PFERror:TRIGger:DELAy**

Function	GSM	This command sets/queries the trigger delay time in seconds for a phase/frequency measurement. The units (S MS US NS) are optional, if no units are specified then units default to S. See <a href="#">"Phase and Frequency Error Measurement Description"</a> on page 103.
	GPRS	
Setting	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
*RST Setting	0 seconds	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TRIGGER:DELAY 1.2MS" !Sets trigger delay time to !1.2 milli-seconds		

## SETup:PFERror

### SETup:PFERror:TRIGGer:SOURce

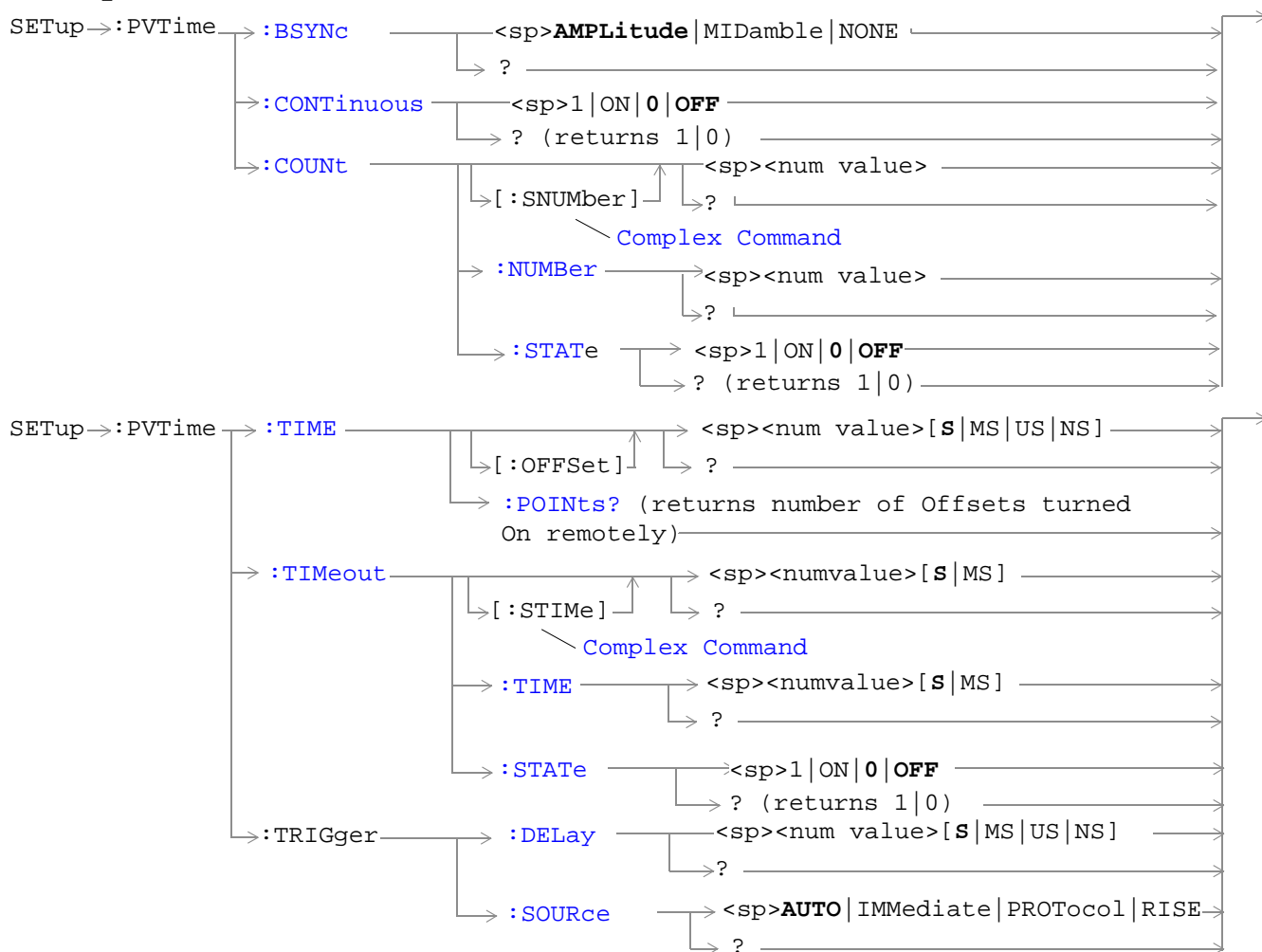
Function	GSM	This command sets/queries the trigger source for phase/frequency measurements. See <a href="#">“Phase and Frequency Error Measurement Description”</a> on page 103.
	GPRS	
Setting	AUTO   PROTOcol   RISE   IMMEDIATE See <a href="#">“Triggering of Measurements”</a> on page 169.	
Query	AUTO   PROT   RISE   IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714; "SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Sets trigger source to AUTO.		

### SETup:PFERror:TRIGGer:QUALifier

Function	GSM	This command selects/queries the trigger qualifier for phase/frequency measurements. See <a href="#">“Trigger Qualifier Description”</a> on page 172.
	GPRS	
Setting	Range: 0   OFF   1   ON	
Query	0   1	
*RST Setting	1   on	
Programming Example		
OUTPUT 714; "SETUP:PFERROR:TRIGGER:QUALIFIER OFF" !Sets trigger qualifier state !to off.		



## SETup:PVTime



“Diagram Conventions” on page 283

## SETup:PVTime

### SETup:PVTime:BSYNc

Function	GSM	This command sets/queries the burst synchronization mode for power versus time measurements. See <a href="#">"Burst Synchronization of Measurements" on page 136.</a>
	GPRS	
Setting	MIDamble   AMPLitude   NONE	
Query	MID   AMPL   NONE	
*RST Setting	MID	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:BSYNC MIDAMBLE" !Selects burst synchronization to on !midamble for power versus time !measurements.		

### SETup:PVTime:CONTInuous

Function	GSM	This command sets/queries the trigger state for power versus time measurements. See <a href="#">"Measurement States" on page 170.</a>
	GPRS	
Setting	Single trigger mode = 0   OFF Continuous trigger mode = 1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:PVTIME: CONTINUOUS OFF" !Specifies single trigger mode for !power versus time measurements.		

### SETup:PVTime:COUNT[:SNUMber]

Function	GSM	This command sets/queries the number of power versus time measurements the test set will make and turns the multi-measurement count state on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:COUNT:SNUMBER 25" !Sets the state to on and the !multi-measurement count value to 25.		

**SETup:PVTime:COUNT:NUMBER**

Function	GSM	This command sets/queries the number of Power vs. Time measurements the test set will make when multi-measurement state is on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
<pre>OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 20" !Sets multi-measurement count value !to 20.</pre>		

**SETup:PVTime:COUNT:STATE**

Function	GSM	This command sets/queries the power versus time multi-measurement count state.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
<pre>OUTPUT 714;"SETUP:PVTIME:COUNT:STATE ON" !Sets multi-measurement count state !to on.</pre>		

## SETup:PVTime:TIME[:OFFSet]

Function	GSM	This command sets/queries the time offsets in seconds for power vs time power measurement, (not the mask measurement).
	GPRS	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 <a href="#">"Power versus Time Measurement Description" on page 109</a> . These values are referenced to the occurrence of bit 0 in a normal burst.  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 Resolution: 1 ns
Query		Range: 0 to 12 comma-separated values ranging from: -50 us to 593 μs and 9.91E+37 if no offsets are specified Resolution: 1 ns
*RST Setting		Time offsets 1 through 12 are on and set to these values: time offset 1 = -28 μs time offset 2 = -18 μs time offset 3 = -10 μs time offset 4 = 0 μs time offset 5 = 321.2 μs time offset 6 = 331.2 μs time offset 7 = 339.2 μs time offset 8 = 349.2 μs time offset 9 = 542.8 μs time offset 10 = 552.8 μs time offset 11 = 560.8 μs time offset 12 = 570.8 μs
<b>Programming Example</b>		
<pre>OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0 US, -18.0 US, -10.0 US, 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 -28.0 US" !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)</pre>		

**SETup:PVTime:TIME:POINts?**

Function	GSM	This command queries the number of Measurement Offset points that are turned on during a power versus time measurement.
	GPRS	This command is useful for determining how many time values will be returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet]" query is sent, and how many power values will be returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 428 command is sent.
Query		Range: 0 to 12 Resolution: 1
*RST Setting		12

**SETup:PVTime:TIMEout[:STIME]**

Function	GSM	This command sets/queries the timeout value in seconds that will be used for power versus time measurements. 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	
Setting		Range: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example		
<pre>OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STIME 4" !Sets the state to on and the timeout !value to 4 seconds.</pre>		

**SETup:PVTime:TIMEout:TIME**

Function	GSM	This command sets/queries the timeout value in seconds that will be used for power versus time measurements. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	
Setting		Range: .1 to 999 seconds Resolution: .1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example		
<pre>OUTPUT 714;"SETUP:PVTIME:TIMEOUT:TIME 6" !Sets the timeout value to 6 seconds.</pre>		

## SETup:PVTime

### SETup:PVTime:TIMEout:STATE

Function	GSM	This command sets/queries power versus time timeout state.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STATE ON" !Sets timeout state to on.		

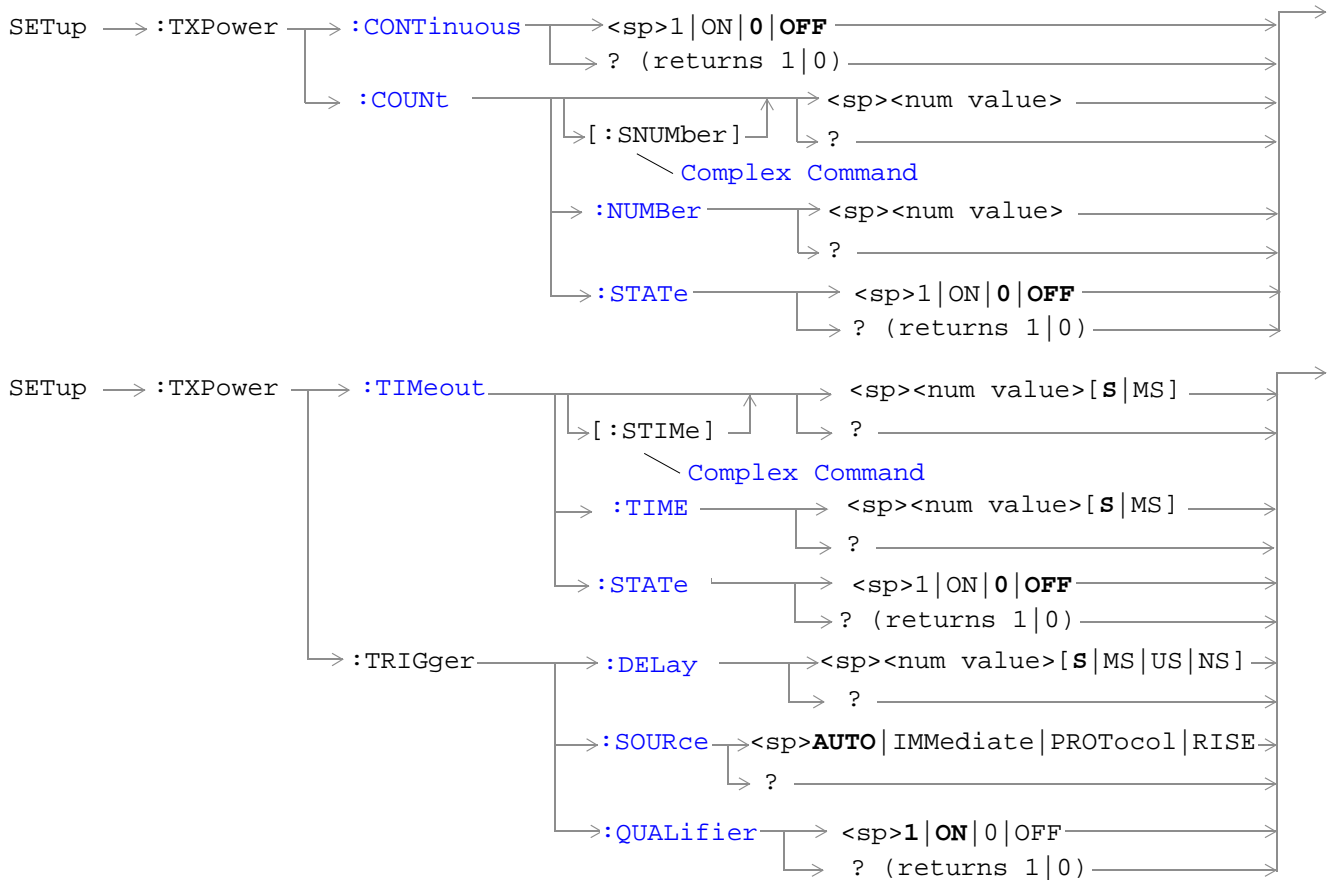
### SETup:PVTime:TRIGger:DELay

Function	GSM	This command selects/queries the trigger delay in seconds for power versus time measurements. 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 Resolution: 5 significant digits or 100 ns, whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
*RST Setting	0 seconds	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY 1.1MS" !Sets trigger delay value to 1.1 !milli-seconds.		

### SETup:PVTime:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for power versus time measurements. See <a href="#">"Triggering of Measurements" on page 169.</a>
	GPRS	
Setting	AUTO   PROTOcol   RISE   IMMEDIATE	
Query	AUTO   PROT   RISE   IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Sets trigger source to Auto.		

## SETup:TXPower



“Diagram Conventions” on page 283

## SETup:TXPower

### SETup:TXPower:CONTInuous

Function	GSM	This command sets/queries the trigger state for TX carrier power measurements.
	GPRS	
Setting	Single trigger mode = 0   OFF Continuous trigger mode = 1   ON	
Query	0   1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER: CONTINUOUS OFF" !Specifies single trigger mode for !TX Carrier Power measurements.		

### SETup:TXPower:COUNT[:SNUMber]

Function	GSM	This command sets/queries the number of TX carrier power measurements the test set will make and turns the multi-measurement count state on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:COUNT:SNUMBER 99" !Sets the state to on and the !multi-measurement count value !to 99.		

### SETup:TXPower:COUNT:NUMBer

Function	GSM	This command sets/queries the number of TX power measurements the test set will make when the multi-measurement state is on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 5" !Sets the TX Power multi-measurement !count number to 5.		



**SETup:TXPower:COUNT:STATE**

Function	GSM	This command sets/queries the TX power multi-measurement count state.
	GPRS	
Setting	0 Off   1 On	
Query	0 1	
*RST Setting	0 off	
Programming Example		
<pre>OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE ON" !Sets the multi-measurement count !state to on.</pre>		

**SETup:TXPower:TIMEout[:STIME]**

Function	GSM	This command sets/queries TX carrier power measurement timeout value and also sets the state to on. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	
Setting	Range: .1 to 999 seconds Resolution: .1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST Setting	10 seconds	
Programming Example		
<pre>OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:STIME 20" !Sets the state to on and the !timeout value to 20 seconds.</pre>		

**SETup:TXPower:TIMEout:TIME**

Function	GSM	This command sets/queries the timeout value in seconds that will be used for TX power measurements. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	
Setting	Range: .1 to 999 seconds Resolution: .1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST Setting	10 seconds	
Programming Example		
<pre>OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME 20" !Sets the TX power measurement !timeout to 20 seconds.</pre>		

## SETup:TXPower

### SETup:TXPower:TIMEout:STATE

Function	GSM	This command selects/queries TX carrier power measurement timeout state.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714; "SETUP:TXPOWER:COUNT:STATE 1" !Turns the TX carrier power timeout !state on.		

### SETup:TXPower:TRIGger:DELay

Function	GSM	This command sets/queries the trigger delay in seconds for TX carrier power measurements. 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 Resolution: 5 significant digits or 100 ns, whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
*RST Setting	zero seconds	
Programming Example		
OUTPUT 714; "SETUP:TXPOWER:TRIGGER:DELAY 1.5MS" !Set trigger delay time to !1.5 milliseconds		

### SETup:TXPower:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for TX carrier power measurements. See <a href="#">"Triggering of Measurements" on page 169.</a>
	GPRS	
Setting	AUTO   PROTOcol   RISE   IMMEDIATE	
Query	AUTO   PROT   RISE   IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714; "SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Sets trigger source to AUTO.		

**SETup:TXPower:TRIGger:QUALifier**

Function	GSM	This command sets/queries the trigger qualification for TX carrier power measurements. When ON, an automatic trigger re-arm occurs if a measurement is triggered when no valid signal (burst) is present. See <a href="#">"Trigger Qualifier Description" on page 172.</a>
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	1   on	
<b>Programming Example</b> <pre> OUTPUT 714; "SETUP:TXPOWER:TRIGGER:QUALIFIER ON" !Sets trigger qualifier state !to on. </pre>		

---

## 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 525](#)

[“STATus:PRESet” on page 543](#)

[“STATus:QUEStionable” on page 544](#)

[“Standard Event Status Register” on page 560](#)

[“Status Byte Register” on page 559](#)

### Status Register Bit Definitions

[“Status Byte Register Bit Assignments” on page 559](#)

[“Standard Event Status Register Bit Assignment” on page 561](#)

[“STATus:QUEStionable Condition Register Bit Assignment” on page 548](#)

[“STATus:QUEStionable:CALL Condition Register Bit Assignment” on page 549](#)

[“STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment” on page 550](#)

[“STATus:QUEStionable:ERRors Condition Register Bit Assignment” on page 552](#)

[“STATus:QUEStionable:ERRors:GSM Condition Register Bit Assignment” on page 556](#)

[“STATus:QUEStionable:HARDware Condition Register Bit Assignment” on page 558](#)

[“STATus:OPERation Condition Register Bit Assignment” on page 529](#)

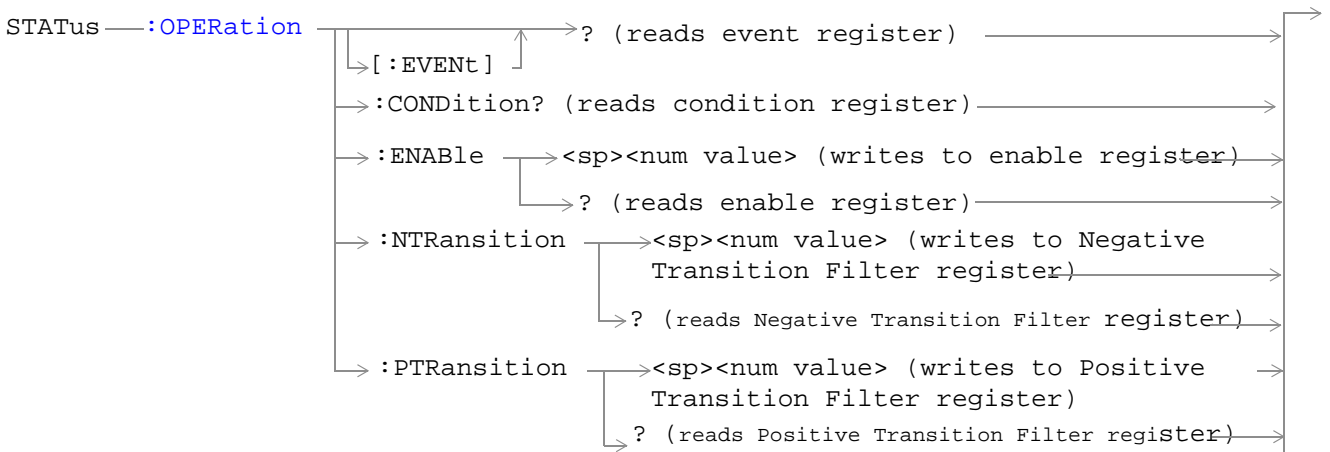
[“STATus:OPERation:CALL Condition Register Bit Assignment” on page 531](#)

[“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 534](#)

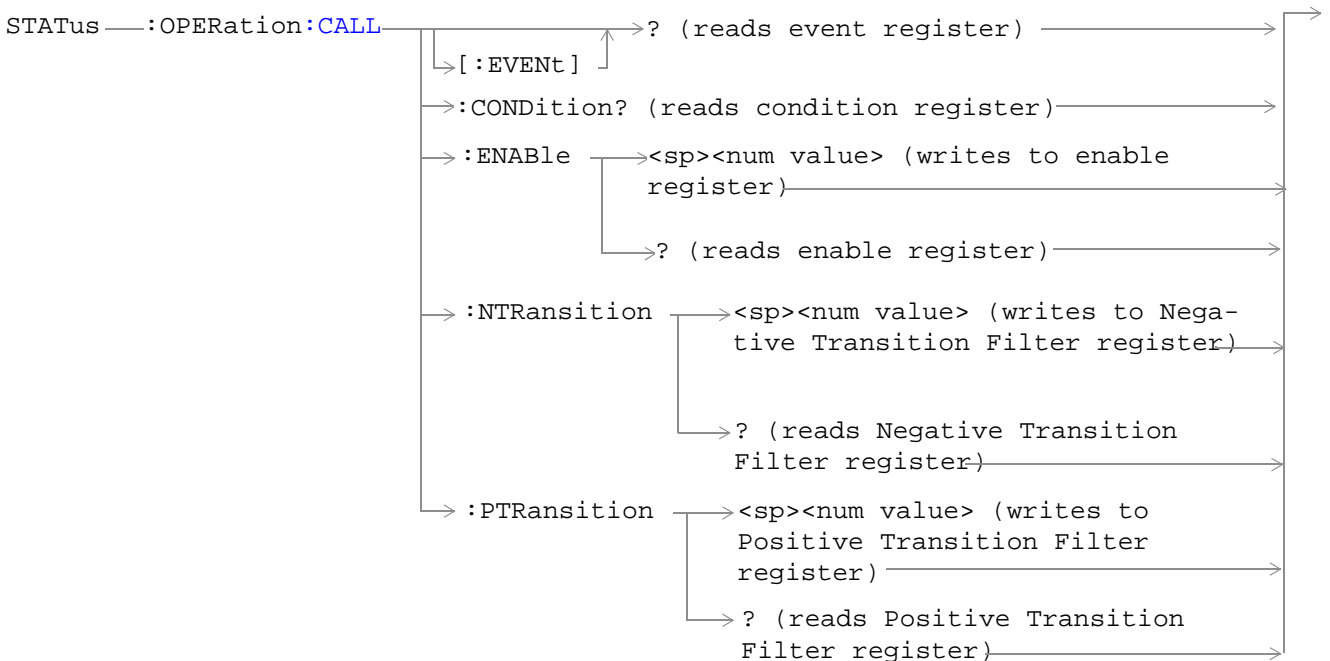
[“STATus:OPERation:NMRReady Condition Register Bit Assignment” on page 536](#)

[“STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 540](#)

## STATUS:OPERation

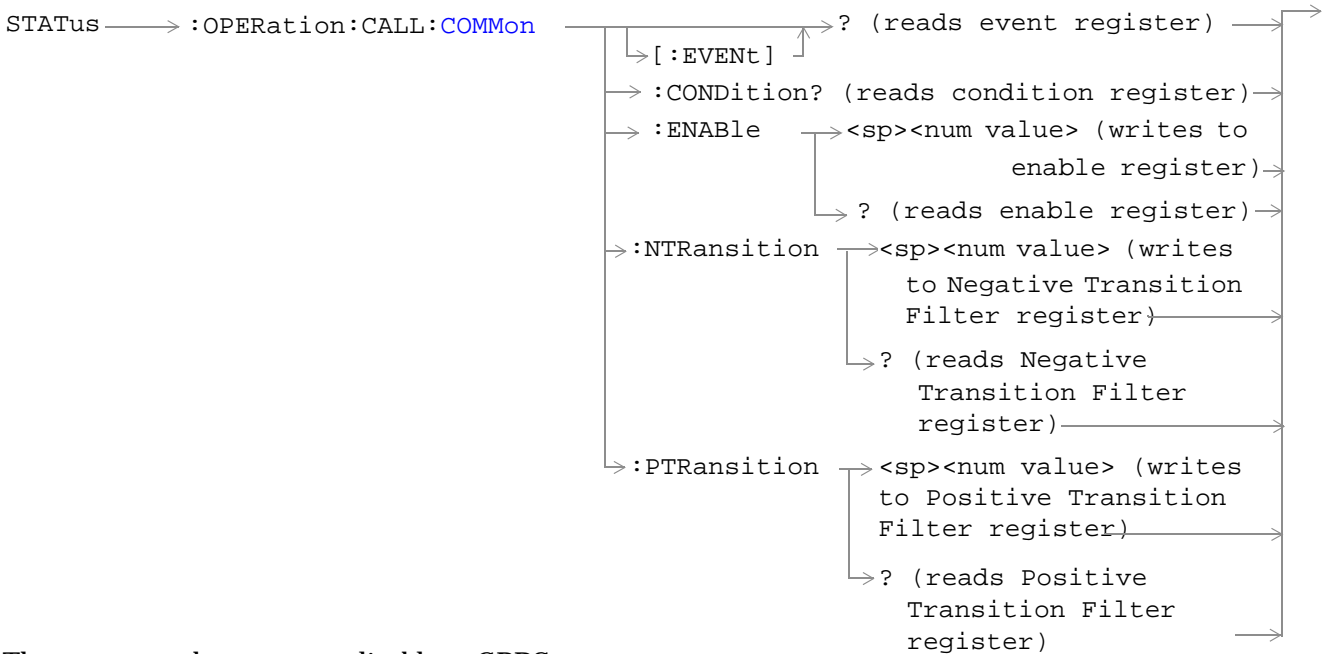


These commands are not applicable to GPRS.

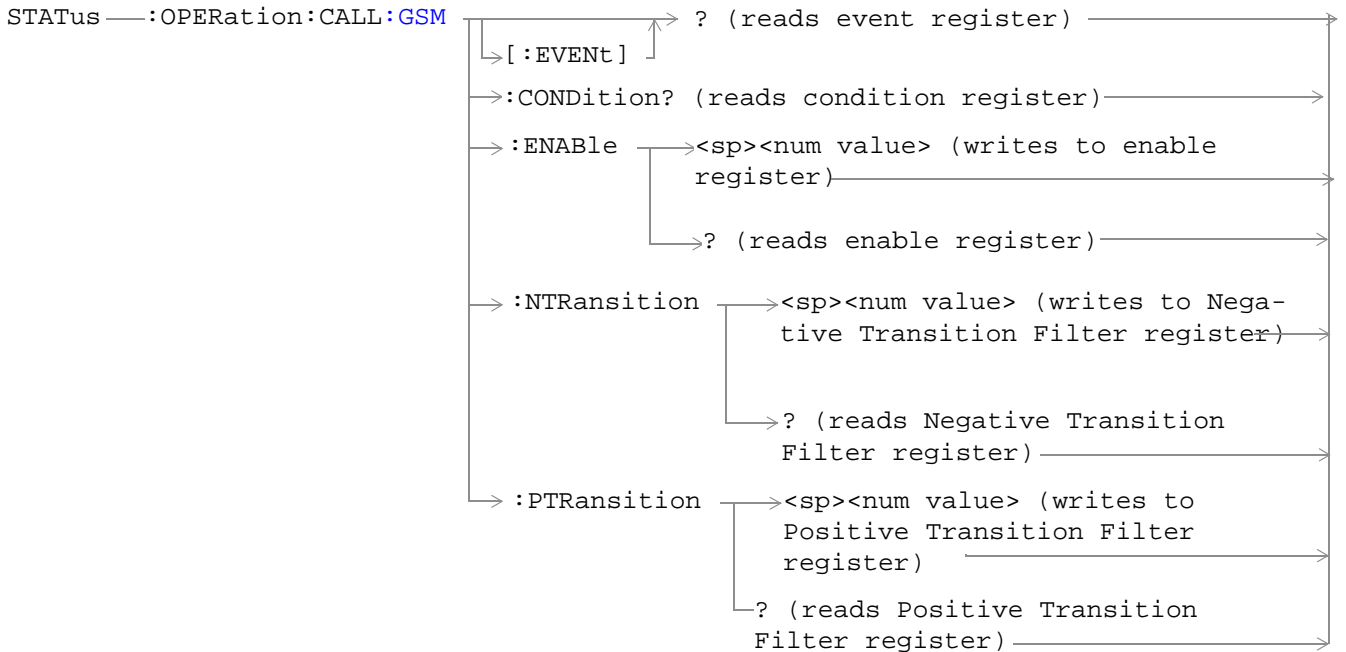


These commands are not applicable to GPRS.

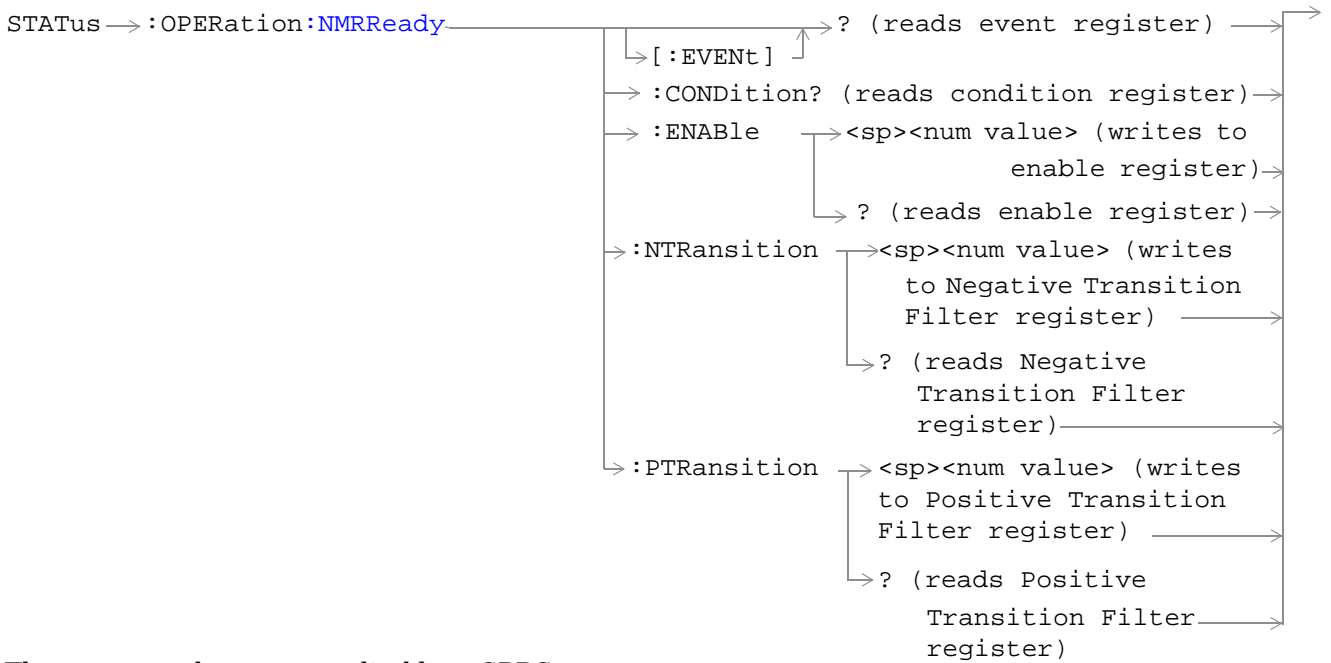
## STATUS:OPERation



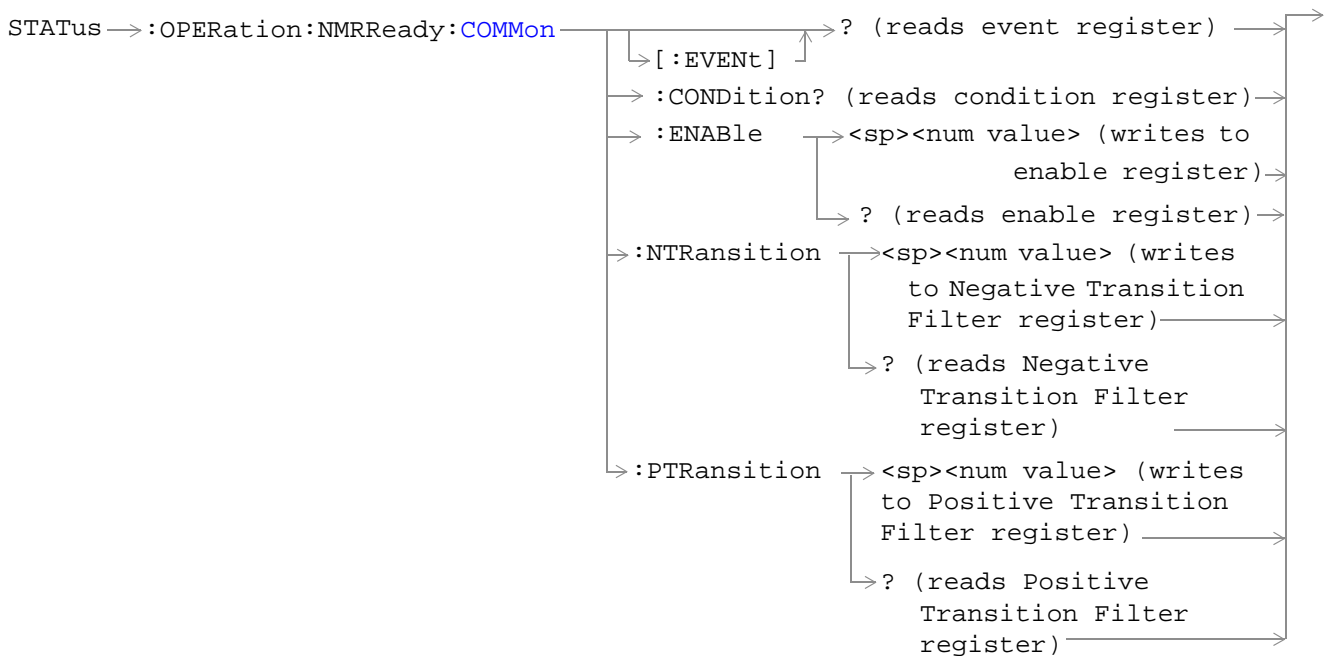
These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

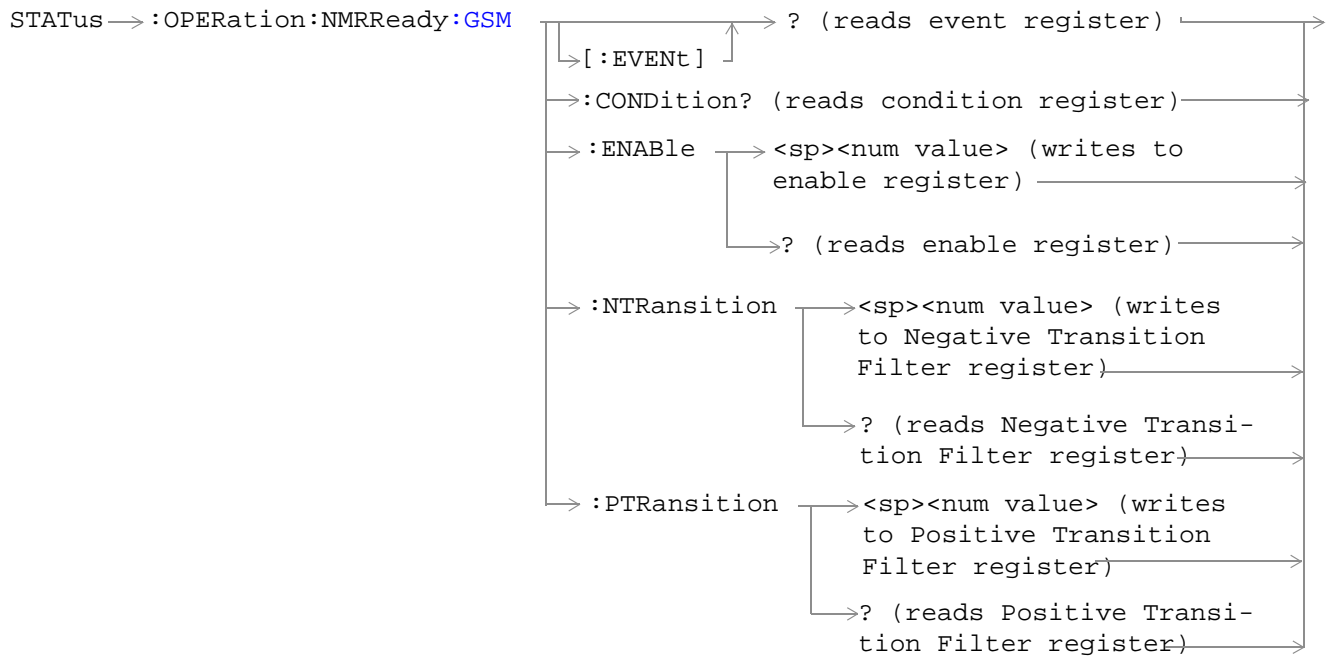


These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

## STATUS:OPERation



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)



**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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Processing SYSTem:SYNChronized Command	This condition bit will be "pulsed" by the SYSTem:SYNChronized command. This will allow the status system to indicate that the input buffer is synchronized to the point where this command is parsed and that all prior sequential commands are completed and all prior overlapped commands have started.
11	2048	Reserved for future use	This bit will always be 0.
10	1024	CALL Summary	This bit is the summary message bit for the OPERation:CALL register.
9	512	NMRReady (New Measurement Result Ready) Summary	This bit is the summary message bit for the OPERation:NMRReady register.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	Reserved for future use.	This bit will always be 0.
0	1	Extension Bit	This bit will always be 0.

## STATUS:OPERation

### 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 Transition
!Filter Register for bit 1
```

### STATUS:OPERation:CALL Condition Register Bit Assignment

The STATUS:OPERation:CALL register bits will be used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	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 will always be 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 subsystem is not applicable to GPRS.

The STATUS:OPERation:CALL:COMMON register bits will be used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.)	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Registering (MS initiated)	This bit is set to a 1 when the Mobile Station initiates registration.
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 will always be 0.
7	128	BS Originating	This bit will be a 1 when: <ul style="list-style-type: none"> <li>Active Cell mode - the call processing state leaves the idle state</li> <li>Test mode - the test set has noted a base station origination.</li> </ul>
6	64	Call Control Status Changing	This bit is set to a 1 when the call control status change detector has been armed.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Call Control Status Alerting	This bit will be a 1 when the test set is in the call alerting state (ringing).
2	4	Call Control Status Connected	This bit will be a 1 when the test set is in the call connected state.
1	2	Call Control Status Idle	This bit will be a 1 when the test set is in the call idle state.
0	1	Extension Bit	This bit will always be 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:GSM Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:OPERation:CALL:GSM register bits will be used to indicate status of processes that occur during normal GSM call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	BS Disconnecting	This bit will be a 1 when: <ul style="list-style-type: none"> <li>Active Cell mode - the call processing state reaches (or is in) the idle state</li> <li>Test mode - the test set has noted a base station termination.</li> </ul>
7	128	BS Originating	This bit will be a 1 when: <ul style="list-style-type: none"> <li>Active Cell mode - the call processing state leaves the idle state</li> <li>Test mode - the test set has noted a base station origination.</li> </ul>
6	64	Call Control Status Changing	This bit is set to a 1 when the call control status change detector has been armed.
5	32	TCH Assignment in Progress	This bit will be a 1 when: <ul style="list-style-type: none"> <li>The channel assignment is successfully completed (when a call is established).</li> <li>The test set notes a change in the TCH ARFCN, cell band, TCH timeslot, or mobile station timing advance.</li> <li>An error message is generated.</li> </ul>
4	16	BCH Changing	This bit will be a 1 when: <ul style="list-style-type: none"> <li>The downlink signal is transmitting on the new broadcast channel.</li> <li>The test set has noted a change in cell band.</li> </ul>

Bit Number	Binary Weighting	Condition	Description
3	8	Call Control Status Alerting	This bit will be a 1 when the test set is in the call alerting state (ringing).
2	4	Call Control Status Connected	This bit will be a 1 when the test set is in the call connected state.
1	2	Call Control Status Idle	This bit will be a 1 when the test set is in the call idle state.
0	1	Extension Bit	This bit will always be 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 Transition
!Filter Register for bit 1
    
```

**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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary bit for the OPERation:NMRReady:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary bit for the OPERation:NMRReady:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the OPERation:NMRReady:AMPS register.
2	4	GSM Summary bit	This bit is the summary bit for the OPERation:NMRReady:GSM register.
1	2	COMMon Summary bit	This bit is the summary bit for the OPERation:NMRReady:COMMon register.
0	1	Extension Bit	This bit will always be 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 Register
!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 subsystem is not applicable to GPRS.

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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	Audio Analyzer	This is the summary bit for the STATUS:OPERation:NMRReady:COMMON Audio Analyzer register.
0	1	Extension Bit	This bit will always be 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 Transition
!Filter Register for bit 1
```

**STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	DPOWer New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Measurement States" on page 170.</a>
9	512	I/Q Tuning New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Measurement States" on page 170.</a>
8	256	BERRor New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Measurement States" on page 170.</a>
7	128	FBERRor New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Measurement States" on page 170.</a>
6	64	DAUDio New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">"Measurement States" on page 170.</a>

Bit Number	Binary Weighting	Condition	Description
5	32	AAUDio New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Measurement States” on page 170</a>.</p>
4	16	ORFSpectrum New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Measurement States” on page 170</a>.</p>
3	8	PFERror New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Measurement States” on page 170</a>.</p>
2	4	PVTime New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Measurement States” on page 170</a>.</p>
1	2	TXPower New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Measurement States” on page 170</a>.</p>
0	1	Extension Bit	This bit will always be 0.

STATUS:OPERation

## 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 Transition
!Filter Register for bit 1
```

## Related Topics

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["Triggering of Measurements" on page 169](#)

\*\*\*\*\*

## STATus:PRESet

STATus → :PRESet

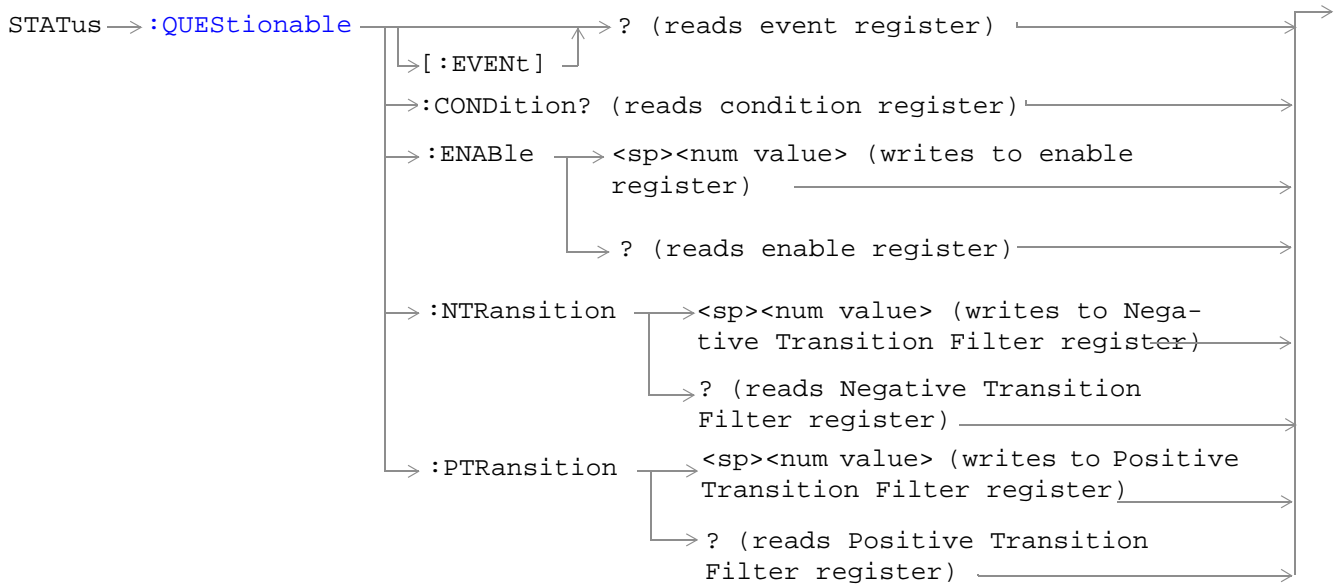
This command is not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

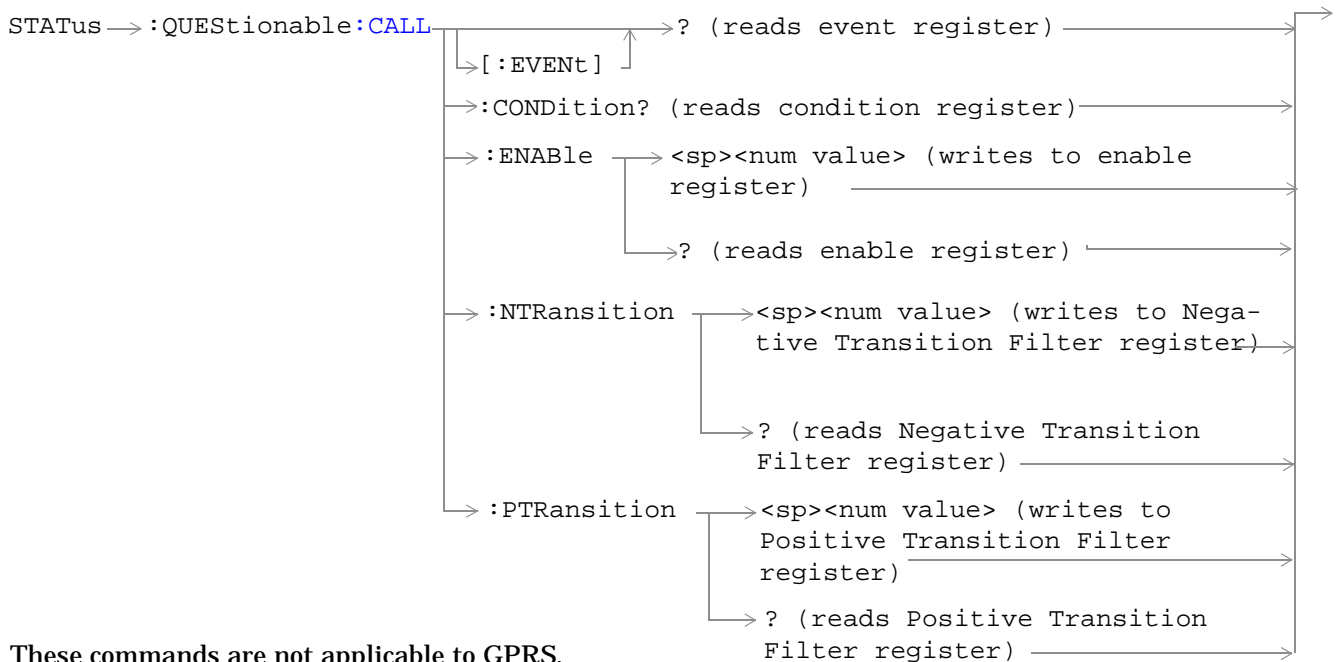
### STATus:PRESet

Function	GSM	Presets the Status Subsystem Sets all Enable Registers to 0 (not enabled). Sets all Positive Transition Registers (PTR) to 1 (positive transitions enabled). Sets all Negative Transition Registers (NTR) to 0 (negative transitions disabled).
	GPRS	This command is not applicable to GPRS.

## STATUS:QUESTIONABLE

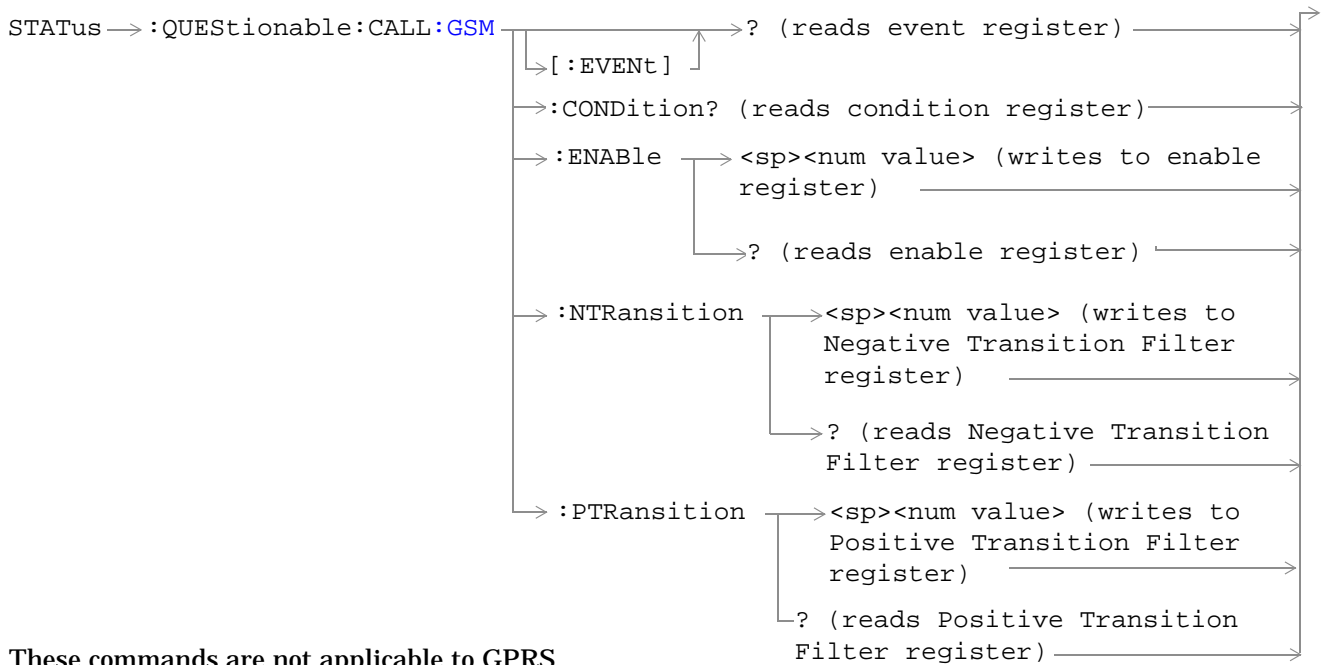


These commands are not applicable to GPRS.

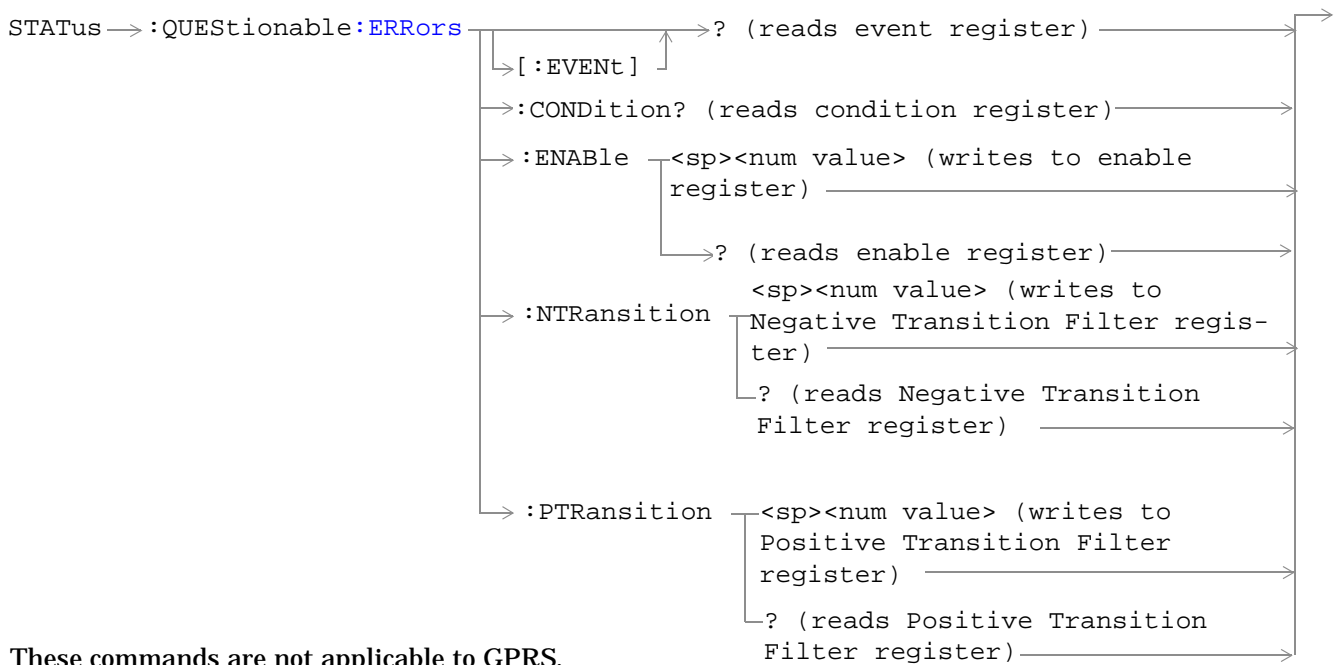


These commands are not applicable to GPRS.



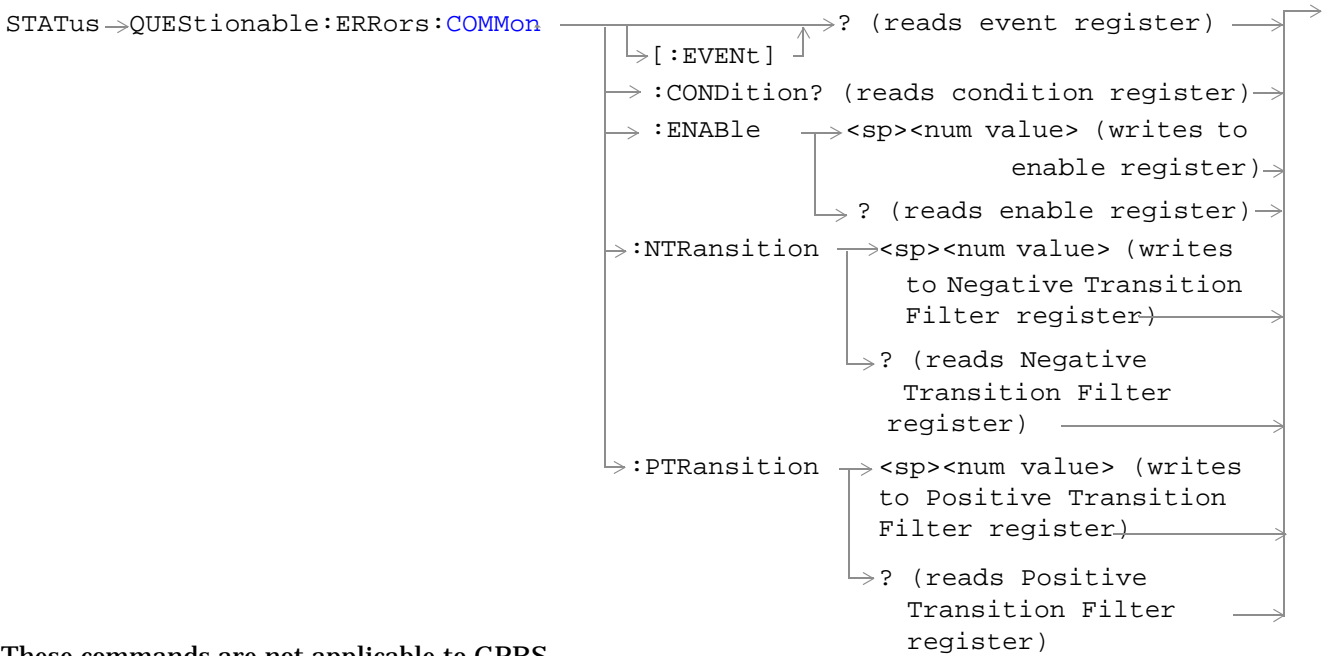


These commands are not applicable to GPRS.

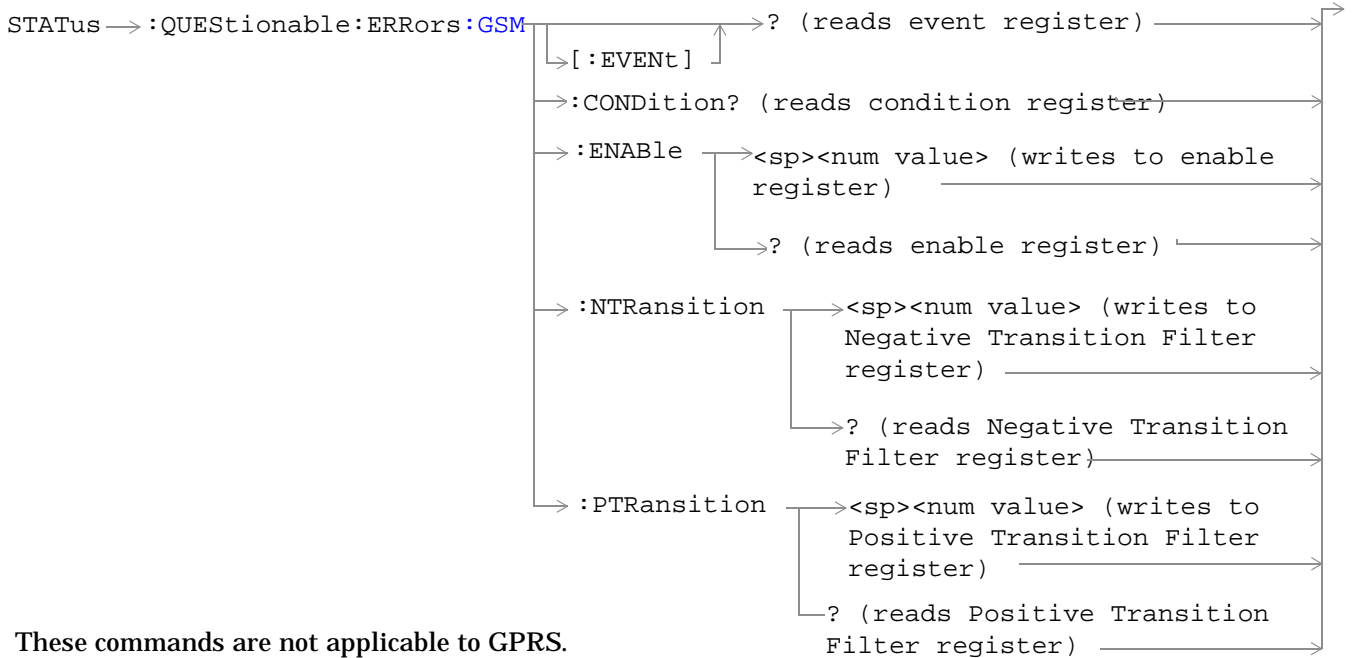


These commands are not applicable to GPRS.

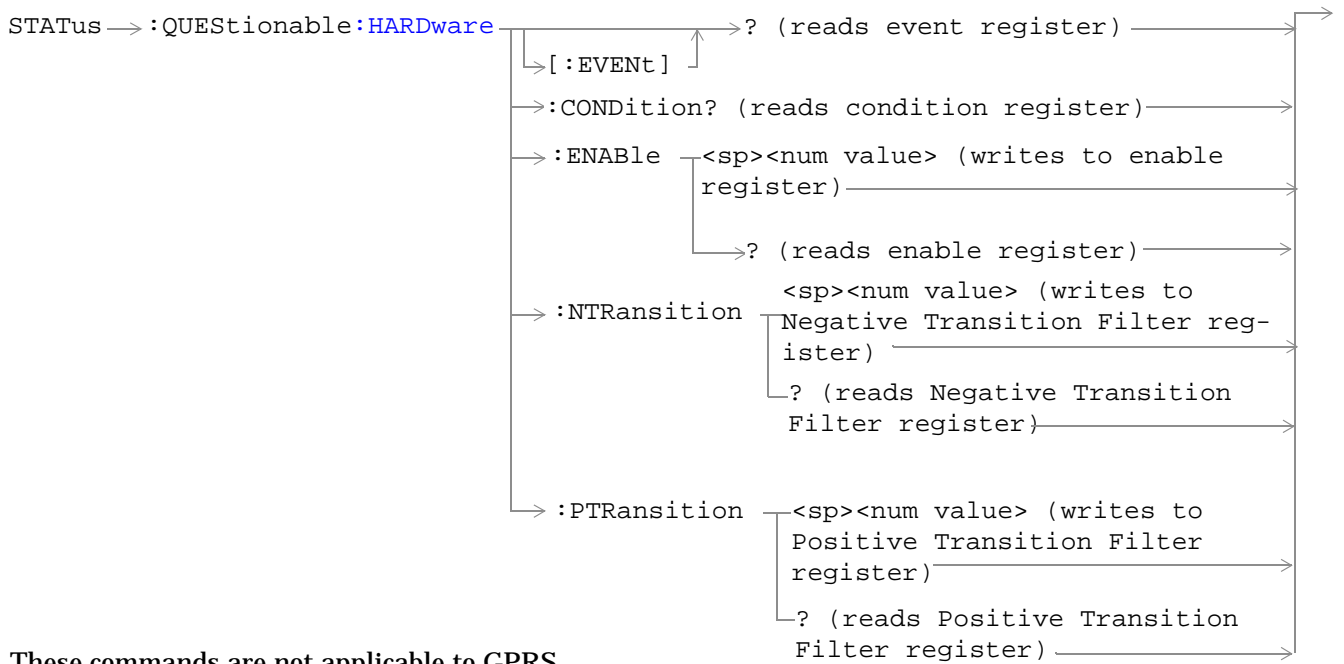
STATUS:QUESTIONable



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 283](#)

### STATUS:QUESTIONable Condition Register Bit Assignment

The STATUS subsystem is not applicable to GPRS.

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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be set to 0.
11	2048	QUESTIONable:HARDware summary	This bit is the summary message bit for the STATUS:QUESTIONable:HARDware register.
10	1024	QUESTIONable:CALL summary	This bit is the summary message bit for the STATUS:QUESTIONable:CALL register.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	QUESTIONable:ERRors summary	This bit is the summary message bit for the STATUS:QUESTIONable:ERRors register.
0	1	Reserved for future use.	This bit will always be 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 subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:CALL registers will contain information about which event(s) occurred during call processing that indicate what call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:GSM register.
1	2	COMMON Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:COMMON register.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONable:CALL Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:CALL:EVENT?" !Queries and clears the Questionable
!Call Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CONDITION?" !Queries and clears the Questionable
!Call Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:ENABLE 1024" !Sets the Questionable
!Call Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:NTRANSITION 2" !Sets the Questionable Call
!Negative Transition Filter Register
!for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:PTRANSITION 2" !Sets the Questionable Call
!Positive Transition Filter Register
!for bit 1
    
```

**STATUS:QUESTIONable:CALL:GSM Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONable:CALL:GSM registers will 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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	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.

Bit Number	Binary Weighting	Condition	Description
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.  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.  If the timer expires, newly allocated channels are released.
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 multiframe (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 will always be 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 subsystem is not applicable to GPRS.

The STATUS:QUESTIONable:ERRORs register bits will be used to indicate information about test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary message bit for the QUESTIONable:ERRORs:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the QUESTIONable:ERRORs:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the QUESTIONable:ERRORs:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the QUESTIONable:ERRORs:GSM register.
1	2	COMMon Summary bit	This bit is the summary message bit for the QUESTIONable:ERRORs:COMMon register.
0	1	Extension Bit	This bit will always be 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 subsystem is not applicable to GPRS.

The STATUS:QUESTIONable:ERRORs:COMMON register bits will be used to indicate information about the COMMON test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	+900 Errors	The condition bit will be 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 will be 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 will be pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit will be 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 will be 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 will be 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 will be 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 will be 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 will be pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONABLE:ERRORS:COMMON Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:EVENT?" !Queries and clears the Questionable
!Errors Common Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:CONDITION?" !Queries the and clears the
!Questionable Errors
!Common Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:ENABLE 1024" !Sets the Questionable
!Errors Common Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:NTRANSITION 2" !Sets the Questionable Errors
!Common Negative Transition
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:PTRANSITION 2" !Sets the Questionable Errors
!Common Positive Transition
!Register for bit 1
    
```

**STATUS:QUESTIONable:ERRORs:GSM Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONable:ERRORs:GSM register bits will be 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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	+900 Errors	The condition bit will be 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 will be 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 will be pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit will be 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 will be 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 will be 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 will be 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 will be 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 will be pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONABLE:ERRORS: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 subsystem is not applicable to GPRS.

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 will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Power-up Self Test(s) Failed	This bit will be a 1 if the power-up self tests failed.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	Reserved for future use.	This bit will always be 0.
0	1	Extension Bit.	This bit will always be 0.

**Program Example - STATUS:QUESTIONable:HARDware Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:EVENT?" !Queries and clears the Questionable
!Hardware Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:CONDITION?" !Queries and clears the Questionable
!Hardware Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:ENABLE 1024" !Sets the Questionable
!Hardware Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:NTRANSITION 2" !Sets the Questionable
!Hardware Negative Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:PTRANSITION 2" !Sets the Questionable
!Hardware Positive Transition Filter
!Register for bit 1
    
```

## Status Byte Register

\*STB?

\*STB? 

NOTE 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. Summarizes the STATus: OPERation Status Register, which fans out to the NMRReady and CALL Status Registers.
6	64	RQS (SRQ TRUE?)/Master Summary Status	RQS is read by a serial poll (SPOLL). Master Summary Status is read by a *STB? query - defined by IEEE 488.2
5	32	Standard Event Status Register	Summarizes the Standard Event Status Register
4	16	Message Available	SCPI - Defined
3	8	STATus: QUEStionable Status Register	This bit number is not applicable to GPRS. Summary Message comes from the STATus: QUEStionable Status Register, which fans out to the CALL and HARDware Status Registers.
2	4	Error/ Event Queue	SCPI - Defined
1	2	Reserved	
0	1	Reserved	

### Program Example - Status Byte Register Bit Assignments

```
OUTPUT 714;"*STB?" !Queries the Status Byte.
```

## Standard Event Status Register

### \*ESR?

\*ESR? —————> Reads and clears the Std Event Status Register. ↗

### \*ESE?

\*ESE? —————> Reads the Std Event Status Register Enable Register ↗

### \*ESE

\*ESE —————> Writes to the Std Event Status Register Enable Register ↗

[“Diagram Conventions” on page 283](#)



## Standard Event Status Register Bit Assignment

Bit Number	Binary Weighting	Condition	Description
15	32768	Reserved by IEEE.	This bit will always be 0.
14	16384	Reserved by IEEE.	This bit will always be 0.
13	8192	Reserved by IEEE.	This bit will always be 0.
12	4096	Reserved by IEEE.	This bit will always be 0.
11	2048	Reserved by IEEE.	This bit will always be 0.
10	1024	Reserved by IEEE.	This bit will always be 0.
9	512	Reserved by IEEE.	This bit will always be 0.
8	256	Reserved by IEEE.	This bit will always be 0.
7	128	Power On	This bit is set to 1 if the power supply has been turned off and on since the last time this register was read or otherwise cleared. Defined in "IEEE Std. 488.2-1992", 11.5.1.1.2
6	64	Reserved for future use.	This bit will always be 0.
5	32	Command Error	This bit is set to 1 if the test set detects an error while trying to process a command. The following events cause a command error: <ul style="list-style-type: none"> <li>• An IEEE 488.2 syntax error. The test set received a message that did not follow the syntax defined by the standard.</li> <li>• A semantic error. For example the test set received an incorrectly spelled command.</li> <li>• The test set received a group execution trigger (GET) inside a program message</li> </ul>
4	16	Execution Error	This bit is set to 1 if the test set detects an error while trying to execute a command. The following events cause an execution error: <ul style="list-style-type: none"> <li>• A &lt;PROGRAM DATA&gt; element received in a command is outside the legal range for the test set, or it is inconsistent with the operation of the test set.</li> <li>• The test set could not execute a valid command due to some test set hardware/firmware condition.</li> </ul>
3	8	Device Dependent Error	This bit is set to 1 if a test set operation does not execute properly due to an internal condition (such as, overrange). This bit indicates that the error was not a command, query, or execution error.

## Standard Event Status Register

Bit Number	Binary Weighting	Condition	Description
2	4	Query Error	This bit is set to 1 if an error has occurred while trying to read the test set's output queue. The following events cause a query error: <ul style="list-style-type: none"><li>• An attempt is made to read data from the output queue when no data is present or is pending.</li><li>• Data in the output queue has been lost. An example of this would be an output queue overflow.</li></ul>
1	2	Reserved for future use.	This bit will always be 0.
0	1	Operation Complete	This bit is set to 1 when the test set has completed all pending operations and is ready to accept new commands. This bit is only generated in response to the *OPC IEEE 488.2 common command.

### Program Example - Standard Event Status Register

```
OUTPUT 714:"*ESR?" !Queries (reads) the Standard Event Status Register.
```

---

# SYSTEM Subsystem

## Description

The SYSTEM subsystem performs system configuration and non-measurement related functions such as:

- Setting the GPIB and LAN addresses
- Setting Date and Time
- Correcting for RF path loss
- Presetting the test set

## Syntax Diagrams and Command Descriptions

[“SYSTEM:APPLication” on page 564](#)

[“SYSTEM:BEEPer” on page 569](#)

[“SYSTEM:COMMunicate” on page 570](#)

[“SYSTEM:CONFigure” on page 574](#)

[“SYSTEM:CORRection” on page 575](#)

[“SYSTEM:CURRent:TA” on page 582](#)

[“SYSTEM:ERRor?” on page 584](#)

[“SYSTEM:FTRigger” on page 585](#)

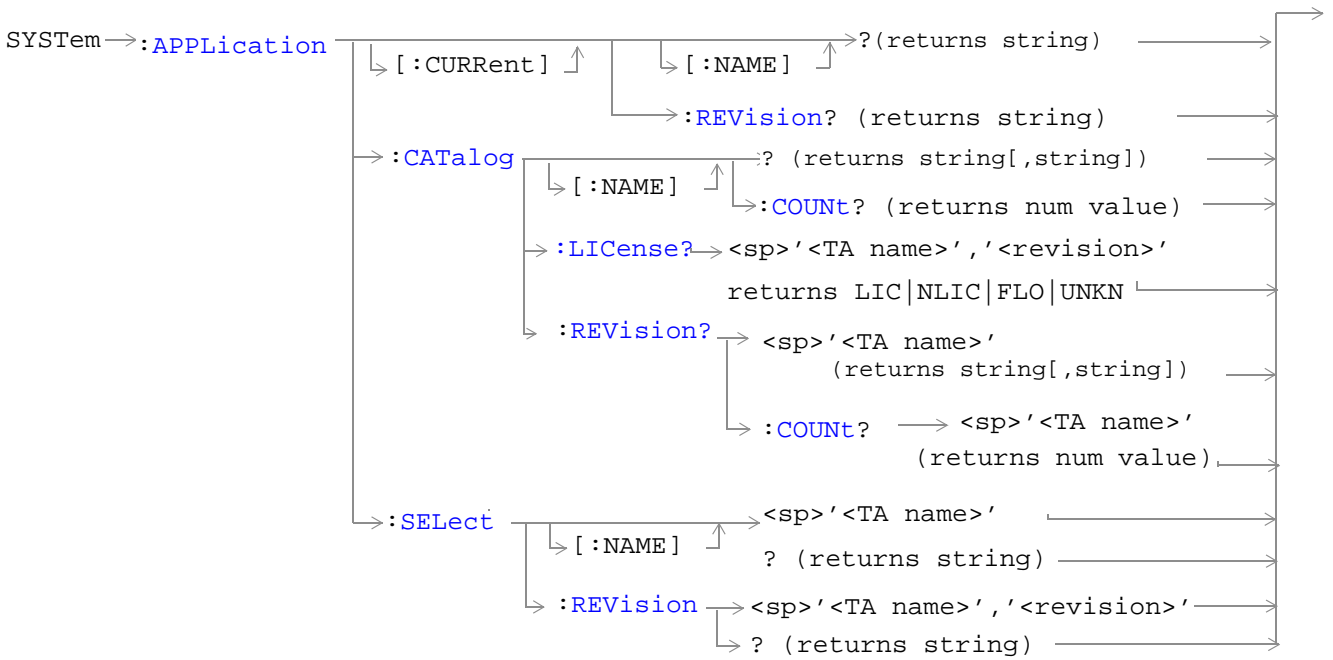
[“SYSTEM:MEASurement” on page 587](#)

[“SYSTEM:PRESet” on page 588](#)

[“SYSTEM:ROSCillator” on page 590](#)

[“SYSTEM:SYNChronized” on page 591](#)

# SYSTem:APPLication



“Diagram Conventions” on page 283

**SYSTem:APPLication:CATalog:LIcense? '<test application name>','<revision>'**

Function	GSM	Query the license status for a selected revision.
	GPRS	<p>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.</p> <p>The returned values are:</p> <ul style="list-style-type: none"> <li>• "LIC" indicates this is a licensed test application.</li> <li>• "NLIC" indicates this is not a licensed test application.</li> <li>• "UNKN" indicates that license status is unknown.</li> </ul>
Query		Range: LIC   NLIC   UNKN
Programming Example		
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.00'"		

**SYSTem:APPLication:CATalog:REVisIon? '<test application name>'**

Function	GSM	Query the test set for all of the revision numbers stored on the test set's hard drive. You must specify a test application.
	GPRS	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.
Query		Range: One or more comma separated strings or a null string
Programming Example		
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'AMPS/136 MOBILE TEST'"		

**SYSTem:APPLication:CATalog:REVisIon:COUnT? '<test application name>'**

Function	GSM	Query the test set for the number of revisions present on the hard disk for a specified test application. Up to 30 revisions can be stored for a test application.
	GPRS	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.
Query		Range: 0 through 30
Programming Example		
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? 'AMPS/136 MOBILE TEST'"		

**SYSTem:APPLication:CATalog[:NAME]?**

Function	GSM	Query the test set for all of the names of the test applications stored on the hard drive.
	GPRS	This query returns one or more strings, each string is separated by a comma.
Query		Range: AMPS/136 Mobile Test IS-2000 Mobile Test Mode GSM Mobile Test GPRS Mobile Test
Programming Example OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:NAME?"		

**SYSTem:APPLication:CATalog[:NAME]:COUNT?**

Function	GSM	Query the test set for the total number test application names stored on the hard drive. Up to 30 test applications can be stored.
	GPRS	
Query		Range: 0 through 30
Programming Example OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"		

**SYSTem:APPLication[:CURRent][:NAME]?**

Function	GSM	Query the test set for the name of the currently running test application.
	GPRS	
Query		Range: Any string up to 25 characters including null. AMPS/136 Mobile Test IS-2000 Mobile Test Mode GSM Mobile Test GPRS Mobile Test null string
Programming Example OUTPUT 714; "SYSTEM:APPLICATION:CURRENT:NAME?"		

**SYSTem:APPLication[:CURRent]:REVIision?**

Function	GSM	Query 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.
<b>Programming Example</b> OUTPUT 714; "SYSTEM:APPLICATION:CURRENT:REVISION?"		

**SYSTem:APPLication:SElect[:NAME] '<test application name>'**

Function	GSM	<p>Selects a test application and reboots the test set. This will switch the test application to the revision already selected. There is no need to re-select the revision before switching. The reboot process takes about 1 minute.</p> <p>Queries the test set for the test application that is selected and will run after the next reboot of the test set.</p> <p>The test application name must be entered as it appears in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <hr/> <p><b>NOTE</b>            Selecting the correct name and the desired revision of a test application is important. This information should be reviewed before proceeding. The directions for how to determine test application name and revision are found in this document.</p> <hr/>
	GPRS	
Setting		Range: AMPS/136 Mobile Test IS-2000 Mobile Test Mode GSM Mobile Test GPRS Mobile Test
Query		Range: AMPS/136 Mobile Test IS-2000 Mobile Test Mode GSM Mobile Test GPRS Mobile Test null string

```

Programming Example
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME `AMPS/136 MOBILE TEST`"
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME?"
    
```

**SYSTem:APPLication:SElect:REVision '<test application name>','<revision>'**

Function	GSM	<p>Selects a test application revision and a test application.</p> <p>The revision does not need to be set in order to switch test applications. The only time you select revisions is to change revisions.</p> <p>Queries the test set for the revision of a specified test application.</p> <p>The test application name and revision must be entered as they appear in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <hr/> <p><b>NOTE</b> GSM Mobile Test; revisions before A.04.00 did not have test application switching and provide no way to return to revisions that have switching. Users will need to reload a revision that has test application switching following the download process for upgrading firmware.</p> <hr/>
	GPRS	
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
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION `GSM MOBILE TEST`,`A.04.00`"
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? `GSM MOBILE TEST`"
    
```

**Related Topics**

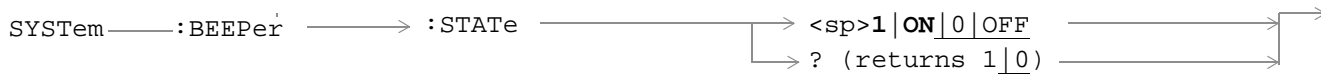
\*\*\*\*\*

[“Selecting a Radio Personality” on page 679](#)

\*\*\*\*\*



## SYSTem:BEEPer

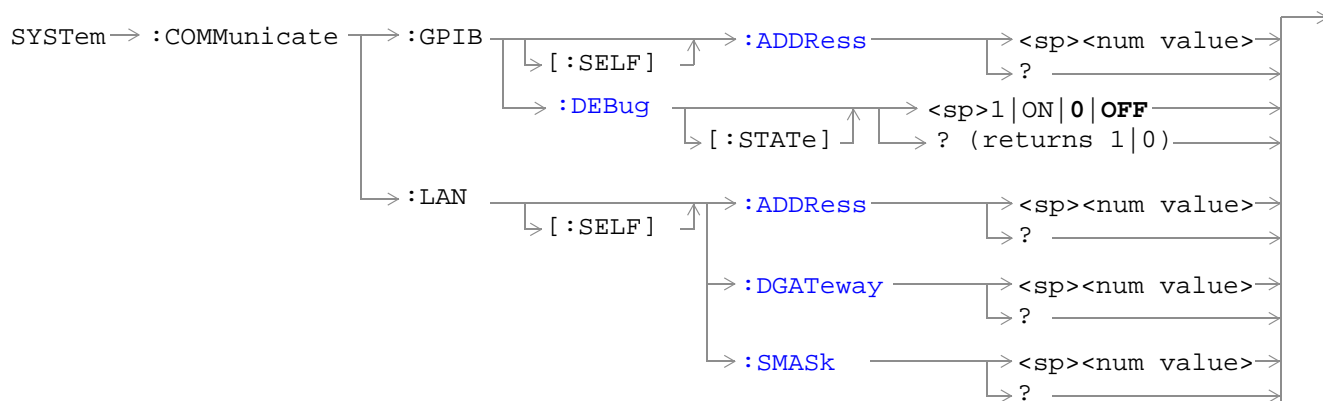


“Diagram Conventions” on page 283

### SYSTem:BEEPer:STATE

Function	GSM	Sets/queries the beeper state of the test set.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	1   on	
Programming Example		
OUTPUT 714; "SYSTEM:BEEPER:STATE OFF" !Sets beeper state to off.		

## SYSTem:COMMunicate



[“Diagram Conventions” on page 283](#)



**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 <a href="#">"SYSTem:COMMunicate:LAN[:SELF]:SMASK" on page 573</a> .  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 = 0 to 223 B,C,D = 0 to 255 (no embedded spaces)	
Query	Range: 15 characters formatted as follows: A.B.C.D where A = 0 to 223 B,C,D = 0 to 255 (no embedded spaces)	
Factory setting	0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access)	
<i>Related Topics</i>	<a href="#">"LAN IP Address" on page 666</a>	
<b>Programming Example</b> <pre> OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:ADDRESS '130.015.156.255'" !Sets the  !LAN IP  !address.</pre>		

**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)	
<b>Programming Example</b> <pre> OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:DGATEWAY '130.2.6.200'"</pre>		

**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. If A is less than or equal to 127, the subnet mask is 255.0.0.0. If A is greater than 127 and less or equal to 191, the subnet mask is 222.255.0.0. If A is grater than 191, the subnet mask is 255.255.255.0. 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)	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:SMASK '255.2.6.200''"</pre>		

## SYSTem:CONFigure

SYSTem→:CONFigure→:INFormation→:HARDware→:VERBose? →(returns model number, serial number, revision number, board ID and Cal file information) →

[“Diagram Conventions” on page 283](#)

### 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 <a href="#">“Hardware Configuration Report” on page 668</a> .
	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 668](#)

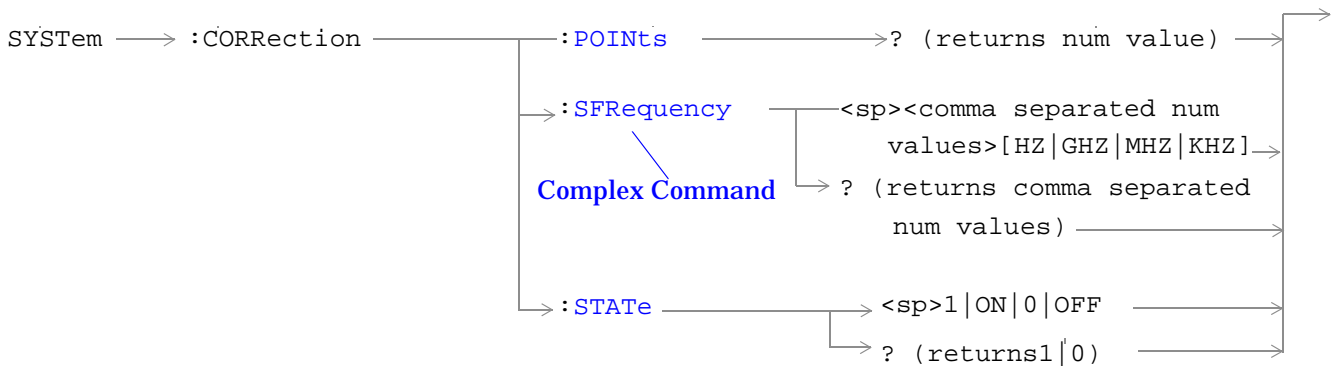
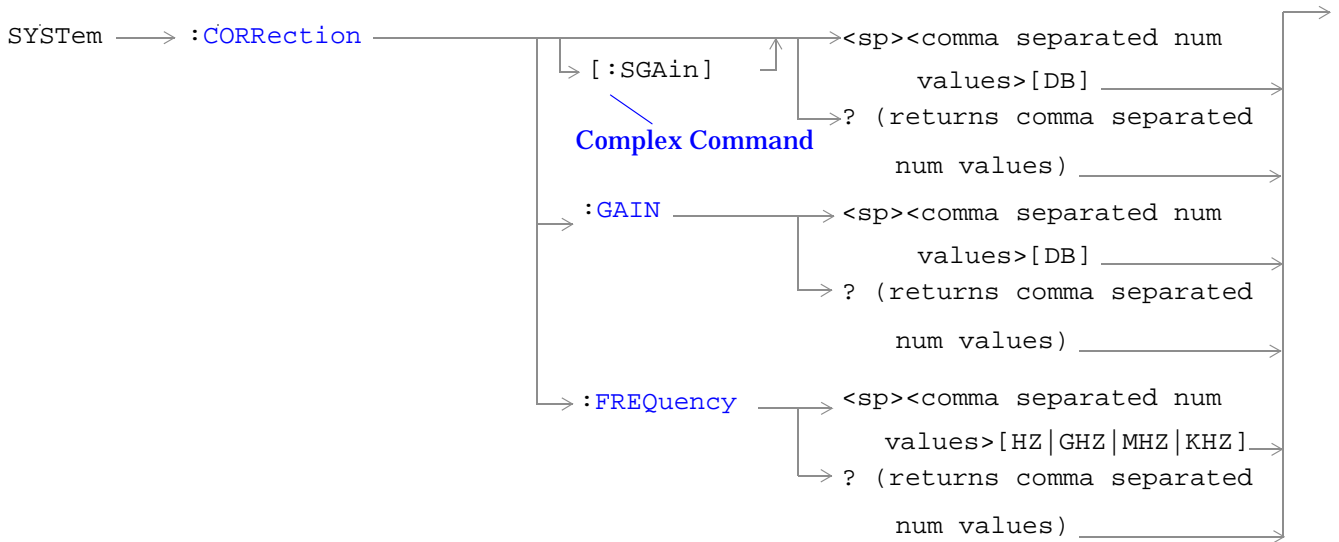
[“SYSTem:CURRent:TA” on page 582](#)

[“Obtaining Test Application Information” on page 677](#)

[“Obtaining Identification Information \\*IDN?” on page 665](#)

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# SYSTem:CORRection



“Diagram Conventions” on page 283

**SYSTem:CORRection:[:SGain]**

Function	GSM	Sets/queries the up to 20 comma separated offset values in dB. This command sets the state to On.
	GPRS	See <a href="#">“Measurement Related Configuration” on page 670.</a> The units, dB, are optional. If no units are specified then units default to dB. Sending a null list (no values) sets the state of all offsets to Off.
Setting		Range: 0 to 20 values between -100 to +100 Resolution: 0.01
Query		Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37) Resolution: 0.01
Factory Setting		Offsets 1 through 20, are set to 0.00 dB, state is set to Off
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -2.55,-3.12,-3.68,-4.23,-4.74,-5.3" !A complex command that sets up to 20 comma separated offsets !and sets the state to On for the frequencies, offsets and !RF IN/OUT Amplitude Offset State  OUTPUT 714;"SYSTEM:CORRECTION:SGAIN" !Sets the state for all frequencies and offsets to Off                 </pre>		



**SYSTem:CORRection:FREQUency**

Function	GSM	Sets/queries up to 20 comma separated frequency values in MHz.
	GPRS	The units, (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to Hz. See <a href="#">“Measurement Related Configuration” on page 670.</a> Sending a null list (no values) sets the state of all frequencies to Off.
Setting		Range: 0 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query		Range: 1 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz, and NAN (9.91E+37) Resolution: 1 HZ
Factory Setting		<ol style="list-style-type: none"> <li>1. 800.00 MHz Off</li> <li>2. 810.00 MHz Off</li> <li>3. 820.00 MHz Off</li> <li>4. 830.00 MHz Off</li> <li>5. 840.00 MHz Off</li> <li>6. 850.00 MHz Off</li> <li>7. 860.00 MHz Off</li> <li>8. 870.00 MHz Off</li> <li>9. 880.00 MHz Off</li> <li>10. 890.00 MHz Off</li> <li>11. 900.00 MHz Off</li> <li>12. 910.00 MHz Off</li> <li>13. 920.00 MHz Off</li> <li>14. 930.00 MHz Off</li> <li>15. 940.00 MHz Off</li> <li>16. 950.00 MHz Off</li> <li>17. 960.00 MHz Off</li> <li>18. 970.00 MHz Off</li> <li>19. 980.00 MHz Off</li> <li>20. 990.00 MHz Off</li> </ol>

## SYSTEM:CORRection

### 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	Sets/queries the up to 20 comma separated offset values in dB.
	GPRS	See <a href="#">"Measurement Related Configuration" on page 670.</a> The units, dB, are optional. If no units are specified, units default to dB. Sending a null list (no values) sets the state of all offsets to Off.
Setting		Range: 0 to 20 values between -100 to +100 Resolution: 0.01
Query		Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37) Resolution: 0.01
Factory Setting		Offsets 1 through 20, are set to 0.00 dB, state is set to off
<b>Programming Example</b> <pre>OUTPUT 714;"SYSTEM:CORRECTION:GAIN -3.12,-3.68,-4.23" !Sets up to 20 comma separated offset values  OUTPUT 714;"SYSTEM:CORRECTION:GAIN" !Sets the state for all frequencies and offsets to Off</pre>		

**SYSTEM:CORREction:POINTs**

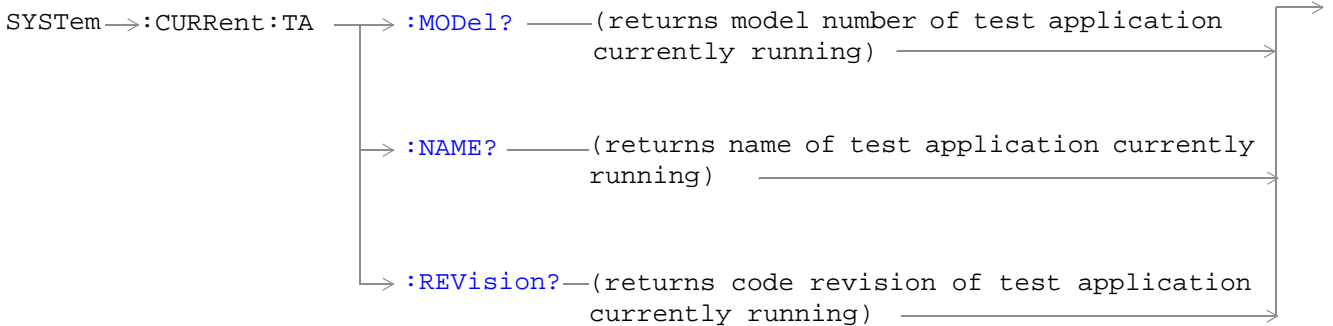
Function	GSM	Query returns the number of offsets that are in their On state when the RF IN/OUT Amplitude Offset State is also set to On. See <a href="#">"Measurement Related Configuration" on page 670.</a>
	GPRS	
Query	Range: 1 to 20, and NAN (9.91E+37) Resolution: 1	
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:POINTS?" !Returns the number of frequencies and offsets !with their state set to On                     </pre>		

**SYSTem:CORRection:SFRequency**

Function	GSM	Sets/queries up to 20 comma separated frequency values in MHz. This command sets the state to On.
	GPRS	<p>The units (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to MHz.</p> <p>See <a href="#">“Measurement Related Configuration” on page 670.</a></p> <p>Sending a null list (no values) sets the state of all frequencies to Off.</p>
Setting	<p>Range: 0 to 20 comma separated values from 292.5 MHz to 2700 MHz</p> <p>Resolution: 1 Hz</p>	
Query	<p>Range: 1 to 20 comma separated values from 292.5 MHz to 2700 MHz, and NAN (9.91E+37)</p> <p>Resolution: 1 HZ</p>	
Factory Setting	<ol style="list-style-type: none"> <li>1. 800.00 MHz Off</li> <li>2. 810.00 MHz Off</li> <li>3. 820.00 MHz Off</li> <li>4. 830.00 MHz Off</li> <li>5. 840.00 MHz Off</li> <li>6. 850.00 MHz Off</li> <li>7. 860.00 MHz Off</li> <li>8. 870.00 MHz Off</li> <li>9. 880.00 MHz Off</li> <li>10. 890.00 MHz Off</li> <li>11. 900.00 MHz Off</li> <li>12. 910.00 MHz Off</li> <li>13. 920.00 MHz Off</li> <li>14. 930.00 MHz Off</li> <li>15. 940.00 MHz Off</li> <li>16. 950.00 MHz Off</li> <li>17. 960.00 MHz Off</li> <li>18. 970.00 MHz Off</li> <li>19. 980.00 MHz Off</li> <li>20. 990.00 MHz Off</li> </ol>	



## SYSTem:CURRent:TA



[“Diagram Conventions” on page 283](#)

### SYSTem:CURRent:TA:MODEl?

Function	GSM	Query the model number of the test application running. Printable ASCII characters up to a 15 character string. See <a href="#">“Obtaining Test Application Information” on page 677</a> .
	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	Query the name of the test application running. Printable ASCII characters up to a 25 character string. This is not the recommended command, see <a href="#">“SYSTem:APPLication” on page 564</a> 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	Query 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 <a href="#">"SYSTem:APPLication" on page 564</a> 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:ERRor?

SYSTem → :ERRor? — (returns contents of error/event queue) →

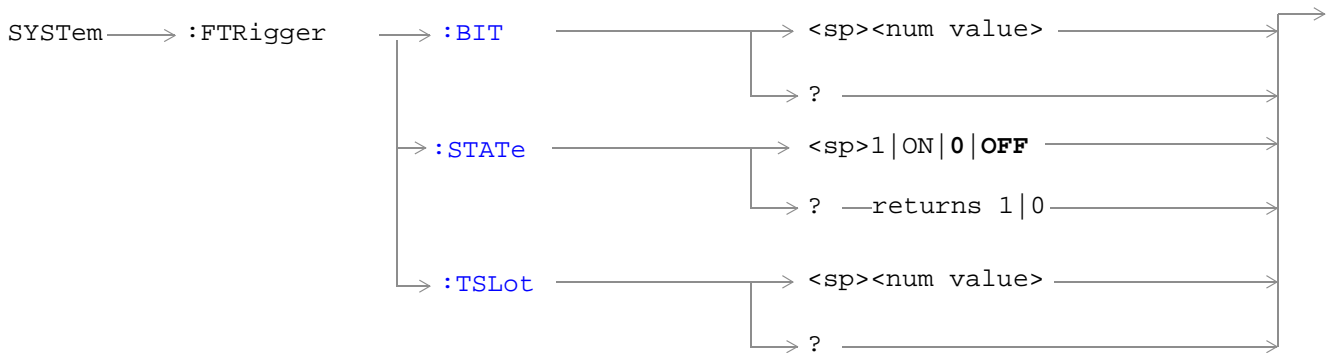
[“Diagram Conventions” on page 283](#)

### SYSTem:ERRor?

Function	GSM	<p>Queries the contents of the Error/Event Queue. The Error/Event Queue may contain one or more messages with an error or event description.</p> <p>Manual users may view the Message Log from the SYSTEM CONFIG screen. The contents of the Error/Event Queue and the Message log may not match. Example, manual user errors are not displayed with SYSTem:ERRor? they are viewed from the Message Log. See <a href="#">“Error Messages” on page 684</a>.</p>
	GPRS	
Query	<p>Error/Event Queue</p> <ul style="list-style-type: none"> <li>Range: 0 to 100 messages up to 255 characters in length</li> </ul>	



## SYSTem:FTRigger



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 283](#)

### SYSTem:FTRigger:BIT

Function	GSM	Selects/queries which bit, after zero, will be used for frame trigger pulse positioning. See <a href="#">“Setting Frame Trigger Parameters” on page 611</a>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0 to 1250 Resolution: 1	
Query	Range: 0 to 1250 Resolution: 1	
*RST Setting	zero	
Programming Example		
<pre> OUTPUT 714;"SYSTEM:FRTIGGER:BIT 14" !Would cause external frame trigger pulses                                      !to occur 14 bits after bit 0 of the                                      !selected timeslot.           </pre>		

**SYSTem:FTRigger:STATE**

Function	GSM	Sets/queries the frame trigger state. See <a href="#">“Setting Frame Trigger Parameters” on page 611</a>
	GPRS	This command is not applicable to GPRS.
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714; "SYSTEM:FRTIGGER:STATE ON" !Set frame trigger state to on.		

**SYSTem:FTRigger:TSLot**

Function	GSM	Selects/queries the timeslot for frame trigger pulse positioning. See <a href="#">“Setting Frame Trigger Parameters” on page 611</a>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0 to 7 Resolution: 1	
Query	Range: 0 to 7 Resolution: 1	
*RST Setting	zero	
Programming Example		
OUTPUT 714; "SYSTEM:FRTIGGER:TSLOT 5" !Sets the frame trigger timeslot to 5.		

# SYSTem:MEASurement

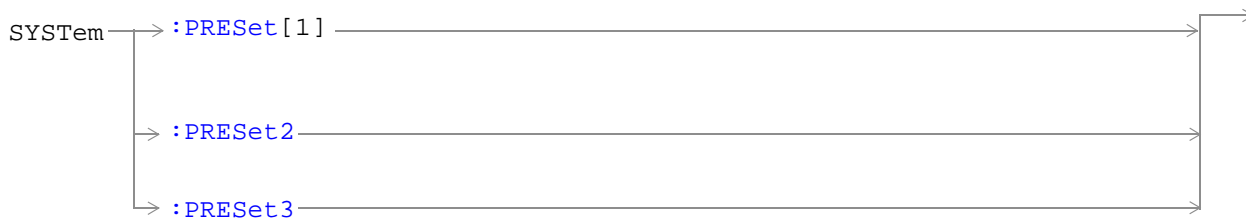


“Diagram Conventions” on page 283

## 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 “ <a href="#">Trigger Arm (Single or Continuous) Description</a> ” on page 171.
	GPRS	Any measurement results are cleared and the Integrity Indicator is set to 1 (No_Result_Available). See “ <a href="#">Integrity Indicator</a> ” on page 146.
Setting	GSM	<p>These results are set to their default values:</p> <ul style="list-style-type: none"> <li>• RACH Count</li> <li>• Page Count</li> <li>• Missing Burst Count</li> <li>• Corrupted Burst Count</li> <li>• Channel Decoder Error Count</li> <li>• MS TX Level Reported</li> <li>• TCH Timing Advance Reported</li> <li>• RX Level</li> <li>• RX Qual</li> </ul>
	GPRS	<p>These results are set to their default values:</p> <ul style="list-style-type: none"> <li>• Block Error Rate (BLER)</li> <li>• Blocks Tested</li> </ul>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:MEASUREMENT:RESET" !Resets current measurements.</pre>		

## SYSTem:PRESet



[“Diagram Conventions” on page 283](#)

### SYSTem:PRESet[1] (not recommended for use)

Function	GSM	Not recommended for use at this time, use the SYSTEM:PRESET3 command for partial preset. 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.
	GPRS	Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed. A partial preset will not modify any measurement settings including trigger arm. See <a href="#">“Trigger Arm (Single or Continuous) Description” on page 171</a> .
Related Topics	See <a href="#">“Partial Preset” on page 640</a> for more details	
Programming Example		
OUTPUT 714;"SYSTEM:PRESET" !Partial preset when changing from remote to manual operation.		

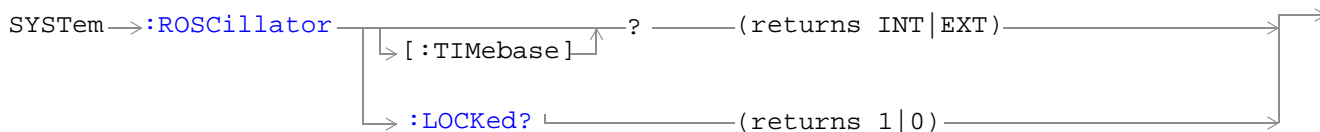
**SYSTem:PRESet2**

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.
	GPRS	All parameters are set to their default values. All measurements are aborted the trigger arm is set to continuous. See <a href="#">“Trigger Arm (Single or Continuous) Description” on page 171</a> . The *RST command will set the trigger arm to single.
Related Topics		See <a href="#">“Full Preset” on page 640</a> for details about the *RST full preset.
Programming Example		
<pre>OUTPUT 714;"SYSTEM:PRESET2" !Full preset for trigger arm set to continuous.</pre>		

**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.
	GPRS	Any call in process is disconnected and all measurements are aborted and inactivated. Measurement parameters are not changed. A partial preset will not modify any measurement settings including trigger arm. See <a href="#">“Trigger Arm (Single or Continuous) Description” on page 171</a> .
Related Topics		See <a href="#">“Partial Preset” on page 640</a> for more details.
Programming Example		
<pre>OUTPUT 714;"SYSTEM:PRESET3" !Partial preset when in remote operation.</pre>		

## SYSTem:ROSCillator



“Diagram Conventions” on page 283

### 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.
	GPRS	A suitable external source must have: <ul style="list-style-type: none"> <li>• an output level of 0 to +13DBM</li> <li>• frequency of 10 MHZ</li> </ul>
Query		Range: INT = internal source 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: 0 = unlocked 1 = locked



---

## IEEE 488.2 Common Commands

### Description

#### **\*CLS**

The \*CLS, clear status command, is defined in “IEEE Std 488.2-1992”, 10.3. This command will also clear and close the error message screen on the test set’s display.

#### **\*ESE**

The \*ESE, standard event status enable command, is defined in “IEEE Std 488.2-1992”, 10.10.

#### **\*ESE?**

The \*ESE?, standard event status enable query, is defined in “IEEE Std 488.2-1992”, 10.11.

#### **\*ESR?**

The \*ESR?, standard event status register query, is defined in “IEEE Std 488.2-1992 “,10.12.

#### **\*IDN?**

The \*IDN?, identification query, is defined in “IEEE Std 488.2-1992”, 10.14.\*IDN? is used to retrieve information about the test set in ASCII format.

\*IDN?, returns ASCII codes 32 through 126 excluding comma and semicolon in four comma separated fields. Field 1 returns the manufacturer, field 2 returns the instrument model number, field 3 returns the serial number, field 4 returns 0.

#### **\*OPC**

The \*OPC, operation complete command, is defined in “IEEE 488.2-1992”, 10.18. \*OPC causes the test set to continuously sense the No Operation Pending flag. When the No Operation Pending flag becomes TRUE, the OPC event bit in the standard event status register (ESR) is set to indicate that the state of all pending operations is completed. The \*OPC common command is not recommended for use as an overlapped command.

#### **\*OPC?**

The \*OPC?, operation complete query, is defined in “IEEE Std 488.2-1992”, 10.19. The \*OPC? query allows synchronization between the controller and the test set using either the message available (MAV) bit in the status byte, or a read of the output OPC?. The \*OPC? query does not effect the OPC event bit in the Standard Event Status Register (ESR). The \*OPC? common command is not recommended for use as an overlapped command.

#### **\*OPT?**

The \*OPT?, option identification query, is defined in “IEEE Std 488.2-1992”, 10.20. Each option will have a unique name, that name will be returned with the query.

#### **\*RST**

The \*RST, full preset command, is defined in “IEEE Std 488.2-1992”, 10.32. A full preset is also accomplished



using the SYStem:PRESet2 command. A full preset restores the majority of settings to their default values and sets measurement trigger arm to single.

#### **\*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 32](#)

[“Preset Descriptions” on page 640](#)

[“Obtaining Identification Information \\*IDN?” on page 665](#)

\*\*\*\*\*



## **8 General Usage**



## 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, DCS, or PCS (GSM only). 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 599](#)).

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 140](#)) 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 597](#)
- [“GPRS Frequency Banded Parameters” on page 598](#)

## GSM Frequency Banded Parameters

There are eight frequency banded parameters for GSM. To set or query:

- the broadcast channel (ARFCN), see [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 306](#).
- the BA (broadcast allocation) table, see [“CALL\[:CELL\]:BA:TABLE\[:SElected\]” on page 299](#).
- the BA table points, see [“CALL\[:CELL\]:BA:TABLE:POINts\[:SElected\]?” on page 302](#).
- the traffic channel number, see [“CALL:TCHannel\[:ARFCn\]\[:SElected\]” on page 371](#).
- the mobile station uplink power control level, see [“CALL:MS:TXLevel\[:SElected\]” on page 336](#).
- the manual channel number for the test set's receiver, see [“RFANalyzer:MANual:CHANnel\[:SElected\]” on page 458](#).
- the expected power of the mobile station, see [“RFANalyzer:EXpected:POWer\[:SElected\]” on page 455](#).
- the RF Generator channel number, see [“CALL\[:CELL\]:RFGenerator:CHANnel\[:SElected\]” on page 359](#).

## Programming Example

```
OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:DCS 512" !Sets broadcast channel to 512
!for DCS.
OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 20,37,124,975,986,1008,1019" !Sets BA table
!to 7 of 16
!possible channels.
OUTPUT 714;"CALL:TCHANNEL:ARFCN:PGSM 124" !Sets traffic channel to 124 for PGSM band.
OUTPUT 714;"CALL:MS:TXLEVEL:PGSM 7" !Sets the mobile station uplink power control
!level to 7 for PGSM band.
OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:EGSM 24" !Manually sets the RF analyzer to
!EGSM channel 24.
OUTPUT 714;"RFANALYZER:EXPECTED:POWER:PGSM -15DBM" !Sets the RF analyzer's input
!power to -15 dbm for PGSM band.
OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:PCS 512" !Sets the RF generator's channel to
!512 for the PCS band.
```

## GPRS Frequency Banded Parameters

There are two frequency banded parameters for GPRS. To set or query:

- the packet data traffic channel (ARFCN), see [“CALL:PDTCH | PDTChannel\[:ARFCn\]\[:SElected\]” on page 346](#).
- the uplink burst transmit level, see [“CALL:PDTCH | PDTChannel:MS:TXLevel\[:SElected\]:BURSt” on page 350](#).

Note that the PCS band is not currently supported for GPRS.

### Programming Example

```
OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:SELECTED 512" !Sets the BCH ARFCN for the
!selected broadcast band to 512.
OUTPUT 714;"CALL:PDTCH:ARFCN:EGSM 1010" !Sets the packet data traffic channel to
!1010 for the EGSM band.
OUTPUT 714;"CALL:PDTCHANNEL:MS:TXLEVEL:DCS:BURST1 10" !Sets the uplink power level of burst
!one in the DCS band to 10.
```

### Related Topics

\*\*\*\*\*

[“Band Selection Parameters” on page 599](#)

[“How the Test Set Performs a Dualband Handover” on page 140](#)

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring the Traffic Channel \(TCH\)” on page 619](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 615](#)

[“Receiver Control” on page 616](#)

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## 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 599](#)
- [“GPRS Band Selection Parameters” on page 600](#)

### GSM Band Selection Parameters

There are four band selection parameters for GSM:

- [“Cell Band Parameter” on page 599](#)
- [“Traffic Band Parameter” on page 599](#)
- [“Manual Band Parameter” on page 599](#)
- [“Signal Generator Band Parameter” on page 600](#)

#### Cell Band Parameter

This parameter allows you to set or query the band used to broadcast the BCH (see [“CALL\[:CELL\]:BAND” on page 304](#)).

- 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 322](#).
- 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

This parameter allows you to set or query the traffic channel band (see [“CALL:TCHannel:BAND” on page 374](#)).

- 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 140](#).
- 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 322](#).

#### Manual Band Parameter

This parameter allows you to set or query the manual channel band (see [“RFANalyzer:MANual:BAND” on page 458](#)).

## Band Selection Parameters

- 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.

### Signal Generator Band Parameter

This parameter allows you to set or query the channel band for the test set's RF generator (see [“CALL\[:CELL\]:RFGenerator:BAND” on page 358](#)).

- 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 628](#).

## GPRS Band Selection Parameters

There are two band selection parameters for GPRS:

- [“Cell Band Parameter” on page 600](#)
- [“Packet Data Traffic Channel Band Parameter” on page 600](#)

Note that the PCS band is not currently supported for GPRS.

### Cell Band Parameter

This parameter allows you to set or query the band used to broadcast the BCH (see [“CALL\[:CELL\]:BAND” on page 304](#)).

- When the data connection status is *not* transferring (see [“Data Connection Processing State Synchronization” on page 53](#)), 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 53](#)), changing the cell band parameter will disconnect any data connection in progress.

### Packet Data Traffic Channel Band Parameter

This parameter allows you to set or query the band used to transmit the packet data traffic channel (see [“CALL:PDTCH | PDTChannel:BAND” on page 349](#)).

- When the data connection status is transferring (see [“Data Connection Processing State Synchronization” on page 53](#)), 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 ETSI test mode using [“CALL:FUNCTION:DATA:START” on page 321](#).



## Related Topics

\*\*\*\*\*

### For GSM:

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring the Traffic Channel \(TCH\)” on page 619](#)

[“Receiver Control” on page 616](#)

[“CALL:CONNeCTed\[:STATe\]?” on page 310](#)

[“Programming the Agilent Technologies 8960 Series 10 for GSM Mobile Testing in Active Cell Operating Mode” on page 175](#)

### For GPRS:

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 615](#)

[“CALL:STATus\[:STATe\]:DATA?” on page 366](#)

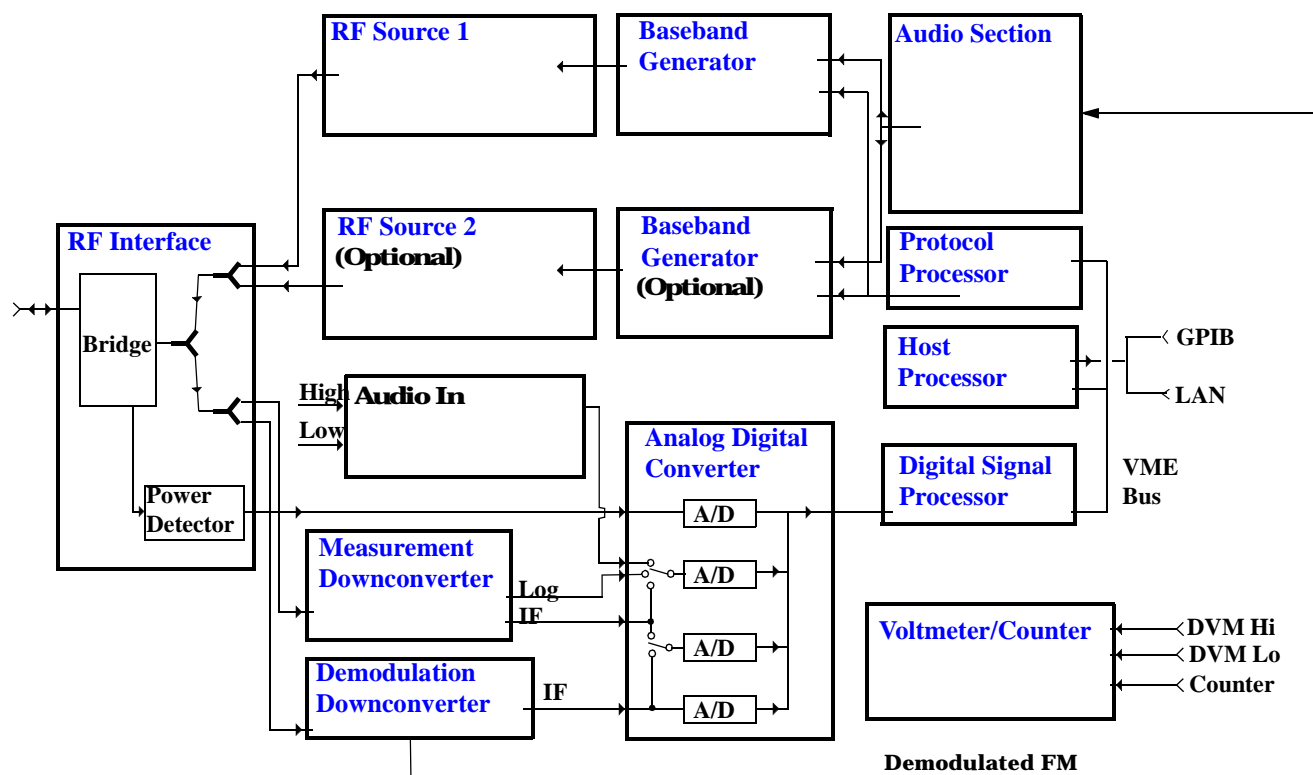
[“Programming the Agilent Technologies 8960 Series 10 for GPRS Mobile Testing in Active Cell Operating Mode” on page 235](#)

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## 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 143.

## 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 and hybrid power splitters which create 4 bidirectional ports, (two receiver ports and two source ports), RF amplifiers, video gain circuits, and fast and slow power detectors.

The sampled input power from the directional bridge is routed to a fast power detector or a slow detector. The fast power detector has a response time of several microseconds and can measure power during the bursts of TDMA systems.

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 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 slow 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 slow detector is measured in a bridge using a pair of RMS thermal detectors in a feedback loop. Signals from the fast and slow power detectors are calibrated with Gain DAC's. Video gain can be applied in 6 dB and 1.5 dB steps.

### Signal Downconversion

The test set's downconversion receiver section has two downconversion modules; a high performance Measurement Downconversion Module for making measurements, and a Demodulation Downconversion Module for maintaining the radio link.

**Measurement Downconverter Module** The Measurement Downconverter module is a part of the receiver, it provides high quality (wide dynamic range, spurious free) signals to the Analog To Digital Converter module's measurement sampler input. These signals are:

- 10 KHz - 6 MHz Intermediate Frequency signal
- detected envelope of the Intermediate Frequency signal

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.

**Demodulation Downconverter Module** The Demodulation Downconverter module is used as part of the demodulation receiver to maintain the radio link of a given TA. The IF signal from the Demodulation Downconverter is sent to the Analog to Digital Converter, the digital data then goes to the protocol subsystem. That data allows the Protocol Processor module to set up a call with the DUT so that testing can be performed on the radio.

The Demodulation Downconverter module is also used as part of the BER testing path. For bit error ratio measurements the bits tested by the Protocol Processor module are taken from this path. The demodulated bits provided to the Protocol Processor contain the data that will be checked for errors.

### Analog To Digital Converter Module

Following the Measurement Downconverter and Demodulation Downconverter modules 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 a given TA, the downconversion path through the Demodulation Downconverter module has a dedicated A/D conversion path.

In order 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 to 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.

## Protocol Processor Module

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

## 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 disk access
- control of all RF and audio hardware modules
- routing measurement results received from the Digital Signal Processing and Protocol Processor modules to the appropriate output device (display, GPIB, LAN, serial, etc.)

## Voltmeter/Counter

**Voltmeter** The voltmeter is primarily used to measure external DC & AC voltages. A secondary purpose is to measure internal voltages for instrument self-diagnostics.

The external voltmeter is capable of measuring DC voltages up to + 50 VDC and AC voltages up to 50 Vpk. A true RMS detector is used for measuring AC voltages. For internal measurements, a switch routes the diagnostic MUX output to the Voltmeter 1 path.

**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.

The counter circuit is based on the METRON IC. This IC contains a reciprocal counter. A reciprocal counter functions by counting the input signal and a reference signal simultaneously during a selected gate period. At the end of this period, the counting is stopped and the values of the signal and reference counters are read. The ratio of these values is used to calculate the input signal frequency.

## 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 and 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 Vpk.

**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 Vpk.

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 Vpk into > 600 ohm loads, and up to 0.8 Vpk into an 8 ohm load (e.g. speaker). The output level is calibrated for all modes except discriminator audio,

## Block Diagram

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.

Demodulated audio can be selected from either of two Demodulation Downconverters. 300 - 3000 Hz BPF, 750 usec de-emphasis, and expandor circuits can be individually applied to the receiver audio, or bypassed.

Audio echo can be selected to route the received audio to the front panel audio output connector.

### **RF Sources**

The test set can contain 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 45 MHz to 2.7 GHz and an amplitude range of -13 dBm to -135 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. The various components which make up the test set source system are described in the following sections.

### **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

---

## 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 [“Test Mode Operating Mode” on page 621](#)).

For GPRS, active cell is the only operating mode currently available.

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 607](#)
- [“Active Cell For GPRS” on page 608](#)

### 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-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 Mode” on page 621](#).

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
```

For a list of basic features provided by active cell operating mode for GSM, see [“Active Cell Features” on page 179](#).

### 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 340](#).

### Setting the Cell Activated State Parameter

The cell activated state parameter is set using [“CALL\[:CELL\]:ACTivated\[:STATE\]” on page 297](#).

## 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 an Agilent proprietary data connection which allows receiver block error rate (BLER) reports to be retrieved from the mobile station (see [“BLER Reports Measurement Description” on page 73](#)). You can also make transmitter measurements using this data connection.

For GPRS mobile stations which support a single uplink timeslot, 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 96](#).
- Transmit Power (TXP) - see [“Transmit Power Measurement Description” on page 127](#)
- Phase and Frequency (PFER) - see [“Phase and Frequency Error Measurement Description” on page 103](#)
- Power versus Time (PVT) - see [“Power versus Time Measurement Description” on page 109](#)

For a typical scenario detailing the steps you might take to test a GPRS mobile station, see [“Testing a GPRS Mobile Station” on page 635](#).

For a list of basic features provided by active cell operating mode for GPRS, see [“Active Cell Features” on page 239](#).

## Related Topics

\*\*\*\*\*

GSM:

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“CALL:OPERating” on page 340](#)

[“Configuring the Traffic Channel \(TCH\)” on page 619](#)

GPRS:

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 615](#)

[“Testing a GPRS Mobile Station” on page 635](#)

[“Programming the Agilent Technologies 8960 Series 10 for GPRS Mobile Testing in Active Cell Operating Mode” on page 235](#)

\*\*\*\*\*



## 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 296](#).

### GSM Broadcast Channel Parameters

- Cell Band (see [“CALL\[:CELL\]:BAND” on page 304](#))
- Cell Power (see [“CALL\[:CELL\]:POWER\[:SAMPlitude\]” on page 355](#))
- Cell Power State (see [“CALL\[:CELL\]:POWER:STATe” on page 356](#))
- Broadcast Channel (ARFCN) (see [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 306](#))
- Mobile Country Code (see [“CALL:MCCode” on page 325](#))
- Mobile Network Code (see [“CALL:MNCCode” on page 326](#))
- Location Area Code (see [“CALL:LACode” on page 324](#))
- Network Color Code (see [“CALL:NCCode” on page 339](#))
- Base Station Color Code (see [“CALL:BCCode” on page 305](#))
- Paging IMSI (see [“CALL:PAGing:IMSI” on page 342](#))
- Repeat Paging (see [“CALL:PAGing:REPeat\[:STATe\]” on page 343](#))
- Paging Mode (see [“CALL:PAGing:MODE” on page 343](#))
- Paging Multiframe (see [“CALL:PAGing:MFRames” on page 344](#))
- Get IMEI at Call Setup (see [“CALL:IMEI” on page 323](#))
- TX Level FACCH Signaling (see [“CALL:SIGNaling” on page 364](#))
- BA Table (see [“CALL\[:CELL\]:BA:TABLE\[:SElected\]” on page 299](#))
- 3 Digit MNC for PCS (see [“CALL:PMNCCode” on page 353](#))

### GPRS Broadcast Channel Parameters

- Cell Band (see [“CALL\[:CELL\]:BAND” on page 304](#))
- Cell Power (see [“CALL\[:CELL\]:POWER:AMPLitude” on page 356](#))

## 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 619](#)) 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 297](#).

If the test set is in test mode (see [“Test Mode Operating Mode” on page 621](#)) 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 146](#).

### GPRS

For GPRS, there are a number of BCH parameters which are currently set to fixed values. See [“Fixed Parameters” on page 639](#).

## Related Topics

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[“Frequency Banded Parameters” on page 597](#)

[“Band Selection Parameters” on page 599](#)

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## 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 585.

- “[External Trigger State \(on or off\)](#)” on page 611
- “[External Trigger Timeslot \(0 to 7\)](#)” on page 611
- “[External Trigger Bit \(0 to 1250\)](#)” on page 611

### 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 is not affected when there are changes to cell activated state.

The frame trigger can be set manually from the system configuration screen by pressing the External Trigger Setup soft key.

## Related Topics

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[“SYSTem:FTRigger” on page 585](#)

\*\*\*\*\*

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## Configuring Mobile Station Operating Parameters

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

For a complete list of GPIB commands in the call processing subsystem, refer to [“CALL Subsystem” on page 296](#).

### GSM Mobile Station Operating Parameters

- MS TX Level (see [“CALL:MS:TXLevel\[:SElected\]” on page 336](#))
- Timing Advance (see [“CALL:MS:TADVance” on page 335](#))
- Mobile DTX State (see [“CALL:MS:DTX\[:STATe\]” on page 329](#))

### GPRS Mobile Station Operating Parameters

- Uplink Burst TX Level (see [“CALL:PDTCH | PDTChannel:MS:TXLevel\[:SElected\]:BURSt” on page 350](#))

## Operating Considerations

### GSM

There are a number of parameters for the broadcast channel (see [“Configuring the Broadcast Channel \(BCH\)” on page 609](#)) and the traffic channel (see [“Configuring the Traffic Channel \(TCH\)” on page 619](#)) 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 MS TX Level parameter, besides informing the mobile station what uplink power to transmit to the test set, also updates the Expected Power parameter. See [“RFANalyzer:EXPEcted:POWer\[:SElected\]” on page 455](#).

### GPRS

For details on the parameters you can use to configure the PDTCH, see [“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 615](#).



## 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 296](#).

### Packet Data Traffic Channel Parameters

- Packet Data Traffic Channel Band (see [“CALL:PDTCH | PDTChannel:BAND” on page 349](#))
- Packet Data Traffic Channel (ARFCN) (see [“CALL:PDTCH | PDTChannel\[:ARFCn\]\[:SElected\]” on page 346](#))
- Downlink Burst Power Reduction Selection (see [“CALL:PDTCH | PDTChannel:PREduction:BURSt\[1 | 2\]” on page 352](#))
- Downlink Power Reduction Level (dB) (see [“CALL:PDTCH | PDTChannel:PREduction:LEVel\[1 | 2\]” on page 352](#))
- Data Connection Type (see [“CALL:FUNCTion:DATA:TYPE” on page 321](#))

### Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see [“CALL:BCHannel” on page 306](#)) 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.

Changing the PDTCH band parameter selects the band for the range of PDTCH ARFCN. However, the setting will not be applied until you re-start the data connection using [“CALL:FUNCTion:DATA:START” on page 321](#).

PDTCH (ARFCN) is a frequency banded parameter (see [“Frequency Banded Parameters” on page 597](#)).

### Related Topics

\*\*\*\*\*

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring Mobile Station Operating Parameters” on page 613](#)

[“Packet Data Traffic Channel Band Parameter” on page 600](#)

[“CALL:PDTCH | PDTChannel” on page 345](#)

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## Receiver Control

This section is *not* applicable to GPRS.

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 455](#).

### 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, 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 597](#) 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 616](#) 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 616](#) 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 458](#) for manual band or manual frequency details.

**Table 4. 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 371](#) traffic channel details and [“CALL:TCHannel:BAND” on page 374](#) for traffic band details. See [“CALL\[:CELL\]:BAND” on page 304](#) for cell band details. See [“CALL:BCHannel” on page 306](#) for broadcast channel details.

**Table 5. 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 6. 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, PCS, or DCS) and is defined in GSM as the uplink frequency.
- 2 Actual frequency depends on current traffic channel band (PGSM, EGSM, 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 ["Measurement Related Configuration" on page 670](#) 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 457](#) or ["CALL:MS:TXLevel\[:SElected\]" on page 336](#).

## Related Topics

\*\*\*\*\*

["Active Cell Operating Mode" on page 607](#)

["Test Mode Operating Mode" on page 621](#)

["Frequency Banded Parameters" on page 597](#)

\*\*\*\*\*

## 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 370](#).

### TCH Parameters

- Traffic Channel Band (see [“CALL:TCHannel:BAND” on page 374](#))
- Traffic Channel (ARFCN) (see [“CALL:TCHannel\[:ARFCn\]\[:SElected\]” on page 371](#))
- Timeslot (see [“CALL:TCHannel:TSLot” on page 376](#))
- Mobile Loopback (see [“CALL:TCHannel:LOOPback” on page 375](#))
- Speech (see [“CALL:TCHannel:DOWNlink:SPEech” on page 375](#))
- Max Frames Allowed for Assignment (see [“CALL:COUNt:TDMA:FRAMES” on page 316](#))
- Channel Mode (see [“CALL:TCHannel:CMODE” on page 374](#))

### Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see [“CALL:BCHannel” on page 306](#)) 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 140](#). 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 322](#)) = 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 37](#)), 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, overriding 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.

## Configuring the Traffic Channel (TCH)

There are 5 different settings for the downlink speech source. See [“CALL:TCHannel:DOWNlink:SPEech” on page 375](#).

- 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.

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 329](#)), 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 609](#)

[“Configuring Mobile Station Operating Parameters” on page 613](#)

[“Receiver Control” on page 616](#)

[“Traffic Band Parameter” on page 599](#)

[“CALL:TCHannel” on page 370](#)

[“Fast Bit Error Measurement Description” on page 90](#)

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## Test Mode Operating Mode

This operating mode is *not* applicable to GPRS.

The test set can operate in two different GSM operating modes (active cell mode or a test mode). Active cell mode is the default operating mode and is used when emulating a normal GSM cell. You use Test mode (see [“CALL:OPERating” on page 340](#) 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. When test mode is selected, the choices of downlink stimulus (Test Function) are:

- BCH (broadcast channel) (see [“BCH Test Function Behavior” on page 623](#))
- BCH + TCH (broadcast channel + traffic channel) (see [“BCH + TCH Test Function Behavior” on page 626](#))
- CW (continuous wave) (see [“CW Test Function Behavior” on page 628](#))

See [“CALL:FUNction” on page 320](#) for test function GPIB syntax.

### Test Mode Operation

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 169](#).

The test set's receiver remains on the uplink frequency determined by the broadcast channel see [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 306](#) 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 616](#).

---

NOTE      [“Setting the Cell Activated State Parameter” on page 607](#) 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 455), 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)	“ <a href="#">CALL[:CELL]:BCHannel[:ARFCn][:SElected]</a> ” on page 306
BCH + TCH	Traffic Channel (2)	“ <a href="#">CALL:TCHannel[:ARFCn][:SElected]</a> ” on page 371
CW	RF Gen Channel	“ <a href="#">CALL[:CELL]:BCHannel[:ARFCn][:SElected]</a> ” on page 306

### Table Footnotes

- 1 Actual frequency depends on current broadcast band (PGSM, EGSM, PCS, or DCS), and is defined in GSM as the uplink frequency.
- 2 Actual frequency depends on current traffic channel band (PGSM, EGSM, 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 455), 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)	“ <a href="#">RFANalyzer:MANual:CHANnel[:SElected]</a> ” on page 458
	Manual Frequency	“ <a href="#">RFANalyzer:MANual:FREQuency</a> ” on page 461

### 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 309](#). (If you are using the test set manually, the Expected Burst field is in the Call Parm 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 355](#) 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 MS TX level will couple to the expected power, and the MS 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 MS 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 458

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 355 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 MS TX level will couple to the expected power, and the MS 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 MS 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 458](#)

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 Params 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 362 command.
- The RF generator's band is set using the `"CALL[:CELL]:RFGenerator:BAND"` on page 358 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 359 command.
- The RF generator's frequency is set using the `"CALL[:CELL]:RFGenerator:FREQUENCY"` on page 362 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"
```

## Related Topics

\*\*\*\*\*

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring the Traffic Channel \(TCH\)” on page 619](#)

[“CALL:OPERating” on page 340](#)

[“Receiver Control” on page 616](#)

\*\*\*\*\*

Test Mode Operating Mode

## Bursting 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 bursting parameters.

Bursting 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. Bursting parameters are activated when the burst you have set a value for becomes active.

Bursting 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 bursting 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.

There are currently two bursting parameters for GPRS. To set or query:

- the Downlink Burst Power Reduction Selection, see [“CALL:PDTCH | PDTChannel:PREduction:BURSt\[1 | 2\]” on page 352](#).
- the Uplink Burst TX Level, see [“CALL:PDTCH | PDTChannel:MS:TXLevel\[:SElected\]:BURSt” on page 350](#).

## Operating Considerations

The test set currently allows you to test a GPRS mobile station which supports a single uplink timeslot. For this reason, the Uplink Burst TX Level parameter only allows you to set or query a value for a single uplink burst (or timeslot).

The Uplink Burst TX Level parameter is also a frequency banded parameter (see [“Frequency Banded Parameters” on page 597](#)).

## Related Topics

\*\*\*\*\*

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 615](#)

[“CALL:PDTCH|PDTChannel” on page 345](#)

\*\*\*\*\*

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## 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 \(DAUDio\) Troubleshooting” on page 80](#)).

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 375](#)), you may hear momentary unpleasant audio bursts from the mobile.

---



## Related Topics

\*\*\*\*\*

[“Programming a Channel Mode Change” on page 138](#)

\*\*\*\*\*



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## 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. The section contains:

- [“Test Overview” on page 635](#)
- [“Procedure” on page 636](#)
- [“Operating Considerations” on page 637](#)

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 the Agilent Technologies 8960 Series 10 for GPRS Mobile Testing in Active Cell Operating Mode” on page 235](#).

### 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 636
- “2. Switch on the GPRS mobile station, perform an attach and establish a data connection” on page 636
- “3. Make measurements and obtain results” on page 637
- “4. Reconfigure the data connection and make more measurements (if required)” on page 637
- “5. Disconnect the Mobile Station from the base station emulator” on page 637

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” on page 304](#))  
Note that the PCS band is not currently supported for GPRS mobile station testing.
  - Cell Power (see [“CALL\[:CELL\]:POWER:AMPLitude” on page 356](#))
- Packet data traffic channel (PDTCH) parameters:
  - Packet Data Traffic Channel Band (see [“CALL:PDTCH | PDTChannel:BAND” on page 349](#))
  - Packet Data Traffic Channel (ARFCN) (see [“CALL:PDTCH | PDTChannel\[:ARFCn\]\[:SElected\]” on page 346](#))
  - Downlink Packet Data Traffic Channel Power Control:
    - Downlink Power Reduction Level (dB) (see [“CALL:PDTCH | PDTChannel:PREduction:LEVel\[1 | 2\]” on page 352](#))
    - Downlink Burst Power Reduction Selection (see [“CALL:PDTCH | PDTChannel:PREduction:BURSt\[1 | 2\]” on page 352](#))
  - Data Connection Type (see [“CALL:FUNCTion:DATA:TYPE” on page 321](#))

Note that some BCH and PDTCH parameters are fixed parameters. This means that their values cannot be changed (see [“Fixed Parameters” on page 639](#)).

- Mobile station operating parameters:
  - PDTCH MS TX Level (see [“CALL:PDTCH | PDTChannel:MS:TXLevel\[:SElected\]:BURSt” on page 350](#))
- 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 462](#). For a more detailed description of measurement execution parameters along with programming examples, see [“Step 4: Configure the Measurement Execution Parameters” on page 247](#).

### 2. Switch on the GPRS mobile station, perform an attach and establish a data connection

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 321](#) 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 53](#)).

### 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, Transmitter Power, Phase and Frequency Error, and Power versus Time are all available for GPRS. In addition, a receiver BLock Error Rate (BLER) result is available. If you plan to control your mobile station directly through its serial connection to measure received signal level, you should perform this measurement at this time.

The FETch subsystem is used to obtain transmitter measurement results. For a description of this subsystem along with links to the GPIB commands, see [“FETCh? Subsystem” on page 380](#).

The [“CALL:STATus:PDTCH | PDTChannel:BLERror?” on page 367](#) 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 637](#)). If you require more details on BLER, see [“BLER Reports Measurement Description” on page 73](#).

For more details on the process of making measurements and gathering results, see [“Step 6: Make Measurements” on page 257](#).

### 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 must reconfigure the data connection. To reconfigure the data connection, you must:

- end the data connection (using [“CALL:FUNction:DATA:STOP” on page 321](#))
- use the PDTCH commands to set up the new channel ([“CALL:PDTCH | PDTChannel” on page 345](#)), and
- restart the data connection (using [“CALL:FUNction:DATA:START” on page 321](#))

If you require more details, see [“Step 7: Reconfigure the Data Connection” on page 267](#).

### 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 321](#)) and then initiate the GPRS detach procedure from the mobile station. If you require more details, see [“Step 8: Disconnect the Mobile Station from the Base Station Emulator” on page 271](#).

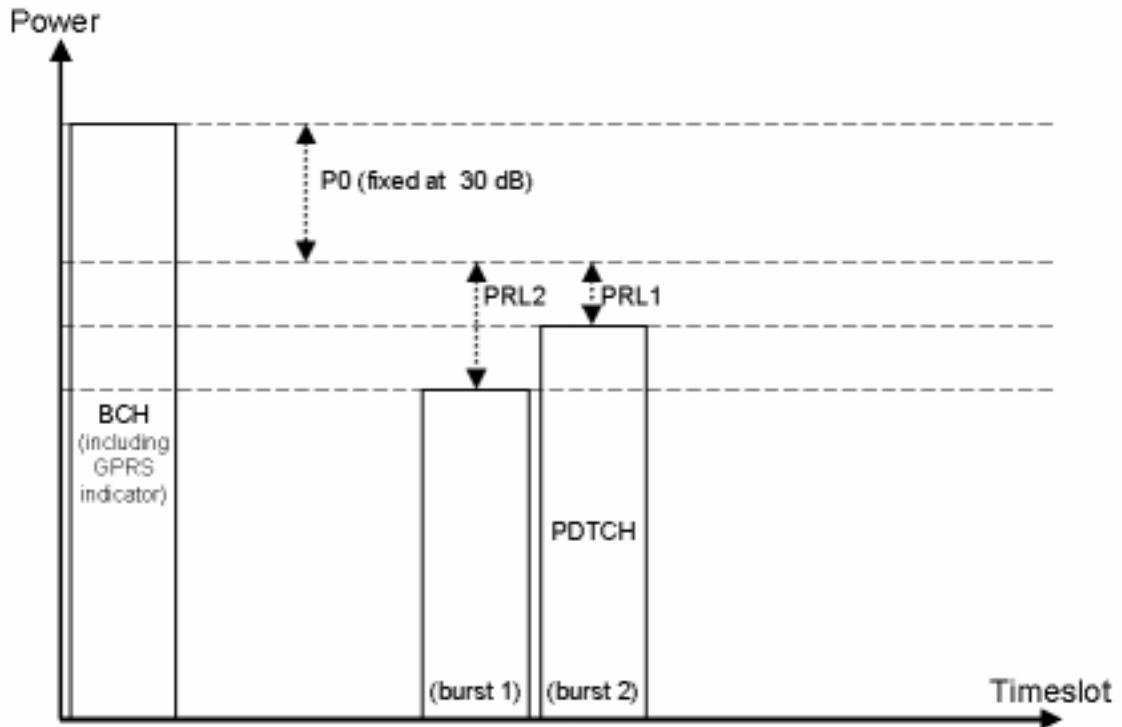
## Operating Considerations

### 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 generally specified as a power reduction level (for each burst) from the reference level for the current connection. 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 2 values (PRL1 and PRL2) which can be mapped to any downlink burst.

P0, PRL1, and PRL2 are shown in the figure below.

**Figure 1. GPRS Power Reduction Levels**



The P0 reference level is fixed at 30 dB (see [“Fixed Parameters” on page 639](#)). Use the following commands to set the BCH power, and PDTCH power reduction levels:

- To set the Cell Power (BCH power level), use [“CALL\[:CELL\]:POWER:AMPLitude” on page 356](#).
- To set the Downlink Power Reduction Level (dB) for PRL1 and PRL2, use [“CALL:PDTCH | PDTChannel:PREduction:LEVel\[1 | 2\]” on page 352](#).
- To make the Downlink Burst Power Reduction Selection (either PRL1 or PRL2) for each PDTCH burst, use [“CALL:PDTCH | PDTChannel:PREduction:BURSt\[1 | 2\]” on page 352](#).

## Fixed Parameters

A number of GPRS parameters currently have fixed values. These fixed parameters are shown in the following table.

**Table 9. GPRS Fixed Parameters**

Fixed Parameter	Value
Broadcast Channel (ARFCN)	DCS: 512 EGSM: 20 PCS: 512 PGSM: 20
Broadcast Allocation (BA) Table	DCS: 512 EGSM: 20 PCS: 512 PGSM: 20
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
Downlink PDTCH P <sub>0</sub>	30 dB
Multislot Configuration	2 (downlink) x 1 (uplink)
Coding Scheme	CS-4

## Related Topics

\*\*\*\*\*

[“Programming the Agilent Technologies 8960 Series 10 for GPRS Mobile Testing in Active Cell Operating Mode” on page 235](#)

[“Active Cell Operating Mode” on page 607](#)

[“Configuring the Broadcast Channel \(BCH\)” on page 609](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 615](#)

\*\*\*\*\*

## Preset Descriptions

### Description

The test set is capable of accepting several different preset commands.

At no time during a preset operation, will transmit power exceed the last user setting of the transmit power. The input power will not be 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

```
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.

### Full Preset

A full preset requires you to setup new measurements and their parameters. If new setup parameters are not needed, 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 will be set to the default value.

---

\*RST gives the same results as partial preset with the exception of Trigger Arm and the measurement parameters.

**Table 10. Full Preset Behavior**

Function	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



**Table 10. Full Preset Behavior**

Function	Result
Maskable Message Display State	On (manual operation full preset)
Maskable Message Display State	Off (remote operation full preset)

**Status Preset**

The STATUS:PRESET command will set the status system as defined in “SCPI 1995 Volume 2: Command Reference” section 20.7. All of the enable registers will be set to 0, all PTR registers will be set to 1, and all NTR registers will be set to 0.

**Example**

```
OUTPUT 714;"STATUS:PRESET" !Presents the STATus subsystem.
```

**Related Topics**

\*\*\*\*\*

[“SYSTem:PRESet” on page 588](#)

[“\\*RST” on page 592](#)

\*\*\*\*\*

## Instrument Status Area

### Description

The Instrument status area is found on the bottom center of the test set's display.

**Figure 2. 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.

## How Do I Change Call Parameters?

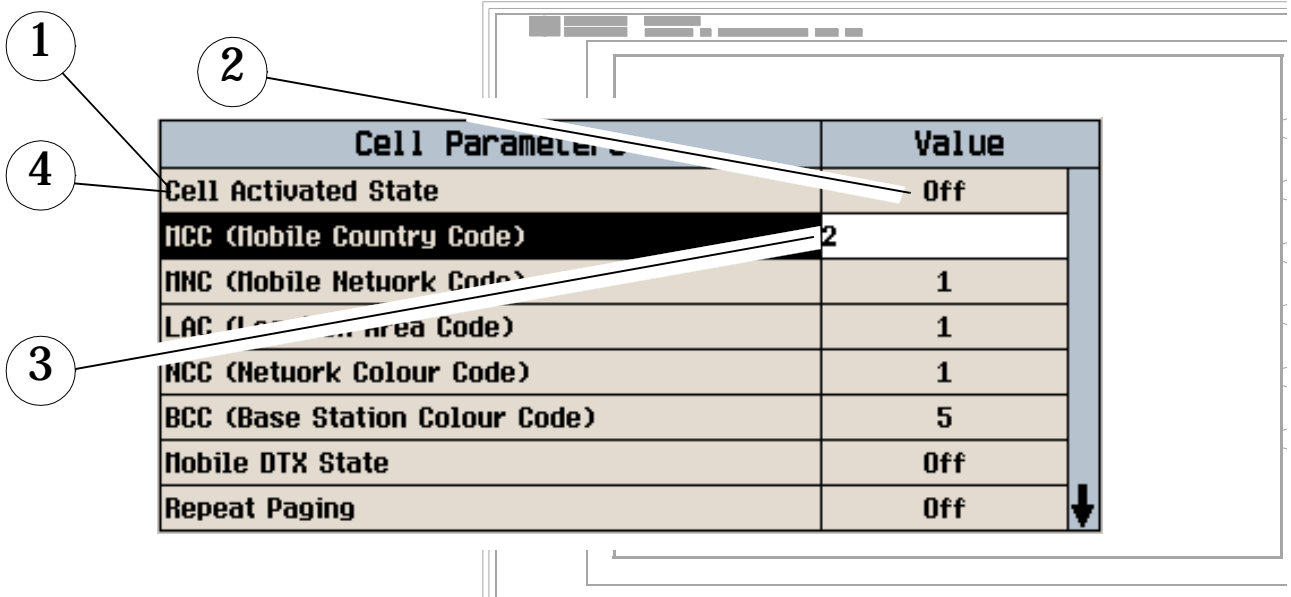
This section is *not* applicable to GPRS.



1. Press F7, F8, or F9.
2. Enter a value or highlight a selection and press the knob.
3. Press the **MORE** key for additional call parameters (**Call Params**). Note: For a dual-band handover, change **Traffic Band** selection (F7, **Call Params** menu 2 of 4).



## B. Set a cell parameter.



To Change “Network” cell parameters follow the instructions below. For all other cell parameters:

Highlight the parameter, press the knob, enter a value, and press the knob.

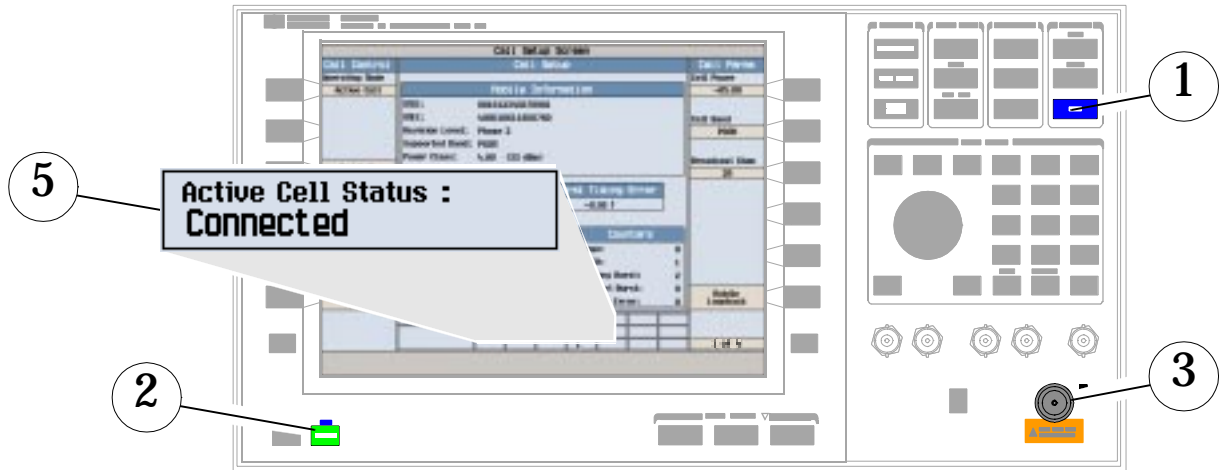
To Change “Network” cell parameters:

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**.

## How Do I Make Measurements on a Mobile?

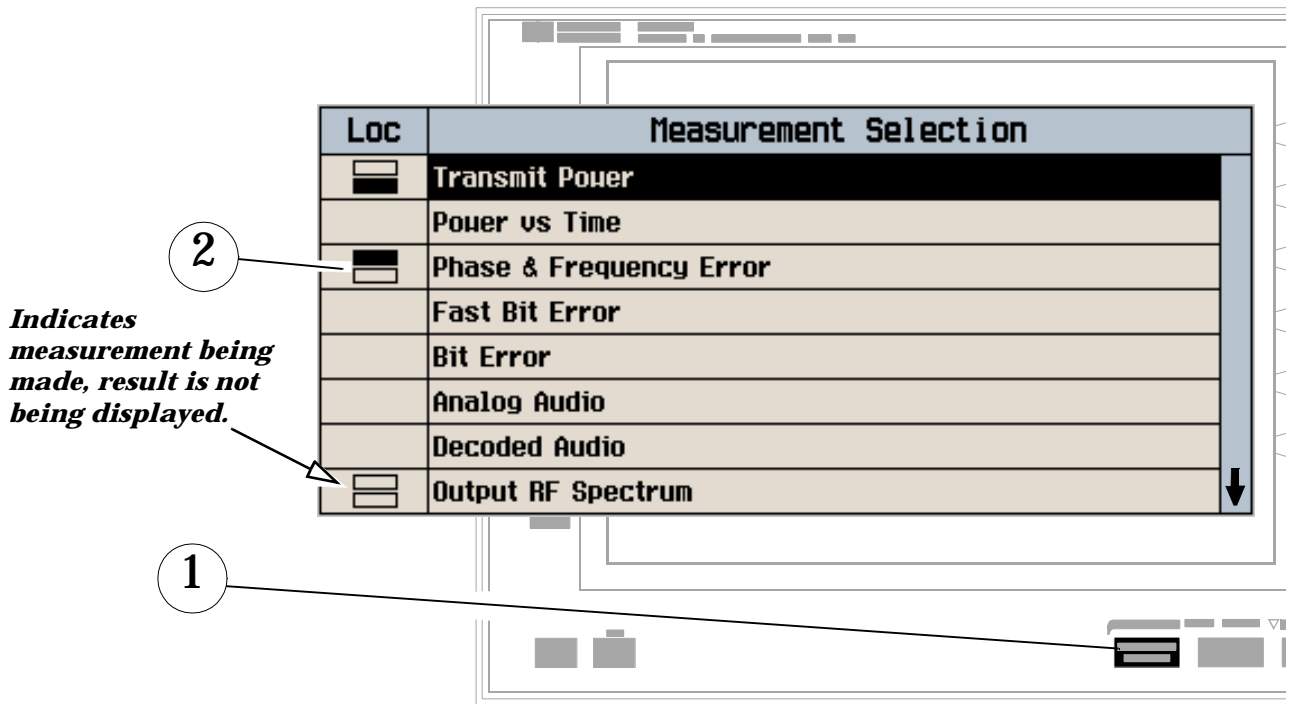
This section is *not* applicable to GPRS.

### A. Establish a call.



1. Press the blue **SHIFT** key.
2. Press the green **Preset** key.
3. Connect the mobile. Note: Is the mobile camped? PGSM is default Cell Band setting.
4. On the mobile press 1, 2, 3, and then press send.
5. Check for **Connected** in the **Active Cell Status:** field.

## B. Select measurements.



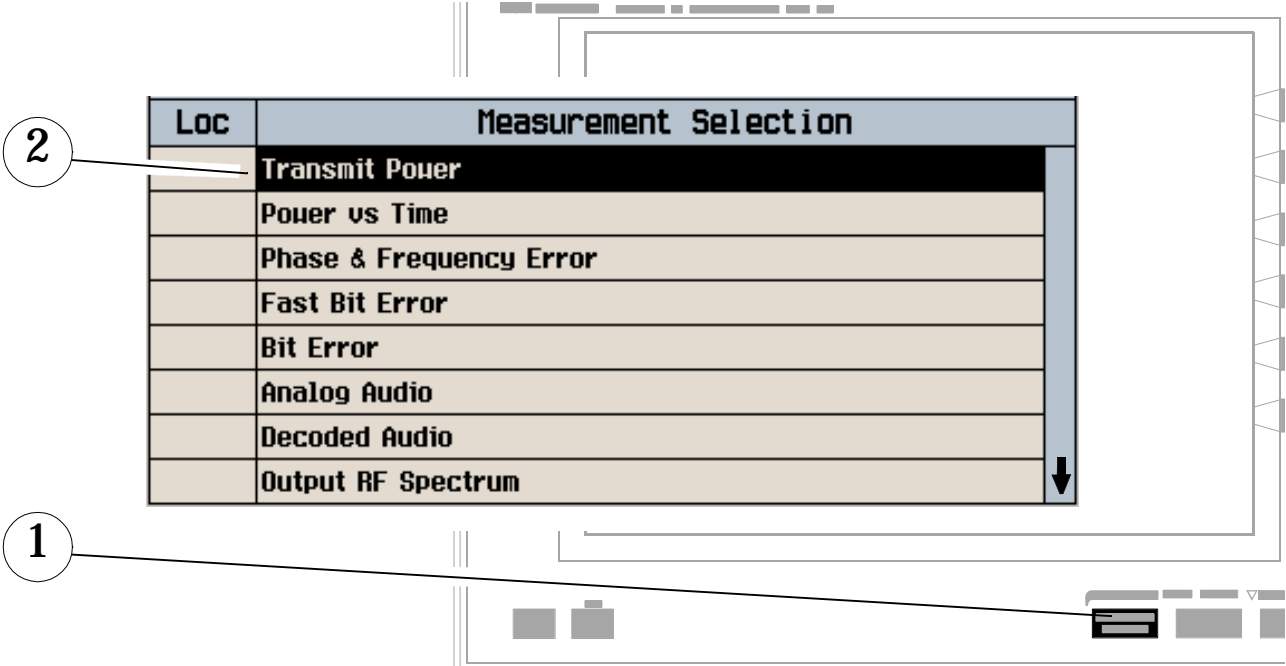
1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.



# How Do I Change Measurement Setup?

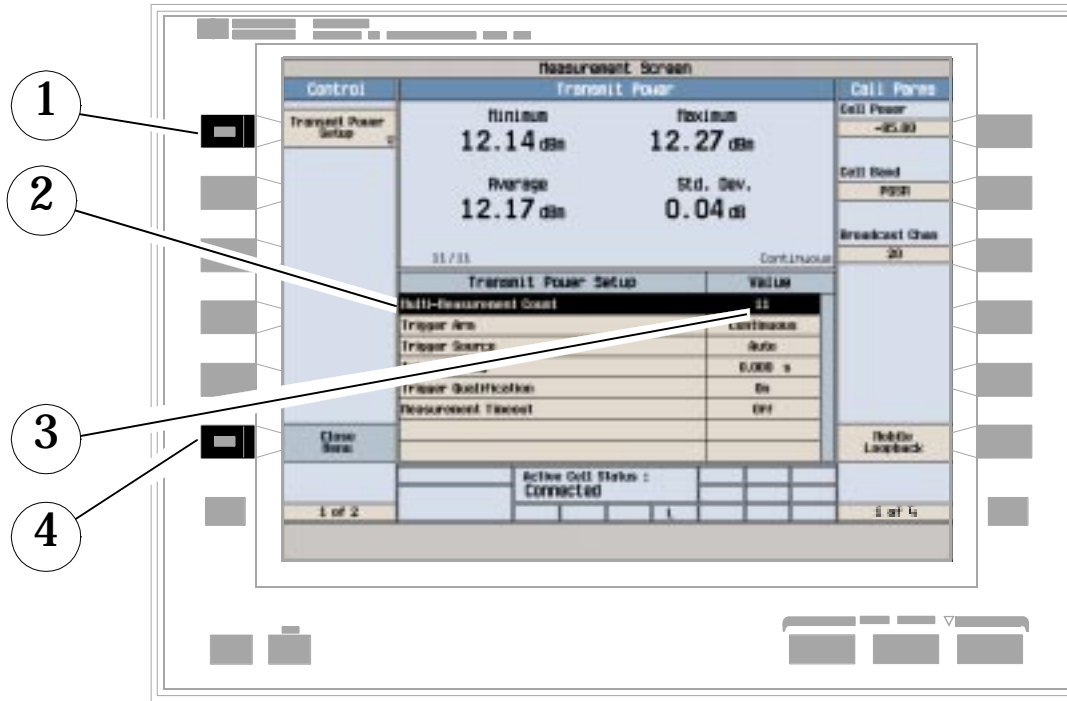
This section is *not* applicable to GPRS.

## A. Select a measurement.



1. Press the **Measurement selection** key.
2. Highlight a measurement to setup and press the knob.

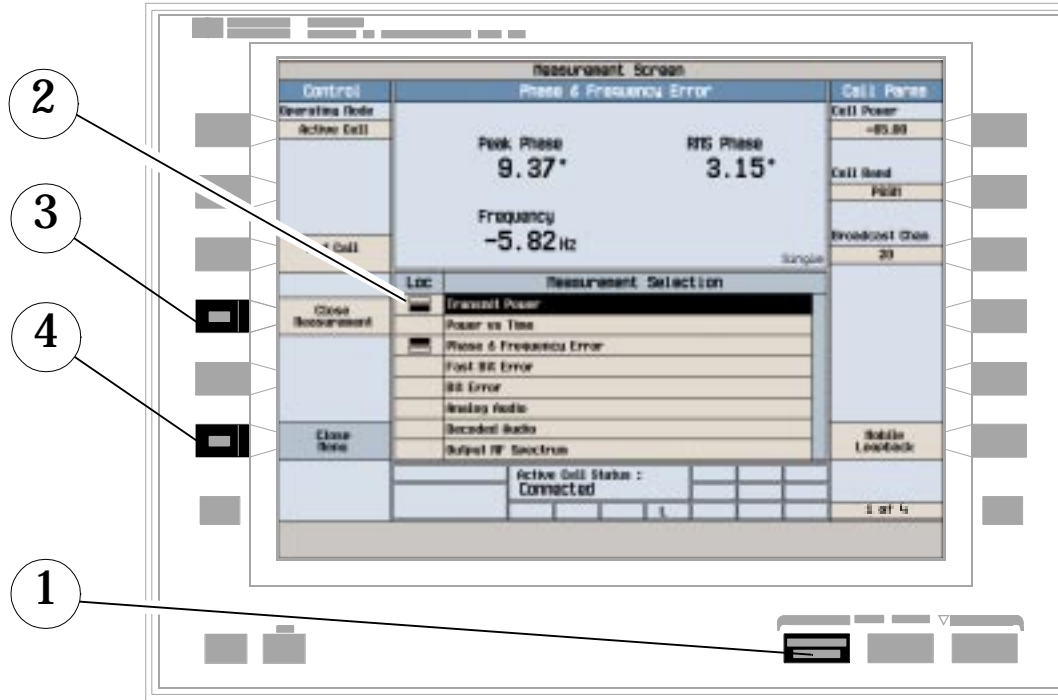
## B. Set up the measurement.



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 **Close Menu (F6)**.

## How Do I Turn Off a Measurement?

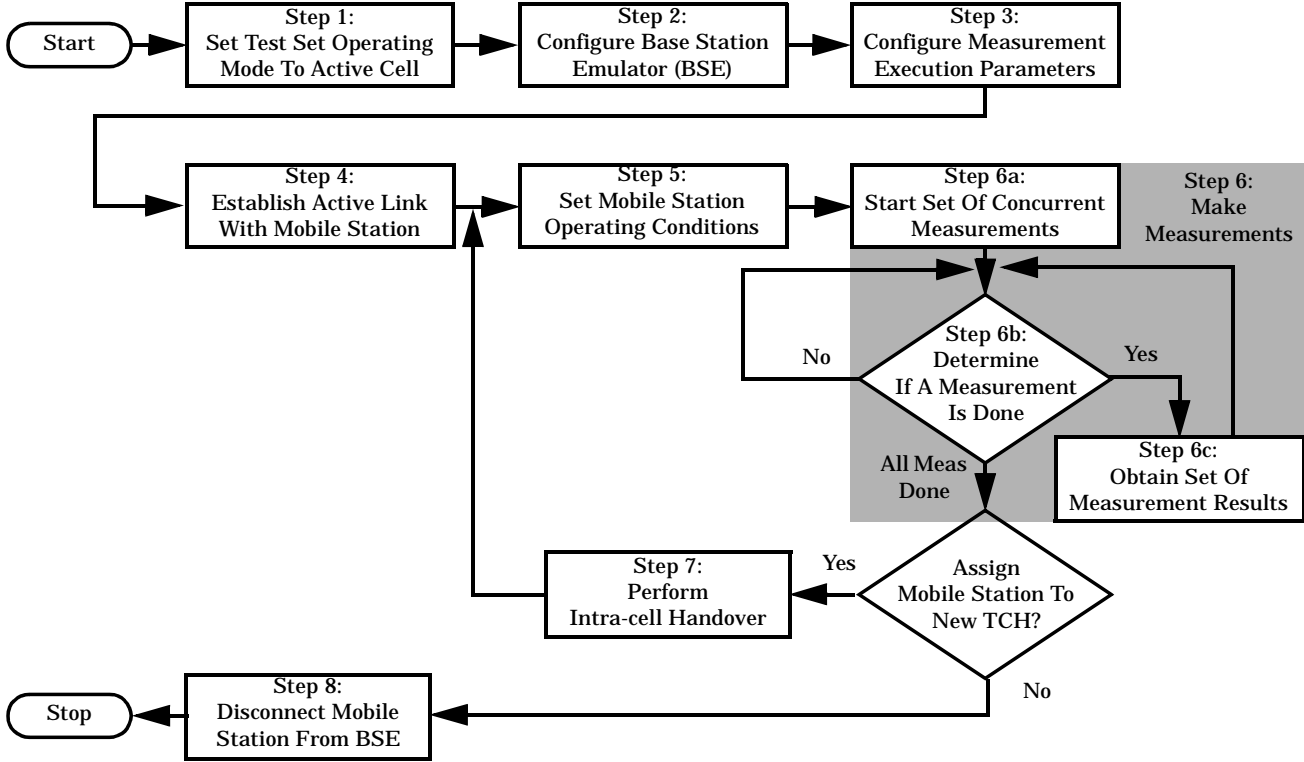
This section is *not* applicable to GPRS.



1. Press the **Measurement selection** key.
2. Highlight the measurement you want to turn off.
3. Press **Close Measurement (F4)**.
4. Press **Close Menu (F6)**.

# Programming Overview

Figure 3. Typical Flow Of Tasks Performed By Control Program



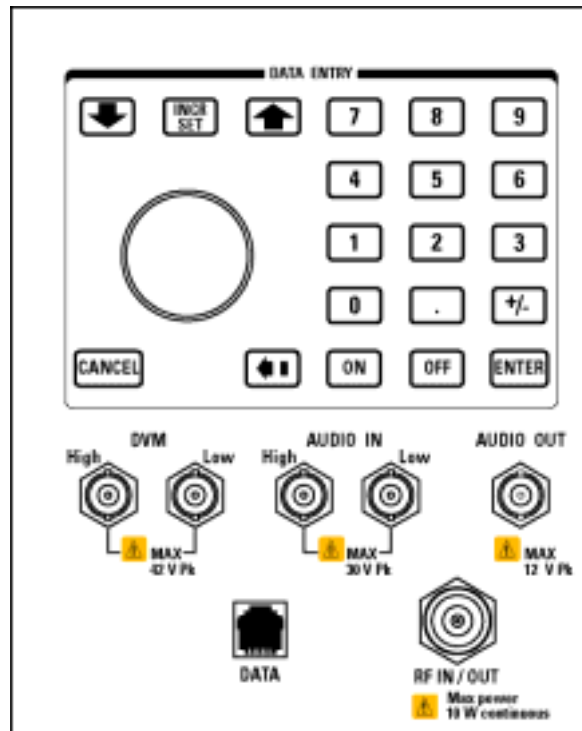
## Related Topics

- \*\*\*\*\*
- [“Programming a Phase and Frequency Error Measurement” on page 106](#)
- [“Programming a Transmit Power Measurement” on page 129](#)
- [“Programming an Output RF Spectrum Measurement” on page 99](#)
- [“Programming a Power versus Time Measurement” on page 114](#)
- [“Programming a Fast Bit Error Measurement” on page 93](#)
- [“Establishing an Active GSM Link with the Mobile Station” on page 30](#)

\*\*\*\*\*

## 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.

## Front Panel Connectors

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 path for all RF signals in or out of the test set. Refer to the technical specifications for more information.

### **Related Topics**

\*\*\*\*\*

[“Analog Audio Measurement Description” on page 62](#)

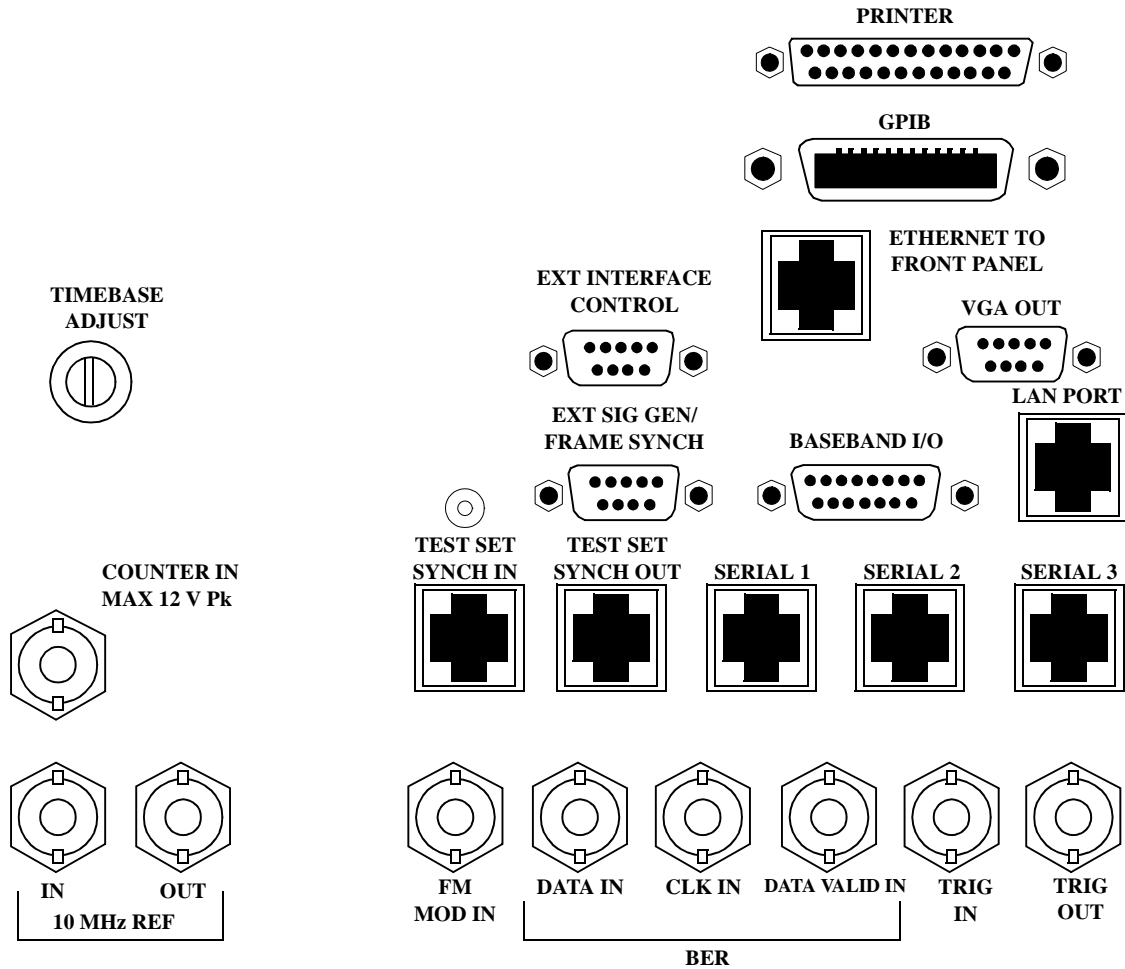
[“AFGenerator” on page 290](#)

[“Configuring the Test Set’s LAN” on page 666](#)

\*\*\*\*\*

# Rear Panel Connectors

## Description



### BASEBAND I/O

Not functional for this release.

## Rear Panel Connectors

### **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

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[“Setting Frame Trigger Parameters” on page 611](#)

[“Timebase Description/Configuration” on page 678](#)

[“SYSTem:ROSCillator” on page 590](#)

[“Configuring the Test Set’s GPIB Address” on page HIDDEN](#)

[“Configuring the Test Set’s LAN” on page 666](#)

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## Remote/Local Mode

### Description

#### Remote Mode

When the test set is operated remotely, all of the keys on the front panel of the test set are disabled (except the LOCAL key and the power switch). During remote operation the test set is controlled by the Remote User Interface, (RUI).

Any open menus are be closed, and any manual entries are be aborted when the test set transitions from local mode to remote mode.

The remote annunciator (R) will appear in the Instrument Status Area of the test set's display indicating that the test set is in remote mode.

When the test set is in remote mode press the LOCAL key on the front panel in order to gain manual control.

#### Local Mode

During local mode all front panel keys and the knob are enabled. During local operation the test set is controlled by the Manual User Interface, (MUI).

The remote annunciator (R) is turned off when the test set is operated in local mode.



## **9 Installation/Configuration**

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## 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

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["DISPlay:BRIGhtness" on page 379](#)

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## Test Set Beeper

### Description

This parameter allows you to change the beeper state to on or off. A beep will indicate error conditions caused during manual or remote operation of the test set.

A 100 ms, 1.24 kHz audible tone (beep) is generated when an error message is logged and the beeper state is set to on. If two errors are generated in quick succession, two beeps are generated to indicate that more than one error has been logged.

The beeper state can be manually set in the Instrument Setup window found in the SYSTEM CONFIG screen.

### Example

```
OUTPUT 714;"SYSTEM:BEEPER:STATE OFF"
```

### Related Topics

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["SYSTem:BEEPer" on page 569](#)

["Error Messages" on page 684](#)

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## 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

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[“SYSTEM:COMMunicate:GPIB:\[:SELF\]:ADDRESS” on page 571](#)

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## 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

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**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.

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### Related Topics

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[“\\*IDN?” on page 592](#)

[“CALibration:DATE” on page 295](#)

[“Obtaining Test Application Information” on page 677](#)

[“SYSTem:COMMunicate” on page 570](#)

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## 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.

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**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.

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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.

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**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.

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The subnet mask number is obtained from your network administrator.

## Related Topics

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[“SYSTem:COMMunicate:LAN\[:SELF\]:ADDRess” on page 572](#)

[“SYSTem:COMMunicate:LAN\[:SELF\]:DGATeway” on page 572](#)

[“SYSTem:COMMunicate:LAN\[:SELF\]:SMASK” on page 573](#)

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## Hardware Configuration Report

### Description

You can generate a list of the test set's hardware configuration over the LAN or GPIB.

The LAN query is the easiest and most direct way to query the test set's hardware configuration. This method uses your web browser to display a formatted report.

The GPIB query returns an unformatted character string that must be buffered and saved to an HTML file to provide formatted text.

### LAN Query

1. Refer to the SYSTEM CONFIG screen to determine the LAN address.
2. Open a web browser and enter <LAN address>/iconfig. For example, if your LAN address is 130.2.2.147, you would enter:  
130.2.2.147/iconfig
3. The web browser will then display formatted text. A partial list of the hardware configuration information is shown below:

### Agilent Technologies 8960 Series 10 E5515A

**Serial Number: US00000097**

**Current Test Application:** E1960A, GSM Mobile Test, A.04.01

**Instrument Options Installed:** RF Source 2

**HOST BOOT ROM REV:** A.02.03\_BOOT

**PROTOCOL BOOT ROM REV:** MOM\_PROTOCOL\_BSP\_1.7

**DSP BOOT ROM REV:** A.00.01

### GPIB Query

Use the following Basic example as a model to store the test set's configuration as an HTML file.

#### GPIB Example:

```

10  DIM Buf1$(20000),Buf2$(20000) ! This is the minimum space for the arrays
20  OUTPUT 714;"SYSTEM:CONFIGURE:INFORMATION:HARDWARE:VERBOSE?"
30  ENTER 714;Buf1$,Buf2$
40  CREATE "HW.htm",1             ! Create an HTML file
50  ASSIGN @File TO "HW.htm"
60  OUTPUT @File;Buf1$,Buf2$
70  END

```

In the future, the hardware configuration report may increase in length. More space would then need to be allocated for the arrays.

Display the HTML file using a web browser or HTML text editor.

## Related Topics

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[“SYSTEM:CONFigure” on page 574](#)

[“SYSTEM:CURRENT:TA” on page 582](#)

[“Obtaining Test Application Information” on page 677](#)

[“Obtaining Identification Information \\*IDN?” on page 665](#)

[“Rear Panel Connectors” on page 655](#)

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## Measurement Related Configuration

### GSM Configuration

#### Description

Amplitude offset is provided in order to compensate for loss or gain of the external network between the test set and the DUT, (device under test). The offset value allows the test set to represent the RF level at the DUT at one frequency. The amplitude offset value can be viewed from the SYSTEM CONFIG screen, Port Configuration, F5 key.

**GPIB Commands Available For The E1960 GSM Mobile Test Application**  These are the commands available to set an amplitude offset for the E1960 GSM Mobile Test Application.

When SYSTEM:CORRECTION:STATE is on; the annunciator “Offset” will be shown on the display.

```
OUTPUT 714;"SYSTEM:CORRECTION:STATE ON" !Set amplitude offset state to ON.
```

```
OUTPUT 714;"SYSTEM:CORRECTION:GAIN -3DB" !Set amplitude offset to 3 dB loss in network.
```

```
OUTPUT 714;"SYSTEM:CORRECTION:GAIN 6DB" !Set amplitude offset to 6 dB gain in network.
```

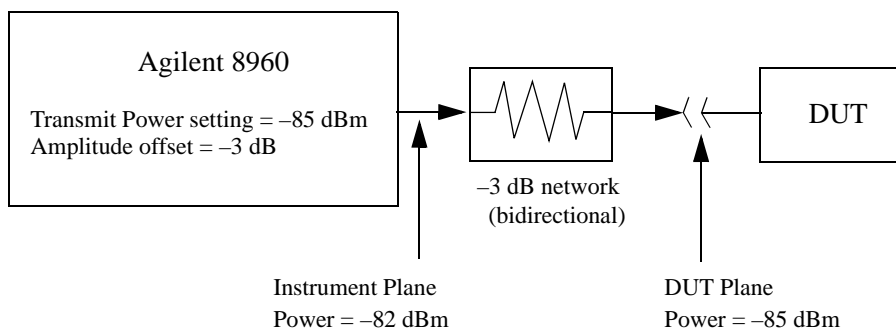
```
OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -9DB" !Set amplitude offset state to ON and a 9 dB loss in the network.
```

**Transmitter Example** Cell power reflects the actual power at the DUT, including any gain or loss entered as an amplitude offset.

If an amplitude offset of -3 dB is set, and the cell power is set to -85 dBm, the cell power setting will indicate -85 dBm. The actual power at the output of the test set's RF IN/OUT connector is -82 dBm, the level shown for cell power is the level present at the DUT plane.

The following figure shows a transmitter example. Transmit power is the combination of the cell power and the amplitude offset values.

**Figure 4. Amplitude Offset Transmitter Example**



The transmit power setting reflects the power at the DUT plane.

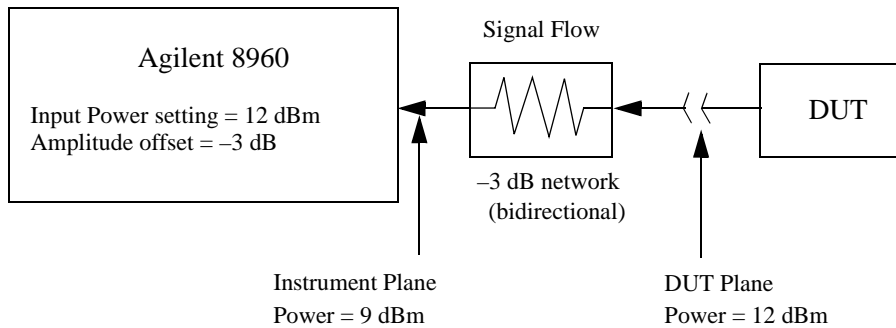
**Receiver Example** The expected power setting reflects the actual power at the DUT, the test set's hardware

changes internally to expect a level that includes the offset.

If an amplitude offset of -3 dB is set, and the expected power setting is set to 12 dBm. The displayed value of expected power indicates 12 dBm in order to reflect the level at the DUT, but the test set's internal hardware changes to receive 9 dBm the actual power received at the test set's RF IN/OUT connector after a -3dB amplitude offset in the network.

The following figure shows a receiver example. Input power is the combination of the expected power and amplitude offset values.

**Figure 5. Amplitude Offset Receiver Example**



The input power setting reflects the power at the DUT plane.

## GPRS Configuration

### Description

Amplitude offset is provided in order to compensate for loss or gain of the external network between the test set and the DUT, (device under test).

The test set allows you to select up to 20 different offsets at 20 different frequencies.

There are 5 non-volatile amplitude offset parameters that require your attention:

- RF IN/OUT Amplitude Offset State
- Frequency state 1 - 20
- Frequency 1 - 20
- Offset state 1-20
- Offset 1 - 20

---

**NOTE**            Frequency and offset values must be set independently.  
                      It is not necessary to use all 20 offsets or frequencies.

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**RF IN/OUT Amplitude Offset State** The RF IN/OUT Amplitude Offset State can be changed to On by setting any of the 20 offsets or frequencies to the On state. The RF IN/OUT Amplitude Offset State can also be turned On or Off independently of the frequency or offset state. When the RF IN/OUT Amplitude Offset State is On, the Offset indicator will appear in the Instrument Status Area of the test set display.

If the RF IN/OUT Amplitude Offset State is Off none of the amplitude offsets are active even if the states of the individual offsets are set to On.

**Remote User** To set the RF IN/OUT Amplitude Offset State to On:

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

**Manual User** In order to manually set the RF IN/OUT Amplitude Offset State, go to the SYSTEM CONFIG screen, and press the RF IN/OUT Amptd Offset key, F5. Amplitude offset loss, gain and state settings are found by pressing the RF IN/OUT Amptd Offset Setup key, F2. RF IN/OUT Amplitude Offset State is the first parameter in the RF IN/OUT Amplitude Offset Setup menu.

When any of the 20 frequencies or offsets are manually set to On, the RF IN/OUT Amplitude Offset State is also set to On.

**Frequency 1 - 20** Up to 20 different RF offset frequencies can be defined by you to correct network loss or gain.

When operating at frequencies not specified in the RF IN/OUT Amplitude Offset frequency list, but between the lowest and highest frequencies in the list, the test set will use linear interpolation to define offset values.

When operating at frequencies above the highest frequency specified, or below the lowest frequency specified in the RF IN/OUT Amplitude Offset frequency list, the test set will use the offset of the closet associated frequency.



If you repeat a frequency entry, only the first entry along with its offset will be used by the test set, even though both of the repeated frequencies may be shown. If a frequency is repeated a warning will appear:

---

**NOTE** Duplicate RF IN/OUT Amplitude Offset Frequency. The first occurrence of duplicate is used.

---

**Remote User** If less than 20 frequencies are sent, the first positions of the RF IN/OUT Amplitude Offset Setup menu will fill in according to the number of frequencies sent. This means that if 6 frequencies are sent, Frequency 1 through Frequency 6 will reflect the values sent by you, and Frequency 7 through Frequency 20 will remain off.

Sending any new frequency values in subsequent commands will write over the original values and set the state to Off for any frequencies not set with the new command.

Sending a null list (no values) with the frequency command results in setting the state for Frequency 1 - 20 to Off .

There are two different commands that can be used to set the RF offset frequency.

- Frequency is set, and the frequency state is set to On with this complex command:

```
OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY 1710.2 MHZ,1805.2 MHZ,1784.8 MHZ,1879.8 MHZ"
!A complex command that sets the up to 20 comma separated frequencies and sets the state to On !for the
frequencies, offsets, and RF IN/OUT Amplitude Offset State
```

- Frequencies are set with this command:

```
OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY 1784.8 MHZ,1879.8 MHZ" !Sets up to 20 comma
!separated frequencies
```

**Manual User** Manual users may set the state or the value for any of the 20 frequencies from the RF IN/OUT Amplitude Offset Setup menu. Frequency values may be set in any order, i.e. set Frequency 1 and then skip to Frequency 20. The frequency state and value is individually controlled for manual users.

In order to manually set the RF offset frequencies go to the SYSTEM CONFIG screen, and press the RF IN/OUT Amptd Offset key, F5. Amplitude offset loss, gain and state settings are found by pressing the RF IN/OUT Amptd Offset Setup key, F2. RF offset frequencies 1 through 20 are listed in the RF IN/OUT Amplitude Offset Setup menu.

When any of the 20 frequencies are manually set to On, the RF IN/OUT Amplitude Offset State and the associated offset state are also set to On.

**Offset 1 - 20** Up to 20 different offset values can be defined by you to correct network loss or gain.

Duplicate offsets are allowed as long as they are associated with different frequencies.

**Remote User** Sending any new offset values in subsequent commands will write over the original values and set the state to Off for any offsets not set with the new command.

There are two different commands to set offsets.

- Offsets are set, and the offset state is set to On with this complex command:

```
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 RFIN/OUT Amplitude Offset State
```

- Offsets are set with this command:

```
OUTPUT 714;"SYSTEM:CORRECTION:GAIN -3.12,-3.68,-4.23" !Sets up to 20 separated offset values
```

**Manual User** Manual users may set the state or the value for any of the 20 offsets from the RF IN/OUT Amplitude

Offset Setup menu. Offset values may be set in any order, i.e. set Offset 1 and then skip to Offset 20. The offset state and value is individually controlled for manual users.

In order to manually set the RF offsets go to the SYSTEM CONFIG screen, and press the RF IN/OUT Amptd Offset key, F5. Amplitude offset gain, loss and state settings are found by pressing the RF IN/OUT Amptd Offset Setup key, F2. RF offsets 1 through 20 are listed in the RF IN/OUT Amplitude Offset Setup menu.

When any of the 20 offsets are manually set to On, the RF IN/OUT Amplitude Offset State and the associated frequency state are also set to On.

**Points** Remote users can query the test set to determine the number of offsets that are in the On state.

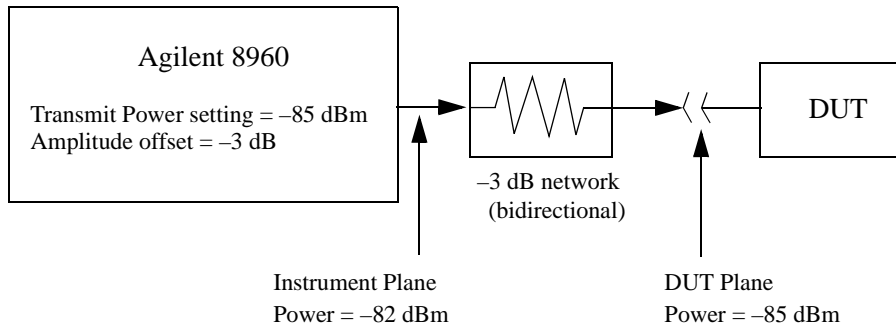
```
OUTPUT 714;"SYSTEM:CORRECTION:POINTS?" !Query returns the number of
!frequencies that have their
!offset states set to On
```

**RF IN/OUT Amplitude Offset** The offset values allow the test set to represent the RF level at the DUT.

**Transmitter Example** When you set transmit power level, the test set uses the amplitude offset value to adjust the power so that the power at the DUT will match the transmit power setting.

With the test set's transmit power set to -85 dBm, the RFIN/OUT Amplitude Offset State set to On, and a -3 dB offset at some frequency. The power transmitted from the test set will be -82 dBm, the 3 dB loss in the network means that the DUT will see -85 dBm.

**Figure 6. Amplitude Offset Transmitter Example**

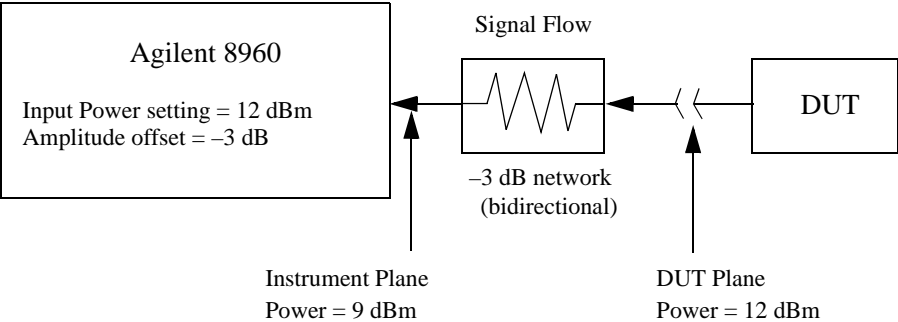


The transmit power setting reflects the power at the DUT plane.

**Receiver Example** The received power setting reflects the power at the DUT. This means the value displayed for received power does not change; however, the test set's hardware changes internally to expect a level that includes the offset.

With the test set's received power set to 12 dBm, the RF IN/OUT Amplitude Offset State set to On, and a -3 dB offset at some frequency. The received power displays 12 dBm to reflect the level at the DUT. The test set's internal hardware changes to receive 9 dBm, the power received at the test set's RF IN/OUT connector after the 3 dB loss in the network.

Figure 7. Amplitude Offset Receiver Example



The input power setting reflects the power at the DUT plane.

**Related Topics**

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[“SYSTEM:CORREction” on page 575](#)

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## 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

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[“DISPlay:MODE” on page 379](#)

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## Obtaining Test Application Information

### Description

Test application information may be viewed from the SYSTEM CONFIG screen. Test application information may be queried using SYSTem:APPLication or SYSTem:CURRent GPIB queries. Queries for information about the current test application, selected test application, or any of the test applications loaded on your test set are available.

### Test Application Information

Each test application has a name, model number, at least one revision, and a license status. This is a sample of the queries available to you.

#### 1. Test application name query:

```
OUTPUT 714; "SYSTEM:APPLICATION:CURRENT:NAME?"
```

This query will return GSM Mobile Test, if that test application is currently running.

#### 2. Model number query:

```
OUTPUT 714; "SYSTem:CURRent:TA:MODEl?"
```

This query will return E1960A, if that test application is currently running.

#### 3. Revision query:

```
OUTPUT 714; "SYSTEM:APPLICATION:CURRENT:REVISION?"
```

This query will return A.04.01, if that revision is currently running.

#### 4. License status query:

```
OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test', 'A.04.01'"
```

This query will return LIC, if the test application is licensed for use.

### Related Topics

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["SYSTem:APPLication" on page 564](#)

["Obtaining Identification Information \\*IDN?" on page 665](#)

["Hardware Configuration Report" on page 668](#)

["SYSTem:COMMunicate" on page 570](#)

["CALibration:DATE" on page 295](#)

["SYSTem:CURRent:TA" on page 582](#)

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## Timebase Description/Configuration

### Description

The time base source is selected by the test set, either an internal time base or an external source (if a suitable signal is detected) is used as the reference oscillator. If a 10 MHz +/- 100 ppm signal, that has an input level from 0 to +13 dBm is connected to the 10 MHz REF IN connector on the rear panel, the test set will automatically select the external timebase.

You can read the status window at the bottom of the test set display for the EXT REF indicator, or query the test set to verify if it is using an external time base or an internal time base. You may also query the test set to verify if the time base is locked. The reference oscillator functionality is controlled through the SYSTEM subsystem.

#### Example:

```
OUTPUT 714;"SYSTEM:ROSCILLATOR[:TIMEBASE]?" !returns INT or EXT
                                           !(internal or external) timebase.
OUTPUT 714;"SYSTEM:ROSCILLATOR:LOCKED?" !returns 1 or 0 (locked or unlocked)
                                           !condition for timebase
```

### Related Topics

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["SYSTem:ROSCillator" on page 590](#)

["Rear Panel Connectors" on page 655](#)

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## Selecting a Radio Personality

### Description

Different radio personalities or radio standards, (such as GSM, AMPS or TIA/EIA 136) can be tested when the optional test applications are purchased from Agilent Technologies. Some test applications will have the ability to test more than one radio standard.

When the operations described in this section are queried, several seconds may pass before the information is ready to be displayed.

You can query the current revision, the selected revision, all the revisions, and the total count of revisions for a selected test application. These queries are helpful when changing revisions or loading new revisions. They are not usually necessary when switching test applications.

The Test Application Setup menu will display all of the test applications available along with the selected revision. The selected revision is the revision that would run if the test set was switched to that test application. There is no need to select a revision every time you want to switch test applications.

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**NOTE**        Selecting the correct name and the desired revision of a test application is important. This information should be reviewed before proceeding.

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### Test Applications Switching

Selecting of a different test application is accomplished manually using the front panel keys, or remotely over GPIB. The test set must be rebooted in order for the test application to become functional. The reboot will happen automatically when the you tell the test set to switch test applications. Rebooting to another test application takes about one minute.

**Remote User**    In order to switch to another test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME `GSM MOBILE TEST`"
```

Sending this command will cause the test set to reboot.

**Manual User**    Test application switching is found on the SYSTEM CONFIG screen.

To switch to the test application you have selected.

1. Press the Test Application key.
2. Use the knob or arrows to scroll to the test application you want.
3. Press the knob or enter key.
4. A menu will appear asking "Switch Now?" If you answer "No" nothing will change, if you answer "Yes" the test set will reboot in the new test application.

### Revision Selection

Different revisions of the test applications in your test set will provide different functionality. Switching

revisions does not reboot the test set in a new test application. It merely selects a revision for the next switch. A revision will remain the selected revision until a different revision is selected by you.

---

**NOTE** If you switch test applications to an older version that does not support test application switching you will not have a path to get back. Using the firmware upgrade process to load firmware with the correct version will fix this problem.

Test application switching is available on revisions greater than A.04.00 of GSM Mobile Test, and all other test applications that are developed thereafter.

---

**Remote User** These are commands to query revision information or select a revision. Selecting a new revision does not switch test applications.

- In order to query a **selected** test application revision (running or not) use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? `AMPS/136 MOBILE TEST`"
```

- In order to query the revision of the test application **currently running** use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"
```

- In order 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`"
```

- In order to **select** a revision of a test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION `GSM mobile test`,`A.04.01`"
```

- Query that returns the number of revisions for a specified test application:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? `GSM MOBILE TEST`"
```

**License Status of Test Applications** The test application license status can be queried for a particular test application and revision using the following GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? `GSM mobile test`,`A.04.01`"
```

This query returns one of the following:

- "LIC" The test application license status is, licensed
- "NLIC" The test application license status is, not licensed
- "UNKN" The test application license status is, unknown

---

**CAUTION** If you switch to an unlicensed state the test set will reboot to SYSTEM CONFIG screen, unable to switch to any other screen or make any measurements. View the Test Application Setup menu to determine the licensed versions of test applications available. Use the Test Application key to switch to a licensed version of the test application.

---

**Manual User** Revision selection is found in the SYSTEM CONFIG screen, Test Application Setup menu. Revisions are shown with their license status. This is where you select the revision and test application that you want, it does not switch test applications. After the revision number is a letter, this 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.
  - “U” This test application has unknown license status.
1. Press the Test Application Setup key.
  2. Use the knob or arrows and scroll to the test application you want.
  3. Press the knob or enter key to display the revision menu.
  4. Use the knob or enter key to scroll to the revision you want.
  5. Press the knob or enter key to select the revision.

### Test Application Names

Each test application has a name associated with it.

- “AMPS/136 Mobile Test” for the E1961A test application.
- “IS-2000 Mobile Test Mode” for the E1962A test application.
- “GSM Mobile Test” for the E1960A test application.
- “GPRS Mobile Test” for the E1964A test application.

**Remote User** In order to query or switch test applications remotely you must use the test application name exactly as it appears (without regard to case) in the Test Application Setup menu of the test set display.

- Query the name of the all test applications installed in the test set.  

```
OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:NAME?"
```
- Query the name of the selected test application (running or not):  

```
OUTPUT 714; "SYSTEM:APPLICATION:SELECT:NAME?"
```
- Query the name of the currently running test application:  

```
OUTPUT 714; "SYSTEM:APPLICATION:CURRENT:NAME?"
```
- In order to know the number of test applications installed in the test set, use the following GPIB command:  

```
OUTPUT 714; "SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"
```

**Manual User** The names of test applications installed in the test set can be viewed from the Test Application Setup menu found in the SYSTEM CONFIG screen. This menu shows you how each test application is spelled and should be used as a reference for GPIB commands.

### Test Application Model Number

Each test application has a model number associated with it.

**Remote User** This query will return E1960A, if that test application is currently running.

## Selecting a Radio Personality

OUTPUT 714;"SYSTem:CURRent:TA:MODEl?"

**Manual User** The test application model number is found in the SYSTEM COFIG screen in the Instrument Information window.

### Programming Example

This program example assumes that the you want 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 not necessary if you are not 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

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["SYSTem:APPLication" on page 564](#)

\*\*\*\*\*

# 10 Error Messages

## Error Messages

### Error Message Descriptions

[“Fixed Timer Messages” on page 687](#)

[“Manual User Error Messages” on page 690](#)

[“-400 to -499 Query Errors” on page 701](#)

[“-300 to -399 SCPI Specified Device-Specific Errors” on page 699](#)

[“-200 to -299 Execution Errors” on page 696](#)

[“-100 to -199 Command Errors” on page 692](#)

[“+100 to +199 Core Device-Specific Error” on page 702](#)

[“+200 to +299 Call Processing Device-Specific Error” on page 704](#)

[“+300 to +399 Link Control Device-Specific Error” on page 707](#)

[“+400 to +499 Core Hardware Device-Specific Error” on page 708](#)

[“+500 to +599 Test Application Hardware Device-Specific Error” on page 711](#)

[“+600 to +699 Instrument Device-Specific Error” on page 712](#)

[“+700 to +799 Test Application Measurement Device-Specific Error” on page 713](#)

[“+800 to +899 Core Measurement Device-Specific Error” on page 714](#)

## 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

## Error Messages

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.

### Related Topics

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["SYSTem:COMMunicate:GPIB:DEBug\[:STATe\]" on page 571](#)

["Test Set Beeper" on page 663](#)

["SYSTem:ERRor?" on page 584](#)

["DISPlay:WINDow:ERRor:CLEar"](#)

["DISPlay:MESSage:MASKable:STATe" on page 379](#)

["Integrity Indicator" on page 146](#)

["FETCh? Subsystem" on page 380](#)

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## Fixed Timer Messages

### Description

This is the list of fixed timers with a brief explanation and their values. A timer expiry message appears in its own window, on the test set display. The user has no access to these values and can not change them. None of the fixed timers are active when operating mode is Test Mode.

Timer Name	Description	Value
T100 RADIO-LINK-TIMEOUT	Detects the presence of the radio link by detecting SACCH frames every 480 ms.	4 SACCH multiframes. That is 1.92 seconds if the SACCH is completely absent.
T200 Data link timer	Used for re-transmission on the data link. The value varies depending on the message type.	155 ms for FACCH
T301 Alerting (ringing) timer	Timer used to limit the amount of time a user has to answer a call.	20 seconds
T303 Mobility Management connection timer	Time the network waits after sending a CM SERVICE REQUEST until receiving a response. This occurs before initiating call clearing procedures towards the MS.	10 seconds
T305 Release timer	Time the network waits after transmitting a DISCONNECT message until receiving a RELEASE message.	10 seconds
T306 In-band tones release timer	Time the network waits after transmitting a DISCONNECT message while in-band tones/announcements are provided, until receiving a RELEASE message.	10 seconds
T308 Release timer	Time the network waits after sending a RELEASE message until receiving a RELEASE COMPLETE message. This occurs before re-transmitting the RELEASE or releasing the Mobility Management connection.	10 seconds
T310 Call proceeding timer	Time the network waits after receiving a CALL CONFIRMED message until receiving a ALERTING, CONNECT, or DISCONNECT message before initiating clearing procedures towards the MS.	10 seconds

## Fixed Timer Messages

Timer Name	Description	Value
T313 Connect acknowledge timer	Time the network waits after transmitting a CONNECT message until receiving the CONNECT ACKNOWLEDGE message before performing clearing procedures with the MS.	10 seconds
T323 Modify complete timer	Time the network waits after sending a MODIFY message during call mode changes, until receiving a MODIFY COMPLETE or MODIFY REJECT message before initiating call clearing procedures.	10 seconds
T3101 Immediate assignment timer	Time the network waits after sending the IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message until the main signalling link is established before releasing the newly allocated channels.	1 second
T3103 Handover timer	Time the network waits after transmitting a HANOVER COMMAND message until receiving HANOVER COMPLETE or HANOVER FAILURE or the MS re-establishes the call before the old channels are released. If the timer expires and the network has not received a correctly decoded L2 (format A or B) or TCH frame, then the newly allocated channels are released.	2 seconds
T3105 Physical information repetition timer	Time the network waits after sending the PHYSICAL INFORMATION message until receiving a correctly decoded L2 (format A or B) or TCH frame. This occur before re-transmitting the PHYSICAL INFORMATION message or releasing the newly allocated channels.	50 ms
T3107 Channel assignment timer	Time the network waits after transmitting an ASSIGNMENT COMMAND message until receiving the ASSESSMENT FAILURE message or the MS re-establishes the call before releasing the old and the new channels.	3 seconds
T3109 Signalling disconnection timer	Time the network waits after sending the CHANNEL RELEASE message before disconnecting the signalling link.	5 seconds
T3111 Channel deactivation after disconnection timer	Time the network waits after disconnecting the signalling link before deactivating the channel.	500 ms



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>. Cycle power to continue.	<N> is the IQ modulator number that you are attempting to calibrate, <N> is 1 or 2.
IQ Calibration failed for modulator <N>. Cycle power to continue.	<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 <N> in progress. Call processing disabled	<N> is the IQ modulator number that you are attempting to calibrate, <N> is 1 or 2.
Instrument warning: Audio generator instrument has been closed.	The audio generator instrument was closed automatically by the test set.
Instrument 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.
Warning; Call processing disabled	The call processing functions are not active because the test set is performing calibration operations.

## 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 684.

**Table 11.**

Message	Description
GSM measurement warning; TX power measurement has been closed 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 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 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 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 the data connection status is Transferring.)

## -100 to -199 Command Errors

### Description

A command error indicates that the test set's GPIB parser has detected an IEEE 488.2 syntax error.

When one of these errors is generated, the command error bit in the event status register is set.

Error Message	Description
-100 Command error	This event bit (Bit 5) indicates a syntax error, or a semantic error, or a GET command was entered, see IEEE 488.2, 11.5.1.1.4.
-101 Invalid character	Indicates a syntactic elements contains a character which is invalid for that type.
-102 Syntax error	Indicates that an unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings.
-103 Invalid separator	The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit.
-104 Data type error	The parser recognized a data element different than one allowed. For example, numeric or string data was expected but block data was encountered.
-105 Get not allowed	Indicates a Group Execute Trigger was received within a program message. Correct the program so that the GET does not occur within the program code.
-108 Parameter not allowed	Indicates that more parameters were received than expected for the header. For example, *ESE common command only accepts one parameter, so *ESE 0,1 is not allowed.
-109 Missing parameter	Indicates that less parameters were received than required for the header. For example, *ESE requires one parameter, *ESE is not allowed.
-110 Command header error	Indicates an error was detected in the header. This error is used when the device cannot detect the more specific errors -111 through -119.
-111 Header separator error	Indicates that a character that is not a legal header separator was encountered while parsing the header.
-112 Program mnemonic too long	Indicates that the header contains more than twelve characters, see IEEE 488.2, 7.6.1.4.1.

Error Message	Description
-113 Undefined header	Indicates the header is syntactically correct, but it is undefined for this specific device. For example, *XYZ is not defined for any device.
-114 Header suffix out of range	Indicates the value of a header suffix attached to a program mnemonic makes the header invalid.
-120 Numeric data error	This error, as well as errors -121 through -129, are generated when parsing a data element which appears to be numeric, including non-decimal numeric types. This particular error is used if the device cannot detect a more specific error.
-121 Invalid character in number	Indicates an invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a "9" in octal data.
-123 Exponent too large	Indicates the magnitude of an exponent was greater than 32000, see IEEE 488.2, 7.7.2.4.1.
-124 Too many digits	Indicates the mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros, see IEEE 488.2, 7.7.2.4.1.
-128 Numeric data not allowed	Indicates that a legal numeric data element was received, but the device does not accept one in this position for the header.
-130 Suffix error	This error, as well as errors -131 through -139, are generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error.
-131 Invalid suffix	Indicates the suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.
-134 Suffix too long	Indicates the suffix contain more than 12 characters, see IEEE 488.2, 7.7.3.4.
-138 Suffix not allowed	Indicates that a suffix was encountered after a numeric element that does not allow suffixes.
-140 Character data error	This error, as well as errors -141 through -149, are generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error.
-141 Invalid character data	Indicates that the character data element contains an invalid character or the particular element received is not valid for the header.
-144 Character data too long	Indicates the character data element contains more than twelve characters, see IEEE 488.2, 7.7.1.4.

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

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[“Standard Event Status Register” on page 560](#)

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## -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.
-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.



Error Message	Description
-240 Hardware error	Indicates that a legal program command or query could not be executed because of a hardware problem in the device.
-241 Hardware missing	Indicates that a legal program command or query could not be executed because of missing device hardware. For example, an option was not installed.
-250 Mass storage error	Indicates that a mass storage error occurred. The device cannot detect the more specific errors described for errors -251 through -259.
-251 Missing mass storage	Indicates that a legal program command or query could not be executed because of missing mass storage.
-252 Missing media	Indicates that a legal program command or query could not be executed because of missing media. For example, no disk.
-253 Corrupt media	Indicates that a legal program command or query could not be executed because of corrupt media. For example, bad disk or wrong format.
-254 Media full	Indicates that a legal program command or query could not be executed because the media is full. For example, there is no room left on the disk.
-255 Directory full	Indicates that a legal program command or query could not be executed because the media directory was full.
-256 File name not found	Indicates that a legal program command or query could not be executed because the file name was not found on the media.
-257 File name error	Indicates that a legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to read or copy a nonexistent file.
-258 Media protected	Indicates that a legal program command or query could not be executed because the media was protected. For example, the write-protect switch on a memory card was set.
-270 Macro error	Indicates that a macro related execution error occurred.
-271 Macro syntax error	Indicates that a syntactically legal macro program data sequence, according to IEEE 488.2, 10.7.2, could not be executed due to a syntax error within the macro definition.
-272 Macro execution error	Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition, see IEEE 488.2, 10.7.6.3.

-200 to -299 Execution Errors

Error Message	Description
-273 Illegal macro label	Indicates that the macro label was not accepted, it did not agree with the definition in IEEE 488.2, 10.7.3
-274 Macro parameter error	Indicates that the macro definition improperly used a macro parameter placeholder, see IEEE 488.2, 10.7.3.
-275 Macro definition too long	Indicates that a syntactically legal macro program data sequence could not be executed because the string of block contents were too long for the device to handle, IEEE 488.2, 10.7.6.1.
-276 Macro recursion error	Indicates that a syntactically legal macro program data sequence 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.

## -300 to -399 SCPI Specified Device-Specific Errors

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. When one of these errors is generated, the device specific error bit in the event status register is set.

Error Message	Description
-300 Device specific error	This event bit (Bit 3) indicates that a device operation did not properly complete due to some condition, such as overrange see IEEE 488.2, 11.5.1.1.6.
-311 Memory error	Indicates some physical fault in the devices memory, such as a parity error.
-312 PUD memory lost	Indicates protected user data saved by the *PUD command has been lost, see IEEE 488.2, 10.27.
-313 Calibration memory lost	Indicates that nonvolatile calibration data used by the *CAL? command has been lost, see IEEE 488.2, 10.2.
-314 Save/recall memory lost	Indicates that the nonvolatile data saved by the *SAV command has been lost, see IEEE 488.2, 10.33.
-315 Configuration memory lost	Indicates that nonvolatile configuration data saved by the device has been lost.
-320 Storage fault	Indicates that the firmware detected a fault when using data storage. This is not an indication of physical damage or failure of any mass storage element.
-321 Out of memory	An internal operation needed more memory than was available
-330 Self test failed	Indicates a problem with the device that is not covered by a specific error message. The device may require service.
-340 Calibration failed	Indicates a problem during calibration of the device that is not covered by a specific error.
-350 Queue overflow	Indicates that there is no room in the queue and an error occurred but was not recorded. This code is entered into the queue in lieu of the code that caused the error.
-360 Communication error	This is the generic communication error for devices that cannot detect the more specific errors described for error -361 through -363.

-300 to -399 SCPI Specified Device-Specific Errors

Error Message	Description
-361 Parity error in program message	Parity bit not correct when data received for example, on a serial port.
-362 Framing error in program message	A stop bit was not detected when data was received for example, on a serial port (for example, a baud rate mismatch).
-363 Input buffer overrun	Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing.

## Related Topics

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[“Standard Event Status Register” on page 560](#)

\*\*\*\*\*

## -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, or 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.

## +100 to +199 Core Device-Specific Error

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error.

These are general errors generated by the core instrument. When one of these errors is generated, the '+100 errors' bit in the questionable error status register is set.

Error Message	Description
+101 Assert; Cycle power. Assert message<message1>	<p>&lt;message1&gt; will appear as:</p> <p>If the DSP generated the assert:</p> <p style="padding-left: 40px;">;P:DSP T:&lt;task ID&gt; E:&lt;error code&gt; C:&lt;error classif.&gt; F1:&lt;flag 1&gt; F2:&lt;flag 2&gt;</p> <p>If the Protocol processor generated the assert:</p> <p style="padding-left: 40px;">;P:Protocol T:&lt;task ID&gt; L:&lt;line number&gt; F:&lt;file name&gt;</p> <p>If the Host processor generated the assert:</p> <p style="padding-left: 40px;">;P:Host T:&lt;task ID&gt; L:&lt;line number&gt; F:&lt;file name&gt;</p>
+102 Exception; Cycle power. Exception message<message2>	<p>&lt;message2&gt; will appear as: T:&lt;task ID&gt; or V:&lt;vector number&gt; or PC:&lt;program counter&gt; or DA:&lt;data adrs reg value&gt;.</p> <p>Vector number, program counter and data address register values are hexadecimal format.</p>
+103 Failure; No measurements or settings can be made	Indicates none of the VTs are operational because a serious problem exists.
+104 Failure; No settling operations will take place	Indicates none of the VTs are operational because a serious problem exists.
+105 Failure; No measurements or setting can be made for the function selected	Indicates none of the VTs 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. <VI NAME> includes : "IntVmVI", "GSMFixedVI", "MiscVI", "GSMSacchMriVI", "IQSelfCalVI1", "IQSelfCalVI2", "TA RevisionVI".
+114 Internal error; <VI NAME> not responding	Indicates that a VI has not been instantiated or the state is not available. <VI NAME> includes : "IntVmVI", "GSMFixedVI", "MiscVI", "GSMSacchMriVI", "IQSelfCalVI1", "IQSelfCalVI2", "TA RevisionVI".
+115 Internal error; <VI NAME> inactive	Indicates that a VI has been made inactive. <VI NAME> includes : "IntVmVI", "GSMFixedVI", "MiscVI", "GSMSacchMriVI", "IQSelfCalVI1", "IQSelfCalVI2", "TA RevisionVI".
+120 Warning; Receiver over range due to requested settings	Indicates the total received power (a combination of received power and amplitude offset) is above the range of the test set.
+121 Warning; Receiver under range due to requested settings	Indicates the total received power (a combination of received power and amplitude offset) is below the range of the test set.
+122 Warning; Reference out of lock	Indicates the test set's internal reference is out of lock.
+123 Warning; Duplicate RF IN/OUT Amplitude Offset Frequency entry. First frequency entry in RF IN/OUT Amplitude Offset table will be used.	Indicates that an amplitude offset value for that frequency has already been entered. The test set will use the amplitude offset value entered first.
+124 Warning; Source over range due to requested settings	The setting selected for total transmit power (a combination of cell power, awgn power, amplitude offset) is above the test set's range.
+125 Warning; Source under range due to requested settings	The setting selected for total transmit power (a combination of cell power, awgn power, amplitude offset) is below the test set's range.
+130 Configuration error; Unable to switch to indicated Test Application	The test application selected is not available for this test set.
+131 Configuration error; Current Test Application is not licensed (License = N). Select another Test Application	The test application selected is not licensed. Select another version or test application that is licensed (License = L).

## +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)	<a href="#">“Fixed Timer Messages” on page 687</a>
+202 GSM call disconnected; Immediate assignment failure (Timer T3101 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+203 GSM call disconnected; Handover failure (Timer T3103 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+204 GSM call disconnected; Channel assignment failure (Timer T3107 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+205 GSM call disconnected; No response to page (Timer T3113 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+206 GSM call disconnected; No answer (Timer T301 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+207 GSM call disconnected; No response to setup (Timer T303 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+210 GSM call disconnected; No response to release 2 times (Timer T308 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+211 GSM call disconnected; No alert from mobile (Timer T310 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+212 GSM call disconnected; No response to connect (Timer T313 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+213 GSM call disconnected; Data link failure (Timer T200 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+214 GSM call disconnected; Physical information repetition failed (Timer T3105 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+217 GSM call disconnected; TMSI (Temporary Mobile Subscriber Identity) reallocation failed (Timer T3250 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+218 GSM call disconnected; Authentication failed (Timer T3260 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>



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 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 BCC.
+232 GSM 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 BCC.
+233 GSM 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 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 BCC.
+235 GSM 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 BCC.
+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.
+250 GSM protocol failure; No response to disconnect (Timer T305 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+251 GSM protocol failure; No response to release (Timer T308 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+252 GSM protocol failure; Channel release failed (Timer T3109 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+253 GSM protocol failure; (Timer T3270 expiry)	<a href="#">“Fixed Timer Messages” on page 687</a>
+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. See <a href="#">“CALL:MS:REPorted:IMEI?” on page 329</a> .
+256 GSM protocol failure; Channel assignment exceeded specified number of frames	Indicates that the max frames allowed for assignment parameter should be increased.

+200 to +299 Call Processing Device-Specific Error

Error Message	Description
+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).
+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.
+271 GSM 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 GSM 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 GSM 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 GSM 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 GSM data connection terminated; MS unexpectedly ended TBF	Indicates that the mobile station unexpectedly ended the TBF (temporary block flow).
+276 GSM data connection terminated; No data received from MS in last 10 seconds	Indicates that no data was received from the mobile station in the allowed time.
+277 GSM 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 GSM 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 GSM data connection terminated; MS did not respond to downlink immediate assignment	Indicates that the mobile station did not respond to the downlink immediate assignment.

## +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 560](#) 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	
+414 Hardware failure; Fixed external reference output is not responding	

Error Message	Description
+415 Hardware failure; Instrument reference is not responding	
+416 Hardware failure; Bit clock A is not responding	
+417 Hardware failure; RF source 2 frequency hardware is not responding	
+418 Hardware failure; RF source 2 digital modulation hardware is not responding	
+419 Hardware failure; RF source 2 level hardware is not responding	
+420 Hardware failure; RF source hopping hardware is not responding	
+421 Hardware failure; Digital demod hopping hardware is not responding	
+422 Hardware failure; Misc VI hardware is not responding	
+423 Hardware failure; Unable to access networking information	
+424 Hardware failure; Bit clock B is not responding	
+425 Hardware failure; Invalid EEPROM checksum <EEPROM board ID>	See the list of EEPROM board ID names below.
+426 Hardware failure; Unable to write to EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+427 Hardware failure; Unable to read from EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+428 Hardware failure; Board not identified <board ID>	See the list of board ID names below.
+429 Hardware failure; Could not create board identification <board ID>	See the list of board ID names below.
+430 Hardware failure; Control version not compatible with FW <board ID>	See the list of board ID names below.
+431 Hardware failure; RF IO DAC cannot be calibrated due to present temperature	
+432 Hardware failure; RF hardware is not responding	
+433 Hardware failure; RF source FM hardware is not responding	
+434 Hardware failure; Audio source FM hardware is not responding	

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.

**<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**

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[“Standard Event Status Register” on page 560](#)

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## +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 12. Test Application Hardware Device Specific Errors**

Error Message
+500 to +599 No errors currently defined

### Related Topics

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[“Standard Event Status Register” on page 560](#)

\*\*\*\*\*

## +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

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["Standard Event Status Register" on page 560](#)

\*\*\*\*\*



## +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 560](#) for information on this register.

Error Message	Description
+701 GSM 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	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	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	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 560](#)

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## Error Message Log

### Description

When an error message is displayed, it is also logged in the error message log. This log is only accessible manually; it is not available through GPIB. The error message log can have two pages it 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 the user presses F10 (Clear Error Message Log).

### Related Topics

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["Error Messages" on page 684](#)

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## 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.05 Release May 2000” on page 716](#)
- [“A.04 Release - March 2000” on page 717](#)
- [“A.03 Release - December 1999” on page 718](#)
- [“A.02 Release - July 1999” on page 719](#)
- [“A.01 Release - March 1999” on page 719](#)
- [“A.00 Initial Release - January 1999” on page 720](#)

### A.05 Release May 2000

#### Call Processing

No new features in this release.

#### Measurements

No new measurements in this release.

#### Other

- **RF Source Analyzer Level Compensation**  
Amplitude offset is provided in order to compensate for loss or gain of the external network between the test set and the DUT, (device under test) over a range of frequencies.
- **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 567.

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**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.

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- 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 379. 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 379](#).
- **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 668](#).
- 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



## Symbols

\*IDN?, 665

## Numerics

3 Digit MNC for PCS 1900, 353

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