

Agilent Technologies 8960 Series 10 E5515B,C 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.07
GPRS Test Application Revision A.01

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



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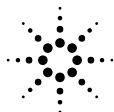
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Edition/Print Date

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

- October 2000 - GSM Test Application Revision A.05
GPRS Test Application Revision A.00
- January 2001 - GSM Test Application Revision A.06
GPRS Test Application Revision A.01
- March 2001 - GSM Test Application Revision A.07
GPRS Test Application Revision A.01

Safety Summary

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

GENERAL

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

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

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

ENVIRONMENTAL CONDITIONS

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

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

BEFORE APPLYING POWER

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

GROUND THE INSTRUMENT

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

FUSES

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

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

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

DO NOT REMOVE THE INSTRUMENT COVER







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

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

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

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

Safety Symbols

-  Caution, refer to accompanying documents
-  Warning, risk of electric shock
-  Earth (ground) terminal
-  Alternating current
-  Frame or chassis terminal
-  Standby (supply). Units with this symbol are not completely disconnected from ac mains when this switch is off.

Product Markings

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

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

CERTIFICATION

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

Agilent Technologies Warranty Statement for Commercial Products

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

Duration of Warranty: 1 year

1. Agilent Technologies warrants Agilent Technologies hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If Agilent Technologies receives notice of such defects during the warranty period, Agilent Technologies will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. Agilent Technologies warrants that Agilent Technologies software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If Agilent Technologies receives notice of such defects during the warranty period, Agilent Technologies will replace software media which does not execute its programming instructions due to such defects.
3. Agilent Technologies does not warrant that the operation of Agilent Technologies products will be uninterrupted or error free. If Agilent Technologies is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.
4. Agilent Technologies products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
5. The warranty period begins on the date of delivery or on the date of installation if installed by Agilent Technologies. If customer schedules or delays Agilent Technologies installation more than 30 days after delivery, warranty begins on the 31st day from delivery.
6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent Technologies, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.
7. TO THE EXTENT ALLOWED BY LOCAL LAW, THE ABOVE WARRANTIES ARE EXCLUSIVE AND NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL IS EXPRESSED OR IMPLIED AND AGILENT TECHNOLOGIES SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OR MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.
8. Agilent Technologies will be liable for damage to tangible property per incident up to the greater of \$300,000 or the actual amount paid for the product that is the subject of the claim, and for damages for bodily injury or death, to the extent that all such damages are determined by a court of competent jurisdiction to have been directly caused by a defective Agilent Technologies product.

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

FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

ASSISTANCE

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

Service and Support

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

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

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

United States Test and Measurement Call Center

(Toll free in US)

(800) 452-4844

Europe

(31 20) 547 9900

Canada

(905) 206-4725

Japan Measurement Assistance Center

(81) 426 56 7832

(81) 426 56 7840 (FAX)

Latin America

(305) 267 4288 (FAX)

Australia/New Zealand

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Taikoo Shing, Hong Kong

DECLARATION OF CONFORMITY

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

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

Declares, that the product

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

Conforms with the following European Directives:

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

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

Supplemental Information:

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

14 December 2000



R.M. Evans / Quality Manager

14 December 2000



W.V. Roland / Reliability & Regulatory
Engineering Manager

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

Manufacturer's Declaration

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

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

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

Herstellerbescheinigung

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

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

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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 434.
2. If necessary, set the IMSI state. See “CALL:PAGing:IMSI” on page 386.

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][:SElected]” on page 388.

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 45.
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 45.

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 434.
2. Configure the necessary call processing connect/disconnect synchronization conditions. See “Call Processing State Synchronization” on page 45.
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 45.

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 “CALL:ORIGinate” on page 385.	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 “CALL:END” on page 355.	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 “CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341.	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 “CALL:BCHannel” on page 341.	Sets the BCH ARFCN for a broadcast band not currently selected.	The test set has noted this parameter change.

Call Processing Event Synchronization

Call Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
CALL:TCHannel[:ARFCn][:SElected] See “CALL:TCHannel[:ARFCn][:SElected]” on page 435.	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:
CALL:TCHannel[:ARFCn]:<traffic band> See “CALL:TCHannel” on page 434.	Sets the TCH ARFCN for a traffic band not currently selected.	The channel assignment has been successfully completed (when a call is established), or
CALL:TCHannel:TSLot See “CALL:TCHannel:TSLot” on page 440.	Sets the TCH timeslot.	The test set has noted this parameter change (no call established), or
CALL:MS:TADVance See “CALL:MS:TADVance” on page 378.	Sets the mobile station timing advance.	The test set has noted this parameter change (not currently selected band), or
CALL:MS:TXLevel[:SElected] See “CALL:MS:TXLevel[:SElected]” on page 379.	Sets the mobile station transmit level for currently selected band.	An error message was generated.
CALL:MS:TXLevel:<traffic band>.	Sets the mobile station transmit level for a traffic band not currently selected.	
CALL:CONNected:ARM[:IMMediate] See “CALL:CONNected:ARM[:IMMediate]” on page 346.	Arms the call control status change detector.	The call control status change detector has been disarmed. See “Connected/Idle Query” on page 46.

Related Topics

“Call Processing State Synchronization” on page 45

“Measurement Event Synchronization” on page 191

“Test System Synchronization Overview” on page 50

Call Processing State Synchronization

Call Processing State Query

The `CALL:STATus[:STATe]?` query returns a string indicating the current call processing state.

There are six possible call processing states for GSM.

The query returns one of the following strings:

- “IDLE”
Idle is returned when the test set is not on a call, involved with any termination, page, origination, or registration call processing procedures with the mobile station.
- “SREQ”
Set Up Request is returned when the test set is in the process of assigning a channel to a mobile station as part of a Page or a mobile station originated call setup.
- “PROC”
Proceeding is returned when the test set is in the process of connecting a call from a mobile station.
- “ALER”
Alerting is returned when the mobile station is about to receive an Alert message as part of a call setup due to a page.
- “CONN”
Connected is returned when the test set and the mobile station are connected on a call.
- “DISC”
Disconnected is returned when the test set is in the process of ending a call.

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

```
OUTPUT 714 ; "CALL:STATus:STATe:DATA?"
```

Description

Connected/Idle Query

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

Query returns one of the following:

- 0 = idle
- 1 = connected

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

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

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

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

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

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

Call State Change Detector

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

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

- the call processing state has changed to either connected or idle
or...
- the attempt to connect or disconnect a call has failed, and one of the test set’s Fixed Timers has timed out
or...
- no call processing state changes occurred within the time period specified by the “Call State Change Detector Timeout” .

The following command arms the call state change detector:

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

Example 5. Mobile Station Originated Call - Arming the Change Detector

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

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

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

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

STATUS:OPERATION:CALL:GSM Status Register

The STATUS subsystem provides a status register group that allows the user to query call processing states. Call processing state synchronization can be performed using the bit transitions of STATUS:OPERATION:CALL:GSM to generate interrupts to the external controller. Refer to “STATUS:OPERATION:CALL:GSM Condition Register Bit Assignment” on page 659 for status bit definitions and GPIB command syntax. See “Call State STATUS:OPERATION:CALL:GSM Program Example” on page 48.

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 sumary
210                                    !bit to generate a summary
220                                    !message.
230 OUTPUT 714;"*SRE 128" !Enable the service request enable register to
240                                    !generate an SRQ.
250 ON INTR 7,15 CALL Err !Define the interrupt-initiated branch wiht a
260                                    !priority of 15, the highest.
270 ENABLE INTR 7;2 !Enable interrupt on interface card 7 with a bit mask
280                    !(for the interface's interrupt-enable register) of 2.
290 PRINT "Make a call, type CONT when connected." !Make a Mobile Station
300                                    !originated call.
310 PAUSE
320 PRINT "End the call from the mobile station and then type CONT."
330 PAUSE
340 LOOP
350   OUTPUT 714;"STATUS:OPERATION:CALL:GSM:EVENT?" !Query the event register.
360   ENTER 714;Eve
370   IF Eve=0 THEN
380     PRINT "The call is still connected, press the end key."

```

```
390     END IF
400   END LOOP
410   END
420   SUB Err
430     DISP "The call has ended."
440     Clear_interrupt=SPOLL(714)
450     OUTPUT 714;"*CLS"
460     STOP
470   SUBEND
```

Related Topics

[“Call Processing Event Synchronization” on page 40](#)

[“CALL:STATus\[:STATe\]\[:VOICe\]?” on page 430](#)

[“CALL:CONNected:ARM\[:IMMediate\]” on page 346](#)

[“CALL:CONNected:TIMEout” on page 347](#)

[“Instrument Status Area” on page 774](#)

Test System Synchronization Overview

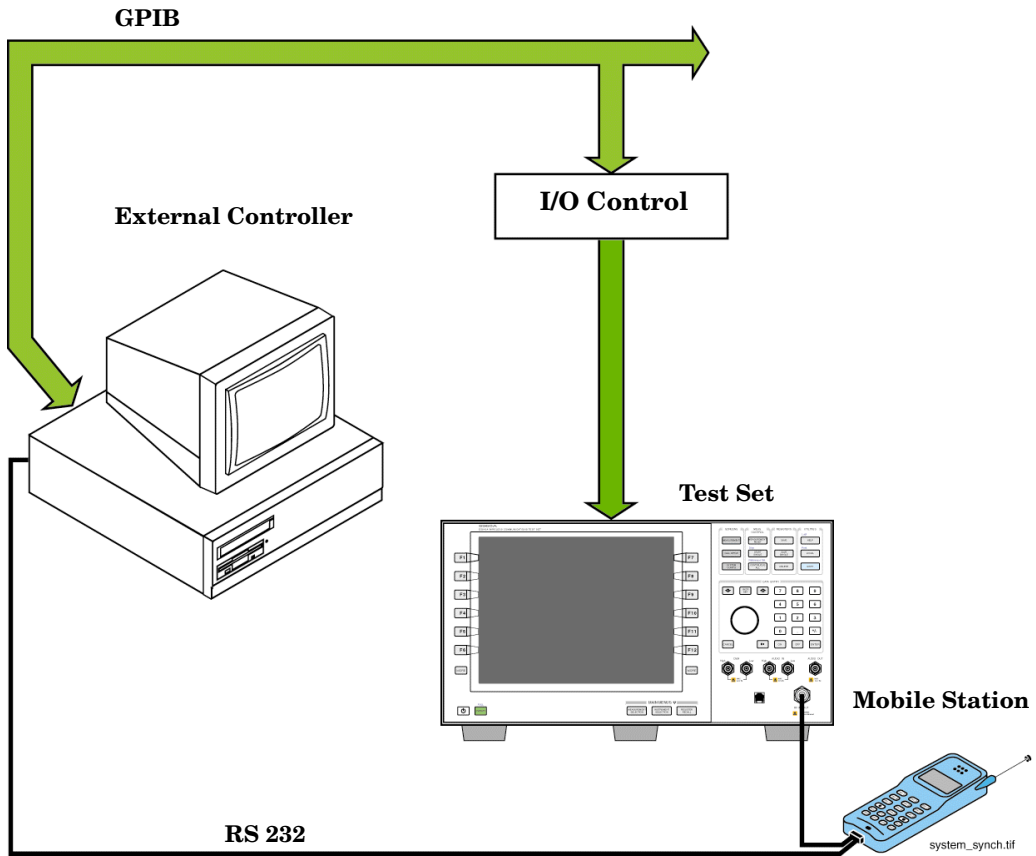
Commands used for synchronization:

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.
- “CALL:STATus[:STATe][:VOICe]?” on page 430

This command queries the test set's current call processing state. This command supports synchronization method five. (See “Call Processing State Query” on page 45).

- “CALL:CONNected[:STATe]?” on page 345

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 46). 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 41.)

- **: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 41.)
- **: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 41.)
- **“INITiate:DONE?”** on page 528
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 191.)
- **STATUS:<register>**
Status bits in the “STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 659 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 667 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 647.
- **“SYSTem:SYNChronized”** on page 720
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 653). This command supports synchronization method four and six.
- **“*OPC”** on page 721, **“*OPC?”** on page 721, and **“*WAI”** on page 722 (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 45
- “Measurement Event Synchronization” on page 191
- “Call Processing Event Synchronization” on page 40
- “SYSTem:SYNChronized” on page 720

2 GPRS Data Connection

Establishing a Data Connection with the Mobile Station

For instructions and a programming example on how to make a data connection, see “Step 4: Make a connection” on page 275.

Related Topics

“CALL:PDTCH | PDTChannel” on page 389

“CALL:FUNCTION:DATA:START” on page 358

“Data Connection Processing State Synchronization” on page 60

Data Connection Processing Event Synchronization

Description

Using the call processing subsystem overlapped command synchronization commands, you can query the test set to find out when an overlapped command operation is done (:DONE?, :OPC?), force the test set to not execute any more commands until an overlapped command operation has completed (:WAIT), or simply force an overlapped command to behave as a sequential command (:SEQ).

Pending Operation Flags

Associated with each overlapped command, the test set maintains a binary indicator known as a pending operation flag. A pending operation flag is set true when the operation started by the overlapped command is executing, and is set false when the operation is no longer executing.

NOTE In addition to the call processing subsystem overlapped commands, the test set also provides the measurement-related INITiate overlapped commands. For more details on these commands see “INITiate” on page 526.

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.	OUTPUT 714 ; "CALL : DCON : ARM : DONE ?" This example queries whether the data connection state change detector has been successfully armed.
:SEquential	Forces an overlapped command to execute in a sequential manner. No subsequent commands are executed until the pending operation flag for this operation is false.	OUTPUT 714 ; "CALL : FUNC : DATA : STAR : SEQ" This example commands the test set to start a data connection. A data connection must be established before any GPRS measurements can be made. :SEQ ensures that no other commands are executed until the pending operation flag associated with the CALL:FUNCTION:DATA:STARt command is false.
:WAIT	Forces the test set to wait until the associated command's pending operation flag is false before executing any more commands.	OUTPUT 714 ; "CALL : DCON : ARM : WAIT ?" This example prevents the test set from executing the next command until the data connection state change detector has been armed.
:OPComplete?	Places a 1 in the test set's output queue when the associated command's pending operation flag goes false. Controlling program hangs on this query until the 1 is retrieved.	OUTPUT 714 ; "CALL : FUNC : DATA : STAR : OPC ?" This example hangs program execution until the :OPC query's until a 1 is placed in the test set's output queue.

Data Connection Processing Subsystem Overlapped Commands

Data Connection Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
CALL:FUNCTION:DATA:STARt See "CALL:FUNCTION:DATA:STARt" on page 358.	Attempts to start the data connection.	The connection status is any non-transitory state (that is Idle, Attached or Transferring).
CALL:DCONnected:ARM[:IMMediate] See "CALL:DCONnected:ARM[:IMMediate]" on page 352.	Arms the data connection state change detector.	The data connection state change detector has been disarmed.

Related Topics

“Data Connection Processing State Synchronization” on page 60

“Measurement Event Synchronization” on page 191

“Test System Synchronization Overview” on page 63

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 358). This is a transitory state (which means that the mobile station can only remain in this state until it successfully moves to another state, or the protocol timer expires). At the end of the signalling exchange, the new state will be either Transferring, Attached or Idle, depending on whether or not the data connection is successfully established.
- “END”
Ending is returned when you have performed the “End Data Connection” action (using “CALL:FUNCTION:DATA:STOP” on page 358). This is a transitory state (which means that the mobile station can only remain in this state until it successfully moves to another state, or the protocol timer expires). At the end of the signalling exchange, the new state will be Attached, even if the procedure encounters an error.
- “TRAN”
Transferring is returned when a data connection has been established.

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

```
OUTPUT 714;"CALL:STATUS:STATE:DATA?"
ENTER 714;Inst_state$
```

Attached State Query This query determines if a data connection is in the Attached state by returning an integer value. The value indicates if the data connection state is Attached or any other non-transitory state, not if any data connection state change has occurred.

The query returns one of the following:

- 0 = Any non-transitory state other than Attached (that is, Idle or Transferring)
- 1 = Attached

If the data connection is in the Attaching, Detaching, Starting, or Ending state, this command does not return a value until the data connection state proceeds to Idle, Attached, or Transferring.

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

Transferring State Query This query determines if a data connection is in the Transferring state by returning an integer value. The value indicates if the data connection state is Transferring or any other non-transitory state, not if any data connection state change has occurred.

The query returns one of the following:

- 0 = Any non-transitory state other than Transferring (that is, Idle or Attached)
- 1 = Transferring

If the data connection is in the Attaching, Detaching, Starting, or Ending state, this command will not return a value until the data connection state proceeds to Idle, Attached, or Transferring.

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

Data Connection State Change Detector This method provides the advantage of indicating that a data connection state change has occurred. The change detector works in conjunction with the Attached State and Transferring State queries. Arming the CALL:DCONNECTED? query provides a way for the external controller to know when the data connection state change process is done.

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

- the data connection processing state has changed to either Idle, Attached or Transferring from one of the transitory states
or,
- the attempt to establish a data connection failed and one of the test set's Fixed Timers has timed out
or,
- no data connection processing state changes occurred within the time period specified by the timeout timer.

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

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

Data Connection State Change Detector Timeout

If a state change does not occur, you need a way to control how long to wait for the change detector. The change detector is disarmed by the timeout timer. After a timeout, the state query that you have initiated (Attached state query or Transferring state query) will return a 1 for connected or a 0 for idle. You can set the timeout value using “CALL:DCONnected:TIMEout” on page 353.

Related Topics

“Test System Synchronization Overview” on page 63

“Data Connection Processing Event Synchronization” on page 57

“CALL:STATus[:STATe]:DATA?” on page 430

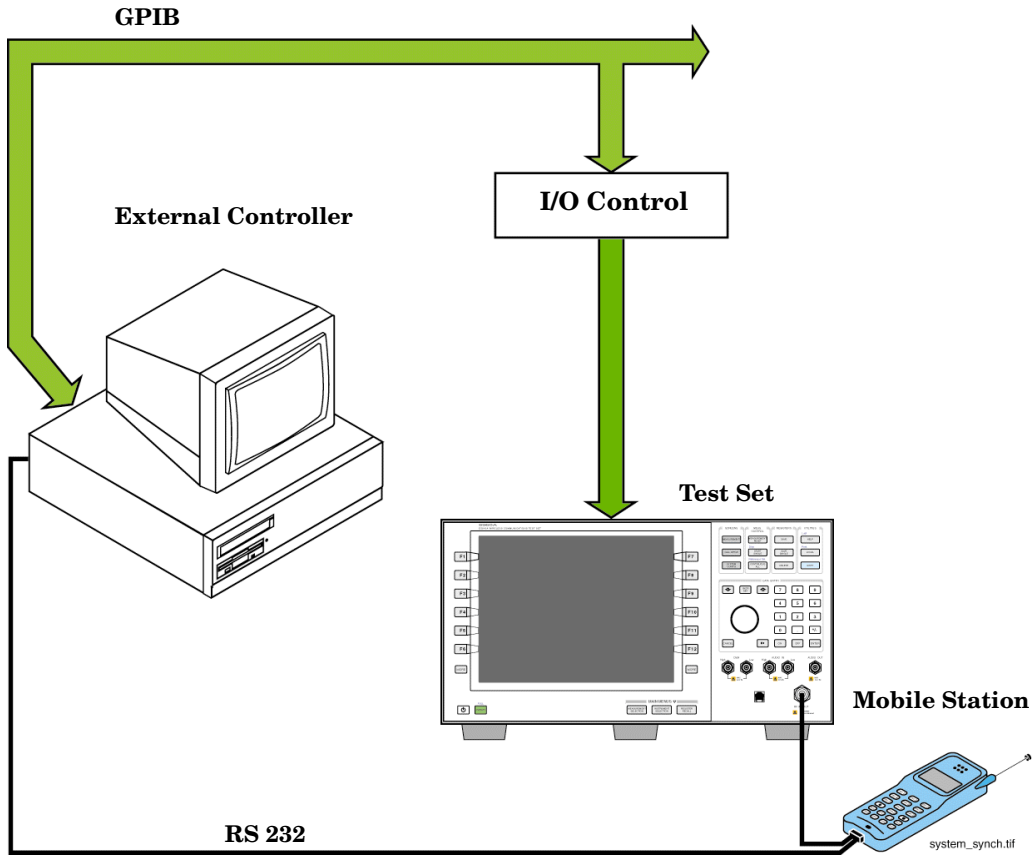
Test System Synchronization Overview

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 430
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 60.
- “CALL:ATTached[:STATe]?” on page 327
This command determines if the current data connection is in the attached state. This command supports synchronization method 5.
- “CALL:TRANsferring[:STATe]?” on page 441
This command determines if the current data connection is in the transferring state. This command supports synchronization method 5.
- :DONE? and :OPC?
These specialized commands can be appended to GPRS data connection processing overlapped commands to support synchronization method three. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 58.

Test System Synchronization Overview

- **: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 58.
- **: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 58.
- **“INITiate:DONE?”** on page 528
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 191.
- **“SYSTem:SYNChronized”** on page 720
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 653). This command supports synchronization method four and six.
- **“*OPC”** on page 721, **“*OPC?”** on page 721, and **“*WAI”** on page 722 (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 60

“Measurement Event Synchronization” on page 191

“Data Connection Processing Event Synchronization” on page 57

“SYSTem:SYNChronized” on page 720

3 Measurements

Analog Audio Measurement Description

This measurement is *not* applicable to GPRS.

How is an analog audio measurement made?

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

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

See "Analog Audio Measurement Block Diagram" on page 70.

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

SINAD/Distortion State

Select On or Off to enable or disable the SINAD and Distortion measurements. This can be done remotely using the "SETup:AAUDio:SDISortion:STATE" on page 567. When On, these measurement results are displayed on the screen below the Audio Level measurement. The SINAD/Distortion Fundamental Frequency must be entered to specify the audio frequency for the measurement (range: 100 Hz to 10 kHz).

Audio Frequency State

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

Filter Type

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

Detector Type

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

Expected Peak Voltage

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

De-Emphasis State

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

Expander Reference Level

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

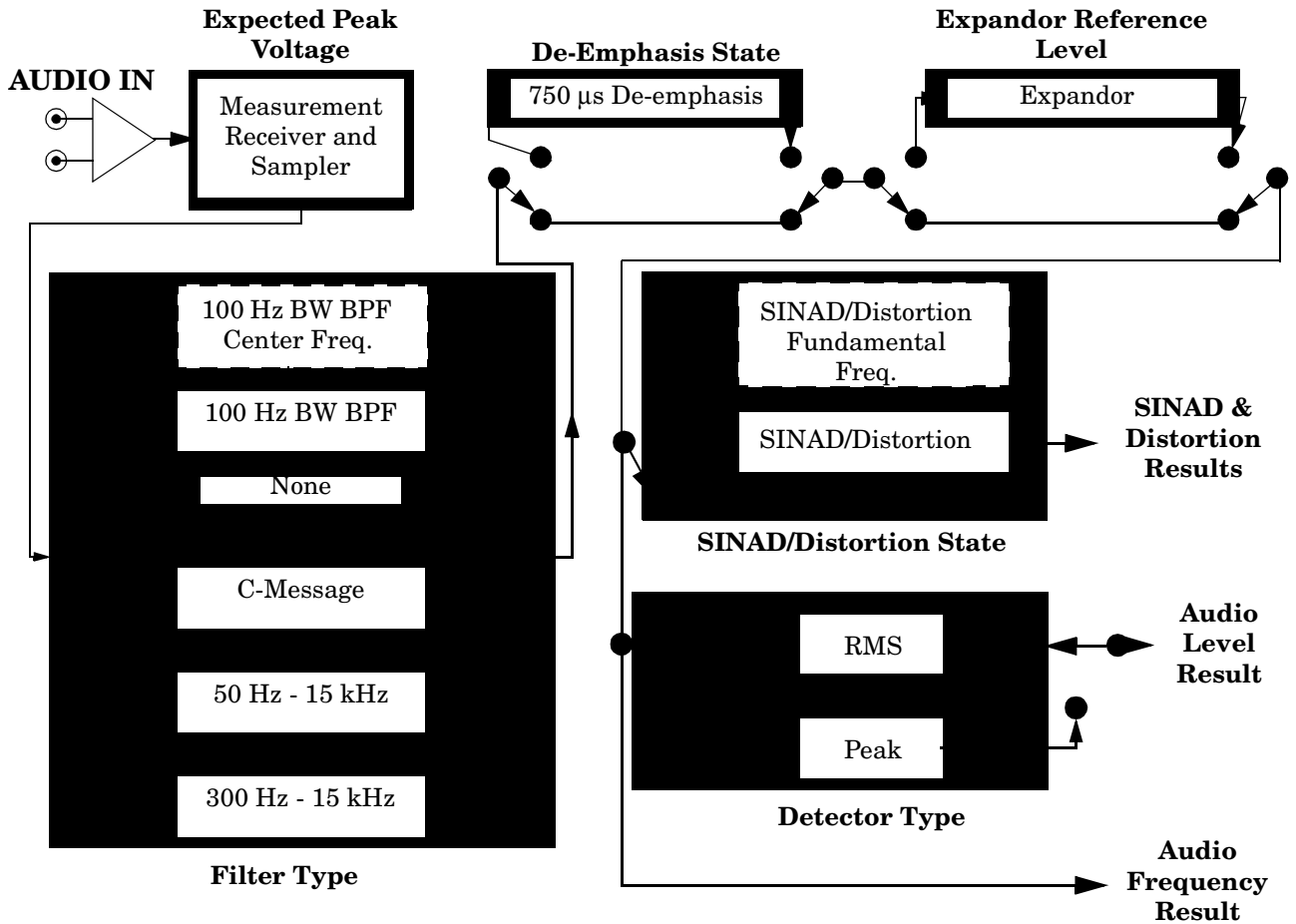
Trigger Source

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

Related Topics

- “Analog Audio Measurement Block Diagram” on page 70
- “Analog Audio Troubleshooting” on page 71
- “Audio Level Measurement Description” on page 75
- “Audio Frequency Measurement Description” on page 72
- “SINAD Measurement Description” on page 157
- “Distortion Measurement Description” on page 96
- “Programming an Audio Frequency Measurement” on page 73
- “Programming an Audio Level Measurement” on page 76
- “Programming a SINAD Measurement” on page 158
- “Programming a Distortion Measurement” on page 97
- “Statistical Measurement Results” on page 195 (Multi-measurements)
- “Triggering of Measurements” on page 214
- “Measurement Timeouts” on page 187

Analog Audio Measurement Block Diagram



Related Topics

“Analog Audio Measurement Description” on page 68

Analog Audio Troubleshooting

Possible Setup Issues

During remote operation of the analog audio measurements, you should always set the Trigger Arm to Single. The length of time required to return a measurement over GPIB using continuous triggering varies, but is always longer than when using single triggering. Continuous triggering can also cause problems when the “INITiate:DONE?” on page 528 is used.

If any other measurements are active, turn them off or set their trigger source to Immediate.

The Detector Type selected (Peak or RMS) also sets how analog audio level measurements are displayed; as a peak value or an rms value. When comparing returned values over GPIB to your specifications, be sure to take into account the type of detector being used.

The Expected Peak Voltage is always set in V_{peak} , regardless of the Detector Type selected, and cannot exceed $20 V_{\text{peak}}$ ($14.1 V_{\text{rms}}$).

For accurate measurements, always set all the analog audio measurement setup parameters to their proper settings for the measurement being made. The SINAD and Distortion measurements typically use different settings than the analog audio level measurement. See “Analog Audio Measurement Description” on page 68 and “Analog Audio Measurement Block Diagram” on page 70.

For very low level audio signals, use the 100 Hz BW BPF filter to reduce the affects of noise (see “Audio Level Measurement Description” on page 75).

For accurate analog audio frequency measurements where more than one signal may be present, use the 100 Hz BW BPF filter to isolate the desired signal (see “Audio Level Measurement Description” on page 75).

Interpreting Integrity Indicator Values

See “Integrity Indicator” on page 183.

If over range (5) is returned, the input level is greater than 4.9 dB above the Expected Peak Amplitude value or the maximum input level of 20 volts peak.

If under range (6) is returned, the input level is lower than 8 dB below the Expected Peak Amplitude value.

If the signal has both over range and under range conditions, only the over range condition (5) is indicated.

Audio Frequency Measurement Description

This measurement is *not* applicable to GPRS.

Related Topics

“Programming an Audio Frequency Measurement” on page 73

“Analog Audio Measurement Description” on page 68

“Analog Audio Measurement Block Diagram” on page 70

“Analog Audio Troubleshooting” on page 71

Programming an Audio Frequency Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make an Audio Frequency measurement via the GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connectors. See “Analog Audio Measurement Description” on page 68.

1. Configure the analog audio measurement parameters using the SETup subsystem. When more than one audio frequency signal may be present, use the 100 Hz bandpass filter to isolate the desired signal to measure (see the Programming Example below).
2. Start the audio frequency measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

Programming Example

```

10 OUTPUT 714;"SETup:AAudio:CONTinuous OFF" !Set the audio
20                                     !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AAudio:EXPEcted:VOLTagE 3V" !Set the Expected peak voltage
40                                     !for the audio input level in Vpeak.
50 OUTPUT 714;"SETup:AAudio:FREQuency:STATe ON" !Enable audio frequency measurement.
60 OUTPUT 714;"SETup:AAudio:FILTer:STATe ON" !Enable the bandpass filter.
70 OUTPUT 714;"SETup:AAudio:FILTer:FREQuency 8000 Hz" !Set the filter's center
80   !frequency to 8 kHz.
90 OUTPUT 714;"SETup:AAudio:TIMEout 3S" !Set a timeout value of 3 seconds
100                                     !in case the measurement cannot be made.
110 OUTPUT 714;"INITiate:AAudio" !Start the Analog Audio measurement.
120 OUTPUT 714;"FETCh:AAudio:INTEgrity?" !Query the integrity indicator to
130                                     !verify that a reliable measurement was made.
140 ENTER 714;Integrity !Enter the returned value into a variable for comparison
150                                     !with possible integrity indicator values (not shown here).
160 IF Integrity=0 THEN !Only fetch measurement result if integrity indicator is 0.
170   OUTPUT 714;"FETCh:AAudio:FREQuency?" !Fetch the analog audio frequency result.
180   ENTER 714;Audio_frequency !Enter the result into a variable.
190 END IF
200 END

```

Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator (0 means a successful measurement with no errors). See “Integrity Indicator” on page 183.
- `Audio_frequency` returns the average audio frequency in hertz.

Related Topics

“Audio Frequency Measurement Description” on page 72

“Analog Audio Troubleshooting” on page 71

“Analog Audio Measurement Description” on page 68

“INITiate” on page 526

“SETup:AAUDio” on page 560

“FETCh:AAUDio” on page 447

Audio Level Measurement Description

This measurement is *not* applicable to GPRS.

How is an Audio Level measurement made?

Audio Level measures the AC voltage of the signal applied to the front-panel AUDIO IN connectors, and is one of the Analog Audio measurements. Audio Level can be measured for signals in the frequency range of 100 Hz to 20 kHz, at levels from 1 mV_{peak} to 20V_{peak}. The measurement is made after any filtering is applied, and can be made using an RMS or Peak detector. The type of detector being used for the measurement is displayed next to the measurement value.

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

Related Topics

“Programming an Audio Level Measurement” on page 76

“Analog Audio Troubleshooting” on page 71

“Analog Audio Measurement Description” on page 68

“Analog Audio Measurement Block Diagram” on page 70

Programming an Audio Level Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make an audio level measurement via the GPIB.

The following procedure assumes that an audio source is connected to the AUDIO IN connectors. See “Analog Audio Measurement Description” on page 68.

1. Configure analog audio measurement parameters using the SETup subsystem. Even though default settings exist for each parameter, it is preferable to deliberately set each parameter to make sure the setting is correct for the specific audio analyzer measurement you are making.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

Programming Example

```

10 OUTPUT 714;"SETup:AAudio:CONTinuous OFF" !Set the analog audio
20                                     !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AAudio:EXPECTED:VOLTage 3V" !Set the Expected Amplitude level for
40                                     !audio input voltage in Vpeak.
50 OUTPUT 714;"SETup:AAudio:SDISTortion:STATe OFF" !Turn off the SINAD and
60                                     !distortion measurements since
70                                     !they are not being used.
80 OUTPUT 714;"SETup:AAudio:FILTer:TYPE NONE" !Bypass all audio filters.
90 OUTPUT 714;"SETup:AAudio:DEMPHasis:STATe OFF" !Turn off de-emphasis.
100 OUTPUT 714;"SETup:AAudio:EXPANDOR:STATe OFF" !Turn off the expander.
110 OUTPUT 714;"SETup:AAudio:DETEctor RMS" !Specify the RMS detector for the
120                                     !audio measurement.
130 OUTPUT 714;"SETup:AAudio:TIMEout 3S" !Set a timeout value of 3 seconds
140                                     !in case the measurement cannot be made.
150 OUTPUT 714;"INITiate:AAudio" !Start the Analog Audio measurement.
120 OUTPUT 714;"FETCh:AAudio:INTEgrity?" !Query the integrity indicator to
130                                     !verify that a reliable measurement was made.
140 ENTER 714;Integrity !Enter the returned value into a variable for comparison
150                                     !with possible integrity indicator values (not shown here).
160 IF Integrity=0 THEN !Only fetch measurement result if integrity indicator is 0.
170   OUTPUT 714;"FETCh:AAudio:VOLTage?" !Fetch the Audio Level result.
180   ENTER 714;Audio_level !Enter the result into a variable.
190 END IF
200 END

```


Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator (0 means a successful measurement with no errors). See “Integrity Indicator” on page 183.
- `Audio_level` returns the audio level in volts rms.

Related Topics

“Analog Audio Measurement Description” on page 68

“Analog Audio Troubleshooting” on page 71

“INITiate” on page 526

“SETup:AAUDio” on page 560

“FETCh:AAUDio” on page 447

Bit Error Measurement Description

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

- “GSM Bit Error Measurement” on page 78
- “GPRS Bit Error Measurement” on page 81

GSM Bit Error Measurement

Bit Error Measurements versus Fast Bit Error Measurements

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

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

The test set allows you to select between Loopback Type A or B, and the fast bit error measurement, which uses Loopback Type C. Refer also to “Fast Bit Error Measurement Description” on page 111.

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

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

How is a Bit Error (BER) Measurement Made?

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

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

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

You must set the measurement type from one of the six measurement types available, (see “SETup:BERror[:TYPE]” on page 571). If you query a residual result when a non-residual measurement is initiated, the test set returns 9.91 E+37 (NAN). The Measurement type must be set before initiating a BER measurement. See “BER Measurement Types” on page 79

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 570 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 573).

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 195

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

BER Measurement Types

Residual:

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

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

Non-residual:

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

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

BER Measurement Results

The results of a BER measurement can be displayed in two ways, (number of errors counted) or (the ratio bad bits (errors) to total bits counted). If you are using the test set manually, select either Count or % from the Measurement Units field. If you are using the test set remotely, these results are available using the FETCh command, see “FETCh:BERRor:COUNT[:BITS]?” on page 459 or “FETCh:BERRor:RATio[:BITS]?” on page 462. Alternatively the “FETCh:BERRor[:ALL]?” on page 458 or “FETCh:BERRor:FULL?” on page 461 can also be used to return the results.

Type A Residual Measurement Results

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

Type B Non-Residual Measurement Results

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

Related Topics for GSM

“Programming a Bit Error Measurement” on page 83

“Test Adherence to Standards” on page 167

“Fast Bit Error Measurement Description” on page 111

“Programming a Fast Bit Error Measurement” on page 114

“CALL:TCHannel:LOOPback” on page 439

“BERR Troubleshooting” on page 87

GPRS Bit Error Measurement

How is a Bit Error (BER) Measurement Made?

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

If the test set's operating mode is set to Active Cell, the data connection type must be set to ETSI Type B in order to make BER measurements. This can be done using "CALL:FUNCTION:DATA:TYPE" on page 358. Alternatively, you can make BER measurements when the test set's operating mode is set to GPRS BCH+PDTCH test mode (see "CALL:OPERating:MODE" on page 384).

The recommended channel coding scheme for BER measurements is CS-4. You use the command "CALL:PDTCH | PDTChannel:CSCHeme" on page 393 to set the coding scheme.

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

Each mobile station may have a different time delay between receiving a block of data and re-sending it on the uplink. By default, the loopback delay control mode is set to automatic, and the amount of delay needed is determined when the test set has, for four consecutive blocks, correctly received 80% of the downlink bits back on the uplink. The test set can be queried for the block delay value using "FETCh:GBERror:DELay?" on page 476.

If necessary, you can manually set the delay using "SETup:GBERror:LDControl:AUTO" on page 599.

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

The BER measurement trigger source is always set to immediate. The BER measurement does not offer multi-measurement results. If you require more details on multi-measurement results, see "Statistical Measurement Results" on page 195.

Types of Signal BER can Measure

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

- One or more GPRS uplink and downlink PDTCH pairs with the mobile station in active cell mode and the data connection type set to ETSI Type B. It is important that the mobile station is set up for the same number of uplink and downlink PDTCHs to optimize measurement speed.
- One or more GPRS uplink and downlink PDTCH pairs with the mobile station in GPRS BCH+PDTCH test mode (see "CALL:OPERating:MODE" on page 384 for details on setting the cell operating mode). Note that you have to manually set your mobile station to synchronize its internal frequency and timing reference with the test set. You also have to command the mobile station to loop back the PDTCH data.

Bit Error Measurement Description

BER Measurement Results

The results of a BER measurement can be displayed in two ways; the number of errors counted or the ratio of bad bits (errors) to total bits counted. If you are using the test set manually, both Count and Bit Error Ratio are displayed on the Bit Error measurement screen. If you are using the test set remotely, these results are available using the FETCh command, see “FETCh:GBERror:COUNt?” on page 475 or “FETCh:GBERror:RATio?” on page 476. Alternatively the command “FETCh:GBERror[:ALL]?” on page 475 can be used to return all of the following results:

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

In addition, the Intermediate Count of Bits Tested result can be queried using “FETCh:GBERror:ICOUNt?” on page 476 and the Block Delay can be queried using “FETCh:GBERror:DELay?” on page 476.

Related Topics for GPRS

“Programming a Bit Error Measurement” on page 83

“Test Adherence to Standards” on page 167

“BERR Troubleshooting” on page 87

Programming a Bit Error Measurement

This section contains two programming examples:

- “Programming a Bit Error Measurement for GSM” on page 83
- “Programming a Bit Error Measurement for GPRS” on page 85

Programming a Bit Error Measurement for GSM

This section provides an example of how to make the bit error (BER) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See “Establishing an Active GSM Link with the Mobile Station” on page 38.

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 returns the "Integrity Indicator" on page 183 (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 78

“SETup:BERRor” on page 569

“INITiate” on page 526

“FETCh:BERRor” on page 456

“Programming: Getting Started Guide for GSM Mobile Test” on page 221

“BERR Troubleshooting” on page 87

Programming a Bit Error Measurement for GPRS

This section provides an example of how to make the GPRS bit error (BER) measurement via GPIB.

The following procedure assumes that the Operating Mode has been set to Active Cell (using “CALL:OPERating:MODE” on page 384) and the data connection type has been set to ETSI Type B (using “CALL:FUNction:DATA:TYPE” on page 358). In addition, it is assumed that a data connection has been established between the test set and the mobile station (that is, the connection status is Transferring). See “Step 4: Make a connection” on page 275. Note that you can also make BER measurements when the test set’s operating mode is set to GPRS BCH+PDTCH test mode (see “CALL:OPERating:MODE” on page 384).

1. Configure the BCH and PDTCH parameters using the CALL subsystem.
2. Configure the Bit Error measurement parameters using the SETup subsystem.
3. Configure the downlink PDTCH parameters using the CALL subsystem.
4. Start the Bit Error measurement using the INITiate subsystem.
5. Use the INITiate:DONE? command to find out if the Bit Error measurement results are available.
6. Use the FETCh? command to obtain Bit Error measurement results.

Programming Example

```
10  ! This code assumes that the current data connection state is Transferring.
20  !
30  ! Configure BCH and PDTCH parameters.
40  OUTPUT 714;"CALL:POW -60 DBM" ! Set the BCH power.
50  OUTPUT 714;"CALL:PDTCH:PZER:LEV 30" ! Set the P0 reference level to 30 dB.
60  OUTPUT 714;"CALL:PDTCH:CSCH CS4" ! Set the channel coding scheme to CS4.
70  ! Configure the measurement parameters
80  OUTPUT 714;"SET:GBER:TIM:TIME 5" ! BER measurement times out after
90                                     ! 5 seconds.
100 OUTPUT 714;"SET:GBER:CONT OFF" ! Configures a BER measurement to
110                                     ! Single Trigger.
120 OUTPUT 714;"SET:GBER:COUN 10000" ! Sets the number of bits to measure
130                                     ! at 10,000.
140 OUTPUT 714;"SET:GBER:LDC:AUTO ON" ! Sets the Loopback Delay
150                                     ! Control mode to ON. This
160                                     ! commands the test set to
170                                     ! determine the Block Delay.
180 ! Set up and select the downlink PDTCH power reduction levels.
190 OUTPUT 714;"CALL:PDTCH:PRED:LEV1 12db"
200 OUTPUT 714;"CALL:PDTCH:PRED:LEV2 0dB"
210 OUTPUT 714;"CALL:PDTCH:PRED:BURS1 PRL1"
220 OUTPUT 714;"CALL:PDTCH:PRED:BURS2 PRL1"
230 OUTPUT 714;"INIT:GBER" ! Start a BER measurement.
240 REPEAT
250     OUTPUT 714;"INIT:DONE?"
260     ENTER 714;Meas_comp$
270     PRINT Meas_comp$
280 UNTIL Meas_comp$="GBER"
290 OUTPUT 714;"FETC:GBER?"
300 ENTER 714;Integrity,Bits_tested,Bit_ratio,Bit_err_cnt
310 END
```

Returned values

The measurements returned by this program are:

- Integrity returns the “Integrity Indicator” on page 183 (0 means a successful measurement with no errors).
- Bits_tested returns the number of bits tested.
- Bit_ratio returns the ratio of bit errors to total bits tested.
- Bit_err_cnt returns the number of bit errors.

Related Topics

“Bit Error Measurement Description” on page 78

“SETup:GBERror” on page 597

“INITiate” on page 526

“FETCh:GBERror” on page 474

“BERR Troubleshooting” on page 87

BERR Troubleshooting

Possible Setup Issues

GSM

During remote operation of the bit error measurement you should configure the trigger arm to single, see “SETup:BERRor:CONTInuous” on page 572.

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 216.

If you have a BER measurement active and your mobile drops the call it may be that you have the “SETup:BERRor:SLControl[:STATe]” on page 574 command set to OFF. This is likely to occur with mobiles that do not respond to downlink signalling when loopback is closed. To solve this problem set the command to ON.

GPRS

The error correction inherent in channel coding scheme CS-1, if used during BER testing, will mask low to medium bit error rates, and result in very much reduced measurement result granularity. CS-4 is therefore the recommended coding scheme for BER measurements. You use the command “CALL:PDTCH | PDTChannel:CSHeme” on page 393 to set the channel coding scheme.

During remote operation of the bit error measurement you should configure the trigger arm to single, see “SETup:GBERRor:CONTInuous” on page 598.

The BER measurement only provides results when the test set’s operating mode is:

- GPRS BCH+PDTCH test mode, or
- Active Cell, and the Data Connection Type is set to ETSI Type B. For details on setting the Data Connection Type see “CALL:FUNCTion:DATA:TYPE” on page 358. For details on setting the cell operating mode, see “CALL:OPERating:MODE” on page 384.

Interpreting Integrity Indicator values

See “Integrity Indicator” on page 183.

Block Error Rate (BLER) Report Measurement Description

This measurement is *not* applicable to GSM.

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

The test set uses an Agilent proprietary data connection to enable BLER reports to be retrieved from the mobile station (For details on how to set the data connection type to BLER, see "CALL:FUNCTION:DATA:TYPE" on page 358).

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

When are BLER Report Measurements Made?

You obtain BLER results using the GPIB query "CALL:STATUS:PDTCH | PDTChannel:BLERror?" on page 431. This query returns the percentage of blocks tested that were in error and the total number of blocks used to generate the BLER result. To reset the BLER result you must use "SYSTEM:MEASUREMENT:RESET" on page 716. The BLER result does not reset automatically when you connect a different GPRS mobile station.

The BLER results are only available when the data connection status is transferring (TRAN). If you require details on data connection states, see "Data Connection Processing State Synchronization" on page 60.

How are BLER Reports Affected When Using Different Power Levels on Downlink Timeslots

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

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

Programming a BLER Report Measurement

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

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See "Step 4: Make a connection" on page 275.

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

Programming Example

```

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

```

Block Error Rate (BLER) Report Measurement Description

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

Returned Values

The measurement reports returned by this program are:

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

Related Topics

“Testing a GPRS Mobile Station” on page 767

“CALL:STATus:PDTCH | PDTChannel:BLERror?” on page 431

“Programming: Getting Started Guide for GPRS Mobile Test” on page 266

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 320 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 321.

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 93

“Test Adherence to Standards” on page 167

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 38.

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 183 (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 91

“SETup:DAUDio” on page 584

“INITiate” on page 526

“FETCh:DAUDio” on page 464

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 585.

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 216.

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 183.

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

Distortion Measurement Description

This measurement is *not* applicable to GPRS.

How is a Distortion measurement made?

Distortion is an audio quality measurement that compares the audio signal level from the mobile at a specified (desired) frequency to the level of signals present at other frequencies. The audio signals from the mobile are typically measured after digital demodulation of the traffic channel.

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

Distortion can be measured in the range of 100 Hz to 10 kHz.

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

Related Topics

“Analog Audio Measurement Description” on page 68

“Analog Audio Troubleshooting” on page 71

“Programming a Distortion Measurement” on page 97

“Test Adherence to Standards” on page 167

Programming a Distortion Measurement

Last updated: February 22, 2001

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a distortion measurement via the GPIB. Distortion measurements are not typically made when testing GSM mobiles but are more common when testing AMPS or other analog mobiles. The programming example below is typical for a 136 mobile.

SINAD and Distortion measurements are affected by the same STATE and INITiate commands, so both measurements are enabled and triggered at the same time. However, measurement results are queried separately. See “Analog Audio Measurement Description” on page 68.

The following procedure assumes that the mobile’s audio output is connected to the AUDIO IN connectors and the mobile is on an analog voice channel (AVC). The AVC is being modulated with a 1004 Hz tone at +/-8 kHz peak deviation, and a 6000 Hz supervisory audio tone (SAT) at +/-2 kHz peak deviation. It is also assumed that the Cell Power from the test set is set to -50 dBm.

1. Configure analog audio measurement parameters using the SETup subsystem.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

Programming Example

```

10 OUTPUT 714;"SETup:AAudio:CONTinuous OFF" !Set the analog audio
20                                     !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AAudio:EXPeCted:VOLTAge 3V" !Set the Expected Amplitude level for
40                                     !audio input voltage in Vpeak.
50 OUTPUT 714;"SETup:AAudio:SDISTortion:STATE ON" !Turn on the SINAD and
60                                     !distortion measurements.
70 OUTPUT 714;"SETup:AAudio:SDISTortion:FREQuency 1004 HZ" !Specify the audio
80                                     !frequency to use for the measurements.
90 OUTPUT 714;"SETup:AAudio:FILTer:TYPE CMESsage" !Select the c-message filter.
100 OUTPUT 714;"SETup:AAudio:DEMPHasis:STATE OFF" !Turn off de-emphasis.
110 OUTPUT 714;"SETup:AAudio:EXPANDOR:STATE OFF" !Turn off the expander.
120 OUTPUT 714;"SETup:AAudio:TImeout 3S" !Set a timeout value of 3 seconds
130                                     !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:AAudio" !Start the Analog Audio measurement.
150 OUTPUT 714;"FETCh:AAudio:INTegrity?" !Query the integrity indicator to
160                                     !verify that a reliable measurement was made.
170 ENTER 714;Integrity !Enter the returned value into a variable for comparison
180                                     !with possible integrity indicator values (not shown here).
190 IF Integrity=0 THEN !Only fetch measurement result if integrity indicator is 0.
200 OUTPUT 714;"FETCh:AAudio:DISToRtion?" ! Fetch the Distortion result.
210 ENTER 714;Distortion !Enter the returned value into a variable.
220 END IF
230 END

```

Returned Values

The results returned by this program are:

- `Integrity` returns the measurement integrity indicator; 0 means a successful measurement with no errors. See “Integrity Indicator” on page 183.
- `Distortion` returns the Distortion measurement value in percent (%).

Related Topics

“Analog Audio Measurement Description” on page 68

“Analog Audio Troubleshooting” on page 71

“Distortion Measurement Description” on page 96

“INITiate” on page 526

“SETup:AAUDio” on page 560

“FETCh:AAUDio” on page 447

Dynamic Power Measurement Description

This measurement is *not* applicable to GPRS.

How is a Dynamic Power Measurement Made?

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

Dynamic Power is not an ETSI specified measurement.

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

Single or Multi-Measurements

The Dynamic Power measurement does not use the multi-measurement state parameter, and so does not return minimum, maximum, and standard deviation values. Instead, you specify the number of bursts that you want to measure using the Number of Bursts parameter (see “SETup:DPOWer:COUNT:NUMBer[:SElected]” on page 592). A single measurement returns the integrity indicator and power level for every burst measured. For example, if you set the number of bursts to 15, the returned comma-separated list contains 15 integrity values followed by 15 corresponding measurement values.

Types of Signals Dynamic Power can Measure

Dynamic Power measurements can be made on these types of input signals:

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

Input Signal Requirements

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

- Input signal level is between -20 dBm and +43 dBm.
- Input signal level is within +3 dB and -3 dB of the expected input level.
- Input signal is within 100 kHz of the measurement frequency.
- The measurement frequency is within the currently selected band.

Trigger Source

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

Related Topics

“Programming a Dynamic Power Measurement” on page 101

Dynamic Power Measurement Description

“SETup:DPOWer” on page 590

“FETCh:DPOWer” on page 468

“Test Adherence to Standards” on page 167

Programming a Dynamic Power Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a Dynamic Power measurement via the GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See “Establishing an Active GSM Link with the Mobile Station” on page 38.

1. Configure the Dynamic Power measurement parameters using the SETup subsystem.
2. Start the Dynamic Power measurement using the INITiate subsystem.
3. Use the INITiate:DONE? command to determine if Dynamic Power measurement results are available.
4. Use the FETCh? commands to obtain Dynamic Power measurement results.

Programming Example

The following program shows how to use the Dynamic Power measurement to measure a GSM mobile station's power control level capability when using SACCH (Slow Associated Control Channel) TX Level Signaling. This technique is based upon the RF power control characteristics specified in GSM 05.08 section 6.3.0 Release 1997.

```

10  ! INITIALIZE VARIABLES IN THE TEST
20  !
30  Sacch_time=TIMEDATE ! Set up a variable to capture test time
40  OPTION BASE 1 ! Set default lower bound of array subscripts to 1
50  REAL Integ1(100),Txp1(100),Power(300)
60  REAL Integ2(100),Txp2(100),Integ3(100),Txp3(100)
70  REAL Start_power,Stop_power
80  INTEGER Test_set,I,Start_level,Stop_level
90  Test_set=714
100 Start_level=5
110 Start_power=33.0
120 Stop_level=15
130 Stop_power=13.0
140 !
150 OUTPUT Test_set;"RFAN:EXP:POW 33" ! Set expected power
160 OUTPUT Test_set;"SYST:CORR -1.2" ! Set value to compensate for cable loss
170 !
180 ! SETUP DPOW PARAMETERS
190 OUTPUT Test_set;"SET:DPOW:CONT OFF;EMD 2"
200 OUTPUT Test_set;"SET:DPOW:COUN:NUMBER 300" ! Set the number of bursts high enough
210 ! to capture all 10 power level changes
220 OUTPUT Test_set;"CALL:SIGN:MS:TXL:FACCH 1" ! Switch on FACCH mode
230 !
240 ! CHANGE POWER LEVEL FROM 5 TO 15
250 OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Start_level
260 OUTPUT Test_set;"CALL:SIGN:MS:TXL:FACCH 0" ! Switch off FACCH signaling - only
270 ! SACCH header is used
280 OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Stop_level

```

Programming a Dynamic Power Measurement

```
290 !
300 ! A SHORT WAIT MIGHT BE NEEDED HERE TO ENSURE 100 PERCENT RELIABILITY OF MEASUREMENT
310 ! THIS MAY BE DEPENDENT ON THE PHONE AND IS TO ENSURE THAT VERY LAST POWER STEP IS
320 ! ALWAYS CAPTURED
330 ! WAIT .1
340 !
350 ! INITIATE DPOW MEASUREMENT AND FETCH RESULTS
360 OUTPUT Test_set;"INIT:DPOW"
370 REPEAT
380     OUTPUT 714;"INIT:DONE?"
390     ENTER 714;Meas_complete$
400 UNTIL Meas_complete$="DPOW"
410 OUTPUT Test_set;"FETC:DPOW?"
420 ENTER Test_set;Integ1(*),Txp1(*)
430 OUTPUT Test_set;"FETC:DPOW:RANG2?"
440 ENTER Test_set;Integ2(*),Txp2(*)
450 OUTPUT Test_set;"FETC:DPOW:RANG3?"
460 ENTER Test_set;Integ3(*),Txp3(*)
470 !
480 ! LOAD TXP RESULTS WHICH HAVE VALID INTEGRITY INTO ARRAY
490 !
500 ! PROCESS BURSTS 1 TO 100
510 K=1
520     FOR J=1 TO 100
530         IF Integ1(J)=0 THEN
540             Power(K)=Txp1(J)
550             K=K+1
560         END IF
570     NEXT J
580 ! PROCESS BURSTS 101 TO 200
590     FOR J=1 TO 100
600         IF Integ2(J)=0 THEN
610             Power(K)=Txp2(J)
620             K=K+1
630         END IF
640     NEXT J
650 ! PROCESS BURSTS 201 TO 300
660     FOR J=1 TO 100
670         IF Integ3(J)=0 THEN
680             Power(K)=Txp3(J)
690             K=K+1
700         END IF
710     NEXT J
720 !
730 PRINT
740 !
750 ! PRINT MEASUREMENT RESULTS
760 PRINT "Measured TX Levels from 5 to 15 using SACCH Method"
770 PRINT
780 I=1
790 FOR J=Start_level TO Stop_level
800     LOOP
810     IF I=(K-1) THEN
```

```

820         PRINT "MS TX LEVEL=";J, "MEASURED POWER=";PROUND(Power(I), -2)
830         GOTO 920
840     END IF
850 EXIT IF (PROUND(Power(I), -2) - PROUND(Power(I+1), -2)) >= .8
860     I=I+1
870 END LOOP
880 PRINT "MS TX LEVEL=";J, "MEASURED POWER=";Power(I)
890     I=I+1
900 NEXT J
910 !
920 ! PRINT TOTAL TIME FOR PROGRAM TO COMPLETE
930 PRINT "Total Test Time=";PROUND(TIMEDATE-Sacch_time, -2); "Seconds"
940 END

```

Returned Values

The measurements returned by this program are:

- `Integ1`, `Integ2`, and `Integ3` return the measurement integrity indicators for each of the ranges used when the Dynamic Power measurement is made over 300 bursts (0 means a successful measurement with no errors). If you require more details, see “Integrity Indicator” on page 183.
- `Txp1()`, `Txp2()`, and `Txp3()` return the average TX power results for each of the ranges used over 300 bursts. For example, `Txp1()` returns average TX power results for bursts 1 to 100.
- `Power()` returns average TX power results for all bursts which have been successfully measured with no errors. That is, only results with an integrity indicator of 0 are contained in `Power()`. This program does not display the entire contents of the `Power()` array. It only displays the results which correlate with power level changes 5 to 15.
- `Sacch_time` returns the total test time.

Related Topics

“Dynamic Power Measurement Description” on page 99

“SETup:DPOWer” on page 590

“INITiate” on page 526

“FETCh:DPOWer” on page 468

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 864).

Interpreting Integrity Indicator Values

See “Integrity Indicator” on page 183.

I/Q Tuning Measurement Description

This measurement is *not* applicable to GPRS.

How is an I/Q Tuning Measurement Made?

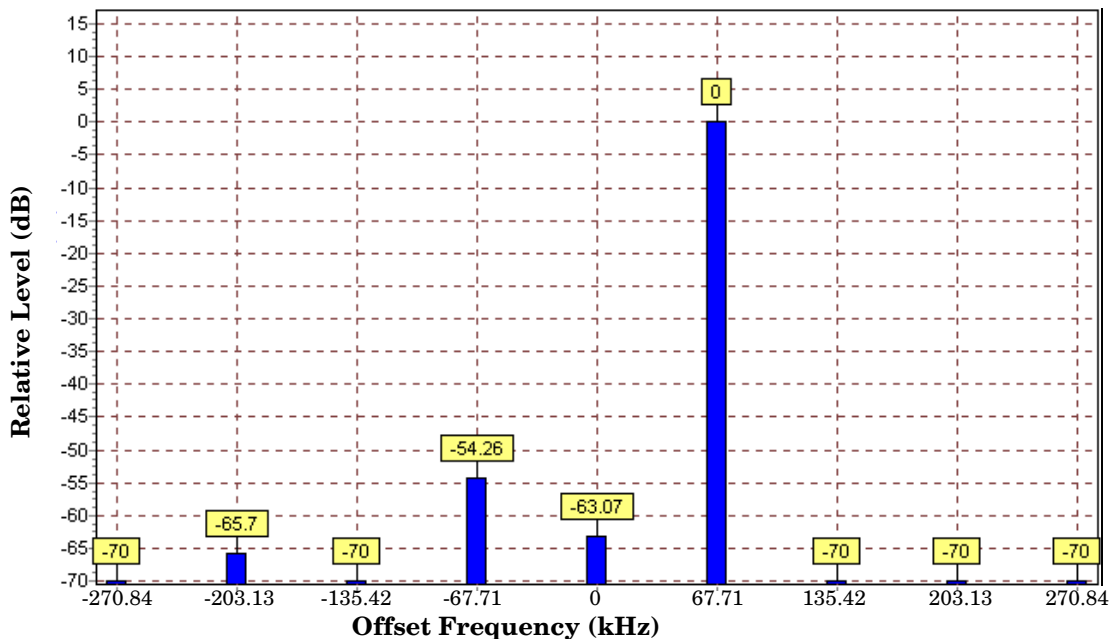
The I/Q Tuning measurement is used in the production process (normally at mobile pre-test) where the I/Q modulator of the mobile is being calibrated. The measurement is normally performed with the mobile station in test mode and transmitting a GMSK modulated sequence of all 0s or all 1s. The mobile can 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 (F_c); $F_c \pm 67.7083$ kHz; $F_c \pm 135.417$ kHz; $F_c \pm 203.125$ kHz and $F_c \pm 270.833$ 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 107

“Test Adherence to Standards” on page 167

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

```

Programming an I/Q Tuning Measurement

```
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 183 (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 105

“SETup:IQTuning” on page 602

“INITiate” on page 526

“FETCh:IQTuning” on page 477

I/Q Tuning Troubleshooting

Possible Setup Issues

This measurement is *not* applicable to GPRS. To run this measurement ensure the test set is configured for GSM measurements.

On most occasions the test set will be able to select the correct reference frequency when “SETup:IQTuning:REFErence[:MANual][:FREQuency][:SElected]” is set to AUTO. However, if the I/Q Modulator is very badly calibrated, it is possible that the test set selects the wrong offset. This could be confirmed by using the “SETup:IQTuning:REFErence[:MANual][:FREQuency][:SElected]” query.

If your measurement results are invalid or look as if they are centered around the wrong frequency it may be that the carrier frequency is not correctly specified. You must input the carrier frequency into the test set. Invalid measurements may be also be caused by modulation data other than all 1s or all 0s, for example, it may be that a midamble is being transmitted.

Interpreting Integrity Indicator Values

See “Integrity Indicator” on page 183.

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 78.

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

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

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

During FBER measurements, the test set generates a downlink TCH with (Pseudo Random Binary Sequence) PRBS-15 data at a known low level. The mobile station receives the data, loops it back to its transmitter, and returns the data to the test set. The test set compares data sent to data received, and FBER is calculated. see “CALL:TCHannel” on page 434

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

When a call is established on the TCH, the loopback type is sent to the mobile station if the signal loopback control is on, see “SETup:FBERror:SLControl[:STATE]” on page 580. If you set signal loopback control to off, the loopback type is controlled using “CALL:TCHannel:LOOPback” on page 439. If you are using the test set manually, the loopback type is controlled using **Mobile Loopback (F12)** on **Call Parms** menu 1 of 4.

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

The loop must be closed before a FBER test can start, using the close loop signalling delay time feature allows time for the loop to close. See “SETup:FBERror:CLSDelay[:STIME]” on page 577 for more details.

Fast Bit Error Measurement Description

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 579 or “SETup:FBERror:MANual:DELay” on page 580

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 91

FBER measurement trigger source is always set to immediate. The FBER measurement does not offer multi-measurement results. see “Statistical Measurement Results” on page 195

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 472 or “FETCh:FBERror:RATio?” on page 473. 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 114

“Test Adherence to Standards” on page 167

“Bit Error Measurement Description” on page 78

“Programming a Bit Error Measurement” on page 83

“CALL:TCHannel:LOOPback” on page 439

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 38.

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 183 (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 111

“SETup:FBError” on page 576

“INITiate” on page 526

“FETCh:FBError” on page 471

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 576.

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 216.

Set signalling loopback control to on; if signalling loopback control is off, set loopback to Type C, see “CALL:TCHannel:LOOPback” on page 439.

The test set may never correlate the uplink and downlink, see “SETup:FBERror:LDControl:AUTO” on page 579 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 581.

Interpreting Integrity Indicator values

See “Integrity Indicator” on page 183.

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

This section is applicable to both GSM and GPRS.

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

ORFS is a narrow-band measurement that provides information about the distribution of the mobile station transmitter's out-of-channel spectral energy due to modulation and switching as defined in ETSI GSM 05.05, section 4.2, 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.4. For GPRS mobiles which support a single uplink timeslot, the measurement conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.3 at offsets < 1800 kHz (when the Multi-Measurement Count - Modulation parameter is set to Off using "SETup:ORFSpectrum:COUNT:STATE" on page 621).

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

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

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

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

TX power (average power), 30 kHz bandwidth power at zero offset, ORFS due to modulation average power, and ORFS due to switching maximum power are included in an ORFS measurement, when both modulation and switching measurements are made. (TX power is performed using the same method as described in the "Transmit Power Measurement Description" on page 160, 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.

Output RF Spectrum Measurement Description

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

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

ORFS due to switching

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

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

Single or Multi-Measurements

To obtain statistical measurement results, the multi-measurement count must be set for both switching and modulation measurements. (See “Statistical Measurement Results” on page 195 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 not be representative.

Types of Signals ORFS can Measure

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

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

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

Input Signal Requirements

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

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

Trigger Source

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

Table 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 or GPRS PDTCH burst with mobile station in test mode	RF Rise
CW signal	Immediate

Related Topics

“Programming an Output RF Spectrum Measurement” on page 120

“Test Adherence to Standards” on page 167

“ORFS Troubleshooting” on page 124

Programming an Output RF Spectrum Measurement

This section contains two programming examples:

- “Programming an Output RF Spectrum Measurement for GSM” on page 120
- “Programming an Output RF Spectrum Measurement for GPRS” on page 121

Programming an Output RF Spectrum Measurement for GSM

This section provides an example of how to make the output RF spectrum (ORFS) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See “Establishing an Active GSM Link with the Mobile Station” on page 38.

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 183 (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 117

“SETup:ORFSpectrum” on page 619

“INITiate” on page 526

“FETCh:ORFSpectrum” on page 481

Programming an Output RF Spectrum Measurement for GPRS

This section provides an example of how to make the output RF spectrum (ORFS) measurement via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See “Step 4: Make a connection” on page 275.

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 183 (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 117

“SETup:ORFSpectrum” on page 619

“INITiate” on page 526

“FETCh:ORFSpectrum” on page 481

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 619.

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 216.

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 484 or “FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet][:MAXimum]?” on page 486 for GPIB commands.

Interpreting Integrity Indicator values

See “Integrity Indicator” on page 183.

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 826.

Unsupported Configuration (22) is returned if you attempt to perform a GPRS ORFS measurement on two uplinks. The ORFS measurements can only be performed on a single uplink.

Phase and Frequency Error Measurement Description

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

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

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

For GPRS mobiles which support a single uplink timeslot or two adjacent uplink timeslots, this measurement conforms to ETSI GSM 05.05 (Ver 8.2.0, 7.2.0, 6.6.0), section 4.6.1. It also conforms with 3GPP 51.010 (formerly ETSI GSM 11.10) if used as part of a type approval system. You can measure one of the two adjacent uplink bursts of the multislot configuration at any one time. You specify the burst to measure using "RFAnalyzer:MSLot:MEASurement:BURSt" on page 558. If you want to measure the first of the two uplink bursts, there are no limits on the relative powers of the two uplink bursts in the multislot configuration. However, if you want to measure the second burst, the level of the first burst must not exceed the level of the second burst.

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

Single or Multi-Measurements

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

A single burst for a PFER measurement calculates the following:

- peak phase error
- rms phase error
- frequency error

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

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

Phase and Frequency Error Measurement Description

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

Types of Signals PFER can Measure

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

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

Input Signal Requirements

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

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

under these conditions:

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

Trigger Source

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

Table 4. Recommended Trigger Source settings

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

Burst Synchronization

The PFER measurement provides you with a choice for the time reference (burst synchronization). (See “Burst Synchronization of Measurements” on page 172). For GPRS mobiles, you should note that only the Midamble synchronization method is available when you set the multislot configuration to D2U2 (2 downlink timeslots, 2 uplink timeslots). For more details on setting the multislot configuration, see “CALL:PDTCH | PDTChannel:MSLot:CONFiuration” on page 397.

Table 5.

Burst Synchronization	Description
Midamble	References measurement timing to the midamble transmitted within a timeslot.
RF Amplitude	The amplitude rise and fall of a transmitted burst determines the measurement time reference.
None	No edge of the burst 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 128

“Test Adherence to Standards” on page 167

“PFER Troubleshooting” on page 132

Programming a Phase and Frequency Error Measurement

This section contains two programming examples:

- “Programming a Phase and Frequency Error Measurement for GSM” on page 128
- “Programming a Phase and Frequency Error Measurement for GPRS” on page 129

Programming a Phase and Frequency Error Measurement for GSM

This section provides an example of how to make the phase and frequency error (PFER) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See “Establishing an Active GSM Link with the Mobile Station” on page 38.

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-measurement
40                                     !of 100.
50 OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO"!Configure trigger source
60                                     !to auto.
70 OUTPUT 714;"SETUP:PFERROR:SYNC MIDAMBLE" !Configures a PFER measurement so
80                                     !that burst synchronization, which
90                                     !will synchronize the timing of the
100                                    !measurement algorithm relative to
110                                    !the data sample, will be set
120                                    !to midamble.
130 OUTPUT 714;"INITIATE:PFERROR" !Starts the PFER measurement.
140 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 183 (0 means a successful measurement with no errors).
- `Max_phase_err` returns the maximum rms phase error in degrees
- `Max_peak_phase_error` returns the maximum peak phase error in degrees
- `Worst_freq_err` returns the frequency, in Hz, that is the furthest from zero, if the most positive and the most negative frequency error are the same value, the most positive will be returned.

Related Topics

“Phase and Frequency Error Measurement Description” on page 125

“SETup:PFERror” on page 628

“INITiate” on page 526

“FETCh:PFERror” on page 488

Programming a Phase and Frequency Error Measurement for GPRS

This section provides an example of how to make the phase and frequency error (PFER) measurement via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See “Step 4: Make a connection” on page 275.

1. Set the multislot configuration to two downlinks, two uplinks (D2U2) and set the uplink power control level for each of the two bursts using the CALL subsystem.
2. Configure PFER measurement parameters using the SETup subsystem.
3. Use the RFANalyzer:MSLot:MEASurement:BURSt command to select burst 1 for the first PFER measurement.
4. Start the PFER measurement using the INITiate subsystem.
5. Use the INITiate:DONE? command to find out if PFER measurement results are available.
6. Use the FETCh? command to obtain PFER measurement results.
7. Use the RFANalyzer:MSLot:MEASurement:BURSt command to select burst 2 for the second PFER measurement.
8. Repeat steps 4 to 6 above to perform a PFER measurement on burst 2 of the multislot configuration.

Programming a Phase and Frequency Error Measurement

Programming Example

```
10 OUTPUT 714;"CALL:PDTCH:MSLOT:CONFIG D2U2" ! Configures the multi-
20                                     ! slot configuration to be
30                                     ! 2 downlink, 2 uplink.
40 OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST 9" ! Sets the uplink power for
50                                     ! burst 1 to 25 dBm.
60 OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST2 6" ! Sets the uplink power for
70                                     ! burst 2 to 31 dBm.
80 OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Configures a PFER measurement to
90                                     !single trigger mode.
100 OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 100" !Configures a multi-measurement
110                                     !of 100.
120 OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Configure trigger source
130                                     !to auto.
140 OUTPUT 714;"SETUP:PFERROR:SYNC MIDAMBLE" !Configures a PFER measurement so
150                                     !that burst synchronization, which
160                                     !will synchronize the timing of the
170                                     !measurement algorithm relative to
180                                     !the data sample, will be set
190                                     !to midamble.
200 OUTPUT 714;"RFANALYZER:MSLOT:MEASUREMENT:BURST 1" ! Perform first PFER
210                                     ! measurement on burst 1.
220 OUTPUT 714;"INITIATE:PFERROR" !Starts the first PFER measurement.
230 REPEAT
240     OUTPUT 714;"INITIATE:DONE?" !Query to see if PFER measurement is done.
250     ENTER 714;Meas_complete$
260 UNTIL Meas_complete$="PFER"
270 OUTPUT 714;"FETCH:PFERROR:ALL?"
280 ENTER 714;Integrity1,Max_phase_err1,Max_peak_err1,Worst_freq_err1
290 OUTPUT 714;"RFANALYZER:MSLOT:MEASUREMENT:BURST 2" ! Perform next PFER
300                                     ! measurement on burst 2.
310 OUTPUT 714;"INITIATE:PFERROR" !Starts the next PFER measurement.
320 REPEAT
330     OUTPUT 714;"INITIATE:DONE?"
340     ENTER 714;Meas_complete$
350 UNTIL Meas_complete$="PFER"
360 OUTPUT 714;"FETCH:PFERROR:ALL?"
370 ENTER 714;Integrity2,Max_phase_err2,Max_peak_err2,Worst_freq_err2
380 END
```

Returned values

This program instructs the test set to make two sets of PFER measurements, the first on burst 1 in the multislot configuration and the second on burst 2. The results returned by this program are:

- `Integrity1` returns the measurement “Integrity Indicator” on page 183 (0 means a successful measurement with no errors) for burst 1.
- `Max_phase_err1` returns the maximum rms phase error in degrees for burst 1.
- `Max_peak_err1` returns the maximum peak phase error in degrees for burst 1.
- `Worst_freq_err1` returns the frequency, in Hz, that is the furthest from zero for burst 1. If the most positive and the most negative frequency error are the same value, the most positive is returned.
- A similar set of results are returned for burst 2 (`Integrity2`, `Max_phase_err2`, `Max_peak_err2` and `Worst_freq_err2`).

Related Topics

“Phase and Frequency Error Measurement Description” on page 125

“SETup:PFERror” on page 628

“INITiate” on page 526

“FETCh:PFERror” on page 488

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 629.

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 216.

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 762 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 183.

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 344.

Power versus Time Measurement Description

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

- “GSM Power versus Time Measurement” on page 133
- “GPRS Power versus Time Measurement” on page 138

GSM Power versus Time Measurement

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

PvT measurements determine if the mobile station’s transmitter power falls within specified power and timing ranges. Refer to the “Typical GSM PvT Measurement” on page 136.

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. The PvT Transmit Power measurement is synchronized to the burst midamble as recommended in 3GPP 51.010 (formerly ETSI GSM 11.10). (The test set also provides a faster transmit power measurement that is synchronized to the burst’s amplitude. See “Transmit Power Measurement Description” on page 160).

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

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

Power versus Time Measurement Results

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

The PvT measurement examines the burst to determine the points where the burst fails by the most or is closest to failing the upper and lower limits. These worst case points provide the upper and lower limit margin results. A negative value, along with the offset time, is returned for the result if the burst fails the mask. A positive value indicates the burst is within the mask. See “FETCh:PVTime:MASK:ALL?” on page 502.

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 637. Note that these points are not the same as those used in the point-by-point comparison which determines the pass/fail result.

Power versus Time Measurement Description

- 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 to 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 183.
- Measurement progress report is a feature that allows you to periodically see how far multi-measurement cycle has progressed. When the multi-measurement count is greater than 1, the progress report will indicate the number of individual sub-measurements that have been completed, n , out of the total number to be completed, m . “ n ” is referred to as ICOUNT remotely. “ m ,” the total number of measurements to be made, is based on the PvT settings you make and the input signal attributes.

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

Types of Signals Power vs. Time Can Measure

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

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

Power vs. Time Input Signal Requirements

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

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

Trigger Source

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

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

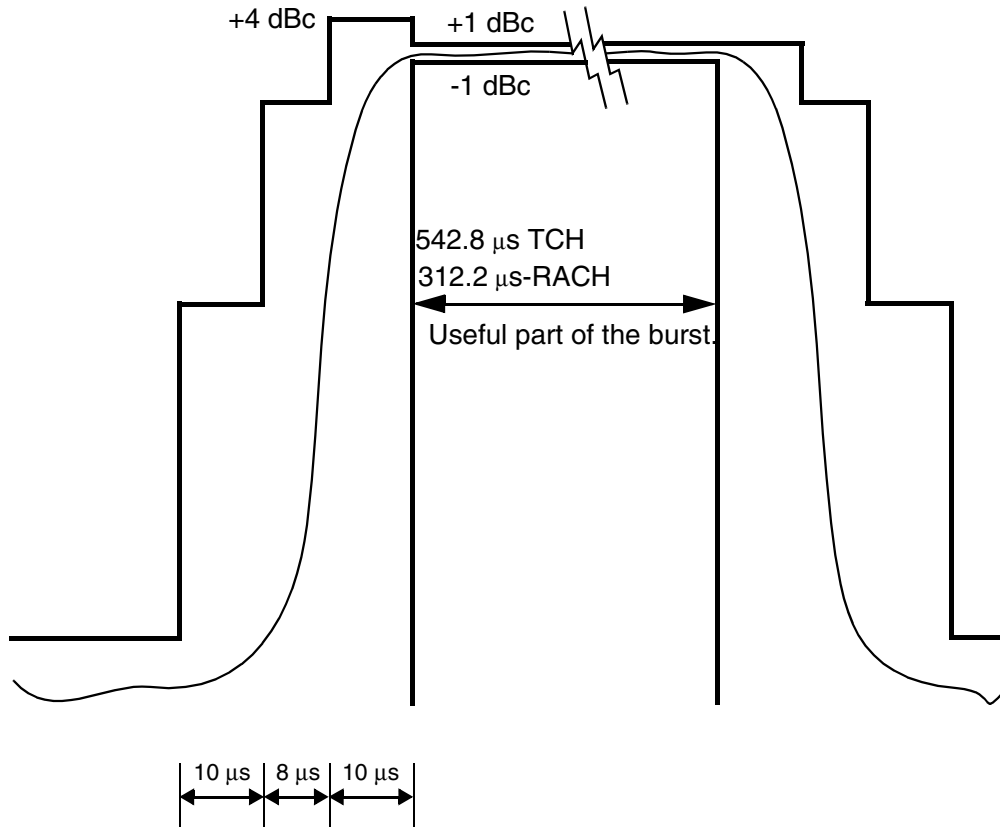
In situations where no protocol trigger is available, the test set will choose RF rise triggering for the PvT measurement. An example of this situation might be when the test set is in test mode operating mode.

Table 6. Recommended Trigger Source Settings

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

For more information on measurement triggering, refer to “Triggering of Measurements” on page 214.

Figure 4. Typical GSM PvT Measurement



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

Burst Synchronization

The PVT measurement provides you with a choice for the time reference setting (burst synchronization). (See “Burst Synchronization of Measurements” on page 172).

Table 7.

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

Related Topics

“Programming a Power versus Time Measurement” on page 143

“Test Adherence to Standards” on page 167

“PVT Troubleshooting” on page 147

GPRS Power versus Time Measurement

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

PvT measurements determine if the mobile station's transmitter power falls within specified power and timing ranges. Refer to the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 141.

During a PvT measurement, the test set makes a narrowband point-by-point measurement of the transmitted carrier power of the GPRS mobile station as it varies across a single burst or two adjacent GMSK modulated TDMA bursts. A single pass or fail result is returned for the entire multislot configuration. This means that if any part of the multislot configuration fails the multislot mask, the result is a Fail. Additional information is provided to indicate which segments of the multislot configuration have failed.

When measuring two adjacent uplinks, each of these can have different power levels. However, the GPRS PvT measurement does not support multislot configurations where the first burst's level is greater than the second burst's level. This also applies to the GPRS PvT TX power measurement. A Potential Receiver Saturation (20) Integrity value will be returned if such a multislot configuration is measured. For more details on the range of Integrity Indicator values, see "Integrity Indicator" on page 183.

Included with the narrowband measurement are broad-band carrier power measurements of the average power for each of the individual bursts in the multislot configuration. The PvT Transmit Power measurement is synchronized to the burst midamble as recommended in 3Gpp 51.010 (formerly ETSI GSM 11.10). (The test set also provides a faster transmit power measurement that is synchronized to the burst's amplitude. See "Transmit Power Measurement Description" on page 160).

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

When using the GPRS PvT measurement to measure two adjacent bursts, the Guard Period Length parameter must be set correctly to ensure accurate pass/fail testing of the first guard period. For more details on setting this parameter see "CALL:MS:TX:BURSt:GPLength" on page 379.

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

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

The PvT measurement examines the multislot configuration to determine the points which have failed the most, or the points which are closest to failing the upper and lower limits. These worst case points provide the upper and lower limit margin results. A negative value, along with the offset time, is returned for the result if the multislot configuration fails the mask. A positive value indicates the multislot configuration is within the mask. The command "FETCh:PVTime[:BURSt[1]]:MASK:ALL? FETCh:PVTime:BURSt2:MASK:ALL?" on page 513 is used to return these values for the burst you specify.

For statistical analysis, the test set allows you to set up to 12 time markers per burst. These markers do not define the mask, but are merely used to get results from specified points on the mask. To set these markers you use "SETUp:PVTime[:BURSt[1]]:TIME[:OFFSet] SETUp:PVTime:BURSt2:TIME[:OFFSet]" on page 637. Note that these points are a subset of those used in the point-by-point comparison which determines the pass/fail result.

- Results for a **single** PvT measurement include:
 1. PvT multislot pass/fail result (0 = Pass, 1 & NaN = Fail)
 2. PvT mask error code (this indicates which parts of the multislot configuration are causing failure). For more details on the mask error code result see “FETCh:PVTime:MASK[:FAIL]:SEGment?” on page 503.
 3. PvT measurement integrity indicator for each burst in the multislot configuration
 4. Transmit carrier power with midamble synchronization (average power during the burst) for each burst in the multislot configuration
 5. Upper limit power margin worst case for each burst in the multislot configuration (how close to or where the signal exceeded upper power limit)
 6. Lower limit power margin worst case for each burst in the multislot configuration (how close or where the signal exceeded lower power limit)
 7. Upper limit timing margin worst case for each burst in the multislot configuration (the time offset where the signal came close to or exceeded upper timing limit)
 8. Lower limit timing margin worst case for each burst in the multislot configuration (the time offset where the signal came close to or exceeded lower timing limit)
- Results for **multi-measurement** PvT measurements include:
 1. Average of transmit carrier power measurements (average of averages) for each burst in the multislot configuration
 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 183.
- The measurement progress report is a feature that allows you to periodically see how far a multi-measurement cycle has progressed. When the multi-measurement count is greater than 1, the progress report indicates the number of individual sub-measurements that have been completed, *n*, out of the total number to be completed, *m*. “n” is referred to as ICOUNT remotely. “m,” the total number of measurements to be made, is based on the PvT settings you make and the input signal attributes.

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

Types of Signals Power vs. Time Can Measure

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

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

For details on the multislot configurations which the test set supports, see “CALL:PDTCH | PDTChannel:MSLot:CONFiguration” on page 397.

Power vs. Time Input Signal Requirements

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

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

Trigger Source

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

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

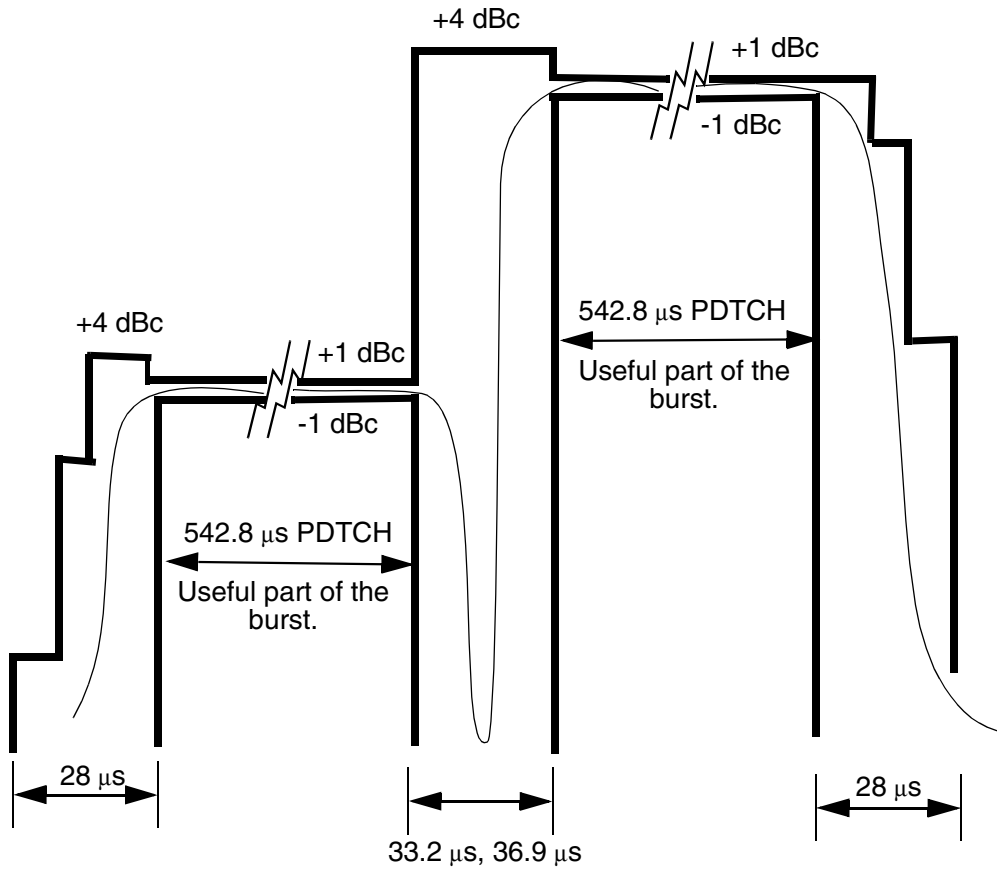
In situations where no protocol trigger is available, the test set chooses RF rise triggering for the PvT measurement. An example of this situation is when the test set is in one of the test mode operating modes.

Table 8. Recommended Trigger Source Settings

Input Signal Type	Recommended Trigger Source
GPRS PDTCH multislot configuration with mobile station in active cell mode	RF Rise or Protocol
GPRS PDTCH multislot configuration with the test set in GPRS BCH or GPRS BCH+PDTCH test mode	RF Rise
Bursting 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 214.

Figure 5. Typical GPRS P_vT Mask for a Two Burst Multislot Configuration



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

Burst Synchronization

The PVT measurement provides you with a choice for the time reference setting (burst synchronization) for a single uplink burst. In the case of two adjacent uplink bursts the burst synchronization is fixed to Midamble. If a valid midamble cannot be found, the measurement will complete on a best effort basis using RF Amplitude synchronization. See “Burst Synchronization of Measurements” on page 172.

Table 9.

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

Related Topics

“Programming a Power versus Time Measurement” on page 143

“Test Adherence to Standards” on page 167

“PVT Troubleshooting” on page 147

Programming a Power versus Time Measurement

This section contains two programming examples:

- “Programming a Power versus Time Measurement for GSM” on page 143
- “Programming a Power versus Time Measurement for GPRS” on page 144

Programming a Power versus Time Measurement for GSM

This section provides an example of how to make the power versus time (PvT) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See “Establishing an Active GSM Link with the Mobile Station” on page 38.

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:SYNC MIDAMBLE" !Configures a PvT measurement so
80                                     !that burst synchronization, which
90                                     !will synchronize the time of the
100                                    !measurement algorithm relative to
110                                    !the data sample, will be set
120                                    !to midamble.
130 OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28US,-18US" !Turns on time markers
140                                     !-28 and -18 microseconds.
150 OUTPUT 714;"INITIATE:PVTIME" !Start PvT measurement.
160 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 183 (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 for GSM

“GSM Power versus Time Measurement” on page 133

“SETup:PVTime” on page 633

“INITiate” on page 526

“FETCh:PVTime” on page 495

Programming a Power versus Time Measurement for GPRS

This section provides an example of how to make the power versus time (PvT) measurement via GPIB.

The following procedure assumes that the Operating Mode has been set to Active Cell (using “CALL:OPERating:MODE” on page 384) and the data connection type has been set to ETSI Type B (using “CALL:FUNCTION:DATA:TYPE” on page 358). In addition, it is assumed that a data connection has been established between the test set and the mobile station (connection status is Transferring). See “Step 4: Make a connection” on page 275.

Note that you can also make power versus time measurements in active cell mode using the BLER and ETSI Type B data connection types (see “CALL:FUNCTION:DATA:TYPE” on page 358). Power versus time measurements can also be made when the test set’s operating mode is set to GPRS BCH+PDTCH test mode (see “CALL:OPERating:MODE” on page 384).

1. Set the multislot configuration to two downlinks, two uplinks (D2U2) and set the uplink power control level for each of the two bursts using the CALL subsystem.
2. Configure PvT measurement parameters using the SETup subsystem.
3. Set the trigger type to single using the SETup subsystem.
4. Start the PvT measurement using the INITiate subsystem.
5. Use the INITiate:DONE? command to find out if the PvT measurement results are available.
6. Use the FETCh? commands to obtain PvT measurement results.

Programming Example

```

10  OUTPUT 714;"CALL:PDTCH:MSLOT:CONFIG D2U2" ! Configures the multislot
20                                     ! configuration to be
30                                     ! 2 downlink, 2 uplink.
40  OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST1 10" ! Sets the uplink power for
50                                     ! the first burst to 23 dBm.
60  OUTPUT 714;"CALL:PDTCH:MS:TXLEVEL:BURST2 5" ! Sets the uplink power for
70                                     ! the second burst to 33 dBm.
80  OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Configures a PvT measurement to
90                                     !single trigger mode.
100 OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 100" !Configures a multi-measurement
110                                     !of 100.
120 OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configure trigger source
130                                     !to auto.
140 OUTPUT 714;"SETUP:PVTIME:SYNC MIDAMBLE" !Configures a PvT measurement so
150                                     !that burst synchronization, which
160                                     !will synchronize the time of the
170                                     !measurement algorithm relative to
180                                     !the data sample, will be set
190                                     !to midamble.
200 OUTPUT 714;"INITIATE:PVTIME" !Start PvT measurement.
210 REPEAT
220     OUTPUT 714;"INITIATE:DONE?" !Check to see if PvT measurement is done.
230     ENTER 714;Meas_complete$
240 UNTIL Meas_complete$="PVT"
250 ! Fetch all the required PvT results.
260 OUTPUT 714;"FETCH:PVTIME:BURST1:INTEGRITY?" ! Always check integrity values.
270 ENTER 714;Integ_burst1
280 OUTPUT 714;"FETCH:PVTIME:BURST2:INTEGRITY?"
290 ENTER 714;Integ_burst2
300 IF (Integ_burst1=0) AND (Integ_burst2=0) THEN
310     OUTPUT 714;"FETCH:PVTIME:MASK?" !PvT pass/fail result for entire mask
320     ENTER 714;Mask_result
330     OUTPUT 714;"FETCH:PVTIME:MASK:SEGMENT?" ! PvT mask error code. This will
340                                     ! tell us which parts of the
350                                     ! uplink has failed the mask.
360     ENTER 714;Mask_error_code
370     OUTPUT 714;"FETCH:PVTIME:BURST1:POWER:AVERAGE?" ! PvT Carrier Power result
380                                     ! for the first burst.
390     ENTER 714;Pvt_pwr_burst1
400     OUTPUT 714;"FETCH:PVTIME:BURST2:POWER:AVERAGE?" ! PvT Carrier Power result
410                                     ! for the second burst.
420     ENTER 714;Pvt_pwr_burst2
430 ELSE
440     PRINT "Measurement error: "&Meas_complete$
450     PRINT "Measurement Integrity value for burst 1 = ";Integ_burst1
460     PRINT "Measurement Integrity value for burst 2 = ";Integ_burst2
470 END IF
480 END

```

Returned values

The measurements returned by this program are:

- `Integ_burst1` and `Integ_burst2` return the measurement integrity values for each of the two adjacent uplink bursts in the multislot configuration (0 means a successful measurement with no errors). See “Integrity Indicator” on page 183.
- `Mask_result` returns the mask pass/fail indicator for the entire mask, not an individual burst. When the multi-measurement count is greater than 1, the PvT mask pass/fail result will return Fail (1) if any single measurement fails.
- `Mask_error_code` returns the mask error code for the entire multislot configuration. For more details on how to interpret the value returned by this result, see “FETCh:PVTime:MASK[:FAIL]:SEGment?” on page 503.
- `Pvt_pwr_burst1` and `Pvt_pwr_burst2` return the PvT carrier power results in dBm for each of the bursts in the multislot configuration.

Related Topics for GPRS

“GPRS Power versus Time Measurement” on page 138

“SETup:PVTime” on page 633

“INITiate” on page 526

“FETCh:PVTime” on page 495

PVT Troubleshooting

This section is applicable to both GSM and GPRS.

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 635.

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 216.

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 762 there is not enough power to generate an RF Rise trigger so the measurement may hang.

Time Offset Range Restrictions for GPRS Mobiles Which Support Two Uplink Timeslots

When you want to perform a Power versus Time measurement on a GPRS mobile which supports a two uplink multislot configuration, there are restricted ranges for the power offset times to ensure that a valid result is returned. This restriction is a function of the expected power for each burst and the guard period as shown in the table below. Note that multislot configurations where the first burst is greater in level than the second burst are not supported for the GPRS PvT measurement.

Table 10. Restricted Ranges for GMSK Multislot Power Offset Times

	Expected Power of Burst 1 is less than or equal to Burst 2	
Guard Period	Burst 1	Burst 2
9 bits	-50 us to 542.8 us	-33.2 us to 593 us
10 bits	-50 us to 542.8 us	-36.9 us to 593 us

Interpreting Integrity Indicator values

See “Integrity Indicator” on page 183.

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 826.

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 826.

GSM Only

Sync Not Found (11) will be returned if the measurement Burst Synchronization is set to Midamble synchronized and the Expected Burst pattern is not set to TSC0 through TSC7, or RACH. Note that the Expected Burst parameter is only used when the test set's operating mode is set to Test Mode or when the Cell Activated state is set to Off. See “CALL:BURSt:TYPE” on page 344.

GPRS Only

Sync Not Found (11) is returned if a valid midamble cannot be found when measuring two adjacent uplink bursts. The measurement still completes on a best effort basis using RF Amplitude synchronization. See “Burst Synchronization of Measurements” on page 172.

Parameter Error (21) is returned if you set a value outside the restricted range of offset times when testing a GPRS mobile station with a two uplink multislots configuration. For more details, see “Time Offset Range Restrictions for GPRS Mobiles Which Support Two Uplink Timeslots” on page 147.

Potential Receiver Saturation (20) is returned if you attempt to measure a multislots configuration where the first burst’s level is greater than the second burst’s level.

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 μ 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 151

“RACH Troubleshooting” on page 153

Programming a RACH Measurement

This section provides an example of how to make a power versus time measurement on a RACH. The same principles as used in this example can also be used for transmit power and phase and frequency error measurements.

Overview of Measurement Procedure

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

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

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

Programming Example

The following example details how to make a power versus time RACH measurement on a mobile originated call in Active Cell mode.

Alternatively, the same measurement could be made on a base station originated call by replacing lines 160 and 170 with the CALL:ORIGINate command.

```

10  INTEGER Int
20  DIM Results(11)
30  REAL Mask,Power
40  OUTPUT 714;"*RST"
50  OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:SELECTED 20" !Configures the
60  !test set to expect a transmission on ARFCN 20.
70  OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10 DBM" !Configures
80  !the test set to expect a power level of 10 dBm.
90  OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Configures trigger
100 !mode to single for a pvt measurement.
110 OUTPUT 714;"SETUP:PVTIME:COUNT:STATE OFF" !Configures the
120 !multi_measurement state to OFF.
130 OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configures the
140 !trigger source to AUTO.
150 OUTPUT 714;"INITIATE:PVTIME" !Start a pvt measurement.
160 PRINT "Connect your mobile to the Test Set and initiate a call"
170 PRINT "from the mobile."
180 OUTPUT 714;"FETCH:PVTIME:ALL?"!Fetches the measurement integrity

```

Programming a RACH Measurement

```
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 149

“RACH Troubleshooting” on page 153

RACH Troubleshooting

Last updated: February 22, 2001

Possible Setup Issues

During manual or remote operation of a RACH measurement ensure that the multi-measurement count is set to Off. The measurement would not complete if multi-measurement count was set to On.

If required refer to the appropriate command:

- “SETup:PVTime:COUNT:STATe” on page 636
- “SETup:TXPower:COUNT:STATe” on page 644
- “SETup:PFERror:COUNT:STATe” on page 630

Interpreting Integrity Indicator values

See “Integrity Indicator” on page 183.

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.

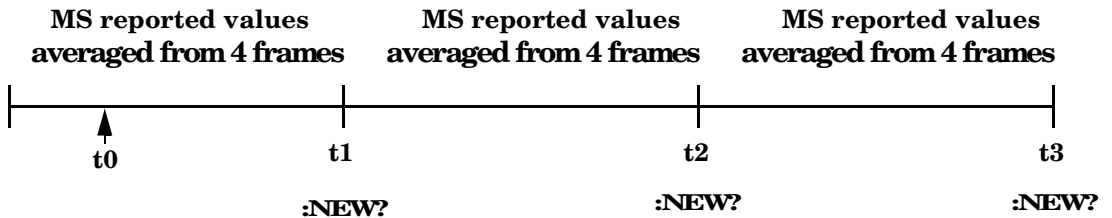
:NEW? and [:LAST?] Queries

: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 6. 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 Parm, MS TX Level field.
- TCH timing advance reported results reflect the value set in the Call Parm, Timing Advance field.
- RX Level reported reflects the received level of TCH in dB, from the Call Parm, 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 756

“CALL:MS:REPorted:TXLevel[:LAST]?” on page 377

“CALL:MS:REPorted:TXLEVEL:NEW?;NEW?;NEW?” on page 378

“CALL:MS:REPorted:TADVance[:LAST]?” on page 376

“CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?” on page 377

“CALL:MS:REPorted:RXLevel[:LAST]?” on page 374

“CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?” on page 375

“CALL:MS:REPorted:RXQuality[:LAST]?” on page 375

“CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?” on page 376

“CALL:MS:REPorted:NEIGHbour[1]?” on page 371

SINAD Measurement Description

This measurement is *not* applicable to GPRS.

How is a SINAD measurement made?

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

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

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

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

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

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

Related Topics

“Programming a SINAD Measurement” on page 158

“Analog Audio Troubleshooting” on page 71

“Analog Audio Measurement Description” on page 68

“Test Adherence to Standards” on page 167

Programming a SINAD Measurement

This measurement is *not* applicable to GPRS.

This section provides an example of how to make a SINAD measurement via the GPIB. SINAD measurements are not typically made when testing GSM mobiles but are more common when testing AMPS or other analog mobiles. The programming example below is typical for a 136 mobile.

SINAD and Distortion measurements are affected by the same STATE and INITiate commands, so both measurements are enabled and triggered at the same time. However, measurement results are queried separately. See “Analog Audio Measurement Description” on page 68.

The following procedure assumes that the mobile’s audio output is connected to the AUDIO IN connectors and the mobile is on an analog voice channel (AVC) that is being modulated with a 1004 Hz tone at +/-8 kHz peak deviation. It is also assumed that the Cell Power from the test set is set to a minimum usable level (typically about -116 dBm).

1. Configure analog audio measurement parameters using the SETup subsystem.
2. Start the analog audio measurement using the INITiate subsystem.
3. Use the FETCh? subsystem to obtain analog audio measurement results.

Programming Example

```

10 OUTPUT 714;"SETup:AAudio:CONTinuous OFF" !Set the analog audio
20                                     !measurements to single trigger mode.
30 OUTPUT 714;"SETup:AAudio:EXPeCted:VOLTage 3V" !Set the Expected Amplitude level for
40                                     !audio input voltage in Vpeak.
50 OUTPUT 714;"SETup:AAudio:SDIStortion:STATe ON" !Turn on the SINAD and
60                                     !distortion measurements.
70 OUTPUT 714;"SETup:AAudio:SDIStortion:FREQuency 1004 HZ" !Specify the audio
80                                     !frequency to use for the measurements.
90 OUTPUT 714;"SETup:AAudio:FILTer:TYPE CMESsage" !Select the c-message filter.
100 OUTPUT 714;"SETup:AAudio:DEMPHasis:STATe OFF" !Turn off de-emphasis.
110 OUTPUT 714;"SETup:AAudio:EXPANDOR:STATe OFF" !Turn off the expander.
120 OUTPUT 714;"SETup:AAudio:TImeout 3S" !Set a timeout value of 3 seconds
130                                     !in case the measurement cannot be made.
140 OUTPUT 714;"INITiate:AAudio" !Start the Analog Audio measurement.
150 OUTPUT 714;"FETCh:AAudio:INTegrity?" !Query the integrity indicator to
160                                     !verify that a reliable measurement was made.
170 ENTER 714;Integrity !Enter the returned value into a variable for comparison
180                                     !with possible integrity indicator values (not shown here).
190 IF Integrity=0 THEN !Only fetch measurement result if integrity indicator is 0.
200 OUTPUT 714;"FETCh:AAudio:SINad?" !Fetch the SINAD result.
210 ENTER 714;Sinad !Enter the returned value into a variable.
220 END IF
230 END

```

Returned Values

The results returned by this program are:

- `Integrity` returns the integrity indicator (0 means a successful measurement with no errors). See “Integrity Indicator” on page 183.
- `SINAD` returns the SINAD value in dB.

Related Topics

“Analog Audio Measurement Description” on page 68

“Analog Audio Troubleshooting” on page 71

“INITiate” on page 526

“SETup:AAUDio” on page 560

“FETCh:AAUDio” on page 447

Transmit Power Measurement Description

This section is applicable to both GSM and GPRS.

How is a transmit power (TXP) measurement made?

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

For GPRS mobiles, TXP provides a broadband measurement of the peak transmitted carrier power of a GMSK modulated signal for a specified burst in a multislot configuration which consists of adjacent timeslots. Only one burst which you specify using “RFANalyzer:MSLot:MEASurement:BURSt” on page 558 is measured at a time.

In order to provide you with a very fast TXP measurement the test set measures the power without synchronizing it to the midamble. The measurement is made with RF amplitude synchronization; therefore, the signal does not need to be demodulated to determine the midamble. This technique is different than the TXP measurement defined in 3GPP 51.010 (formerly ETSI GSM 11.10). (See “Burst Synchronization of Measurements” on page 172). The power versus time measurement provides a carrier power measurement that is synchronized to the burst’s midamble, and conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.3 and 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.2. (See “Power versus Time Measurement Description” on page 133 for more details.)

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

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

Single or Multi-Measurements

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

Types of Signals TX Power can Measure

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

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

Input Signal Requirements

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

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

Trigger Source

Auto triggering is the recommended trigger source for each measurement. This allows the test set to choose the preferred trigger source. However you may want to select the trigger source. See Table 11. on page 161

Table 11. Recommended Trigger Source Settings

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

Related Topics

“Programming a Transmit Power Measurement” on page 163

“Test Adherence to Standards” on page 167

“Transmit Power Troubleshooting” on page 166

Programming a Transmit Power Measurement

This section contains two programming examples:

- “Programming a Transmit Power Measurement for GSM” on page 163
- “Programming a Transmit Power Measurement for GPRS” on page 164

Programming a Transmit Power Measurement for GSM

This section provides an example of how to make the transmit power (TXP) measurement via GPIB.

The following procedure assumes that an active link is established between the test set and the mobile station. See “Establishing an Active GSM Link with the Mobile Station” on page 38.

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 183 (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 160

“SETup:TXPower” on page 642

“INITiate” on page 526

“FETCh:TXPower” on page 521

Programming a Transmit Power Measurement for GPRS

This section provides an example of how to make the transmit power (TXP) measurement via GPIB.

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See “Step 4: Make a connection” on page 275.

1. Set the multislot configuration to two downlinks, two uplinks (D2U2) using the CALL subsystem.
2. Configure the TXP measurement parameters using the SETup subsystem.
3. Use the RFANalyzer:MSLOT:MEASurement:BURSt command to select burst 2 of the multislot configuration for the TXP measurement.
4. Start the TXP measurement using the INITiate subsystem.
5. Use the INITiate:DONE? command to find out if TXP measurement results are available.
6. Use the FETCh? command to obtain TXP measurement results.

Programming Example

```
10 OUTPUT 714;"CALL:PDTCH:MSLOT:CONFIG D2U2" ! Configures the multi-
20                                     ! slot configuration to be
30                                     ! 2 downlink, 2 uplink.
40 OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Configures a TXP measurement to
50                                     !single trigger mode.
60 OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 100" !Configures a multi-measurement
70                                     !of 100.
80 OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Configure trigger source
90                                     !to auto.
100 OUTPUT 714;"RFANALYZER:MSLOT:MEASUREMENT:BURST 2" ! Perform the TXP
110                                     ! measurement on burst 2.
120 OUTPUT 714;"INITIATE:TXPOWER" !Start TXP measurement.
130 REPEAT
140     OUTPUT 714;"INITIATE:DONE?" !Check to see if TXP measurement is done.
150     ENTER 714;Meas_complete$
160 UNTIL Meas_complete$="TXP" !"TXP" must be all upper case.
```



```
170 OUTPUT 714;"FETCH:TXPOWER:ALL?" !Fetch TXP results.  
180 ENTER 714;Integrity, Avg_tx_power  
190 END
```

Returned Values

The measurements returned by this program are:

- Integrity returns the measurement “Integrity Indicator” on page 183 (0 means a successful measurement with no errors).
- Avg_tx_power returns the average transmit power in dBm for burst 2 of the multislot configuration.

Related Topics

“Transmit Power Measurement Description” on page 160

“SETup:TXPower” on page 642

“INITiate” on page 526

“FETCh:TXPower” on page 521

Transmit Power Troubleshooting

Possible Setup Issues

During remote operation of the Transmit Power measurement you should configure the trigger arm to single, see “SETup:TXPower” on page 642.

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 216.

If trigger source immediate is used for burst modulated signals the results returned will be unreliable. Burst modulated signals should be measured with Trigger Source set to RF Rise or Auto.

Interpreting Integrity Indicator values

See “Integrity Indicator” on page 183.

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 826.

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 826.

Test Adherence to Standards

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

Frequency Error and Phase Error - 3GPP 51.010 (formerly ETSI GSM 11.10) sections 13.1 and 13.16.1

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

Related Topics

“Phase and Frequency Error Measurement Description” on page 125

“Programming a Phase and Frequency Error Measurement for GSM” on page 128

“Programming a Phase and Frequency Error Measurement for GPRS” on page 129

Transmitter Output Power and Burst Timing Error - 3GPP 51.010 (formerly ETSI GSM 11.10) sections 13.3 and 13.16.2

To make a transmitter output power measurement that conforms to 3GPP 51.010 (formerly ETSI GSM 11.10) standards, perform a Power versus Time measurement with the desired setup. An ETSI compliant, transmitter output power (TXPower) result is available as a result of this measurement. Pass/fail checking of the Power versus Time mask is also available by using the Power versus Time measurement. The Burst Timing Error result is available for GSM and GPRS on the Call Setup screen and by issuing a query to the CALL subsystem (“CALL:STATus:TCHannel:TERRor?” on page 433 for GSM, “CALL:STATus:PDTCH | PDTChannel:TERRor?” on page 431 for GPRS).

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

When measuring two adjacent uplinks, each of these can have different power levels. However, the GPRS PvT measurement does not support multislot configurations where the first burst's level is greater than the second burst's level. This also applies to the GPRS PvT TX power measurement. A Potential Receiver Saturation (20) Integrity value will be returned if such a multislot configuration is measured. For more details on the range of Integrity Indicator values, see “Integrity Indicator” on page 183.

Making a faster transmitter output power measurement.

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

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

Related Topics

“Transmit Power Measurement Description” on page 160

“Programming a Transmit Power Measurement for GSM” on page 163

“Programming a Transmit Power Measurement for GPRS” on page 164

“GSM Power versus Time Measurement” on page 133

“GPRS Power versus Time Measurement” on page 138

“Programming a Power versus Time Measurement for GSM” on page 143

“Programming a Power versus Time Measurement for GPRS” on page 144

Output RF Spectrum - 3GPP 51.010 (formerly ETSI GSM 11.10) sections 13.4 and 13.16.3

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

The Output RF Spectrum due to Modulation method of test conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.4 at offsets < 1800 kHz. For GPRS mobiles which support a single uplink timeslot, the measurement conforms to 3GPP 51.010 (formerly ETSI GSM 11.10), section 13.16.3 at offsets < 1800 kHz (when the Multi-Measurement Count - Modulation parameter is set to Off using “SETup:ORFSpectrum:COUNt:STATe” on page 621).

Making a faster ORFS measurement.

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

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

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

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 not be representative.

Related Topics

“Output RF Spectrum Measurement Description” on page 117

“Programming an Output RF Spectrum Measurement for GSM” on page 120

“Programming an Output RF Spectrum Measurement for GPRS” on page 121

Reference Sensitivity - 3GPP 51.010 (formerly ETSI GSM 11.10) section 14.2

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

Making a faster reference sensitivity measurement.

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

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

Related Topics

“GSM Bit Error Measurement” on page 78

“GPRS Bit Error Measurement” on page 81

“Programming a Bit Error Measurement for GSM” on page 83

“Programming a Bit Error Measurement for GPRS” on page 85

“Fast Bit Error Measurement Description” on page 111

“Programming a Fast Bit Error Measurement” on page 114

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 105

“Programming an I/Q Tuning Measurement” on page 107

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 99

“Programming a Dynamic Power Measurement” on page 101

Analog Audio Measurements

The Analog Audio measurements are not ETSI specified measurements.

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

Related Topics

“Analog Audio Measurement Description” on page 68

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 125 and "Power versus Time Measurement Description" on page 133.) there are three possible settings for measurement synchronization:

- Midamble
- RF Amplitude
- None

Selecting midamble causes the test set to use the input signal's midamble data to determine the measurement's time reference. A measurement is capable of midamble synchronization if the test set is able to determine transmitted data from measurement samples (i.e. perform demodulation). Midamble synchronization is not available for Transmit Power measurements. However, the Power vs. Time measurement can perform an average power measurement using midamble synchronization.

NOTE When the test set's operating mode is "test mode" or when the cell activated state is "off", the burst type may need to be specified before the test set can synchronize to the input signal's midamble. See "Expected Burst" on page 739.

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 183 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 183

“INITiate” on page 526

“SETup Subsystem” on page 559

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 38.

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 183 (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 766

“CALL:TCHannel:CMODE” on page 438

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 38 or for GPRS see, “Step 4: Make a connection” on page 275.

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 724. After a handover, the frequency banded parameters for the new band are active. Only one set of frequency banded parameters is active at any one time. However, you can set up any of the traffic channel parameters for bands involved in the handover because the test set remembers the settings and switches to them when the handover occurs.

Related Topics

For GSM:

- “Step 6: Reconfigure Test Set and Mobile Station Connection Parameters” on page 235
- “CALL:TCHannel” on page 434

For GPRS:

- “Step 6: Reconfigure Test Set and Mobile Station Connection Parameters” on page 281

Dealing With Semicolon Separated Response Data Lists

Description

In accordance with IEEE 488.2-1992 Section 8.4.1 the test set uses the semicolon (;) as the response message unit separator (RMUS). The RMUS separates sequential response message unit elements from one another when multiple response message unit elements are sent in a response message. This condition would occur when combining multiple queries into a single GPIB transaction.

Query Response Data Types Used By Test Set

The test set can return the following data types in response to queries:

- character data (char): ASCII characters A-Z (65-90 decimal), underscore (95 decimal), digits (48-57 decimal).
- string data: ASCII characters enclosed in quotes (for example, "5551212" or "PGSM")
- numeric response data (nr1): numeric data in the form +/- dddddddd
- numeric response data (nr3): numeric data in the form +/- ddd.ddd E +/- dddd

Semicolon Separated Response Data Lists Containing Mixed Data Types

Problems can occur when trying to enter semicolon separated response data lists containing mixed data types.

For example: If the following command string is sent to the test set, the test set will respond by constructing a response message which contains multiple response message unit elements (that is, one response message unit element for each query item contained in the command string). Some response message unit elements are string data type, some are character data type and some are nr3 data type.

```
OUTPUT 714; "CALL:MS:REP:IMSI?;PCL?;REV?;SBAN?;ONUM?;MCC?;MNC?;LAC?"
```

An example response message generated by the test set in response to the above OUTPUT statement would be:

```
"001012345678901";+4.00000000E+000;PHAS1;"PGSM";"5551212";9.91E37;9.91E37;9.91E37
```

Constructing the following data entry statement will account for multiple responses from the query:

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

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

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

Dealing With Semicolon Separated Response Data Lists

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

Semicolon Separated Response Data Lists Containing Only Numeric Data Types

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

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

Concurrent Measurements

Description

A number of measurements can be initiated (with the INITiate command) while other measurements are being made, and the test set will perform as many operations simultaneously as its architecture allows. This technique is referred to as concurrency. Performing measurements concurrently can greatly improve test throughput.

Operating Considerations

The test set has three parallel signal paths to improve measurement throughput.

- Demodulation downconverter path.
- Measurement downconverter path.
- Power detector path.

Since measurements are DSP (digital signal processor) based, and there are four A/D converters available to digitize or “sample” the input signal for analysis by the DSP, the test set will always have the capability to perform one transmitter measurement, one receiver measurement, and maintain the radio link concurrently. The test set’s ability to perform multiple transmitter, or multiple receiver tests concurrently will depend on the availability of resources within the test set and availability of the signal to be tested.

Concurrent Measurements for the GSM and GPRS Test Applications

This table shows the concurrency considerations for the GSM Mobile Test Application. Refer to the “Table

Concurrent Measurements

Key” on page 181 if you require an explanation of the codes used in the table.

Table 1. GSM Concurrency Considerations

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

Table 2. GPRS Concurrency Considerations

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

Table Key

Empty cell: These measurements can operate concurrently with no conflicts.

A: Cannot operate concurrently. The measurement which is initiated most recently will cause all other conflicting measurements to be closed.

B: These measurements share a sampler path. If multiple measurements are initiated at the same time, they will execute sequentially. However, if multiple measurements are configured to operate off the same trigger event and only a single occurrence of that event happens, only the first initiated measurement will complete.

C: The traffic channel ARFCN or transmit power level can be changed while the measurement is in progress. However, this causes the measurement to re-start, obviously increasing test time.

D: When this measurement is initiated, all other measurements are closed.

NOTE This note is applicable to GSM only.

The downlink speech source cannot be used when the FBER or BER measurements are running. These measurements take absolute control of the downlink speech source and use it to generate the pseudo-random data.

Related Topics

“Measurement Event Synchronization” on page 191

“Block Diagram” on page 730

Integrity Indicator

Description

The test set can evaluate its own performance and make a determination as to the validity of a measurement result. The test set evaluates the conditions surrounding a measurement and reports to the user its evaluation of these conditions in a parameter called the measurement integrity indicator. A measurement integrity indicator value is returned for every completed measurement. It is recommended that the user take advantage of this feature in every measurement.

The returned value defines whether or not a problem was encountered by the measurement process. It is not, however, guaranteed to be the only or root cause of the measurement problem. This is because some of the conditions surrounding a measurement may interact, and the test set may have insufficient information to determine the root cause of the measurement problem. However, in most cases, the value returned is the most likely cause of the problem.

Not all of the integrity indicator values are available for each measurement or test application, if a value doesn't apply it will not be available.

Example: Questionable Result for PGSM (15) and Questionable Result Due To Channel Mode (16) are GSM only integrity indicator values.

NOTE Measurement synchronization must be set to midamble in order for GSM measurements to return integrity indicator (8, 9, 11).

Table 3.

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 3.

Integrity Indicator Number	Integrity Indicator Message
6	Under Range: Indicates that the input signal is under range. The amplitude of the DUT's signal is not high enough for the DSP sampler to produce accurate results with the measurement algorithm.
7	Burst Short: Indicates that the burst duration is too short, or part of the burst was not sampled due to improper triggering.
8	Trigger Early or Fall Early: Indicates that the DUT's burst amplitude fell prematurely or, due to an early trigger (early relative to a transmitted burst) the measurement sampling operation terminated before the falling edge of the burst.
9	Trigger Late or Rise Late: Indicates that either the rising edge of the DUT's burst was late or, due to a late trigger (late relative to a transmitted burst) the measurement sampling operation didn't start until after the rising edge of the transmitted burst.
10	Signal Too Noisy: Indicates that the measurement algorithm has found the signal measured to be too noisy to provide accurate results.
11	Sync Not Found: Indicates that the midamble was not found therefore the measurement was not synchronized.
12	Oven Out of Range: Indicates that a temperature controlled oven (other than the internal timebase oven) is outside of its operating range. The power meter's oven is checked and its condition reported with this value. (The internal timebase generates a temporary error message (out of lock) that is sent to the system error queue and the display. This is not an integrity indicator value, it is an error message.)
13	Unidentified Error: Indicates errors which are not covered by the other integrity values. Examples include: parameter errors, algorithm memory errors (too many measurements), measurements unavailable (unable to control), autorange unable to converge, default calibration data used.
14	PCM Full Scale Warning: Indicates that the PCM signal has reached plus or minus full scale. The measurement made will be accurate on the PCM signal but would typically indicate an overdriven or oscillating element in the DUT.
15	Questionable Result for PGSM: Indicates that the user attempted to make an FBER measurement in a phase 1 system. FBER is only possible in a phase 2 GSM system. This indicator is available only when the selected broadcast band is PGSM.
16	Questionable Result Due To Channel Mode: Indicates that the channel mode was set to Enhanced Full Rate Speech while a Decoded Audio measurement was active. Decoded Audio is not supported for EFR Speech.

Table 3.

Integrity Indicator Number	Integrity Indicator Message
17	<p>Can not Correlate: Indicates that the test sets internally generated reference signal does not correlate with the received signal.</p> <p>Some conditions that could cause this integrity indicator result include the following:</p> <ul style="list-style-type: none"> • an input signal that is corrupted • the input signal is extremely distorted • the input signal is off by more than 10 ms. • the frequency of the input signal deviates more than allowed • something is wrong with the long-code mask coming from the mobile ID
18	<p>Frequency Out Of Range: Indicates that a Channel Power Measurement was attempted at a frequency for which there is no calibration data. The test set display will indicate 4 dashes.</p>
19	<p>Uncalibrated Due To Temperature: Indicates that the current temperature of the test set is different than the calibration data temperature by more than ± 10 degrees C, when attempting a Channel Power Measurement.</p>
20	<p>Potential Receiver Saturation: Indicates that an input signal immediately prior to the measured input was high enough to potentially saturate the receiver hardware.</p>
21	<p>Parameter Error: Indicates that a measurement setup parameter has been set in a way that gives invalid measurement results.</p>
22	<p>Unsupported Configuration: Indicates that some parameter, other than a measurement setup parameter has been set so that it causes an invalid measurement result. Typically this would be a base station emulator parameter.</p>
23	<p>Call Processing Operation Failed: Indicates that a call processing operation, (base station emulator) needed in the course of making the measurement could not complete.</p>

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 835

Measurement Timeouts

Description

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

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

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

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

Timeout Default Values

Table 4. List of Timeouts and Default Values

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

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

Programming Example

The following program causes a timeout to occur on an attempted transmit power measurement. The integrity indicator should return a 2 (the measurement timeout indicator).

```
10 !Existing conditions: A call is not connected.
20 OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME 5;STATE ON" !Sets a timeout value
30                                     !of 5 seconds
40 OUTPUT 714;"INITIATE:TXPOWER" !Initiates a single TX power measurement.
50 OUTPUT 714;"FETCH:TXPOWER?" !Queries the TX Power measurement result.
60 ENTER 714;Integrity,Tx_pwr_result
70 PRINT "Integrity indicator was ";Integrity
80 IF Integrity=2 THEN !Integrity Indicator 2 indicates TX power timed-out.
90 PRINT "Measurement timed out"
100 ELSE
110 PRINT "Measurement did not time out, TX power measurement result was ";Tx_pwr_result
120 END IF
130 END
```

In this example, if the transmit power measurement takes longer than 5 seconds to complete, the FETCh command retrieves an integrity value of 2. The test set's GPIB is then available to accept more commands.

Related Topics

"Integrity Indicator" on page 183

"SETup Subsystem" on page 559

Invalid Measurement Results

Description

Invalid measurement results are returned by the test set when conditions such as signal level are not within the present measurement range. Three different invalid measurement results are provided in order to help you understand the condition that caused the invalid result.

- $9.9E+37$ = INFINITY (Infinity)
- $-9.9E+37$ = NINF (Negative Infinity)
- $9.91E+37$ = NAN (Not A Number)

$9.9E+37$ (INFINITY)

$9.9E+37$ is returned by the test set when the measurement is out of range and results are far above the present measurement range.

$-9.9E+37$ (NINFINITY)

$-9.91E+37$ is returned by the test set when the measurement is out of range and results are far below the present measurement range.

$9.91E+37$ (NAN)

$9.91E+37$ is returned by the test set when the measurement is out of range but it can not be determined if measurement results are far above, or far below the measurement range.

If a measurement exceeds its measurement timeout value before a valid result is determined, $9.91E+37$ is returned.

FETCH? and READ? Invalid Results

When a FETCH? or READ? query is performed on a measurement with invalid results, the integrity indicator returns a value of 1, indicating No Result Available.

Manual Users Invalid Results

Manual users will generally see four dashes, “----” on the test set display. When the measurement timeout value has been exceeded, “Measurement Timeout” is displayed as well as the four dashes.

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 195

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 528 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 529. 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 529. 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 38 and “Triggering Process Description” on page 215.

```

10  OUTPUT 714;"SETUP:TXPOWER:CONTINUOUS OFF" !Sets TX power trigger mode
20                                     !to single.
30  OUTPUT 714;"SETUP:PFERROR:CONTINUOUS OFF" !Sets PFER trigger mode
40                                     !to single.
50  OUTPUT 714;"INITiate:TXPower;PFERror" !Begins a TX power and
60                                     !PFER measurement.
70  REPEAT
80  OUTPUT 714;"INITIATE:DONE?" !Queries the test set for measurements
90                                     !that are done
100 ENTER 714;Meas_done$ !String value representing DONE measurements,
110                            ! NONE if no measurements are done.
120 SELECT Meas_done$ !This variable will be set to WAIT until measurements
130                            !are DONE.
140 CASE "TXP" !Characters must be upper case.
150 OUTPUT 714;"FETCH:TXPOWER:POWER?" !If this case is selected, Tx power
160                                     !(no integrity indicator) is FETChed.
170 ENTER 714;Tx_power
180 PRINT "TX_Power is ";Tx_power
190 CASE "PFER" !Characters must be uppercase.
200 OUTPUT 714;"FETCH:PFERROR:RMS?" !If this case is selected, rms phase error
210                                     !measurement is FETChed.
220 ENTER 714;Phs_error
230 PRINT "Max RMS Phase Error is ";Phs_error
240 END SELECT
250 UNTIL Meas_done$ = "NONE" !When all triggered measurements have completed,
260                            !the INITiate:DONE? query returns NONE.
270 END

```

STATUS:OPERATION:NMRREADY:GSM

The STATUS:OPERation:NMRReady:GSM command allows the program to immediately branch to the next operation or command without continuing through a loop as in INITiate:DONE? See “STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 667 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 209.
- 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 647 or “Status Subsystem Overview” on page 196.
- STATUS:OPERation bit (512 for NMRReady).
- Service Request Enabling (*SRE 128 for NMRReady).

The “STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 667 status register provides status reporting on the following measurement completions:

- TX Power
- Power vs. Time
- Phase/Frequency Error
- Output RF Spectrum
- Analog Audio
- Decoded Audio
- Fast Bit Error Rate
- Bit Error Rate
- I/Q Tuning
- Dynamic Power
- GPRS Bit Error Rate

Example 1. Generating a Service Request (SRQ) Interrupt - Bit Error Rate NMRR

The following example illustrates the use of the STATUS subsystem to generate a service request when a BERR measurement completes. This example assumes a call is already connected and the BERR measurement is setup (mobile station must be in loopback type A or B).

```

10  OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:PTR 256" !Enable positive transition
20                                     !filter on fast BER bit.
30  OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:ENABLE 256" !Enable the fast BER Bit to
40                                     !generate a summary message.
45  OUTPUT 714;"STATUS:OPERATION:NMRREADY:ENABLE 4" !Enable the GSM summary bit.
50  OUTPUT 714;"STATUS:OPERATION:ENABLE 512" !Enable the Operation summary bit to
60                                     !generate a summary message.
70  OUTPUT 714;"*SRE 128" !Enable the service request enable register to generate SRQ.
80  OUTPUT 714;"*CLS" !Clear all status data structures.
90  ON INTR 7,15 CALL Meas_complete !Define interrupt-initiated branch with a priority
100                                     !of 15 (highest)
110 ENABLE INTR 7;2 !Enable interrupt on interface card 7 with a bit mask
120                                     !(for interface's interrupt-enable register) of 2.
130 OUTPUT 714;"SETUP:FBER:CONTINUOUS OFF;:INITIATE:FBERROR" !Initiate a single
140                                     !fast BER test.
150 LOOP
160 DISP "Waiting for BERR test to complete"
170 WAIT .1 !"Dummy" loop
180 END LOOP
190 !Instead of a "dummy" loop, controlling application could be performing setups,
200 !making measurements, etc.
210 END
220 SUB Meas_complete
230 DISP "BER test complete, OK to FETCh results now"
240 Clear_interrupt=SPOLL(714) !Clear the RQS message in the status byte register.
250 STOP
260 SUBEND

```

Operating Considerations

Only one indicator is returned per query.

All active measurements must be set to single trigger mode. This ensures that when a measurement completes it remains in the “DONE” state rather than restarting. Sending the “*RST” command at the beginning of the test code or using the “SETup:CONTInous:OFF” command during measurement setups are ways to set the trigger to single for all measurements.

Related Topics

“INITiate Command Functions” on page 524

“What Happens When a Measurement is INITiated?” on page 524

“Concurrent Measurements” on page 179

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.
```

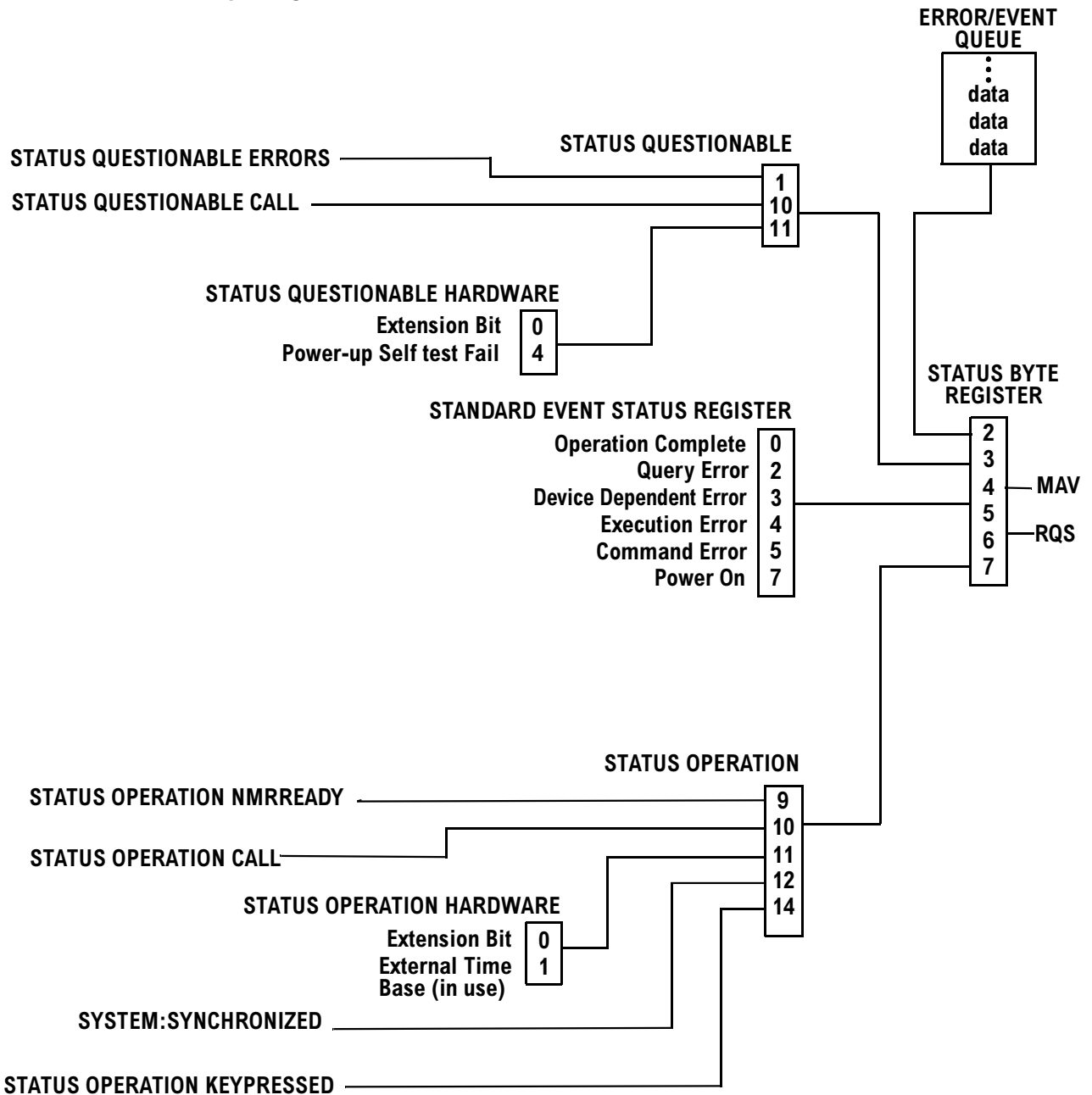
Related Topics

“Measurement Progress Report” on page 190

Status Subsystem Overview

Description

Overview of STATUS Reporting Structure



Status Reporting Structure For STATUS QUESTIONABLE and STATUS OPERATION

STATUS QUESTIONABLE CALL

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

Bit 10
STATUS
QUESTIONABLE

STATUS QUESTIONABLE ERRORS

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

Bit 1
STATUS
QUESTIONABLE

STATUS OPERATION CALL

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

Bit 10
STATUS
OPERATION

STATUS OPERATION NMRREADY

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

Bit 9
STATUS
OPERATION

Status Reporting Structure For STATUS OPERATION KEYPressed Register**STATUS OPERATION KEYPRESSED**

F1 softkey	0	Bit 14 STATUS OPERATION
F2 softkey	1	
F3 softkey	2	
F4 softkey	3	
F5 softkey	4	
F6 softkey	5	
F7 sofkey	6	
F8 softkey	7	
F9 softkey	8	
F10 softkey	9	
F11 softkey	10	
F12 softkey	11	

Status Reporting Structures For The COMMON Registers

STATUS QUESTIONABLE ERRORS COMMON

Extension Bit	0
+100 Messages	1
+200 Messages	2
+300 Messages	3
+400 Messages	4
+500 Messages	5
+600 Messages	6
+700 Messages	7
+800 Messages	8
+900 Messages	9
RUI Maskable Messages	14

Bit 1
STATUS
QUESTIONABLE
ERRORS

STATUS OPERATION CALL COMMON

Extension Bit	0
Call Control Status Idle	1
Call Control Status Connected	2
Call Control Status Alerting	3
Call Control Status Registering	4
Call Control Status Handover	5
Call Control Status Changing	6
BS Originating	7
Registering (BS Initiated)	9
Data Summary	14

Bit 1
STATUS
OPERATION
CALL

STATUS OPERATION CALL COMMON DATA

Extension Bit	0
Data Connection Status Idle	1
Data Connection Status Attached	2
Data Connection Status Transferring	3
Data Connection Status Data Connected	4
Data Connected Status Off	5
Data Connected Control Status Changing	6
Starting Data Connection	7

Bit 14
STATUS
OPERATION
CALL COMMON

STATUS OPERATION NMRREADY COMMON

Extension Bit	0
Audio Analyzer	1

Bit 1
STATUS
OPERATION
NMRREADY

Status Reporting Structure For The GSM Test Application

STATUS QUESTIONABLE CALL GSM

Extension Bit	0
Date Link Failure	1
Radio Link Failure	2
Immediate Assignment Failure	3
Channel Assignment Failure	4
Handover Failure	5
No Response to Page	6
Channel Assignment > Frames Identification Failure	7
Channel Mode Not Supported	9
Data Summary	14

CALL

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
GBER	11

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

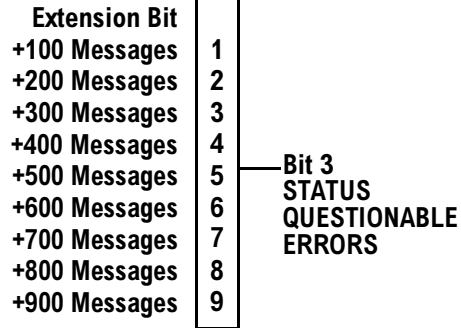
Status Reporting Structure For STATUS QUESTIONABLE CALL GSM DATA Register

STATUS QUESTIONABLE CALL GSM DATA	
Extension Bit	0
Attach Failure	1
Detach Failure	2
Routing Area Update Failure	3
Start Data Connection Failure	4
No Data Received Recently	5
Downlink Timed Out	6
Uplink Immediate Assignment Failure	7
Downlink Immediate Assignment Failure	8
MS Unexpectedly Ended TBF	9
End Data Connection Failure	10

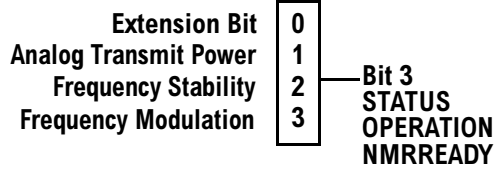
Bit 14
STATUS
QUESTIONABLE
CALL GSM

Status Reporting Structure For The AMPS Registers

STATUS QUESTIONABLE ERRORS AMPS



STATUS OPERATION NMRREADY AMPS



Status Reporting Structure For The DIGital136 Registers

STATUS QUESTIONABLE ERRORS DIGITAL 136

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

STATUS OPERATION NMRREADY DIGITAL 136

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

Status Reporting Structures For The TA136 Registers

STATUS QUESTIONABLE ERRORS TA136

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

Status Reporting Structure For The DIGital 2000 Registers

STATUS QUESTIONABLE ERRORS DIGITAL 2000

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

STATUS OPERATION NMRREADY DIGITAL 2000

Extension Bit	0	
HWQuality	1	
Reserved for future use	2	Bit 7 STATUS OPERATION NMRREADY
Reserved for future use	3	

Status Reporting Structure For The CDMA Registers

STATUS QUESTIONABLE ERRORS CDMA

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

STATUS QUESTIONABLE CALL CDMA

Extension Bit	0	
Traffic channel preamble not received	1	
Service Option or Radio Configuration rejected by MS	2	Bit 8 STATUS QUESTIONABLE CALL
Service connect completion not received	3	
Call drop timer timed out	4	

STATUS OPERATION NMRREADY CDMA

Extension Bit	0	
DA Power	1	
WQuality	2	Bit 8 STATUS OPERATION NMRREADY
C Power	3	
CFERror	4	
CAPPower	5	

Status Reporting Structure For The TA 2000 Registers

STATUS QUESTIONABLE ERRORS TA 2000

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

STATUS QUESTIONABLE CALL TA 2000

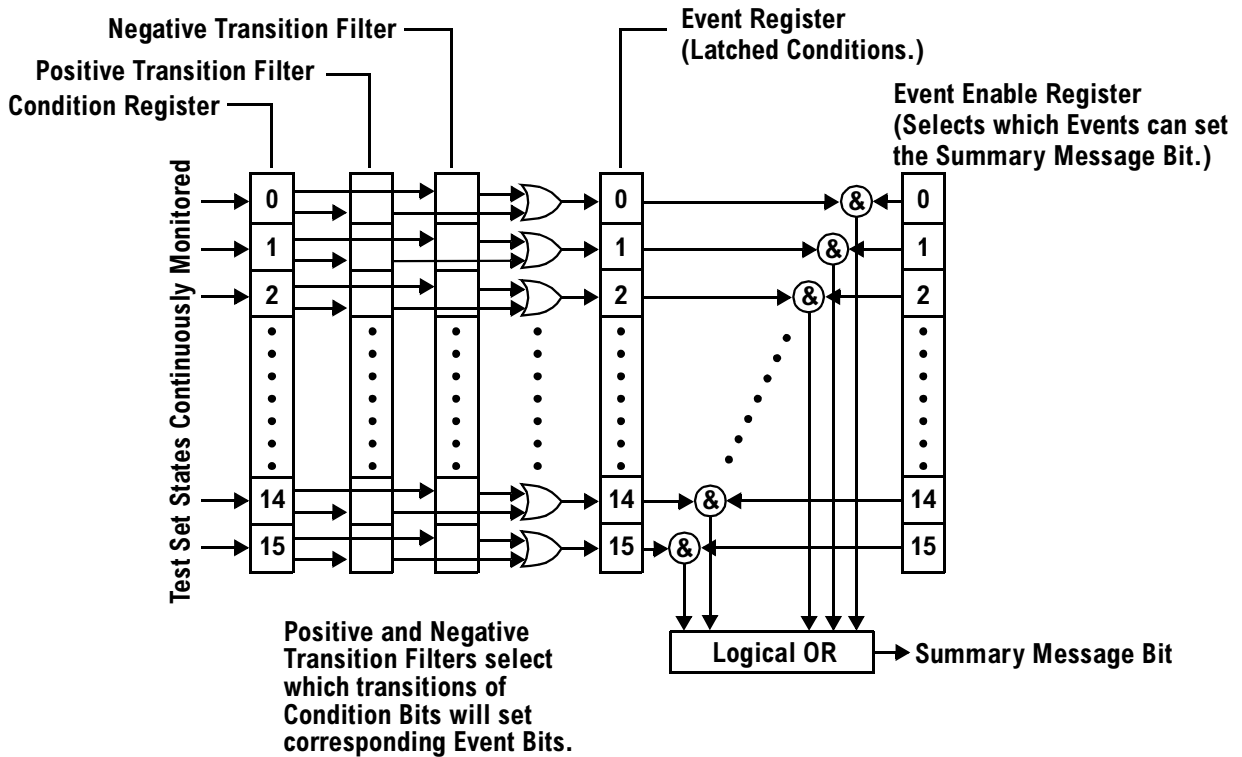
Extension Bit	0	
Release order not received	1	Bit 9 STATUS QUESTIONABLE CALL
Handoff completion not received	2	
Carrier not detected on new channel	3	
MS reject order received	4	

STATUS OPERATION NMRREADY TA 2000

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

Status Data Structure - Register Model

The generalized status register model consists of a Condition Register, Transition Filters, an Event Register, an Enable Register, and a Summary Message Bit.



Condition Register

A condition is a test set state that is either TRUE or FALSE (a GPIB command error has occurred or a GPIB command error has not occurred). Each bit in a Condition Register is assigned to a particular test set state. A Condition Register continuously monitors the hardware and firmware states assigned to it. There is no latching or buffering of any bits in a Condition Register; it is updated in real time. Condition Registers are read-only. Condition Registers in the test set are 16 bits long and may contain unused bits. All unused bits return a zero value when read.

Transition Filters In the test set, the Transition Filters are implemented as two registers: a 16-bit positive transition (PTR) register and a 16-bit negative transition (NTR) register.

For each bit in the Condition Register, a Transition Filter bit determines the state transitions which will set a corresponding bit in the Event Register. Transition Filters may be set to pass positive transitions (PTR), negative transitions (NTR) or either (PTR or NTR). A positive transition refers to a condition bit which has changed from 0 to 1. A negative transition refers to a condition bit which has changed from 1 to 0.

A positive transition of a bit in the Condition register will be latched in the Event Register if the corresponding bit in the positive transition filter is set to 1. A positive transition of a bit in the Condition register will not be latched in the Event Register if the corresponding bit in the positive transition filter is set to 0.

A negative transition of a bit in the Condition register will be latched in the Event Register if the corresponding bit in the negative transition filter is set to 1. A negative transition of a bit in the Condition register will not be latched in the Event Register if the corresponding bit in the negative transition filter is set to 0. Either transition (PTR or NTR) of a bit in the Condition Register will be latched in the Event Register if the corresponding bit in both transition filters is set to 1. No transitions (PTR or NTR) of a bit in the Condition Register will be latched in the Event Register if the corresponding bit in both transition filters is set to 0.

Transition Filters are read-write.

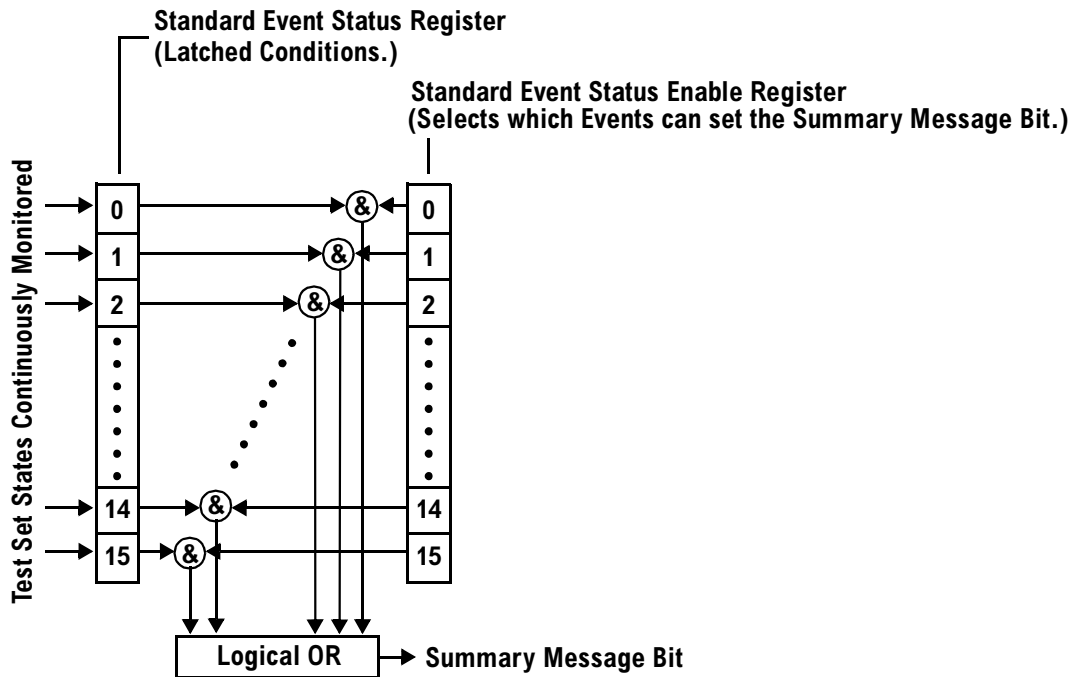
Transition Filters are unaffected by a *CLS (clear status) command.

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

Event Register The Event Register captures bit-state transitions in the Condition Register as defined by the Transition Filters. Each bit in the Event Register corresponds to a bit in the Condition Register. Bits in the Event Register are latched, and, once set, they remain set until cleared by a query of the Event Register or a *CLS (clear status) command. This guarantees that the application can't miss a bit-state transition in the Condition Register. There is no buffering; so while an event bit is set, subsequent transitions in the Condition Register corresponding to that bit are ignored. Event Registers are read-only. Event Registers in the test set are 16 bits long and may contain unused bits. All unused bits return a zero value when read.

Event Enable Register The Event Enable Register defines which bits in the Event Register will be used to generate the Summary Message. Each bit in the Enable Register has a corresponding bit in the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By using the enable bits the application program can direct the test set to set the Summary Message to the 1 or TRUE state for a single event or an inclusive OR of any group of events. Enable Registers are read-write. Enable Registers in the test set are 16 bits long and may contain unused bits which correspond to unused bits in the associated Event Register. All unused bits return a zero value when read and are ignored when written to. Enable Registers are unaffected by a *CLS (clear status) command or queries.

Standard Event Status Register Model

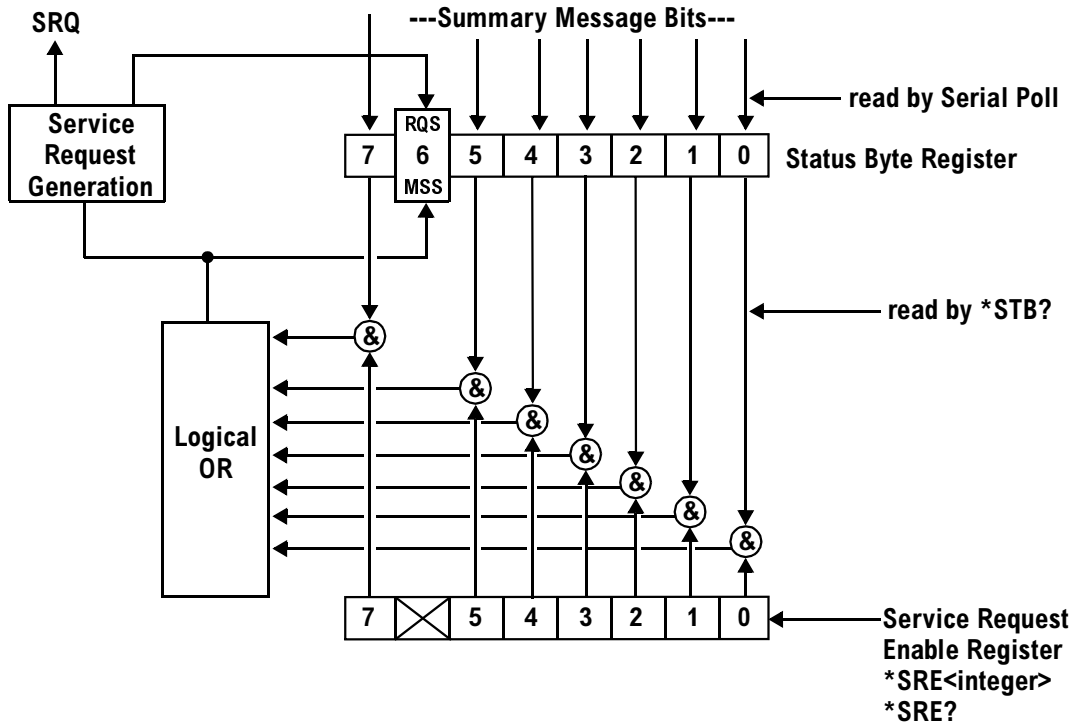


Summary Message Bit The Summary Message is a single-bit message which indicates whether or not one or more of the enabled events have occurred since the last reading or clearing of the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs an inclusive OR on all the resulting bits to generate the Summary Message. By use of the enable bits, the application program can direct the test set to set the Summary Message to the 1, or TRUE, state for a single event or an inclusive OR of any group of events.

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

The Summary Message is FALSE, logic 0, if the queue is empty and no enabled events are TRUE. Registers can be cleared by reading all the information from the queue. Registers can also be cleared using the *CLS (clear status) command.

Service Request Enabling Register Model



Status Byte Register The Status Byte Register is an 8 bit register that provides single bit summary messages, each summary message summarizes and overlaying status data structure. Summary messages always track the current status of the associated status data structure. Service request enabling determines if one or more of the summary messages will generate a message. Device status reporting is defined in IEEE 488.2-1992, 11.1.

The Status Byte Register contains the STB and RQS (or MSS) messages from the test set. The Status Byte Register can be read with either a serial poll or the *STB? common query. The value for bit 6 is dependent on which method used.

When reading with a serial poll the status byte and the RQS message are returned as a single data byte. The RQS message indicates if the SRQ is TRUE. The Status Byte Register is not affected by a serial poll, the RQS is set to FALSE when polled.

The *STB? query allows you to read the status byte and the MSS. The response represents the sum of the binary weighted values of the Status Byte Register from bit 0-5 and 7.

The Master Summary Status (MSS) message from bit 6 indicates when there is at least one reason for requesting service.

The Message Available (MAV) summary message from bit 4 is TRUE when there is a message in the output queue.

The Status Byte Register is cleared with the *CLS common command. The output queue and the MAV are not affected by the *CLS command.

Service Request Enable Register The Service Request Enable Register is an 8 bit register that enables corresponding summary messages in the Status Byte Register. Enabling the service request with the *SRE command allows you to choose which bits in the Status Byte Register will trigger a service request.

The Service Request Enable Register is read with the *SRE? query. The returned value is the sum of the binary weighted values of the Service Request Enable Register, with a range of 0 through 63 or 128 through 191.

The value of the unused bit 6 will always be zero.

Related Topics

“STATus Subsystem Description” on page 647

“Standard Event Status Register” on page 690

Triggering of Measurements

GSM and GPRS Operating Considerations

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

Description

Trigger Source Description

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.

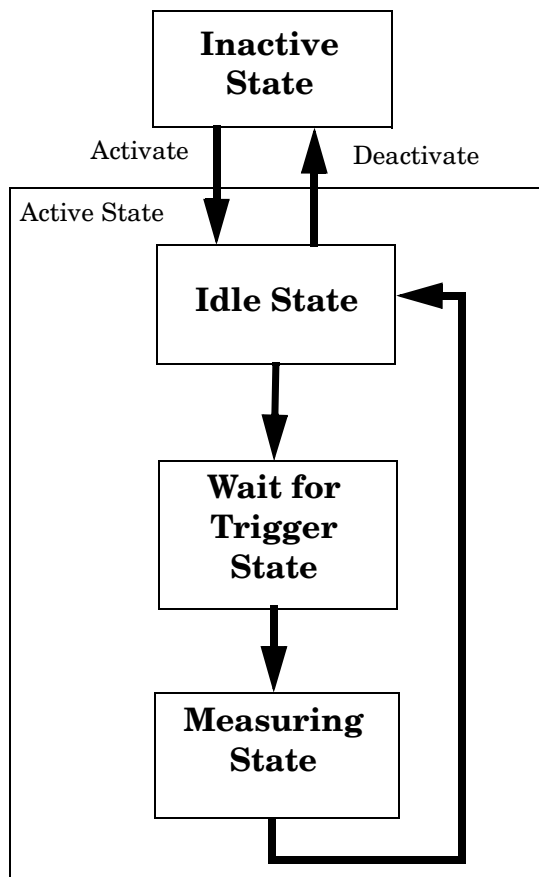
Auto Trigger Source: When auto triggering is selected, the test set automatically chooses the best trigger source for that measurement. This trigger source setting is convenient because the measurement trigger doesn't need to be changed when switching parameters. Auto trigger source is the best choice 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 1. The Test Set's Measurement States



Measurement States

The following examples describe states of the test set under various conditions. Refer to Figure 1. on page 215.

Example 2. 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 3. 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 4. 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 5. 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 5. 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 183

“SETup:ORFSpectrum:TRIGger:SOURce” on page 627

“SETup:PFERror:TRIGger:SOURce” on page 632

“SETup:PVTime:TRIGger:SOURce” on page 641

“SETup:IQTuning:TRIGger:SOURce[:SElected]” on page 617

“SETup:TXPower:TRIGger:SOURce” on page 645

5 GSM Programming Guide

Programming: Getting Started Guide for GSM Mobile Test

Introduction

The Getting Started Guide is organized around the basic set of tasks a control program normally performs when testing a mobile station in a manufacturing environment.

Conventions used in this Getting Started Guide

Throughout this Getting Started Guide the term “test set” refers to an Agilent Technologies 8960 Series 10 wireless communications test set with the E1960A GSM mobile test application installed.

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

How to use this Getting Started Guide

The most effective way to use this Getting Started Guide is with the Programming Flowchart included inside this guide and the 8960 User Documentation. This documentation is found in two locations:

- the 8960 Family Support Site (updated frequently) on the Internet, or
- the User Documentation CD-ROM shipped with your test application.

Each step on the Programming Flowchart is illustrated with example program code in this guide. Using this Getting Started Guide, the Programming Flowchart, and the on-line information about 8960 programming, you will be able to generate a control program to perform fundamental mobile station manufacturing tests.

Useful on-line links

Go to the 8960 Family Support Site on either the CD-ROM or the Internet. The CD-ROM should self-launch to its home page. The URL for the website is:

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

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

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

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

About the Programming Examples Presented in this Guide

Programming Language:

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

Line Numbers

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

Code that is not part of the download control program example does not have line numbers. This code may represent an alternate method of performing the task or may illustrate a feature not used by the control program example.

Syntax used in Programming Examples:

- The programming examples use the shortened form of the command syntax to minimize GPIB bus transactions. The shortened form of a command is defined by use of capital letters in the command syntax. For the command syntax:

```
RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO?
```

the shortened form would be:

```
RFAN:CONT:MEAS:FREQ:AUTO?
```

- The programming examples do not include optional nodes. Optional nodes in the command syntax are defined by enclosing the node inside the [] brackets. For example, the command syntax:

```
CALL[:CELL]:POWer[:SAMPlitude] -80dBm
```

appears in the programming examples as:

```
CALL:POW -80dBm
```

- Programming examples make extensive use of compound commands using the ; and the :: separators. Refer to the on-line information for the definition and use of these command separators.

Complex Commands

Complex commands are used to configure the state and assign values to parameters simultaneously. Complex commands can be used to save programming steps and minimize GPIB bus transactions.

- The syntax below turns the state of the parameter on.

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

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

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

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

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

The command above sets the parameter state to ON and the value of the parameter to 10 seconds. Note that in this example the optional command mnemonic :STIME has been included to clarify that this complex command was used to set both the state and the value.

- This command can be shortened further by removing the optional command mnemonic :STIME, as shown below.

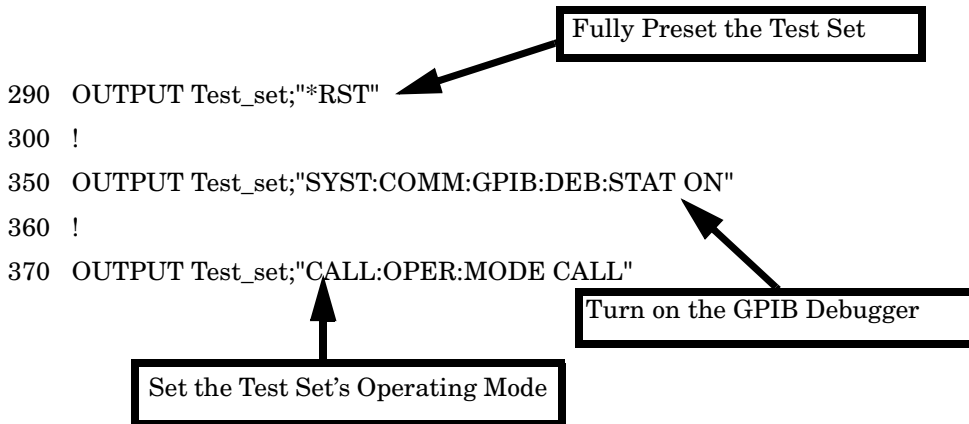
```
OUTPUT Test_set; "SET:DTXP:TIM 10 S"
```

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

Step 1: Set up the Test Set

This step explains how to:

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



Fully Preset the Test Set

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

Turn on the GPIB Debugger

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

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

Step 1: Set up the Test Set

Set the Test Set's Operating Mode

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

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

Step 2: Configure Test Set and Mobile Station Parameters

This step explains how to:

- “Configure the Broadcast Channel Parameters”
- “Configure the Traffic Channel Parameters”
- “Configure the Mobile Station Operating Parameters”

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

Configure the Broadcast Channel Parameters

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

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

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

```

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

```

Step 2: Configure Test Set and Mobile Station Parameters

Configure the Traffic Channel Parameters

The following example illustrates setting the traffic channel ARFCN and timeslot. Refer to the User Documentation, either on the Internet or the CD-ROM, or the GPIB syntax guide for other traffic channel parameters you can configure.

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

Configure the Mobile Station Operating Parameters

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

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


Step 3: Set the Measurement Parameters

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

```

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

```

Step 4: Make a Connection

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

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

Originating a Call from the Test Set

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

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

```

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

```

Originating a Call from the Mobile Station

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

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

```

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

```

Step 5: INITiate and FETCh Measurements

This step explains how to:

- “INITiate a set of measurements”
- “FETCh measurement results using a subroutine”

INITiate a set of measurements

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

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

FETCh measurement results using a subroutine

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

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

```

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

```

Step 5: INITiate and FETCh Measurements

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

Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

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

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

Reconfigure the Mobile Station Parameters

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

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

Reconfigure the Connection to a New ARFCN

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

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

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

Reconfigure the Connection to a New ARFCN in a Different Band

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

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

Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

new TCH ARFCN.

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


Step 7: End the Connection

You can end the connection in one of two ways:

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

Ending the Connection from the Test Set

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

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

Ending the Connection from the Mobile Station

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

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

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

Step 1: Set Up the Test Set

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

Description

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

Contents

- “Initialize the Test Set”
- “Set Up General Operating Conditions”

Initialize the Test Set

- Fully Preset the Test Set

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

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

- Clear the Error Queue

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

Sending the *CLS command clears the error queue.

Set Up General Operating Conditions

- Turn Debugger On

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

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

- Set Operating Mode

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

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

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

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

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

Command to Set the Test Set's Operating Mode

Command	Example
CALL:OPER:MODE <operating mode>	CALL:OPER:MODE CELL

- Set Amplitude Offsets

To achieve accurate measurement results, it is important to account for losses in the cabling and fixturing between the mobile station and test set. You must determine what the losses are for your test setup and then specify the appropriate frequency-dependent amplitude offset values.

You can specify amplitude offsets for up to 20 frequencies using the following commands:

Commands to Set Amplitude Offsets

Command	Example
SYST:CORR:FREQ <freq1>, <freq2>, <freq3>	SYST:CORR:FREQ 800MHz, 1800MHz, 1900MHz
SYST:CORR[:SGain] <offset1>, <offset2>, <offset3>	SYST:CORR -0.7, -1.0, -1.2

- Set Display Mode

To achieve a slightly faster test execution speed, you can disable the front panel display on the test set using the DISP:MODE FAST command.

Step 2: Configure Test Set and Mobile Station Parameters

The following information provides additional details on Step 2 of the Programming Flowchart. This information is applicable to all test applications.

Description

In this step you configure the parameters that allow a connection to be made between the test set and mobile station. This mainly involves setting up channels and power levels.

Contents

- “Set Up Channels”
- “Set Cell Power”
- “Set Mobile Station Transmit Power”
- “Set Up Additional Connection Parameters”

Set Up Channels

Setting up channels involves specifying the channel associated with every band and channel type (for example, analog or digital), and then setting the active band and channel type.

- Specify Channel Numbers

All of the test set’s test applications can test in more than one frequency band (for example, US Cellular, US PCS, or Korean PCS). To produce the most efficient code, you should configure the channel information for each band in advance. Then, to move to a new band during testing, you only need to send the command to change bands. You do not need to also specify the channel of the new band. This reduces test time.

To set up the channel number for the various bands, use one of the following commands (depending upon which test application you are using):

Commands to Set the Channel for a Band

Command	Example
CALL:<channel mnemonic>:<band mnemonic> <num value>	CALL:TCH:EGSM 124
CALL:SET:<channel type mnemonic>:<band mnemonic> <num value>	CALL:SET:DTC:PCS 777
CALL:CHAN:<channel type mnemonic>:<band mnemonic> <num value>	CALL:CHAN:DIG2000:K PCS 384

This practice also applies to test applications which test both analog and digital channel types. In this case you should specify the channel for the analog and digital channel types in advance. Then, switching between them requires only one command to initiate the change, and not an additional change to specify the channel of the new channel type.

If you specify channels in advance as described, the only time you need to specify a channel during testing is if you move to a new channel within the same band and channel type.

- **Set Active Band and Mode**

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

Commands to Set the Active Band

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

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

Command to Set the Active Channel Type

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

- **Active Cell and Test Mode Considerations**

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

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

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

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

Step 2: Configure Test Set and Mobile Station Parameters

Set Cell Power

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

Command to Set Cell Power

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

- Active Cell and Test Mode Considerations

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

Set Mobile Station Transmit Power

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

Commands to Set Mobile Station Transmit Power

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

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

- Manually Setting Expected Power

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

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

Set Up Additional Connection Parameters

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

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

All of these parameters are configured using the CALL subsystem.

Step 3: Set Measurement Parameters

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

Description

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

Contents

- “Measurement Parameters Overview”
- “Generic Measurement Parameters”
- “Measurement-Specific Measurement Parameters”

Measurement Parameters Overview

There are two different types of measurement parameters:

- Generic Measurement Parameters
- Measurement-Specific Measurement Parameters

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

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

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

Generic Measurement Parameters

There are three types of generic measurement parameters:

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

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

Measurement Count Parameters

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

Statistical Measurement Results Parameters

Parameter	Command Syntax
Measurement Count State	SETup:<meas-mnemonic>:COUNT:STATE <ON 1 OFF 0>
Measurement Count Number	SETup:<meas-mnemonic>:COUNT:NUMBER <numeric value>
Measurement Count Number and State	SETup:<meas-mnemonic>:COUNT[:SNUMBER] <numeric value>

Example 6. Programming Example:

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

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

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

Measurement Timeout Parameters

Parameters	Command Syntax
Measurement Timeout Time and State	SETup:<meas-mnemonic>:TIMEout[:STIME] <numeric value> [<suffix>]
Measurement Timeout State	SETup:<meas-mnemonic>:TIMEout:STATE <ON 1 OFF 0>
Measurement Timeout Time	SETup:<meas-mnemonic>:TIMEout:TIME <numeric value> [<suffix>]

Example 7. Programming Example:

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

sets the measurement timeout state to ON and set the measurement timeout time to 10 seconds for the digital transmit power measurement.

Step 3: Set Measurement Parameters

Measurement Trigger Parameters There are three measurement trigger parameters. They control the arming of a measurement, the source of the trigger, and the trigger's delay.

- The trigger arm parameter determines whether the test set makes one measurement and then stops (single), or automatically re-arms upon completion of one measurement and repeats the process (continuous). The recommended setting when writing a control program is single (CONTInuous OFF).
- The trigger source parameter selects the source of the measurement trigger signal. The recommended Trigger Source setting when writing a control program is AUTO.

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

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

NOTE Trigger delay is not applicable to analog measurements.

Measurement Trigger Parameters

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

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

```
SETup[:ALL]:CONTInuous:OFF
```

Example 8. Programming Example:

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

sets the trigger arm to single for all measurements.

Example 9. Programming Example:

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

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

Example 10. Programming Example:

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

sets the trigger delay to 10 microseconds for the digital transmit power measurement.

Measurement-Specific Measurement Parameters

Measurement-specific measurement parameters set up operating conditions for a specific measurement. For example:

- Setting the channel power measurement speed in IS-2000
- Setting ORFS frequency offsets in GPRS
- Setting number of bits for the FBER measurement in GSM

Refer to the GPIB syntax listing for the detailed list of measurement parameters for individual measurements.

Example 11. Programming Example:

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

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

Example 12. Programming Example:

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

sets the first ORFS offset to 400 kHz.

Example 13. Programming Example:

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

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

Example 14. Program Example Setting Both Generic and Measurement-Specific Measurement Parameters

```
! Set trigger arm to single for all measurements:
!
OUTPUT Test_set;"SET:CONT:OFF"
!
! *****
! Configure Modulation Accuracy Measurement:
!
OUTPUT Test_set;"SET:MACC:COUN 5"
! Example of using a complex command to set both the
! measurement count state and number at the same time.
!
OUTPUT Test_set;"SET:MACC:TRIG:SOUR AUTO"
! Sets trigger source to auto.
!
OUTPUT Test_set;"SET:MACC:TIM 15"
! Sets timeout state to ON and time to 15 sec.
!
OUTPUT Test_set;"SET:MACC:EVM10:STAT ON"
! Turns the EVM10 State ON
!
! *****
! Configure Digital TX Power Measurement:
```

Step 3: Set Measurement Parameters

```
!  
OUTPUT Test_set;"SET:DTXP:COUN 5"  
OUTPUT Test_set;"SET:DTXP:TRIG:SOUR AUTO"  
OUTPUT Test_set;"SET:DTXP:TIM 5"  
!  
! *****  
! Configure Frequency Stability Measurement:  
!  
OUTPUT Test_set;"SET:FST:COUN 3"  
OUTPUT Test_set;"SET:FST:TIM 10"  
!  
! *****  
! Configure Analog TX Power Measurement:  
!  
OUTPUT Test_set;"SET:ATXP:COUN 5"  
OUTPUT Test_set;"SET:ATXP:TRIG:SOUR AUTO"  
OUTPUT Test_set;"SET:ATXP:TIM 15"
```

Step 4: Make Connection

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

Description

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

Contents

- “Establish a Call in Active Cell Mode”
- “Make a Test Mode Connection”

Establish a Call in Active Cell Mode

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

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

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

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

Call Connection Synchronization Commands

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

Step 4: Make Connection

- Call-Connected-State Query

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

Responses Returned by the CALL:CONN? Query

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

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

- Call-State-Change Detector Arm Command

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

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

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

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

- Call-State-Change Detector Timeout Command

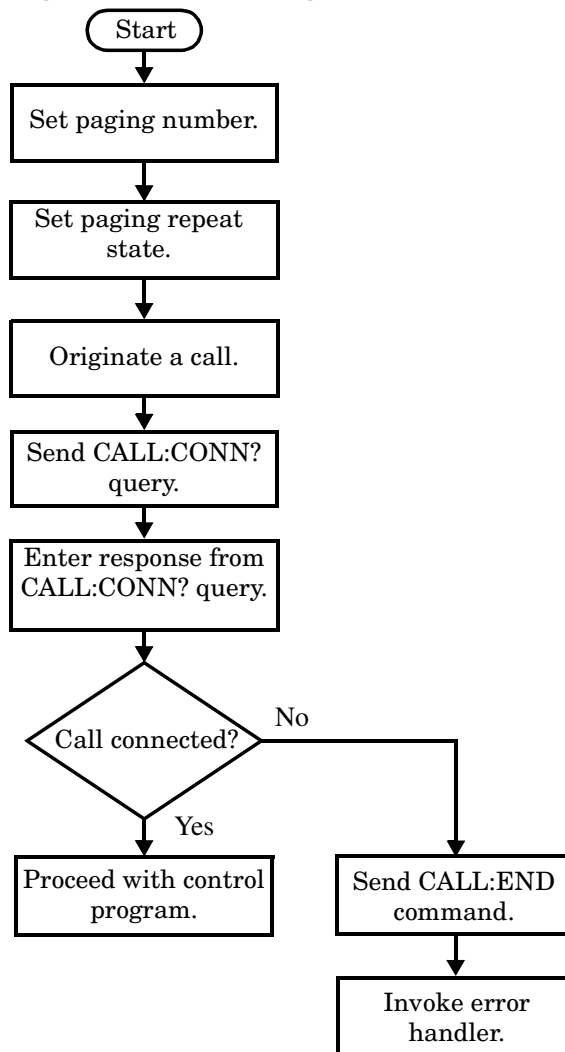
If the call-state-change detector is armed and a call connection is attempted but the call state never changes from the idle state, the CALL:CONN? query hangs the bus. This easily happens if the mobile is badly broken, the mobile is not connected to the test set, or no one pushes the send button on the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

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

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

Process for Making a Base Station Originated Call

Figure 2. Process for Making a Base Station Originated Call



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

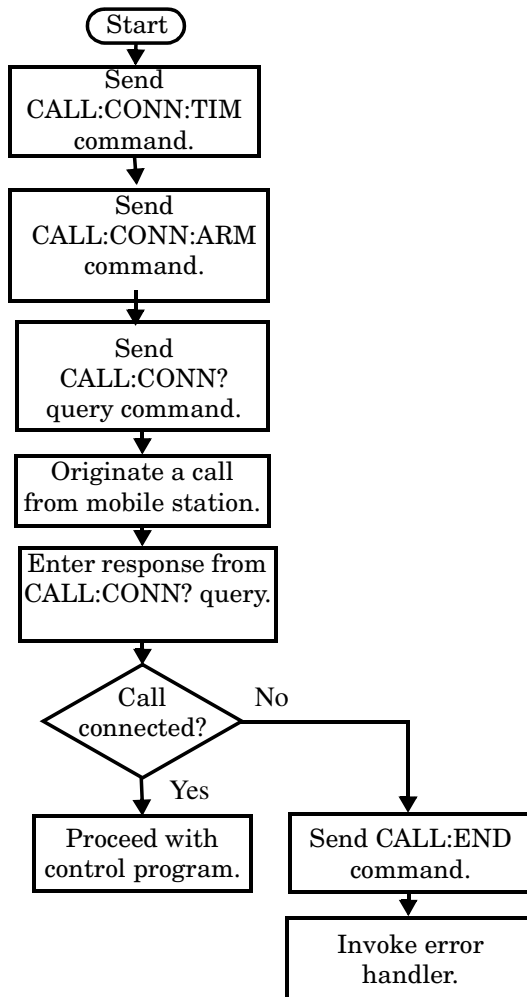
Step 4: Make Connection

Example 15. Programming Example

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

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

Process for Making a Mobile Station Originated Call Figure 3. Process for Making a Mobile Station Originated Call



NOTE The test set cannot originate a call from the mobile station. You must physically dial a number on the mobile station and press send, or send commands to a test bus built into the mobile station. For mobile station originated calls where the call is originated by physically dialing a number (as opposed to using a test bus) ensure that the call-state-change detector timeout time is long enough to allow the number to be dialed.

Example 16. Programming Example

```

OUTPUT Test_set;"CALL:CONN:TIM 10"           ! Set timeout time to 10 seconds
OUTPUT Test_set;"CALL:CONN:ARM"             ! Arm the change detector
DISP "Initiate a call from the mobile"
OUTPUT Test_set;"CALL:CONN?"                ! Initiate a call connected state query
ENTER Test_set;Call_connected                ! Program hangs here until
                                           ! origination passes or fails

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected. Proceed with the control program.

```

Make a Test Mode Connection

To make a connection between the test set and mobile station in test mode, you must send the appropriate test mode commands to the mobile station to command it to synchronize to the test set's signal and begin transmitting.

You may also want to make a quick power measurement to ensure that the connection has been made.

Step 5: INITiate and FETCh Measurements

The following information provides additional details on Step 5 of the Programming Flowchart. This information is applicable to all test applications.

Description

This step involves making measurements on the mobile station.

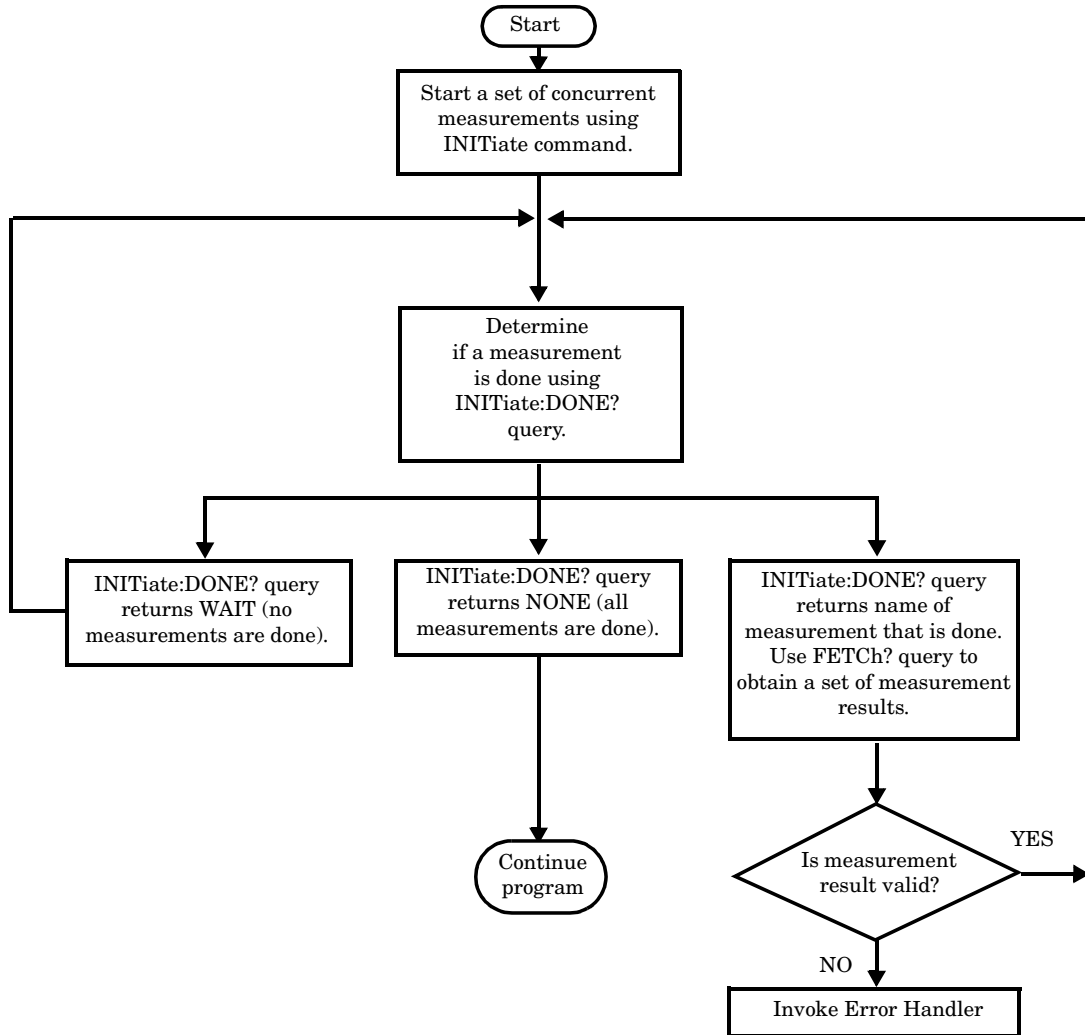
The test set has multiple signal paths and processors, which means you can make measurements concurrently and reduce test time. Making concurrent measurements involves starting a group of measurements, fetching the results of the measurements as they complete, and then verifying that the results are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

Contents

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

Concurrent Measurement Process

Figure 4. Process for Making Concurrent Measurements



Step 5: INITiate and FETCh Measurements

Start a Set of Concurrent Measurements The INITiate command is used to start measurements. Each individual measurement can be started using the INITiate command. For starting measurements, the syntax of the INITiate command is as follows:

```
INITiate:<measurement mnemonic>[:ON]
```

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

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

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

Determine if a Measurement Is Done Use the INITiate:DONE? query command to determine which measurement has completed.

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

Table 6. Responses Returned from INITiate:DONE? Query

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

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

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

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

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

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

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

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

Example FETCh? Result Formats

Command	Results Returned
FETC:TXP?	Measurement integrity and average value
FETC:TXP:POW:ALL?	Minimum, maximum, average and standard deviation values
FETC:TXP:POW:AVER?	Average value only
FETC:TXP:POW:MIN?	Minimum value only
FETC:TXP:POW:MAX?	Maximum value only
FETC:TXP:POW:SDEV?	Standard deviation value only
FETC:TXP:INT?	Measurement integrity value only

Example 17. Concurrent Measurement Process Programming Example

```

! Start a Set of Concurrent Measurements:
!
OUTPUT Test_set;"INIT:TXP;PFER"
!
! Determine if a Measurement Is Done:
!
LOOP
  OUTPUT Test_set;"INIT:DONE?"
  ENTER Test_set;Meas_done$
!
! Obtain a Set of Measurement Results:
!
SELECT Meas_done$
  CASE "TXP"
    OUTPUT Test_set;"FETC:TXP:POW?"
    ENTER Test_set;Avg_tx_power
  CASE "PFER"
    OUTPUT Test_set;"FETC:PFER:RMS?"
    ENTER Test_set;Max_rms_phas_er
  END SELECT
EXIT IF Meas_done$="NONE"
END LOOP

```

Step 5: INITiate and FETCh Measurements

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

The measurement integrity indicator is a measurement result and therefore is queried using the FETCh subsystem. A value of 0 indicates that the measurement is valid. A value other than 0 indicates that an error occurred during the measurement process.

Example Integrity Indicators

Value Returned	Description (message also appears on test set)
0	Normal
1	No Result Available
2	Measurement Timeout
5	Over Range
6	Under Range

Example 18. Programming Example

```
OUTPUT Test_set;"FETC:DTXP?"
ENTER Test_set;Integrity,Avg_dig_pow
IF Integrity=0 THEN
    PRINT "AVG DIG POW= ";Avg_dig_pow
ELSE
    PRINT "DTXP Measurement Error"
    PRINT "DTXP Measurement Integrity is ";Integrity
END IF
```

Alternative Measurement Process

You may choose to test in a sequential way rather than use the concurrent measurement process.

For instance, instead of using the INIT:DONE? query to determine when a measurement is complete, you may choose to initiate a set of measurements and then simply fetch them sequentially.

Example 19. Programming Example

```
OUTPUT Test_set; "INIT:DTXP;MACC"
OUTPUT Test_set; "FETC:DTXP:POW?"
ENTER Test_set;Avg_dig_pow
OUTPUT Test_set; "FETC:MACC:EVM[1]?"
ENTER Test_set;Max_EVM1
```

In this example, the test set starts both measurements at the same time. However, if the MACC measurement finishes first, the results are not fetched until the DTXP measurement finishes. Therefore, this process requires that you understand the order in which measurements will complete in order to optimize your testing speed.

Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

The following information provides additional details on Step 6 of the Programming Flowchart. This information is applicable to all test applications.

Description

After performing a set of measurements on the mobile station using the configuration established in step 2, you may want to change this configuration and test the mobile station again. This step involves changing testing conditions such as channel, mobile station transmit power level, or cell power.

Contents

- “Change Channels”
- “Change Other Connection Parameters”

Change Channels

In a manufacturing environment it is common to test a mobile station on more than one channel. Some or all of the tests may be performed on multiple channels, to verify the mobile station’s performance in a range of operating frequencies.

Perform a Handoff (Handover) in Active Cell Mode

If you are operating in active cell mode, to change channels you perform a handoff (handover) to the new channel. The control program sends the commands to initiate the handoff (handover), and then determines whether the transition was successfully completed. This is accomplished using the CALL:STATus? query.

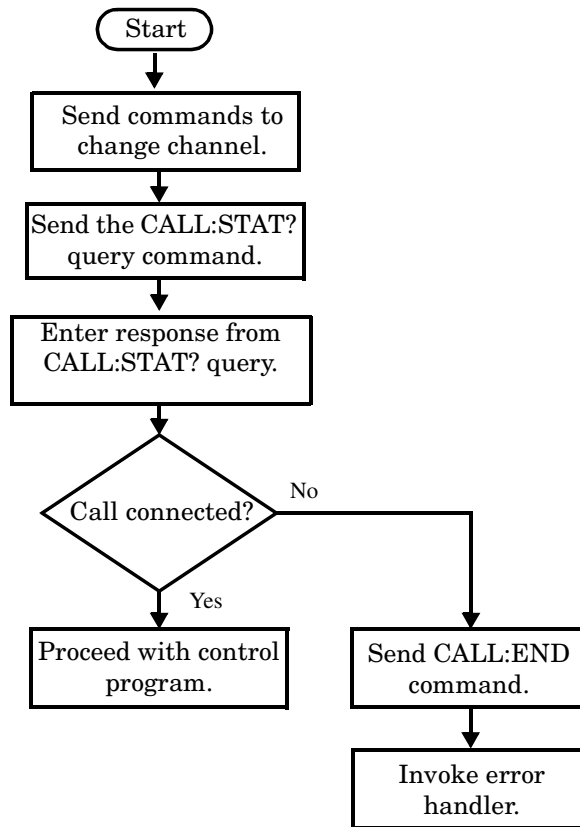
The CALL:STATus? query immediately returns the state of the call at the time the query is received.

Example Responses Returned from the CALL:STAT? Query

Response	Meaning
IDLE	The call is in the Idle state
ALER	The call is in the Alerting transitory state.
HAND	The call is in the Handoff transitory state.
PAG	The call is in the Paging transitory state.
CONN	The call is in the Connected state.

After issuing the commands to perform a handoff (handover), you should send the CALL:STAT? query to verify that the call is still connected before resuming testing.

Figure 5. Process for Performing a Handoff (Handover)



Test Mode Considerations In test mode, you can either change the test set's frequencies by using the handoff (handover) commands, or directly control the RF generator and RF analyzer.

In either case, you must also send the appropriate test mode commands to the mobile station to move it to the new channel.

Change Other Connection Parameters

You may also choose to change the mobile station transmit power level or cell power, or other connection parameters such as timeslot or timing advance.

Step 7: End Connection

The following information provides additional details on Step 7 of the Programming Flowchart. This information is applicable to all test applications.

Description

In this step you release the call (in active cell mode) or end the mobile station transmission (in test mode).

Contents

- “Release the Call in Active Cell Mode”
- “End the Mobile Station Test Mode Transmission”
- “Partially Preset the Test Set”

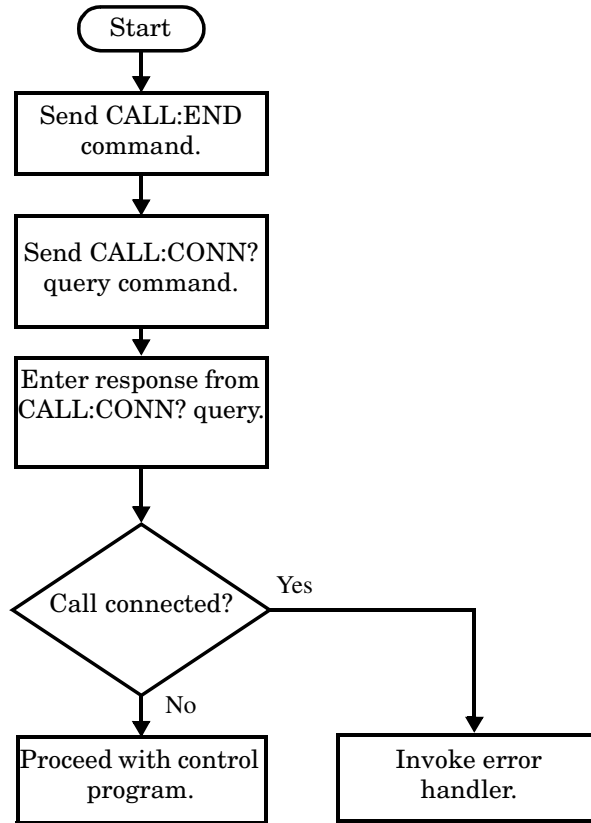
Release the Call in Active Cell Mode

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

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

Releasing an Active Call from the Base Station

Figure 6. Process for Releasing an Active Call from the Base Station

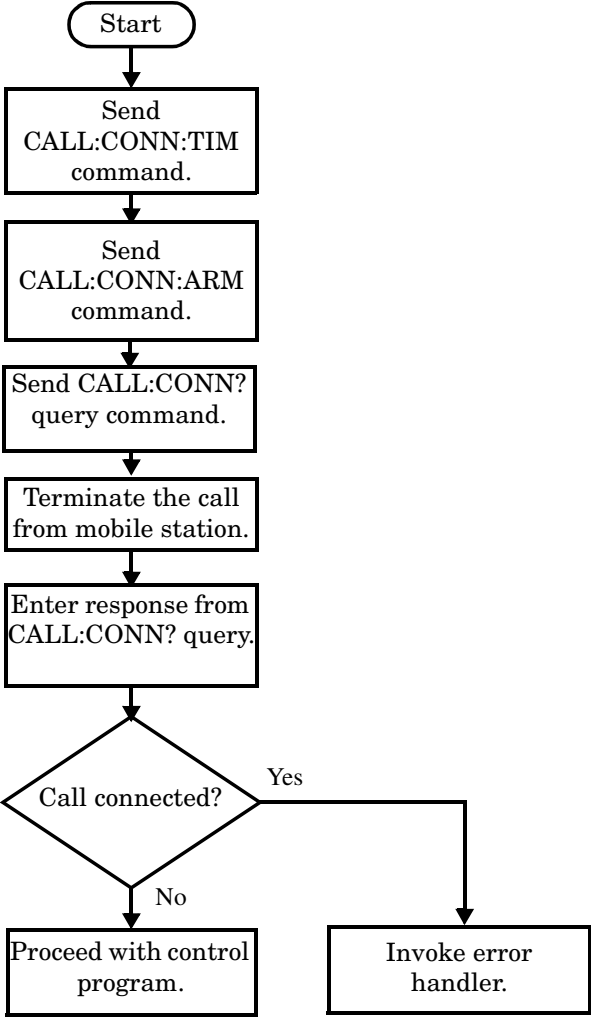


Example 20. Programming Example

```
OUTPUT Test_set;"CALL:END"           ! Initiate a base station release.
OUTPUT Test_set;"CALL:CONN?"        ! Send call connected state query.
ENTER Test_set;Call_connected        ! Program hangs here until state
                                     ! change or timer expires.
IF Call_connected THEN               ! Check if disconnection successful
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

Releasing an Active Call from the Mobile Station

Figure 7. Process for Terminating an Active Call from the Mobile Station



NOTE The test set cannot initiate a call disconnection from the mobile station. You must manually push the end button on the mobile station or send commands to a test bus built into the mobile station. For a mobile station release where the call is terminated by physically pushing a button on the phone (as opposed to using a test bus) ensure that the call-state-change-detector timeout time is long enough to allow the end button to be pushed.

Step 7: End Connection

Example 21. Programming Example

```
OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Test_set;"CALL:CONN:ARM"   !Arm the change detector.
DISP "Terminate the call from the mobile station."
OUTPUT Test_set;"CALL:CONN?" !Initiate call connected state query.
ENTER Test_set;Call_connected    !Program hangs here until state
                                !change or timer expires.
IF Call_connected THEN          !Check if disconnection successful.
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

End the Mobile Station Test Mode Transmission

In test mode, you must send the necessary test mode commands to end the mobile station transmission.

Partially Preset the Test Set

At this point, it is good practice to partially preset the test set by sending the SYST:PRES3 command. This command stops all measurement and call processing processes, but does not reset all values to default.

6 GPRS Programming Guide

Programming: Getting Started Guide for GPRS Mobile Test

Introduction

The Getting Started Guide is organized around the basic set of tasks a control program normally performs when testing a mobile station in a manufacturing environment.

Conventions used in this Getting Started Guide

Throughout this Getting Started Guide the term “test set” refers to an Agilent Technologies 8960 Series 10 wireless communications test set with the E1964A GPRS mobile test application installed.

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

How to use this Getting Started Guide

The most effective way to use this Getting Started Guide is with the Programming Flowchart included inside this guide and the 8960 User Documentation. This documentation is found in two locations:

- the 8960 Family Support Site (updated frequently) on the Internet, or
- the User Documentation CD-ROM shipped with your test application.

Each step on the Programming Flowchart is illustrated with example program code in this guide. Using this Getting Started Guide, the Programming Flowchart, and the on-line information about 8960 programming, you will be able to generate a control program to perform fundamental mobile station manufacturing tests.

Useful on-line links

Go to the 8960 Family Support Site on either the CD-ROM or the Internet. The CD-ROM should self-launch to its home page. The URL for the website is:

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

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

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

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

About the Programming Examples Presented in this Guide

Programming Language:

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

Line Numbers

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

Code that is not part of the download control program example does not have line numbers. This code may represent an alternate method of performing the task or may illustrate a feature not used by the control program example.

Syntax used in Programming Examples:

- The programming examples use the shortened form of the command syntax to minimize GPIB bus transactions. The shortened form of a command is defined by use of capital letters in the command syntax. For the command syntax:

```
RFANalyzer:CONTRol:MEASurement:FREQuency:AUTO?
```

the shortened form would be:

```
RFAN:CONT:MEAS:FREQ:AUTO?
```

- The programming examples do not include optional nodes. Optional nodes in the command syntax are defined by enclosing the node inside the [] brackets. For example, the command syntax:

```
CALL[:CELL]:POWer[:SAMPlitude] -80dBm
```

appears in the programming examples as:

```
CALL:POW -80dBm
```

- Programming examples make extensive use of compound commands using the ; and the :: separators. Refer to the on-line information for the definition and use of these command separators.

Complex Commands

Complex commands are used to configure the state and assign values to parameters simultaneously. Complex commands can be used to save programming steps and minimize GPIB bus transactions.

- The syntax below turns the state of the parameter on.

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

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

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


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

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

The command above sets the parameter state to ON and the value of the parameter to 10 seconds. Note that in this example the optional command mnemonic :STIME has been included to clarify that this complex command was used to set both the state and the value.

- This command can be shortened further by removing the optional command mnemonic :STIME, as shown below.

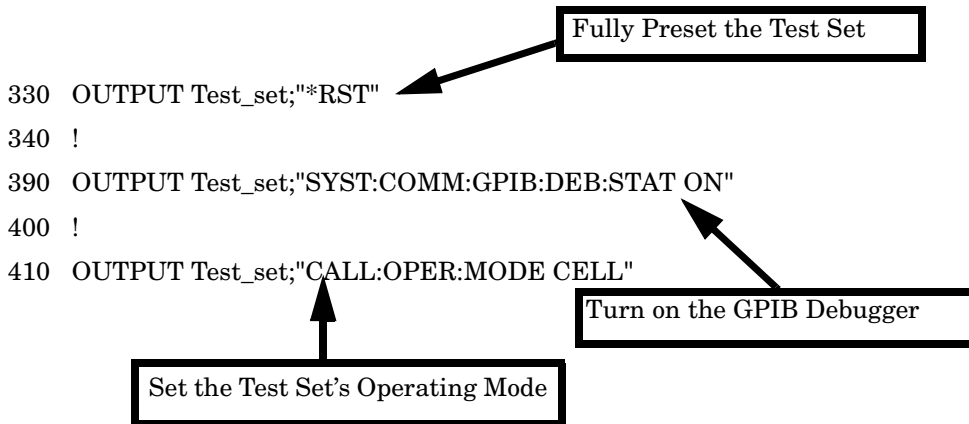
```
OUTPUT Test_set; "SET:DTXP:TIM 10 S"
```

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

Step 1: Set up the Test Set

This step explains how to:

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



Fully Preset the Test Set

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

Turn on the GPIB Debugger

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

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

Set Test Set's Operating Mode

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

There are also three test mode operating modes available. These test modes are useful when you are operating the mobile station in test mode. See the 8960 Family Support Site on the Internet for more information on test modes.

Step 2: Configure Test Set and Mobile Station Parameters

This step explains how to:

- “Configure the Broadcast Channel Parameters”
- “Configure the Packet Data Traffic Channel Parameters”
- “Configure the Mobile Station Operating Conditions”

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

Configure the Broadcast Channel Parameters

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

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

Configure the Packet Data Traffic Channel Parameters

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

```
520 OUTPUT Test_set;"CALL:PDTCH 45" ! Set packet data traffic channel
530 ! Set Data Connection Type to BLER
540 OUTPUT Test_set;"CALL:FUNC:DATA:TYPE BLER"
550 ! Set Multi-slot Configuration to two downlinks and one uplinks.
560 OUTPUT Test_set;"CALL:PDTCH:MSL:CONF D2U1"
570 OUTPUT Test_set;"CALL:PDTCH:CSCH CS4"! Set Coding Scheme to CS4
580 !
590 ! Assign values to the power reduction levels
600 OUTPUT Test_set;"CALL:PDTCH:PZER:LEV 30" ! Assign a value to P0
610 OUTPUT Test_set;"CALL:PDTCH:PRED:LEV1 11"! Set PRL1 to 11 dB
620 OUTPUT Test_set;"CALL:PDTCH:PRED:LEV2 0" ! Set PRL2 to 0 dB
630 !
640 ! Assign power levels to the downlink bursts
650 ! Assign Burst 1 a PRL of 0 dB
660 OUTPUT Test_set;"CALL:PDTCH:PRED:BURS1 PRL2"
670 ! Assign Burst 2 a PRL of 11 dB
680 OUTPUT Test_set;"CALL:PDTCH:PRED:BURS2 PRL1"
```

Configure the Mobile Station Operating Conditions

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

```
710 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS1 5"  
720 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS2 3"
```

Step 3: Set Measurement Parameters

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

```

780 ! Configure ORFS Measurement:
790 !
800 ! The lines below are examples of using complex commands to set
810 ! multi-meas state and count at the same time.
820 OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5"
830 OUTPUT Test_set;"SET:ORFS:MOD:COUN 10"
840 !
850 OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO"! Set trig source to AUTO.
860 OUTPUT Test_set;"SET:ORFS:CONT OFF" ! Set trig mode to single.
870 OUTPUT Test_set;"SET:ORFS:TIM 60" ! Set timeout time.
880 ! Put switching and modulation offsets to be tested into string
890 ! variables. S$ contains switching offsets. M$ contains
900 ! modulation offsets.
910 Swit$=".4MHZ,-.4MHZ,.6MHZ,-.6MHZ,1.2MHZ,-1.2MHZ,1.8MHZ,-1.8MHZ"
920 Mod$=".4MHZ,-.4MHZ,.6MHZ,-.6MHZ,1.2MHZ,-1.2MHZ,1.8MHZ,-1.8MHZ"
930 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit$
940 OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod$
950 !
960 ! Configure TX Power Measurement:
970 !
980 OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20"
990 OUTPUT Test_set;"SET:TXP:TRIG:SOUR AUTO;QUAL ON"
1000 !
1010 ! Configure Phase & Frequency Error Measurement:
1020 !
1030 OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;SYNC MID"
1040 OUTPUT Test_set;"SET:PFER:TRIG:SOUR AUTO"
1050 !
1060 ! Configure multislot measurements to be made on burst 1
1070 OUTPUT Test_set;"RFAN:MSL:MEAS:BURS 1"

```

Step 4: Make a connection

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

- “Mobile Station performs a GPRS Attach”
- “Start a Data Connection”

Mobile Station performs a GPRS Attach

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

Synchronization between the control program and the test set is maintained by querying the test set for the state of the connection between it and the mobile station. When a GPRS Attach is being performed, the `CALL:ATT?` hanging query is the appropriate query to use. It will return a “1” when the mobile station is attached and a “0” otherwise. A state change detector is also armed to ensure the query does not stop hanging before the state transition from “IDLE” to “ATTached” is able to begin. Finally, to prevent the query from hanging indefinitely, which could occur if the mobile station is not turned on or not sent the correct commands, a timeout is set for this query. In this example, 10 seconds is the value assigned to the timeout. After 10 seconds, the change detector is disarmed and the query returns either a “1” or “0”.

```

1190 DISP "Turn the phone on now.  Make the phone perform a GPRS attach."
1200 Start_time=TIMEDATE
1210 LOOP
1220     OUTPUT Test_set;"CALL:DCON:TIM 10"
1230     OUTPUT Test_set;"CALL:DCON:ARM"
1240     OUTPUT Test_set;"CALL:ATT?"
1250     ENTER Test_set;Att_state
1260 EXIT IF Att_state
1270     Current_time=TIMEDATE-Start_time
1280     IF Current_time>=Timer THEN             ! Timer value is 1 minute
1290         BEEP
1300         DISP ""
1310         PRINT "GPRS attach did not complete. Program terminated."
1320         STOP
1330     END IF
1340 END LOOP

```

Step 4: Make a connection

Start a Data Connection

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

```
1370 OUTPUT Test_set;"CALL:FUNC:DATA:STAR"  
1380 OUTPUT Test_set;"CALL:TRAN?"  
1390 ENTER Test_set;Tran_state  
1400 IF NOT Tran_state THEN  
1410     BEEP  
1420     DISP ""  
1430     PRINT "Data connection failed.  Program terminated."  
1440     STOP  
1450 END IF
```


Step 5: INITiate and FETCh Measurements

This step explains how to:

- “INITiate a set of measurements”
- “FETCh measurement results”

INITiate a set of measurements

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

```
1510 ! Start a set of concurrent measurements:
1520 !
1530 OUTPUT Test_set;"SYST:MEAS:RES" ! Reset the BLER results
1540 OUTPUT Test_set;"INIT:ORFS;TXP;PFER"
```

FETCh measurement results

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

```
1580 CALL Global_fetch
2980 SUB Global_fetch
2990     OPTION BASE 1
3000     COM /Address/Test_set
3010     OUTPUT Test_set;"CALL:PDTCH?"
3020     ENTER Test_set;Pdtch
3030     OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS?;BURS2?"
3040     ENTER Test_set;Ms_pwr_bs1;Ms_pwr_bs2
3050 !
3060 ! Determine if a measurement is done:
3070 !
3080     LOOP
3090         OUTPUT Test_set;"INIT:DONE?"
3100         ENTER Test_set;Meas_done$
3110 !
3120 ! Obtain measurement results: Each measurement illustrates a
3130 ! different way of reading in results. There is no one right way.
3140 ! The method used is application dependent. Note that the examples
3150 ! do not show all possible ways.
3160 !
3170         SELECT Meas_done$
3180 !
```

Step 5: INITiate and FETCh Measurements

```
3190     CASE "TXP"    ! TX Power measurement done.
3200         ALLOCATE Txpower(4)
3210         OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
3220         ENTER Test_set;Integrity,Txpower(*)
3230         IF (Integrity=0) THEN    ! Always check integrity value.
3240             PRINT "TX Power results: PDTCH=";Pdtch
3250             PRINT "                Burst1 TXL=";Ms_pwr_bs1
3260             PRINT "                Burst2 TXL=";Ms_pwr_bs2
3270             PRINT USING "5X,""Minimum:"" ,M2D.2D,"" dBm"" ;Txpower(1)
3280             PRINT USING "5X,""Maximum:"" ,M2D.2D,"" dBm"" ;Txpower(2)
3290             PRINT USING "5X,""Average:"" ,M2D.2D,"" dBm"" ;Txpower(3)
3300             PRINT USING "5X,""Std Dev:"" ,M2D.2D,"" dB"" ;Txpower(4)
3310             DEALLOCATE Txpower(*)
3320         ELSE
3330             GOSUB Bad_measurement
3340         END IF
3350     !
3360     CASE "PFER"    ! Phase & Frequency Error measurement done.
3370         OUTPUT Test_set;"FETC:PFER:ALL?"
3380         ENTER Test_set;Integrity,Rms_ph_er,Peak_ph_er,Worst_frq_er
3390         IF (Integrity=0) THEN
3400             PRINT "PFERror results: PDTCH=";Pdtch
3410             PRINT "                Burst1 TXL=";Ms_pwr_bs1
3420             PRINT "                Burst2 TXL=";Ms_pwr_bs2
3430             PRINT "RMS Phase Error: ";Rms_ph_er;" deg"
3440             PRINT "Peak Phase Error: ";Peak_ph_er;" deg"
3450             PRINT "Worst Freq Error: ";Worst_frq_er;" Hz"
3460         ELSE
3470             GOSUB Bad_measurement
3480         END IF
3490     !
3500     CASE "ORFS"    ! ORFS measurement done.
3510     !
3520     ! This code illustrates a more 'generic' approach to reading
3530     ! measurement results. By using the capabilities designed into
3540     ! high-level measurements, routines that access measurement
3550     ! results do not have to explicitly know what the measurement
3560     ! execution conditions were. That information can be determined
3570     ! at the time the measurement results are queried.
3580     !
3590         OUTPUT Test_set;"FETC:ORFS:INT?"    ! Check integrity.
3600         ENTER Test_set;Integrity
3610         IF (Integrity=0) THEN
3620             ! Get the number of offsets tested.
3630             OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?"
3640             ENTER Test_set;Points
3650             IF Points THEN    ! Only query if one or more offsets tested.
3660                 ALLOCATE Swit_res(Points),Swit_offs(Points)
3670                 ! Get measurement offsets.
3680                 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?"
3690                 ENTER Test_set;Swit_offs(*)
3700                 ! Get results
3710                 OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:SWIT?"
```

```

3720     ENTER Test_set;Tx_power,Swit_res(*)
3730     PRINT "ORFS Swit Results: PDTCH=";Pdtch
3740     PRINT "          Burst1 TXL=";Ms_pwr_bs1
3750     PRINT "          Burst2 TXL=";Ms_pwr_bs2
3760     PRINT USING "19X,""TX Power ="" ,M2D.2D,"" dBm""";Tx_power
3770     PRINT "          Offset (kHz)          Level (dBm)"
3780     PRINT "          -----          -----"
3790 Orfs_image:  IMAGE 6X,M4D.2D,12X,M4D.2D
3800     FOR J=1 TO Points
3810         PRINT USING Orfs_image;(Swit_offs(J)/1.E+3),Swit_res(J)
3820     NEXT J
3830     DEALLOCATE Swit_res(*),Swit_offs(*)
3840     END IF
3850     ! Get the number of offsets tested.
3860     OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?"
3870     ENTER Test_set;Points
3880     IF Points THEN ! Only query if one or more offsets tested.
3890         ALLOCATE Mod_res(Points),Mod_offs(Points)
3900         ! Get measurement offsets
3910         OUTPUT Test_set;"SET:ORFS:MOD:FREQ?"
3920         ENTER Test_set;Mod_offs(*)
3930         ! Get results
3940         OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:MOD?"
3950         ENTER Test_set;Tx_power,Pwr_30khz,Mod_res(*)
3960         PRINT "ORFS Mod Results: TCH=";Tch;"and TXL=";Ms_pwr_lvl
3970         PRINT "30 KHz BW Power =" ;Pwr_30khz;" dBm"
3980         PRINT "          Offset (kHz)          Level (dB)"
3990         PRINT "          -----          -----"
4000         FOR J=1 TO Points
4010             PRINT USING Orfs_image;(Mod_offs(J)/1.E+3),Mod_res(J)
4020         NEXT J
4030         DEALLOCATE Mod_res(*),Mod_offs(*)
4040     END IF
4050     ELSE
4060         GOSUB Bad_measurement
4070     END IF
4080     END SELECT
4090     EXIT IF Meas_done$="NONE"
4100     END LOOP ! If 'WAIT' is returned from 'INIT:DONE?' query, it
4110             ! just falls through the loop.
4120     SUBEXIT
4130 Bad_measurement: !
4140     PRINT "Measurement error: "&Meas_done$
4150     PRINT "Measurement Integrity value =" ;Integrity
4160     RETURN
4170     !
4180     SUBEND

```

Making the BLER Measurement

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

```
1590 REPEAT
1600   OUTPUT Test_set;"CALL:STAT:PDTCH:BLER?"
1610   ENTER Test_set;Bler,Blocks
1620 UNTIL (Blocks>=2000 AND Blocks<=2300)
1630 PRINT
1640 PRINT "Blocks tested at -101 dBm = ";Blocks
1650 PRINT "BLER Result at downlink PDTCH power of -101 dBm = ";Bler
```

Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

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

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

```
1720 ! Configure the RF Analyzer to burst 2
1730 OUTPUT Test_set;"CALL:PDTCH:MSL:CONF D2U2"
1740 OUTPUT Test_set;"RFAN:MSL:MEAS:BURS 2"
```

Reconfigure the Mobile Station Parameters

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

```
1880 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS 10"
```

Reconfigure the connection to a new PDTCH ARFCN

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

```
2100 OUTPUT Test_set;"CALL:SET:PDTCH:MS:TXL:BURS 5"
2110 OUTPUT Test_set;"CALL:SET:PDTCH 120"
2120 OUTPUT Test_set;"CALL:HAND"
2130 ! Use a call synchronization command to ensure the
2140 ! reconfiguration succeeded.
2150 OUTPUT Test_set;"CALL:STAT:DATA?"
2160 ENTER Conn_status$
2170 IF Conn_status$<>"TRAN" THEN
2180     PRINT "Data connection failed to reconfigure properly."
2190     PRINT "Program terminated."
2200     STOP
2210 END IF
```

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

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

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

```
2370 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:DCS:BURS 15"  
2380 OUTPUT Test_set;"CALL:PDTCH:DCS 665"  
2390 OUTPUT Test_set;"CALL:PDTCH:BAND DCS"  
2400 ! Use a call synchronization command to ensure the  
2410 ! reconfiguration succeeded.  
2420 OUTPUT Test_set;"CALL:STAT:DATA?"  
2430 ENTER Conn_status$  
2440 IF Conn_status$<>"TRAN" THEN  
2450     PRINT "Data connection failed to reconfigure properly."  
2460     PRINT "Program terminated."  
2470     STOP  
2480 END IF
```

Step 7: End the Connection

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

- “End the Data Connection”
- “GPRS Detach”

End the Data Connection

The `CALL:FUNC:DATA:STOP` command ends the data connection. As in “Step 4: Make a connection” on page 275, synchronization with the control program is important. The `CALL:FUNC:DATA:STOP` command is a sequential command, meaning its operation is completed before the test set accepts another command. Therefore, it is only necessary to use the `CALL:STAT:DATA?` query to ensure the data connection has ended and the connection is in the “ATTached” state.

```
2640 OUTPUT Test_set;"CALL:FUNC:DATA:STOP"
2650 OUTPUT Test_set;"CALL:STAT:DATA?"
2660 ENTER Test_set;Conn_status$
2670 IF Conn_status$<>"ATT" THEN
2680     PRINT "Unable to terminate data connection correctly."
2690     PRINT "PROGRAM TERMINATED."
2700     STOP
2710 END IF
```

GPRS Detach

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

The example below illustrates how you could maintain synchronization if you choose to perform the GPRS detach.

```
2760 DISP "Initiate a GPRS Detach"
2770 Start_time=TIMEDATE
2780 LOOP
2790     OUTPUT Test_set;"CALL:STAT:DATA?"
2800     ENTER Test_set;Conn_state$
2810     EXIT IF Conn_state$="IDLE"
2820     Current_time=TIMEDATE-Start_time
2830     IF Current_time>=Timer THEN
2840         DISP ""
2850         PRINT "GPRS detach did not occur. Program terminated"
2860         STOP
2870     END IF
2880     IF Conn_state$="DET" THEN
2890         DISP "GPRS detach is in process."
2900     END IF
2910 END LOOP
```

Step 1: Set Up the Test Set

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

Description

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

Contents

- “Initialize the Test Set”
- “Set Up General Operating Conditions”

Initialize the Test Set

- Fully Preset the Test Set

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

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

- Clear the Error Queue

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

Sending the *CLS command clears the error queue.

Set Up General Operating Conditions

- Turn Debugger On

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

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

- Set Operating Mode

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

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

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

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

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

Command to Set the Test Set's Operating Mode

Command	Example
CALL:OPER:MODE <operating mode>	CALL:OPER:MODE CELL

- Set Amplitude Offsets

To achieve accurate measurement results, it is important to account for losses in the cabling and fixturing between the mobile station and test set. You must determine what the losses are for your test setup and then specify the appropriate frequency-dependent amplitude offset values.

You can specify amplitude offsets for up to 20 frequencies using the following commands:

Commands to Set Amplitude Offsets

Command	Example
SYST:CORR:FREQ <freq1>, <freq2>, <freq3>	SYST:CORR:FREQ 800MHz, 1800MHz, 1900MHz
SYST:CORR[:SGain] <offset1>, <offset2>, <offset3>	SYST:CORR -0.7, -1.0, -1.2

- Set Display Mode

To achieve a slightly faster test execution speed, you can disable the front panel display on the test set using the DISP:MODE FAST command.

Step 2: Configure Test Set and Mobile Station Parameters

The following information provides additional details on Step 2 of the Programming Flowchart. This information is applicable to all test applications.

Description

In this step you configure the parameters that allow a connection to be made between the test set and mobile station. This mainly involves setting up channels and power levels.

Contents

- “Set Up Channels”
- “Set Cell Power”
- “Set Mobile Station Transmit Power”
- “Set Up Additional Connection Parameters”

Set Up Channels

Setting up channels involves specifying the channel associated with every band and channel type (for example, analog or digital), and then setting the active band and channel type.

- Specify Channel Numbers

All of the test set’s test applications can test in more than one frequency band (for example, US Cellular, US PCS, or Korean PCS). To produce the most efficient code, you should configure the channel information for each band in advance. Then, to move to a new band during testing, you only need to send the command to change bands. You do not need to also specify the channel of the new band. This reduces test time.

To set up the channel number for the various bands, use one of the following commands (depending upon which test application you are using):

Commands to Set the Channel for a Band

Command	Example
CALL:<channel mnemonic>:<band mnemonic> <num value>	CALL:TCH:EGSM 124
CALL:SET:<channel type mnemonic>:<band mnemonic> <num value>	CALL:SET:DTC:PCS 777
CALL:CHAN:<channel type mnemonic>:<band mnemonic> <num value>	CALL:CHAN:DIG2000:K PCS 384

This practice also applies to test applications which test both analog and digital channel types. In this case you should specify the channel for the analog and digital channel types in advance. Then, switching between them requires only one command to initiate the change, and not an additional change to specify the channel of the new channel type.

If you specify channels in advance as described, the only time you need to specify a channel during testing is if you move to a new channel within the same band and channel type.

- **Set Active Band and Mode**

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

Commands to Set the Active Band

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

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

Command to Set the Active Channel Type

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

- **Active Cell and Test Mode Considerations**

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

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

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

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

Set Cell Power

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

Command to Set Cell Power

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

Step 2: Configure Test Set and Mobile Station Parameters

- Active Cell and Test Mode Considerations

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

Set Mobile Station Transmit Power

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

Commands to Set Mobile Station Transmit Power

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

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

- Manually Setting Expected Power

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

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

Set Up Additional Connection Parameters

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

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

All of these parameters are configured using the CALL subsystem.

Step 3: Set Measurement Parameters

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

Description

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

Contents

- “Measurement Parameters Overview”
- “Generic Measurement Parameters”
- “Measurement-Specific Measurement Parameters”

Measurement Parameters Overview

There are two different types of measurement parameters:

- Generic Measurement Parameters
- Measurement-Specific Measurement Parameters

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

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

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

Generic Measurement Parameters

There are three types of generic measurement parameters:

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

Step 3: Set Measurement Parameters

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

Measurement Count Parameters

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

Statistical Measurement Results Parameters

Parameter	Command Syntax
Measurement Count State	SETup:<meas-mnemonic>:COUNT:STATE <ON 1 OFF 0>
Measurement Count Number	SETup:<meas-mnemonic>:COUNT:NUMBER <numeric value>
Measurement Count Number and State	SETup:<meas-mnemonic>:COUNT[:SNUMBER] <numeric value>

Example 22. Programming Example:

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

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

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

Measurement Timeout Parameters

Parameters	Command Syntax
Measurement Timeout Time and State	SETup:<meas-mnemonic>:TIMEout[:STIME] <numeric value> [<suffix>]
Measurement Timeout State	SETup:<meas-mnemonic>:TIMEout:STATE <ON 1 OFF 0>
Measurement Timeout Time	SETup:<meas-mnemonic>:TIMEout:TIME <numeric value> [<suffix>]

Example 23. Programming Example:

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

sets the measurement timeout state to ON and set the measurement timeout time to 10 seconds for the digital transmit power measurement.

Measurement Trigger Parameters There are three measurement trigger parameters. They control the arming of a measurement, the source of the trigger, and the trigger's delay.

- The trigger arm parameter determines whether the test set makes one measurement and then stops (single), or automatically re-arms upon completion of one measurement and repeats the process (continuous). The recommended setting when writing a control program is single (CONTInuous OFF).
- The trigger source parameter selects the source of the measurement trigger signal. The recommended Trigger Source setting when writing a control program is AUTO.

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

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

NOTE Trigger delay is not applicable to analog measurements.

Measurement Trigger Parameters

Parameter	Command Syntax
Trigger Arm	SETup:<meas-mnemonic>:CONTInuous <ON 1 OFF 0>
Trigger Source	SETup:<meas-mnemonic>:TRIGger:SOURce <AUTO IMMEDIATE PROTOCOL RISE>
Trigger Delay	SETup:<meas-mnemonic>:TRIGger:DELay <numeric value>[<suffix>]

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

```
SETup[:ALL]:CONTInuous:OFF
```

Example 24. Programming Example:

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

sets the trigger arm to single for all measurements.

Example 25. Programming Example:

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

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

Example 26. Programming Example:

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

sets the trigger delay to 10 microseconds for the digital transmit power measurement.

Step 3: Set Measurement Parameters

Measurement-Specific Measurement Parameters

Measurement-specific measurement parameters set up operating conditions for a specific measurement. For example:

- Setting the channel power measurement speed in IS-2000
- Setting ORFS frequency offsets in GPRS
- Setting number of bits for the FBER measurement in GSM

Refer to the GPIB syntax listing for the detailed list of measurement parameters for individual measurements.

Example 27. Programming Example:

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

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

Example 28. Programming Example:

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

sets the first ORFS offset to 400 kHz.

Example 29. Programming Example:

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

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

Example 30. Program Example Setting Both Generic and Measurement-Specific Measurement Parameters

```
! Set trigger arm to single for all measurements:
!
OUTPUT Test_set;"SET:CONT:OFF"
!
! *****
! Configure Modulation Accuracy Measurement:
!
OUTPUT Test_set;"SET:MACC:COUN 5"
! Example of using a complex command to set both the
! measurement count state and number at the same time.
!
OUTPUT Test_set;"SET:MACC:TRIG:SOUR AUTO"
! Sets trigger source to auto.
!
OUTPUT Test_set;"SET:MACC:TIM 15"
! Sets timeout state to ON and time to 15 sec.
!
OUTPUT Test_set;"SET:MACC:EVM10:STAT ON"
! Turns the EVM10 State ON
!
! *****
! Configure Digital TX Power Measurement:
```



```
!  
OUTPUT Test_set;"SET:DTXP:COUN 5"  
OUTPUT Test_set;"SET:DTXP:TRIG:SOUR AUTO"  
OUTPUT Test_set;"SET:DTXP:TIM 5"  
!  
! *****  
! Configure Frequency Stability Measurement:  
!  
OUTPUT Test_set;"SET:FST:COUN 3"  
OUTPUT Test_set;"SET:FST:TIM 10"  
!  
! *****  
! Configure Analog TX Power Measurement:  
!  
OUTPUT Test_set;"SET:ATXP:COUN 5"  
OUTPUT Test_set;"SET:ATXP:TRIG:SOUR AUTO"  
OUTPUT Test_set;"SET:ATXP:TIM 15"
```

Step 4: Make Connection

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

Description

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

Contents

- “Establish a Call in Active Cell Mode”
- “Make a Test Mode Connection”

Establish a Call in Active Cell Mode

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

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

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

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

Call Connection Synchronization Commands

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

- Call-Connected-State Query

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

Responses Returned by the CALL:CONN? Query

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

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

- Call-State-Change Detector Arm Command

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

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

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

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

- Call-State-Change Detector Timeout Command

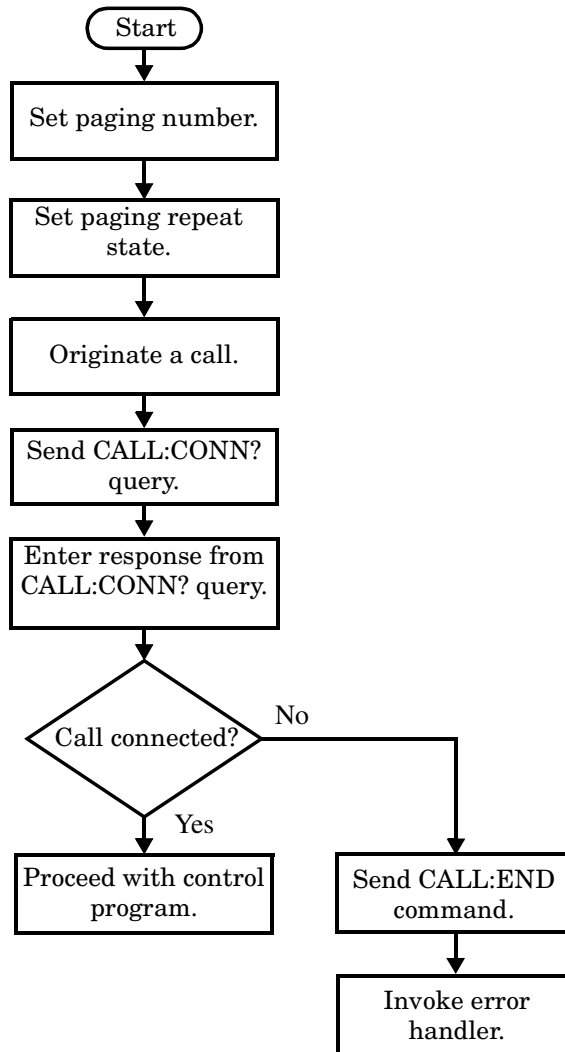
If the call-state-change detector is armed and a call connection is attempted but the call state never changes from the idle state, the CALL:CONN? query hangs the bus. This easily happens if the mobile is badly broken, the mobile is not connected to the test set, or no one pushes the send button on the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

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

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

Process for Making a Base Station Originated Call

Figure 8. Process for Making a Base Station Originated Call



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

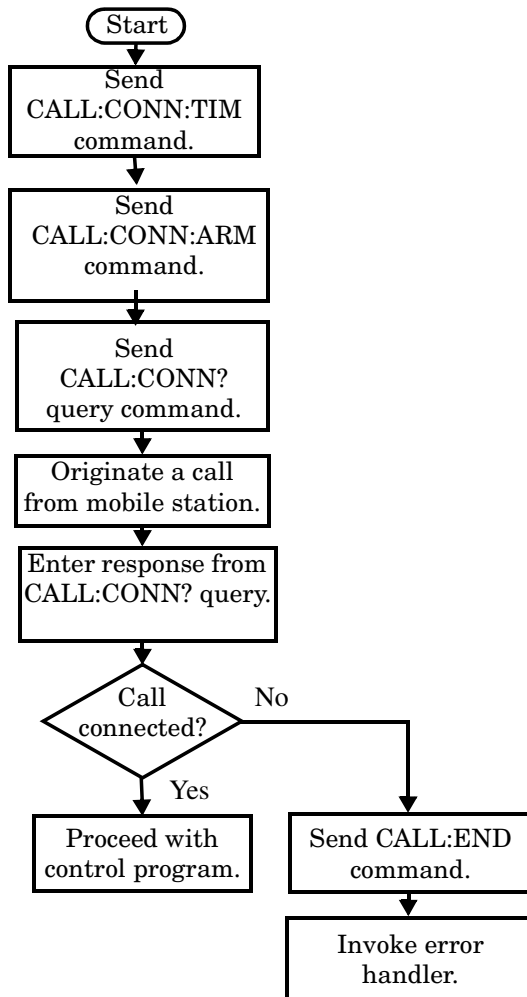
Example 31. Programming Example

```

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

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected so proceed with control program

```

Process for Making a Mobile Station Originated Call Figure 9. Process for Making a Mobile Station Originated Call

Step 4: Make Connection

NOTE The test set cannot originate a call from the mobile station. You must physically dial a number on the mobile station and press send, or send commands to a test bus built into the mobile station. For mobile station originated calls where the call is originated by physically dialing a number (as opposed to using a test bus) ensure that the call-state-change detector timeout time is long enough to allow the number to be dialed.

Example 32. Programming Example

```
OUTPUT Test_set;"CALL:CONN:TIM 10"           ! Set timeout time to 10 seconds
OUTPUT Test_set;"CALL:CONN:ARM"             ! Arm the change detector
DISP "Initiate a call from the mobile"
OUTPUT Test_set;"CALL:CONN?"                ! Initiate a call connected state query
ENTER Test_set;Call_connected                ! Program hangs here until
                                           ! origination passes or fails

IF NOT Call_connected THEN
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected. Proceed with the control program.
```

Make a Test Mode Connection

To make a connection between the test set and mobile station in test mode, you must send the appropriate test mode commands to the mobile station to command it to synchronize to the test set's signal and begin transmitting.

You may also want to make a quick power measurement to ensure that the connection has been made.

Step 5: INITiate and FETCh Measurements

The following information provides additional details on Step 5 of the Programming Flowchart. This information is applicable to all test applications.

Description

This step involves making measurements on the mobile station.

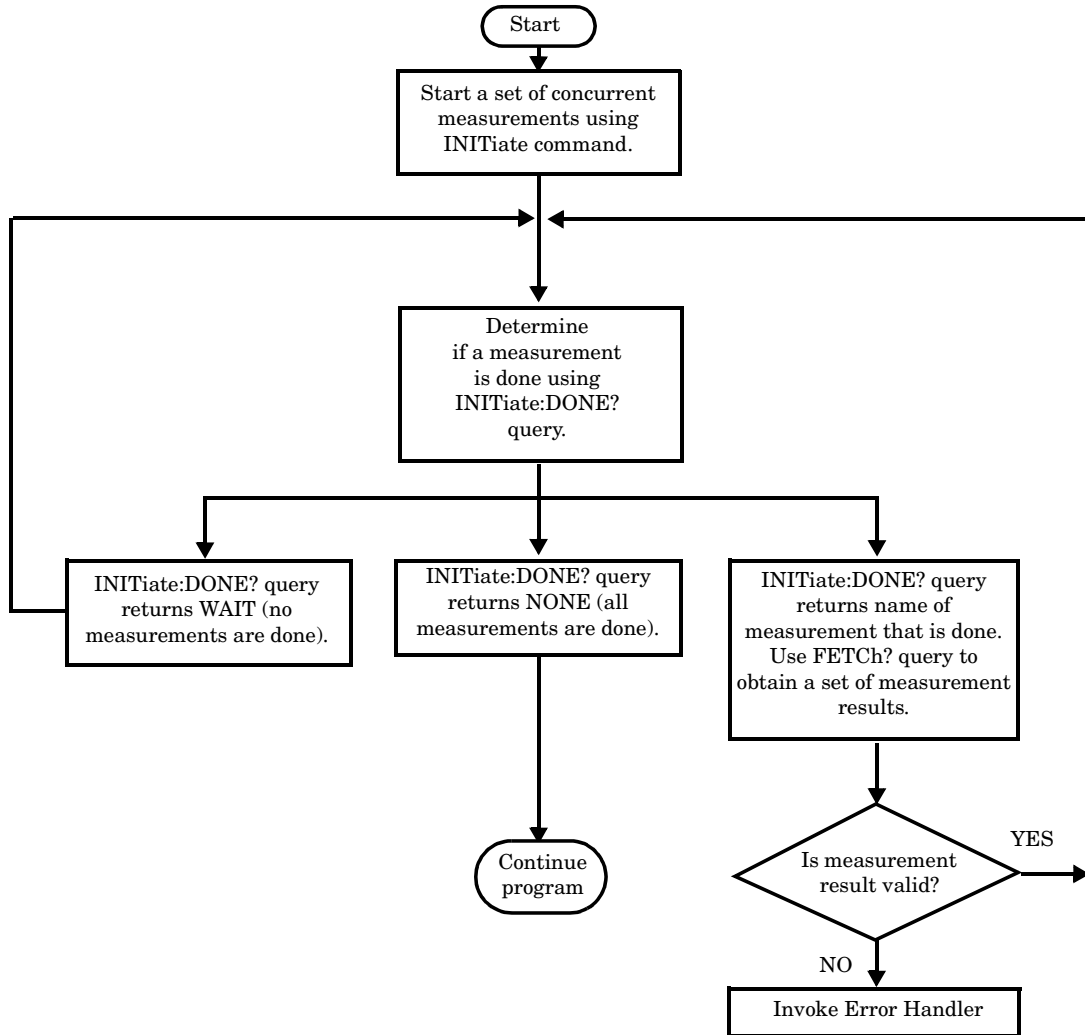
The test set has multiple signal paths and processors, which means you can make measurements concurrently and reduce test time. Making concurrent measurements involves starting a group of measurements, fetching the results of the measurements as they complete, and then verifying that the results are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

Contents

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

Concurrent Measurement Process

Figure 10. Process for Making Concurrent Measurements



Start a Set of Concurrent Measurements The INITiate command is used to start measurements. Each individual measurement can be started using the INITiate command. For starting measurements, the syntax of the INITiate command is as follows:

```
INITiate:<measurement mnemonic>[:ON]
```

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

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

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

Determine if a Measurement Is Done Use the INITiate:DONE? query command to determine which measurement has completed.

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

Table 7. Responses Returned from INITiate:DONE? Query

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

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

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

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

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

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

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

Step 5: INITiate and FETCh Measurements

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

Example FETCh? Result Formats

Command	Results Returned
FETC:TXP?	Measurement integrity and average value
FETC:TXP:POW:ALL?	Minimum, maximum, average and standard deviation values
FETC:TXP:POW:AVER?	Average value only
FETC:TXP:POW:MIN?	Minimum value only
FETC:TXP:POW:MAX?	Maximum value only
FETC:TXP:POW:SDEV?	Standard deviation value only
FETC:TXP:INT?	Measurement integrity value only

Example 33. Concurrent Measurement Process Programming Example

```
! Start a Set of Concurrent Measurements:
!
OUTPUT Test_set;"INIT:TXP;PFER"
!
! Determine if a Measurement Is Done:
!
LOOP
  OUTPUT Test_set;"INIT:DONE?"
  ENTER Test_set;Meas_done$
!
! Obtain a Set of Measurement Results:
!
SELECT Meas_done$
  CASE "TXP"
    OUTPUT Test_set;"FETC:TXP:POW?"
    ENTER Test_set;Avg_tx_power
  CASE "PFER"
    OUTPUT Test_set;"FETC:PFER:RMS?"
    ENTER Test_set;Max_rms_phas_er
  END SELECT
EXIT IF Meas_done$="NONE"
END LOOP
```

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

The measurement integrity indicator is a measurement result and therefore is queried using the FETCh subsystem. A value of 0 indicates that the measurement is valid. A value other than 0 indicates that an error occurred during the measurement process.

Example Integrity Indicators

Value Returned	Description (message also appears on test set)
0	Normal
1	No Result Available
2	Measurement Timeout
5	Over Range
6	Under Range

Example 34. Programming Example

```
OUTPUT Test_set;"FETC:DTXP?"
ENTER Test_set;Integrity,Avg_dig_pow
IF Integrity=0 THEN
    PRINT "AVG DIG POW= ";Avg_dig_pow
ELSE
    PRINT "DTXP Measurement Error"
    PRINT "DTXP Measurement Integrity is ";Integrity
END IF
```

Alternative Measurement Process

You may choose to test in a sequential way rather than use the concurrent measurement process.

For instance, instead of using the INIT:DONE? query to determine when a measurement is complete, you may choose to initiate a set of measurements and then simply fetch them sequentially.

Example 35. Programming Example

```
OUTPUT Test_set; "INIT:DTXP;MACC"
OUTPUT Test_set; "FETC:DTXP:POW?"
ENTER Test_set;Avg_dig_pow
OUTPUT Test_set; "FETC:MACC:EVM[1]?"
ENTER Test_set;Max_EVM1
```

In this example, the test set starts both measurements at the same time. However, if the MACC measurement finishes first, the results are not fetched until the DTXP measurement finishes. Therefore, this process requires that you understand the order in which measurements will complete in order to optimize your testing speed.

Step 6: Reconfigure Test Set and Mobile Station Connection Parameters

The following information provides additional details on Step 6 of the Programming Flowchart. This information is applicable to all test applications.

Description

After performing a set of measurements on the mobile station using the configuration established in step 2, you may want to change this configuration and test the mobile station again. This step involves changing testing conditions such as channel, mobile station transmit power level, or cell power.

Contents

- “Change Channels”
- “Change Other Connection Parameters”

Change Channels

In a manufacturing environment it is common to test a mobile station on more than one channel. Some or all of the tests may be performed on multiple channels, to verify the mobile station’s performance in a range of operating frequencies.

Perform a Handoff (Handover) in Active Cell Mode

If you are operating in active cell mode, to change channels you perform a handoff (handover) to the new channel. The control program sends the commands to initiate the handoff (handover), and then determines whether the transition was successfully completed. This is accomplished using the CALL:STATus? query.

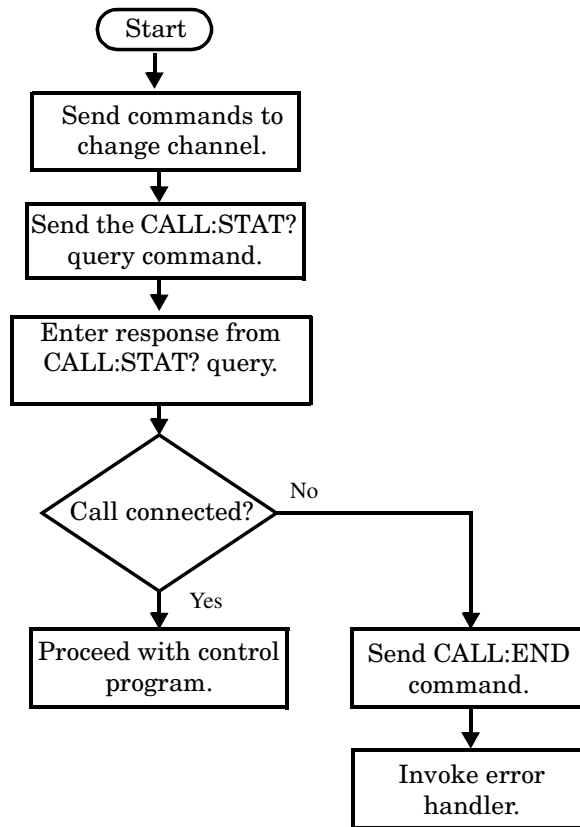
The CALL:STATus? query immediately returns the state of the call at the time the query is received.

Example Responses Returned from the CALL:STAT? Query

Response	Meaning
IDLE	The call is in the Idle state
ALER	The call is in the Alerting transitory state.
HAND	The call is in the Handoff transitory state.
PAG	The call is in the Paging transitory state.
CONN	The call is in the Connected state.

After issuing the commands to perform a handoff (handover), you should send the CALL:STAT? query to verify that the call is still connected before resuming testing.

Figure 11. Process for Performing a Handoff (Handover)



Test Mode Considerations In test mode, you can either change the test set's frequencies by using the handoff (handover) commands, or directly control the RF generator and RF analyzer.

In either case, you must also send the appropriate test mode commands to the mobile station to move it to the new channel.

Change Other Connection Parameters

You may also choose to change the mobile station transmit power level or cell power, or other connection parameters such as timeslot or timing advance.

Step 7: End Connection

The following information provides additional details on Step 7 of the Programming Flowchart. This information is applicable to all test applications.

Description

In this step you release the call (in active cell mode) or end the mobile station transmission (in test mode).

Contents

- “Release the Call in Active Cell Mode”
- “End the Mobile Station Test Mode Transmission”
- “Partially Preset the Test Set”

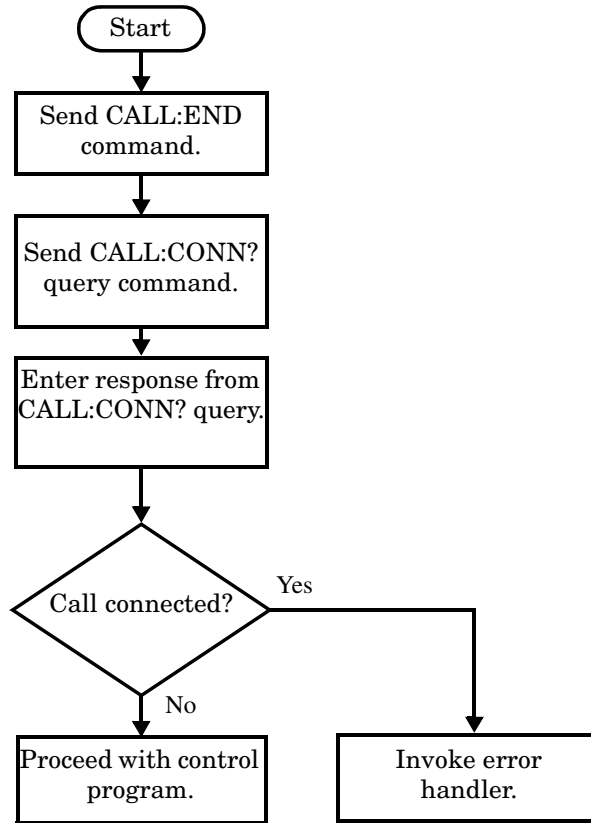
Release the Call in Active Cell Mode

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

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

Releasing an Active Call from the Base Station

Figure 12. Process for Releasing an Active Call from the Base Station



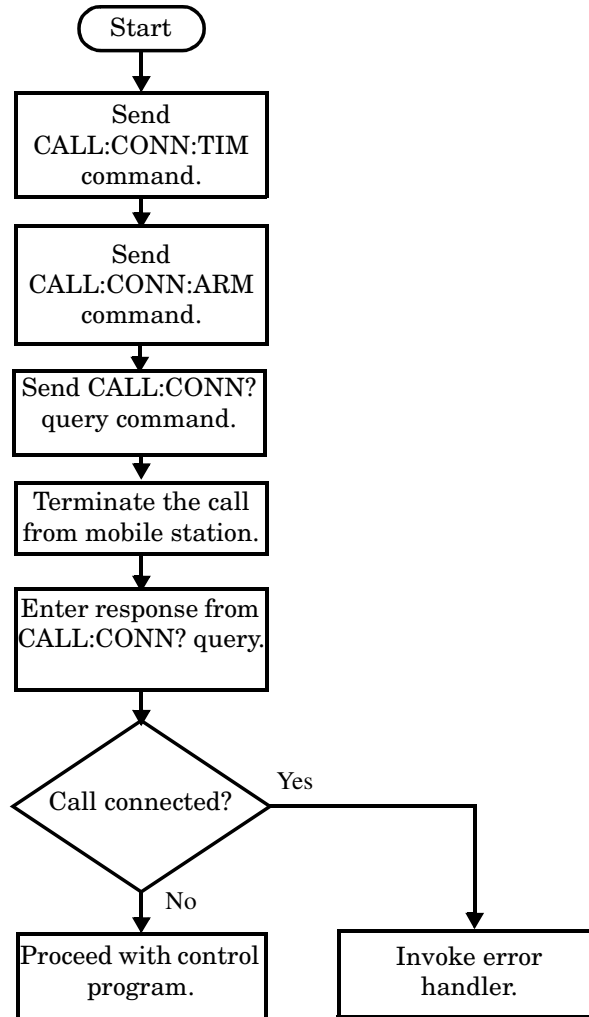
Example 36. Programming Example

```

OUTPUT Test_set;"CALL:END"          ! Initiate a base station release.
OUTPUT Test_set;"CALL:CONN?"       ! Send call connected state query.
ENTER Test_set;Call_connected      ! Program hangs here until state
                                   ! change or timer expires.
IF Call_connected THEN             ! Check if disconnection successful
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
  
```

Releasing an Active Call from the Mobile Station

Figure 13. Process for Terminating an Active Call from the Mobile Station



NOTE The test set cannot initiate a call disconnection from the mobile station. You must manually push the end button on the mobile station or send commands to a test bus built into the mobile station. For a mobile station release where the call is terminated by physically pushing a button on the phone (as opposed to using a test bus) ensure that the call-state-change-detector timeout time is long enough to allow the end button to be pushed.

Example 37. Programming Example

```

OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Test_set;"CALL:CONN:ARM"   !Arm the change detector.
DISP "Terminate the call from the mobile station."
OUTPUT Test_set;"CALL:CONN?" !Initiate call connected state query.
ENTER Test_set;Call_connected    !Program hangs here until state
                                  !change or timer expires.
IF Call_connected THEN           !Check if disconnection successful.
! <put error handler here>
END IF
! Call is disconnected so proceed with control program

```

End the Mobile Station Test Mode Transmission

In test mode, you must send the necessary test mode commands to end the mobile station transmission.

Partially Preset the Test Set

At this point, it is good practice to partially preset the test set by sending the SYST:PRES3 command. This command stops all measurement and call processing processes, but does not reset all values to default.

Step 7: End Connection

7 GPIB Command Syntax

Diagram Conventions

Description

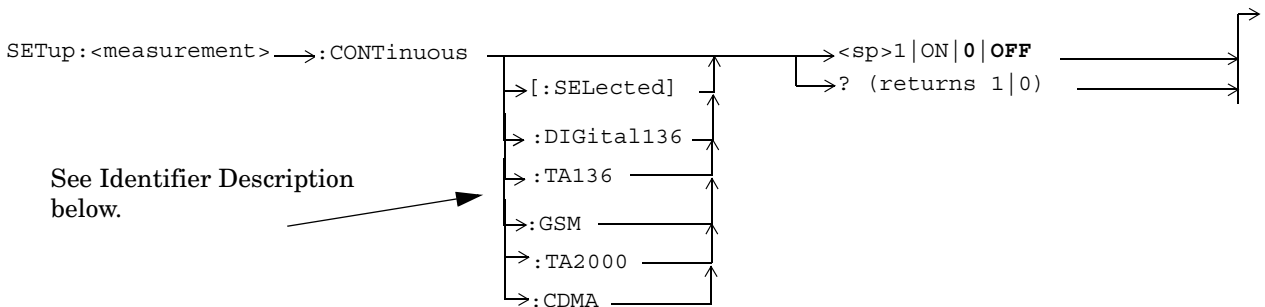
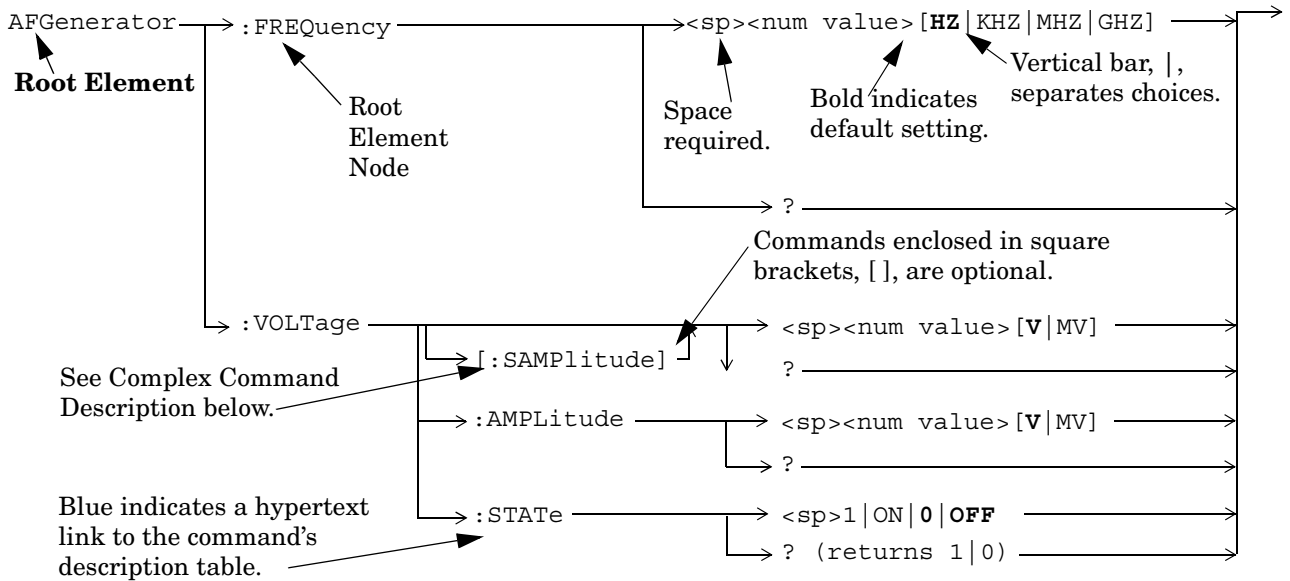


Diagram Description

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.

Diagram Conventions

Complex Command Description

A complex command sets the state of the parameter to ON, and is used to set a value for that parameter. These parameters; amplitude, frequency, gain, number, time, and value can be used as a complex command. Refer to the specific command for the parameter that applies.

Identifier Description

Some test applications are able to test more than one radio format. There may be commands/queries that are shared by more than one radio format in the some of these test applications. Identifiers are used to specify the radio format for the command/query. The command/query is sent to the active radio format if you don't use an identifier. An identifier must be used when sending commands to the inactive radio format.

Developing Code

It is recommended that you set the Test Set's operating environment to debug. To set the Test Set debug mode to "ON" use the following syntax:

```
SYSTem:COMMunicate:GPIB:DEBug ON
```

Units-of-Measure

Amplitude (linear)	V
Frequency	Hz
Power (logarithmic)	dBm
Time	s

ABORt Subsystem

Description

The ABORt command causes a measurement cycle in progress to stop. If the measurement is not being continuously armed (trigger arm set to single) , the measurement will remain in the idle state after this event. If the measurement is being continuously armed (trigger arm set to continuous), a new measurement cycle will begin after ABORt. If an ABORt command is issued from any measurement state other than measuring, the command is ignored.

Other Commands that Execute an ABORt Action

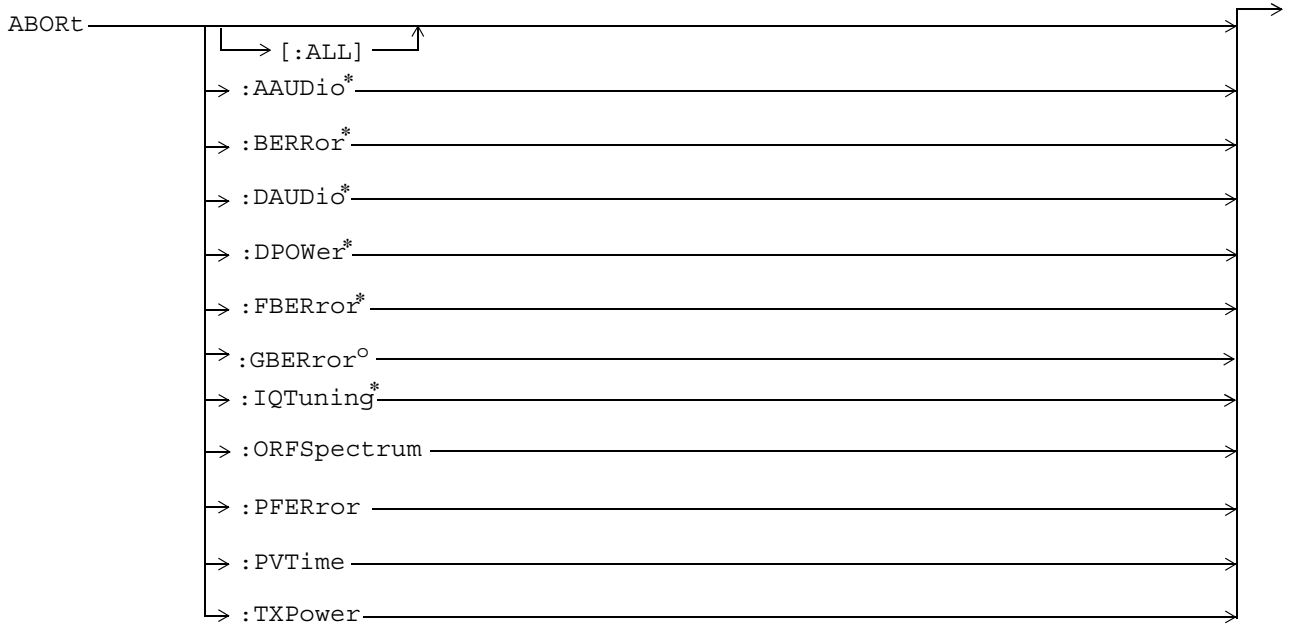
INITiate:<meas> will execute an ABORt:<meas> as part of the INITiate:<meas> command.

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

Syntax Diagram and Command Descriptions

“ABORt”

ABORT



* Not applicable to GPRS.

° Not applicable to GSM.

“Diagram Conventions” on page 313

ABORT[:ALL]

Function	GSM	Stops any and all measurements that are active. See “Measurement States” on page 216
	GPRS	If the trigger arm is set to single, see “Trigger Arm (Single or Continuous) Description” on page 216 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"> • AAUDio • BERRor • DAUDio • DPOWer • FBERRor • IQTuning • ORFSpectrum • PFERRor • PVTime • TXPower
	GPRS	Range <ul style="list-style-type: none"> • GBERRor • ORFSpectrum • PFERRor • PVTime • TXPower
<p>Programming Example</p> <pre>OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.</pre>		

ABORt

ABORt:<meas-mnemonic>

Function	GSM	Stops the selected measurement if it is active. See “Measurement States” on page 216
	GPRS	If the trigger arm is set to single, see “Trigger Arm (Single or Continuous) Description” on page 216 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">• AAUDio• BERRor• DAUDio• DPOWer• FBERRor• ORFSpectrum• IQTuning• PFERRor• PVTime• TXPower
	GPRS	Range <ul style="list-style-type: none">• GBERRor• ORFSpectrum• PFERRor• PVTime• TXPower
Programming Example		
OUTPUT 714; "ABORT:PVTIME" !Aborts a PvT measurement.		

AFGenerator Subsystem

This subsystem is *not* applicable to GPRS.

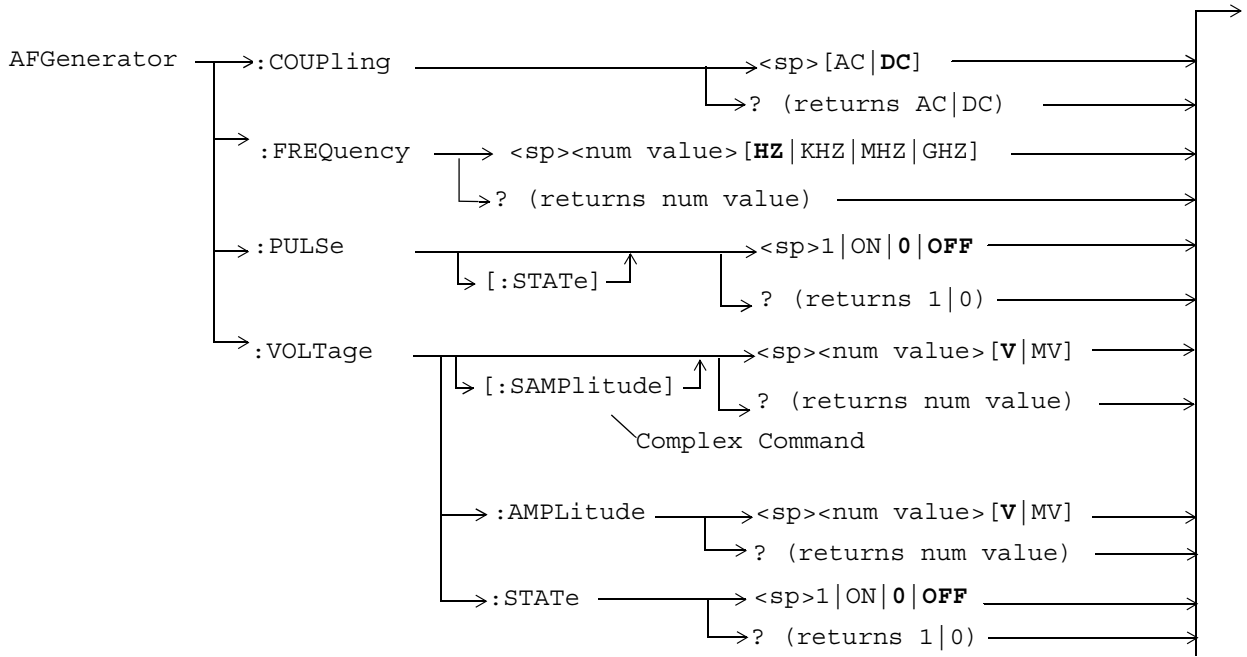
Description

The AFGenerator subsystem is used to control the audio source that is available at the Audio Output connector.

Syntax Diagram and Command Descriptions

“AFGenerator”

AFGenerator



“Diagram Conventions” on page 313

AFGenerator:COUPling

Function	GSM	Sets the output of the audio generator to be ac or dc coupled to the front-panel AUDIO OUT port.
	GPRS	This command is not applicable to GPRS.
Setting		Range: AC or DC
Query		Range: AC or DC
*RST setting		DC
Programming Example		
OUTPUT 714;"AFGENERATOR:COUPling AC" !Sets the audio generator coupling to AC.		

AFGenerator:FREQuency

Function	GSM	Sets/queries the frequency of the audio generator. The units (HZ KHZ MHZ GHZ) are optional, if no units are specified then units default to Hz.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 Hz to 20 kHz 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 "AFGenerator" on page 320.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST setting		0 off
Programming Example		
OUTPUT 714;"AFGENERATOR:PULSE ON" !Sets the audio generator pulse to ON.		

AFGenerator

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">.5 mV pk. <= 1 V pk. output5 mV pk. > 1 V pk. output
Query		Range: 0 - 9 v peak Resolution: <ul style="list-style-type: none">.5 mV pk. <= 1 V pk. output5 mV pk. > 1 V pk. output
*RST setting		zero volts
Programming Example		
OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output !voltage to 2.1 volts.		

AFGenerator:VOLTage:AMPlitude

Function	GSM	Sets/queries the amplitude for the audio generator when the audio generator state is on. The units (V MV) are optional, if no units are specified then units default to V.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 - 9 V pk. Resolution: <ul style="list-style-type: none">.5 mV pk. <= 1 V pk. output5 mV pk. > 1 V pk. output
Query		Range: 0 - 9 V pk. Resolution: <ul style="list-style-type: none">.5 mV pk. <= 1 V pk. output5 mV pk. > 1 V pk. output
*RST setting		zero volts
Programming Example		
OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output !voltage to 1.414 volts peak.		

AFGenerator:VOLTage:STATE

Function	GSM	Sets/queries the audio generator state
	GPRS	This command is not applicable to GPRS.
Setting	0 OFF 1 ON	
Query	0 1	
*RST setting	0 off	
Programming Example		
OUTPUT 714;"AFGENERATOR:VOLTAGE:STATE ON" !Set the audio generator state to ON.		

CALibration Subsystem

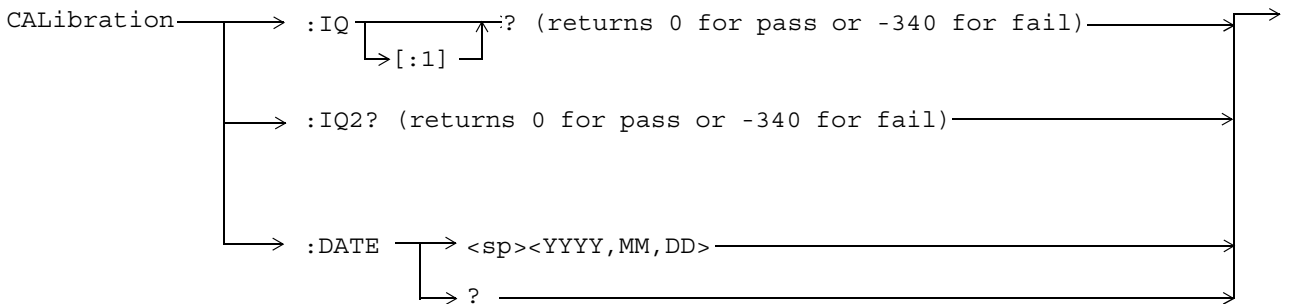
Description

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

Syntax Diagram and Command Descriptions

“CALibration”

CALibration



“Diagram Conventions” on page 313

CALibration:IQ[:1]?

Function	GSM	Sets/queries the calibration of the IQ modulator for RF generator 1. It takes some time to complete calibration and can't be aborted except by cycling the power switch.
	GPRS	<ul style="list-style-type: none"> Calibrates the IQ modulator for RF generator 1. Returns a value indicating success or failure of calibration.
Query	Range	<ul style="list-style-type: none"> 0 = Pass -340 = Fail
Programming Example OUTPUT 714;"CALIBRATION:IQ1?" !Performs a calibration of the IQ modulator !for RF generator 1 and returns 0 or -340		

NOTE When the calibration is done the test set display will display:
IQ Calibration completed successfully for modulator 1.

CALibration

CALibration:IQ2?

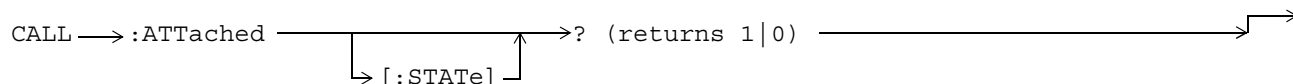
Function	GSM	Sets/queries the calibration of the IQ modulator for RF generator 2. It takes some time to complete calibration and can't be aborted except by cycling the power switch.
	GPRS	<ul style="list-style-type: none">• Calibrates the IQ modulator for RF generator 2.• Returns a value indicating success or failure of calibration.
Query		Range <ul style="list-style-type: none">• 0 = Pass• -340 = Fail
Programming Example		
<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 calibration is done the test set display will display:
IQ Calibration completed successfully for modulator 2.

CALibration:DATE

Function	GSM	Sets/queries the date of the last system calibration done to the test set, not the IQ calibration date. Returns a comma separated list YYYY,MM,DD in that order.
	GPRS	
Setting		Sets the system calibration date. Range <ul style="list-style-type: none">• Year = 0000 to 9999• Month = 01 to 12• Day = 01 to 31
Query		Returns the date when system calibration was performed. Range <ul style="list-style-type: none">• Year = 0000 to 9999• Month = 1 to 12• Day = 1 to 31
Programming Example		
<pre>OUTPUT 714;"CALIBRATION:DATE 1999,01,04" !Sets the date of the last system !calibration year, month and day.</pre>		

CALL:ATTached



This diagram is not applicable to GSM.

“Diagram Conventions” on page 313

CALL:ATTached[:STATE]?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries whether or not the data connection is in the attached state. 1 is returned if the data connection is in the attached state. 0 is returned if the data connection is in any other non-transitory state. For more details on the Attached State query or the data connection states, see “Data Connection Processing State Synchronization” on page 60.
Query	Range: 0 1	
*RST Setting	0 OFF	
Programming Example		
OUTPUT 714; "CALL:ATTached:STATE?"		

CALL Subsystem

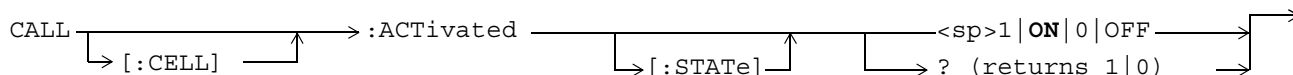
Description

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 329	“CALL:MNCcode” on page 365
“CALL:ATTached” on page 327	“CALL:MS” on page 366
“CALL:BA” on page 330	“CALL:NCCode” on page 382
“CALL:BAND” on page 339	“CALL:OPERating” on page 383
“CALL:BCCode” on page 340	“CALL:ORIGinate” on page 385
“CALL:BCHannel” on page 341	“CALL:PAGing” on page 386
“CALL:BURSt” on page 344	“CALL:PDTCH PDTChannel” on page 389
“CALL:CONNected” on page 345	“CALL:PMNCcode” on page 400
“CALL:COUNt” on page 348	“CALL:POWer” on page 402
“CALL:DCONnected” on page 352	“CALL:RFGenerator” on page 407
“CALL:END” on page 354	“CALL:SETup” on page 415
“CALL:FUNcTION” on page 357	“CALL:SIGNaling” on page 428
“CALL:HANdOver HANdOff” on page 360	“CALL:STATus” on page 429
“CALL:IMEI” on page 362	“CALL:TCHannel” on page 434
“CALL:LACode” on page 363	“CALL:TRANsferring” on page 441
“CALL:MCCode” on page 364	

CALL:ACTivated

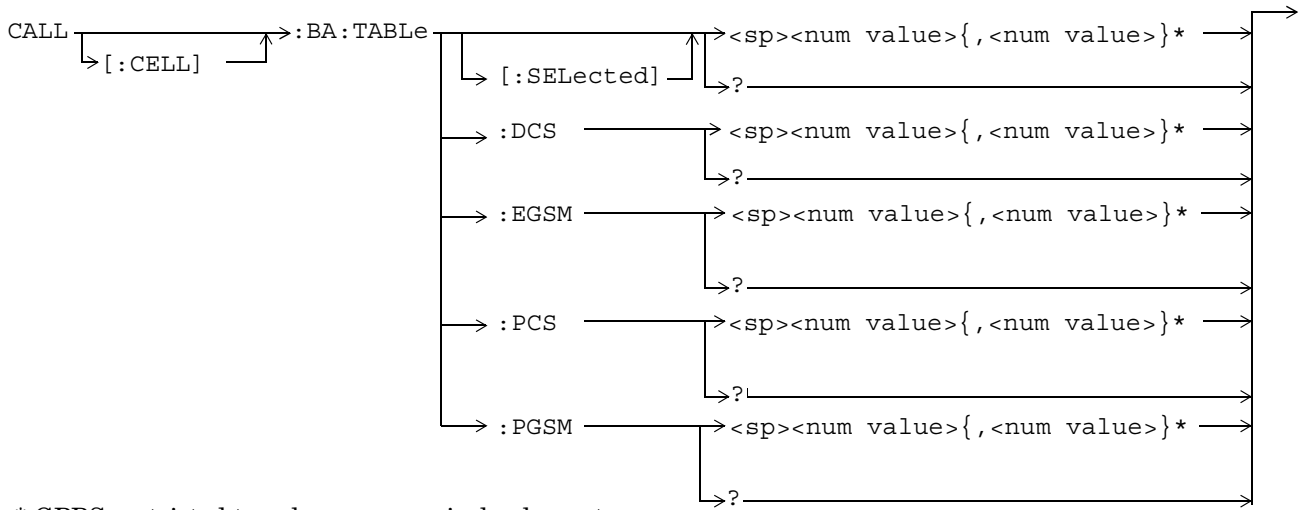


This command is not applicable to GPRS.

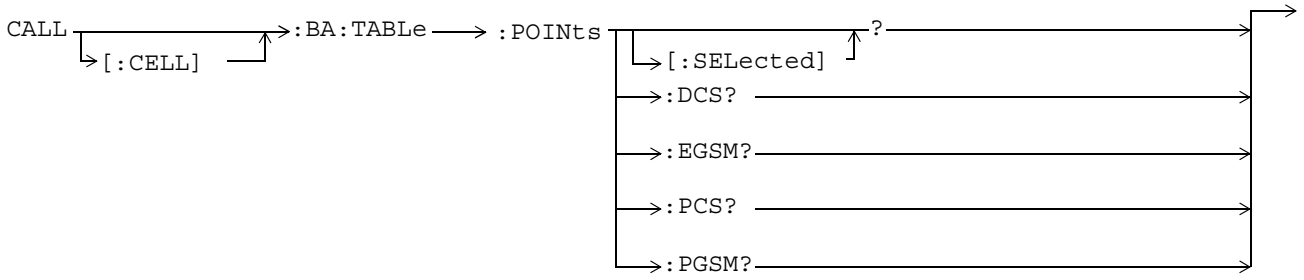
“Diagram Conventions” on page 313

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 “CALL:BURSt:TYPE” on page 344.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST Setting	1 (state = ON)	
Related Topics	“Configuring the Broadcast Channel (BCH)” on page 746	
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:ACTIVATED:STATE OFF" !Turns all signalling operations, !uplink demodulation and downlink !(BCH & TCH) generation off.</pre>		

CALL:BA

* GPRS restricted to only one numerical value entry.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:BA

CALL[:CELL]:BA:TABLE[:SElected]

Function	GSM	This command 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 sets/queries the BA table entry for the selected broadcast band. Only one entry is permitted within the band.
Setting	<p>Depends upon the selected broadcast band: Range:</p> <ul style="list-style-type: none"> • PGSM, EGSM, DCS broadcast band range: 0 to 124 512 to 885 975 to 1023 • PCS broadcast band range: 512 to 810 <p>Resolution: 1</p> <p>default setting:</p> <p>GSM</p> <ul style="list-style-type: none"> • PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 • EGSM BA Table: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110 • DCS BA Table: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862 • PCS BA Table: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790 <p>states:</p> <ul style="list-style-type: none"> • first entry = ON, all others = OFF <p>GPRS</p> <ul style="list-style-type: none"> • PGSM BA Table: 20 • EGSM BA Table: 20 • DCS BA Table: 512 • PCS BA Table: 512 	
Query	<p>Range:</p> <ul style="list-style-type: none"> • PGSM, EGSM, DCS broadcast band range: 0 to 124 512 to 885 975 to 1023 • PCS broadcast band range: 512 to 810 • 9.91E+37 (NAN) - for GSM only 	
*RST Setting	<p>GSM</p> <p>PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117</p> <p>states:</p> <p>First entry = ON, all others = OFF</p> <p>GPRS</p> <p>PGSM BA Table: 20</p>	

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512,689,885" !Sets 3 table entries for the
!selected broadcast band.
!States of the remaining 13
!entries are set to OFF.
```

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512" !Sets the table entry for the selected
!broadcast band.
```

CALL[:CELL]:BA:TABLE:DCS

Function	GSM	This command 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 sets/queries the BA table entry for the DCS broadcast band. Only one entry is permitted within the band.
Setting	Range: 0 to 124 512 to 885 975 to 1023 Resolution: 1	
Query	Range: <ul style="list-style-type: none"> 0 to 124 512 to 885 975 to 1023 9.91E+37 (NAN) - for GSM only 	
*RST Setting	GSM entries: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862 states: 512 = ON, all others = OFF GPRS entry: 512	

Programming Example

GSM

```
OUTPUT 714;"CALL:CELL:BA:TABLE:DCS 512,612,787" !Sets three BA table entries for
!the DCS broadcast band. States
!of the remaining 13 entries are
!set to OFF.
```

```
OUTPUT 714;"CALL:CELL:BA:TABLE:DCS" !Sets states of all table entries to OFF.
```

GPRS

```
OUTPUT 714;"CALL:CELL:BA:TABLE:DCS 637" !Sets the table entry for the DCS
!broadcast band.
```

CALL:BA

CALL[:CELL]:BA:TABLE:EGSM

Function	GSM	This command 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 sets/queries the BA table entry for the EGSM broadcast band. Only one entry is permitted within the band.
Setting		Range: 0 to 124 512 to 885 975 to 1023 Resolution: 1
Query		Range: <ul style="list-style-type: none">• 0 to 124 512 to 885 975 to 1023• 9.91E+37 (NAN) - for GSM only
*RST Setting		GSM entries: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110 states: 20 = ON, all others = OFF GPRS entry: 20
Programming Example GSM OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120,975,1012" !Sets three BA table entries for !the EGSM broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM" !Sets states of all table entries to OFF. GPRS OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120" !Sets the table entry for the EGSM !broadcast band.		

CALL[:CELL]:BA:TABLE:PCS

Function	GSM	This command 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 sets/queries the BA table entry for the PCS broadcast band. Only one entry is permitted within the band.
Setting	Range: 512 to 810 Resolution: 1	
Query	Range: <ul style="list-style-type: none"> • 512 to 810 • 9.91E+37 (NAN) - for GSM only 	
*RST Setting	<p>GSM entries: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790 states: 512 = ON, all others = OFF</p> <p>GPRS entry: 512</p>	
Programming Example GSM OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660,710,790" !Sets three BA table entries for !the PCS broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:PCS" !Sets states of all table entries to OFF. GPRS OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660" !Sets the table entry for the PCS !broadcast band.		

CALL:BA

CALL[:CELL]:BA:TABLE:PGSM

Function	GSM	This command 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 sets/queries the BA table entry for the PGSM broadcast band. Only one entry is permitted within the band.
Setting		Range: 0 to 124 512 to 885 975 to 1023 Resolution: 1
Query		Range: <ul style="list-style-type: none">• 0 to 124 512 to 885 975 to 1023• 9.91E+37 (NAN) - for GSM only
*RST Setting		GSM entries: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 states: 20 = ON, all others = OFF GPRS entry: 20
Programming Example GSM OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 20,36,120" !Sets three BA Table entries for !the PGSM broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM" !Sets states of all BA Table entries to OFF. GPRS OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 62" !Sets the table entry for the PGSM !Broadcast channel.		

CALL[:CELL]:BA:TABLE: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
Programming Example		
<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
Programming Example		
<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:BA

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
Programming Example		
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:EGSM?" !Queries the number of entries that !are in the ON state in the EGSM !broadcast band BA Table.		

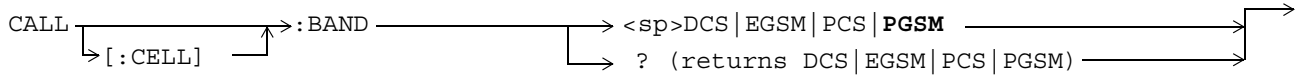
CALL[:CELL]:BA:TABLE:POINTS:PCS?

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
Programming Example		
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PCS?" !Queries the number of entries that !are in the ON state in the PCS !broadcast band BA Table.		

CALL[:CELL]:BA:TABLE:POINTS: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 "Configuring the Broadcast Channel (BCH)" on page 746
Programming Example		
OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PGSM?" !Queries the number of entries that !are in the ON state in the PGSM !broadcast band BA Table.		

CALL:BAND

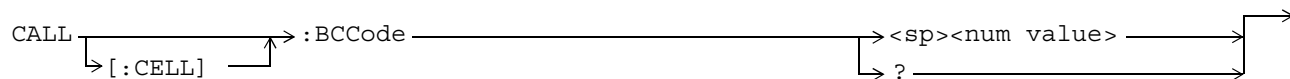


“Diagram Conventions” on page 313

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 “RFANalyzer:CONTROL:AUTO” on page 548).
	GPRS	This command sets/queries the band in which the broadcast channel (BCH) is transmitted.
Setting	Range: PGSM EGSM DCS PCS	
Query	Range: PGSM EGSM DCS PCS	
*RST Setting	PGSM	
Related Topics	GSM	See “Cell Band Parameter” on page 726.
	GPRS	See “Cell Band Parameter” on page 727
Programming Example		
OUTPUT 714;“CALL:CELL:BAND PGSM” !Sets the band for the BCH to PGSM.		

CALL:BCCode



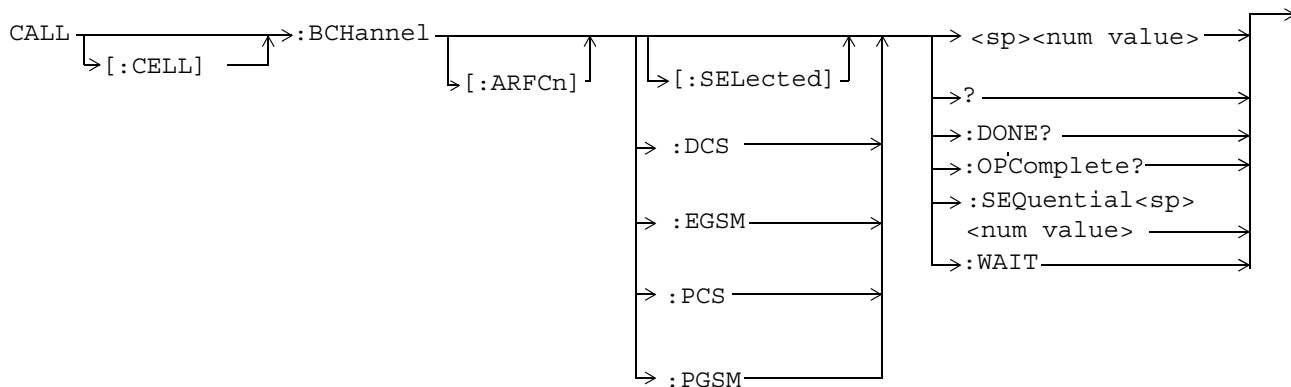
This command is not applicable to GPRS.

“Diagram Conventions” on page 313

CALL[:CELL]:BCCode

Function	GSM	Sets/queries the value of the Base Station Colour Code (BCC). This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 329).
	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 “Configuring the Broadcast Channel (BCH)” on page 746.
Programming Example		
OUTPUT 714;“CALL:CELL:BCCODE 4” !Sets the cell’s base station color code to 4.		

CALL:BCHannel



“Diagram Conventions” on page 313

CALL[:CELL]:BCHannel[:ARFCn][:SElected]

Function	GSM	This command sets/queries the broadcast channel ARFCN for the currently active (that is, the selected) broadcast band.
	GPRS	
Setting	Depends upon the selected broadcast band. Range: <ul style="list-style-type: none"> PGSM broadcast band range: 1 to 124 EGSM broadcast band range: 0 to 124 975 to 1023 DCS broadcast band range: 512 to 885 PCS broadcast band range: 512 to 810 Resolution: 1	
Query	Depends upon the selected broadcast band. Range: <ul style="list-style-type: none"> PGSM broadcast band range: 1 to 124 EGSM broadcast band range: 0 to 124 975 to 1023 DCS broadcast band range: 512 to 885 PCS broadcast band range: 512 to 810 Resolution: 1	
*RST Setting	20	
Related Topics	“Configuring the Broadcast Channel (BCH)” on page 746.	
Programming Example OUTPUT 714; "CALL:CELL:BCHANNEL:ARFCN:SELECTED 512" !Sets BCH ARFCN for the selected !broadcast band to channel 512.		

CALL:BCHannel

CALL[:CELL]:BCHannel[:ARFCn]:DCS

Function	GSM	This command sets/queries the broadcast channel ARFCN for the DCS broadcast band.
	GPRS	
Setting		Range: 512 to 885 Resolution: 1
Query		Range: 512 to 885 Resolution: 1
*RST Setting		512
Related Topics		“Configuring the Broadcast Channel (BCH)” on page 746.
Programming Example		
OUTPUT 714; "CALL:CELL:BCHANNEL:ARFCN:DCS 810" !Sets BCH ARFCN for DCS broadcast !band to 810.		

CALL[:CELL]:BCHannel[:ARFCn]:EGSM

Function	GSM	This command sets/queries the broadcast channel ARFCN for the EGSM broadcast band.
	GPRS	
Setting		Range: 0 to 124 975 to 1023 Resolution: 1
Query		Range: 0 to 124 975 to 1023 Resolution: 1
*RST Setting		20
Related Topics		“Configuring the Broadcast Channel (BCH)” on page 746.
Programming Example		
OUTPUT 714; "CALL:CELL:BCHANNEL:ARFCN:EGSM 120" !Sets BCH ARFCN for EGSM broadcast !band to 120.		

CALL[:CELL]:BCHannel[:ARFCn]:PCS

Function	GSM	This command sets/queries the broadcast channel ARFCN for the PCS broadcast band.
	GPRS	
Setting		Range: 512 to 810 Resolution: 1
Query		Range: 512 to 810 Resolution: 1
*RST Setting		512
Related Topics		“Configuring the Broadcast Channel (BCH)” on page 746.
Programming Example <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	This command sets/queries the broadcast channel ARFCN for the PGSM broadcast band.
	GPRS	
Setting		Range: 1 to 124 Resolution: 1
Query		Range: 1 to 124 Resolution: 1
*RST Setting		20
Related Topics		“Configuring the Broadcast Channel (BCH)” on page 746.
Programming Example <pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:PGSM 113" !Sets BCH ARFCN for PGSM broadcast !band to 113.</pre>		

CALL:BURSt

CALL → :BURSt :TYPE → <sp>RACH* | TSC0 | TSC1 | TSC2 | TSC3 | TSC4 | **TSC5** | TSC6 | TSC7 →

?

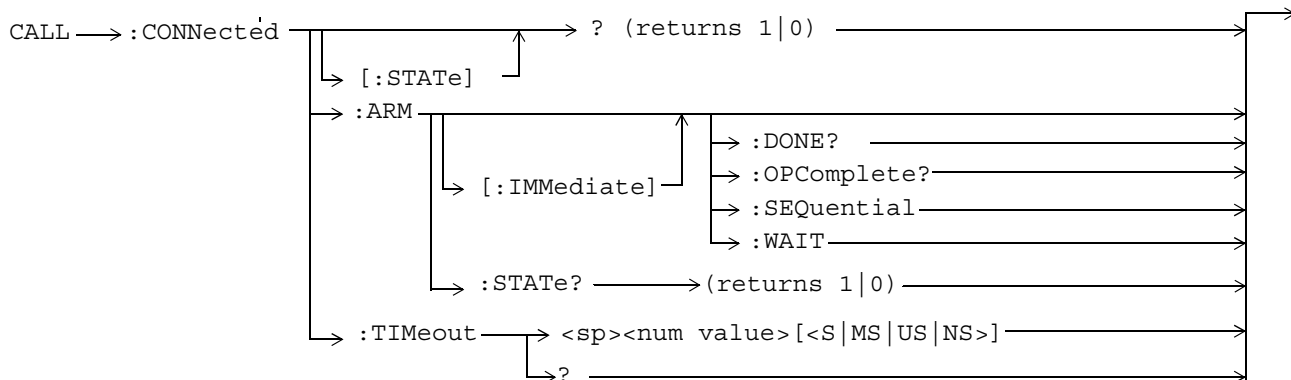
* Not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:BURSt:TYPE

Function	GSM	Sets/queries the Expected Burst parameter. This parameter is used for measurement synchronization when the test set's operating mode is set to Test Mode, see “CALL:OPERating:MODE” on page 384 (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see “Expected Burst” on page 739.
	GPRS	Sets/queries the Expected Burst parameter. This parameter is used for measurement synchronization when the test set's operating mode is set to Test Mode, see “CALL:OPERating:MODE” on page 384 (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see “Expected Burst” on page 739.
Setting	GSM	Range: RACH TSC0 TSC1 TSC2 TSC3 TSC4 TSC5 TSC6 TSC7
	GPRS	Range: TSC0 TSC1 TSC2 TSC3 TSC4 TSC5 TSC6 TSC7
Query	GSM	Range: RACH TSC0 TSC1 TSC2 TSC3 TSC4 TSC5 TSC6 TSC7
	GPRS	Range: TSC0 TSC1 TSC2 TSC3 TSC4 TSC5 TSC6 TSC7
*RST Setting	TSC5	
Related Topics	“Test Mode Operating Modes” on page 738.	
Programming Example		
<pre>OUTPUT 714;"CALL:BURSt:TYPE TSC2" ! Sets the test set to expect Training Sequence Code 2 in !the midamble burst.</pre>		

CALL:CONNEcted



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:CONNEcted[:STATe]?

Function	GSM	Queries the connected/disconnected state of the call. 1 is returned if the call is in the connected state. 0 is returned if the call is in the idle (that is, disconnected) state. If the call is in any state other than connected or idle, the query will hang until the call state transitions to the connected or idle state. When used in conjunction with the CALL:CONNEcted:ARM and CALL:CONNEcted:TIMEout commands, the CALL:CONNEcted:STATe? command allows the control program to synchronize to call connection/disconnection. See “Call Processing State Synchronization” on page 45.
	GPRS	This command is not applicable to GPRS.
Query	Range: 0 1	
*RST Setting	0	
Programming Example		
<pre> OUTPUT 714;"CALL:CONNECTED:STATE?" !Returns 1 if call connected, !0 if call disconnected. </pre>		

CALL:CONNeCTed

CALL:CONNeCTed:ARM[:IMMeDiate]

Function	GSM	<p>Sets (arms) the call-state-change detector. Arming the call-state-change detector allows the control program to tell the test set that it is expecting a change to the state of a call prior to initiating the state change.</p> <p>Once armed, The detector remains armed until there is a call state change to Idle or Connected from one of the transitory states. The call-state-change-detector is not disarmed by a call state change to one of the transitory states, nor is it disarmed by any transitions from Idle to Idle, or Connected to Connected.</p> <p>When used in conjunction with the CALL:CONNeCTed:STATe? and the CALL:CONNeCTed:TIMEout commands, the CALL:CONNeCTed:ARM command allows the control program to synchronize to call connection/disconnection. See “Call Processing State Synchronization” on page 45.</p>
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714;"CALL:CONNECTED:ARM:IMMEDIATE" !Arms the call-state-change detector.		

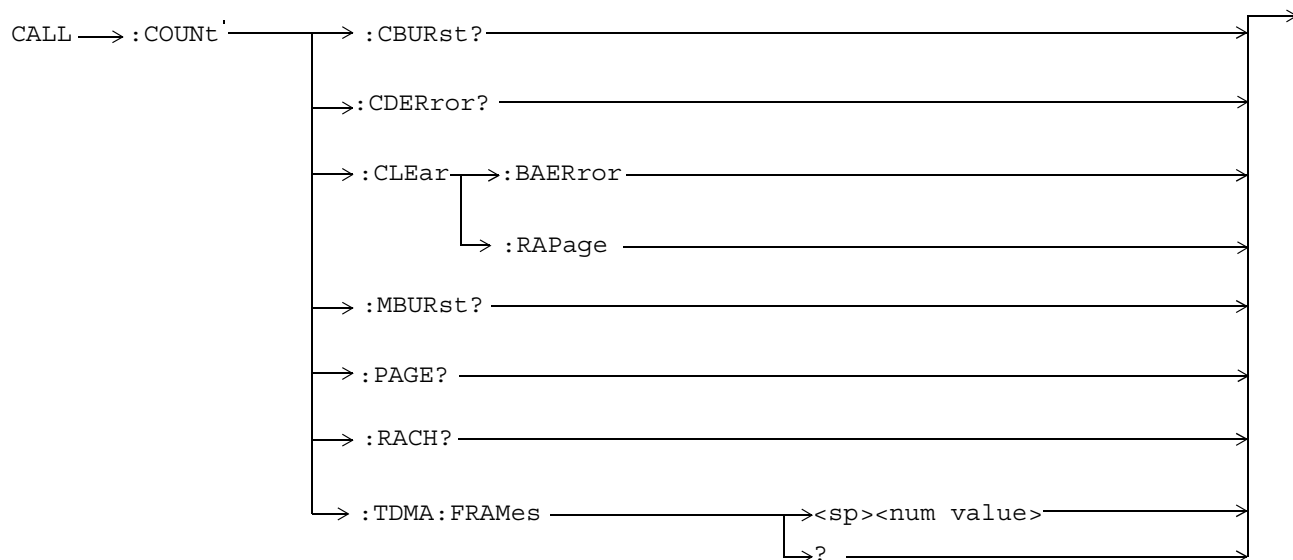
CALL:CONNeCTed:ARM:STATe?

Function	GSM	<p>Queries the arm state of the call-state-change detector. This command never hangs and immediately returns a 1 if the call-state-change detector is armed and a 0 if it is not armed. See “Call Processing State Synchronization” on page 45.</p>
	GPRS	This command is not applicable to GPRS.
Query	Range: 0 1	
*RST Setting	0	
Programming Example		
OUTPUT 714;"CALL:CONNECTED:ARM:STATE?" !Returns arm state of !call-state-change detector.		

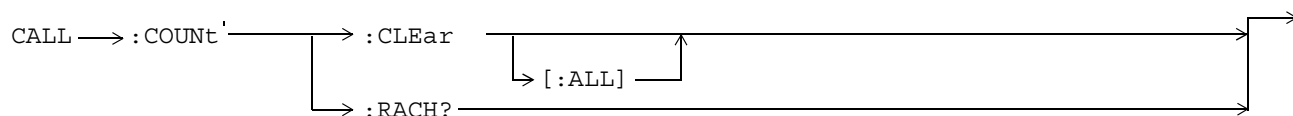
CALL:CONNECTed:TIMEout

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 “Call Processing State Synchronization” on page 45.</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	“Call Processing State Synchronization” on page 45	
	“Call Processing Event Synchronization” on page 40	
Programming Example <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.



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

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: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
Programming Example		
OUTPUT 714;"CALL:COUNT:CDERROR?" !Queries the channel decode error counter.		

CALL:COUNT:CLEAr[:ALL]

Function	GSM	This command is not applicable to GSM.
	GPRS	This command resets the RACH count result counter to zero.
Programming Example		
OUTPUT 714;"CALL:COUNT:CLEAr" !Clears the RACH count result counter.		

CALL:COUNT:CLEAr:BAERror

Function	GSM	This command sets the corrupt burst, missing burst, and decode error counters' count to zero.
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714;"CALL:COUNT:CLEAr:BAERror" !Clears the corrupt burst, missing burst, and !decode error counters		

CALL:COUNT

CALL:COUNT:CLEAr:RAPage

Function	GSM	This command sets the RACH and page counters' count to zero.
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714;"CALL:COUNT:CLEAr:RAPage" !Clears the RACH and page counters.		

CALL:COUNT:MBURst?

Function	GSM	This command queries the missing burst counter. The missing burst counter keeps track of how many uplink bursts, that should have been there, were missing. The missing burst counter does not count idle frames as missing.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 99999 Resolution: 1
*RST Setting		0
Programming Example		
OUTPUT 714;"CALL:COUNT:MBURst?" !Returns the number of missing uplink bursts.		

CALL:COUNT:PAGE?

Function	GSM	This command queries the page counter. The page counter keeps track of the number of pages sent by the base station (BS) emulator during a BS originated call setup.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 9999 Resolution: 1
*RST Setting		0
Programming Example		
OUTPUT 714;"CALL:COUNT:PAGE?" !Returns the number of pages sent by the base station !emulator.		

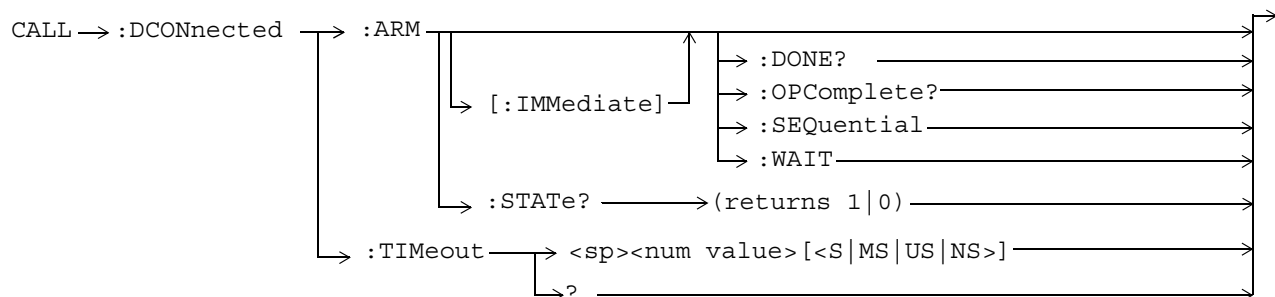
CALL:COUNT:RACH?

Function	GSM	This command 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 queries the RACH counter. The RACH counter keeps track of the number of RACH bursts received by the base station emulator during data connection setup attempts.
Query		Range: 0 to 9999 Resolution: 1
*RST Setting		0
Programming Example		
<pre>OUTPUT 714;"CALL:COUNT:RACH?" !Returns the number of RACH bursts received by the base !station emulator during call setup/data connection attempts.</pre>		

CALL:COUNT:TDMA:FRAMES

Function	GSM	This command sets/queries the Max Frames Allowed for Assignment field. The Max Frames Allowed for Assignment field specifies the maximum number of TDMA frames the mobile station is allowed to take, from the start of the assignment or handover command, for a channel assignment. This is only applicable to changes in TCH band, TCH ARFCN or TCH timeslot. Changes to any other TCH parameter will not cause an error to be generated if the number of frames taken to perform the change exceeds the setting of the Max Frames Allowed for Assignment field.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 15 to 999 Resolution: 1
Query		Range: 15 to 999 Resolution: 1
*RST Setting		28
Programming Example		
<pre>OUTPUT 714;"CALL:COUNT:TDMA:FRAMES 15" !Sets the number of TDMA frames allowed !before transmitting the new TCH.</pre>		

CALL:DCONnected



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

CALL:DCONnected:ARM[:IMMediate]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Sets (arms) the data connection state change detector. Arming the data connection state change detector allows the control program to tell the test set that it is expecting a change to the state of a data connection prior to initiating the state change.</p> <p>Once armed, the detector remains armed until there is a data connection state change to Idle, Attached or Transferring, from one of the transitory states. The data connection state change detector is not disarmed by a connection state change to one of the transitory states, nor is it disarmed by any transitions from Idle to Idle, Attached to Attached or Transferring to Transferring.</p> <p>When this command is used in conjunction with CALL:ATTached:STATE?, CALL:TRANsferring:STATE?, and CALL:DCONnected:TIMEout, it allows the control program to synchronize to data connection/disconnection. See “Data Connection Processing State Synchronization” on page 60.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Data Connection Processing Event Synchronization” on page 57.</p>
Programming Example		
OUTPUT 714; "CALL:DCONnected:ARM:IMMediate" !Arms the data connection state change detector.		

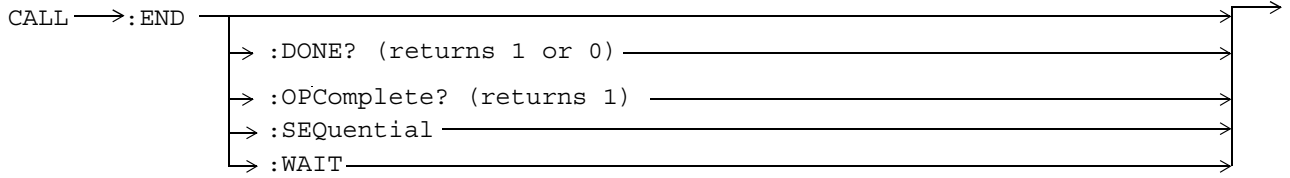
CALL:DCONnected:ARM:STATe?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries whether the data connection state change detector is armed or not. This command immediately returns a 1 if the data connection state change detector is armed and a 0 if it is not armed. See “Data Connection Processing State Synchronization” on page 60.
Query	Range: 0 1	
*RST Setting	0	
Programming Example <pre>OUTPUT 714;"CALL:DCONnected:ARM:STATe?" !Returns arm state of !data connection state change detector</pre>		

CALL:DCONnected:TIMEout

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the maximum time the test set will wait for a hanging CALL:ATTached[:STATe]? and CALL:TRANsferring[:STATe]? query to complete. The default setting units are seconds. A timeout timer is started whenever the data connection state change detector becomes armed. You can set the duration of the timeout using this command. The timeout should be greater than the maximum amount of time the control program needs to wait between arming the data connection state change detector and the connect/disconnect operation starting. Once the process starts and the data connection state has moved into one of the transitory states the pre-defined GPRS timers prevent the data connection state from staying in a transitory state forever. See “Data Connection Processing State Synchronization” on page 60.
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	“Data Connection Processing State Synchronization” on page 60	
	“Data Connection Processing Event Synchronization” on page 57	
Programming Example <pre>OUTPUT 714;"CALL:DCONnected:TIMEout 3" !Sets the CALL:DCONnected: STSTe? query timeout time to 3 !seconds.</pre>		

CALL:END



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

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

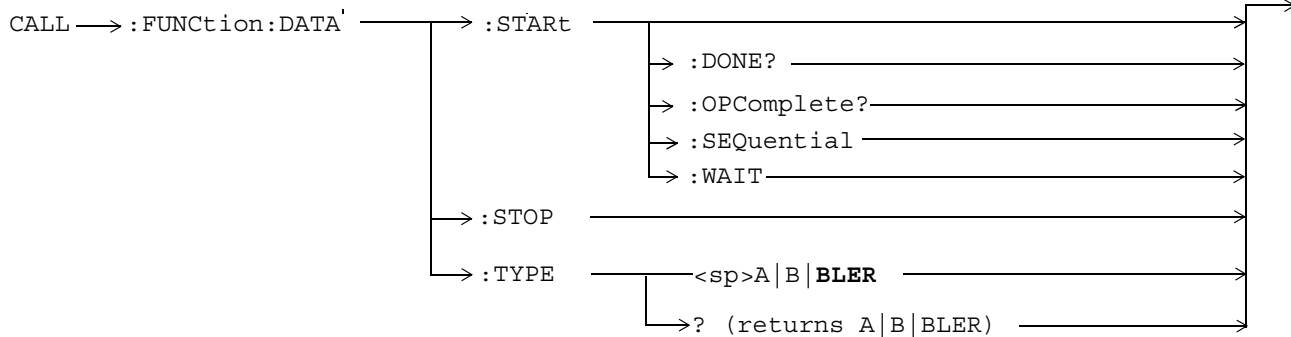
CALL:END:SEquential

Function	GSM	Terminate the active call but force the overlapped CALL:END command to execute as a sequential command. This command does terminate the active call. The :SEquential modifier forces an overlapped command to execute as a sequential command.
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714;"CALL:END:SEQUENTIAL" !Terminate the active call with !sequential operation.		

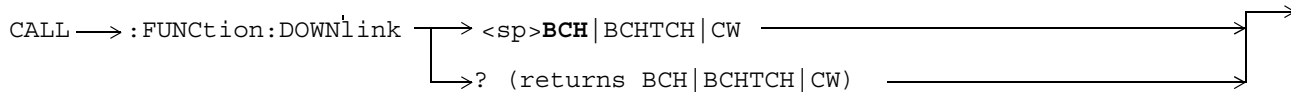
CALL:END:WAIT

Function	GSM	Terminate the active call but force the test set to process no more GPIB commands until the previously issued overlapped CALL:END command is finished. This command does not terminate the active call. This command is used to halt processing of GPIB commands from the test set's GPIB input buffer until the previously issued overlapped command is finished.
	GPRS	This command is not applicable to GPRS.
Related Topics	"Call Processing Event Synchronization" on page 40 "Call Processing State Synchronization" on page 45	
Programming Example		
OUTPUT 714;"CALL:END" ! Terminate the active call. OUTPUT 714;"CALL:COUNT:CLEAR:BAERROR" !Clear the burst and decode !error counters. OUTPUT 714;"CALL:COUNT:CLEAR:RAPAGE" !Clear the RACH and Page counters. OUTPUT 714;"CALL:END:WAIT" !Wait here until CALL:END is finished. OUTPUT 714;"CALL:ORIGINATE" !Originate a new call.		

CALL:FUNCTION



These commands are not applicable to GSM.



This command is not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:FUNCTION

CALL:FUNCTION:DATA:START

Function	GSM	This command is not applicable to GSM.
	GPRS	This command attempts to start the data connection. See “Data Connection Processing Event Synchronization” on page 57. Additional commands can be appended to aid in controller/mobile station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 58 for examples.
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.
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 “CALL:FUNCTION:DATA:START” on page 358 to start a data connection. If you set this parameter to ETSI Type A, no packet data traffic channel (PDTCH) bursts will be transmitted on the downlink. Setting this parameter to ETSI Type B ensures that one or more downlink (PDTCH) bursts are present, which can be used to loopback data through the uplink. The number of downlink bursts is determined by the setting of the command “CALL:PDTCH PDTChannel:MSLot:CONFIguration” on page 397. ETSI Type B is required if you want to perform BER measurements in active cell mode. Setting this parameter to BLER ensures that an Agilent proprietary data connection type is used which allows the test set to obtain BLock Error Rate (BLER) measurement reports from the mobile station (see “Block Error Rate (BLER) Report Measurement Description” on page 88). In addition, the BLER data connection type allows you to perform other GPRS measurements at the same time (except BER and ORFS due to Modulation). It is recommended that you should always end the data connection (using “CALL:FUNCTION:DATA:STOP” on page 358) before changing the data connection type. If you change this parameter while the data connection status is transferring, the data connection will be dropped (changing the data connection status to attached), and an error message will be generated.
Setting	Range: A B BLER	
Query	Range: A B BLER	
*RST Setting	BLER	

Programming Example

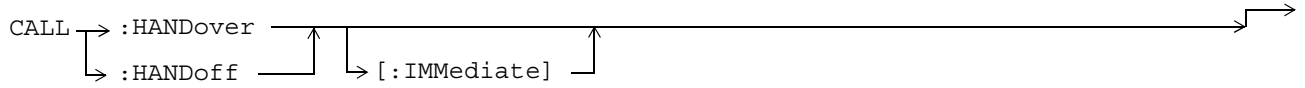
```
OUTPUT 714;"CALL:FUNCTION:DATA:TYPE B" !Sets the data connection type to ETSI Type B.
```

CALL:FUNCTION:DOWNlink

Function	GSM	This command sets/queries the downlink signal configuration when Operating Mode = Test mode.
	GPRS	This command is not applicable to GPRS.
Setting	Range: BCH BCHTCH CW	
Query	Range: BCH BCHTCH CW	
*RST Setting	BCH	
Related Topics	"Test Mode Operating Modes" on page 738	

Programming Example

```
OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCHTCH" !Sets Test Mode downlink
!configuration to generate a
!broadcast channel (BCH) and a
!traffic channel (TCH).
```

CALL:HANDOver | HANDoff

This command is not applicable to GSM.

“Diagram Conventions” on page 313

CALL:HANdOver | HANdOff[:IMMediate]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command applies the deferred PDTCH parameters to the active PDTCH. These parameters are:</p> <ul style="list-style-type: none"> • Deferred PDTCH Band • Deferred PDTCH ARFCN [band] • Deferred mobile station TX Level [burst][band] • Deferred Multislot Configuration • Deferred Coding Scheme • Deferred P0 <p>For more information on the use of deferred parameters see “Using Deferred Parameters” on page 755.</p> <p>The action taken when this command is set depends on the setting of the cell operating mode and the data connection status:</p> <ul style="list-style-type: none"> • When the cell operating mode is set to Active Cell (see “CALL:OPERating” on page 383) and the data connection status is Transferring, this command causes any necessary over-the-air signaling to modify the PDTCH resources (frequency, power level, timeslot assignment and coding scheme). The immediate settings are updated with the deferred settings just applied and the current downlink PDTCH levels are updated. • When the cell operating mode is set to Active Cell (see “CALL:OPERating” on page 383) and the data connection status is any state other than Transferring, this command does not cause any over -the-air signaling with the mobile station. The immediate settings are updated with the deferred settings just applied. • When the cell operating mode is not set to Active Cell, this command replaces any active PDTCHs with new PDTCHs using the new parameters. If there are no active PDTCHs, the new values will be remembered until there is an active PDTCH. In either case, the immediate settings are updated with the deferred settings just applied and the current downlink PDTCH levels are updated.
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:HANdOver:IMMediate"</pre>		

CALL:IMEI

CALL → :IMEI:AUTO → `<sp>1|ON|0|OFF` →
 → ? (returns 1|0) →

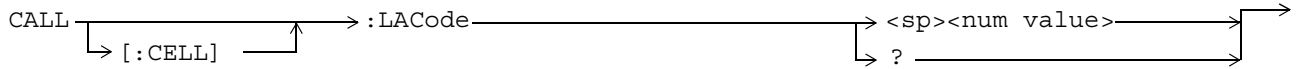
This command is not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:IMEI:AUTO

Function	GSM	Sets/queries whether or not the base station emulator should request the international mobile equipment identity (IMEI) on call setup.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST Setting	1	
Related Topics	“Configuring the Broadcast Channel (BCH)” on page 746	
Programming Example		
OUTPUT 714;“CALL:IMEI:AUTO OFF” !Sets automatically get IMEI state to OFF.		

CALL:LACode



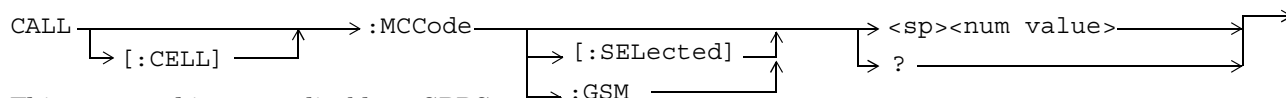
This command is not applicable to GPRS.

“Diagram Conventions” on page 313

CALL[:CELL]:LACode

Function	GSM	Sets/queries the value of the cell's Location Area Code (LAC). This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 329).
	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		“Configuring the Broadcast Channel (BCH)” on page 746
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.

“Diagram Conventions” on page 313

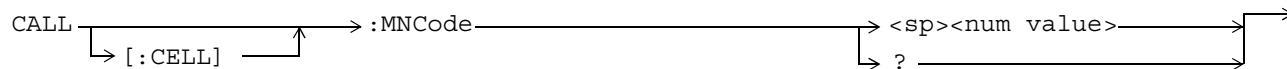
CALL[:CELL]:MCCode[:SElected]

Function	GSM	Sets/queries the value of the Mobile Country Code (MCC) for the active (that is the selected) radio format. This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 329).
	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		“Configuring the Broadcast Channel (BCH)” on page 746
Programming Example		
OUTPUT 714;“CALL:CELL:MCCODE 4” !Sets the cell’s mobile country code to 4.		

CALL[:CELL]:MCCode:GSM

Function	GSM	Sets/queries the value of the Mobile Country Code (MCC) for the GSM radio format. This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 329).
	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		“Configuring the Broadcast Channel (BCH)” on page 746
Programming Example		
OUTPUT 714;“CALL:CELL:MCCODE 4” !Sets the cell’s mobile country code to 4.		

CALL:MNCCode



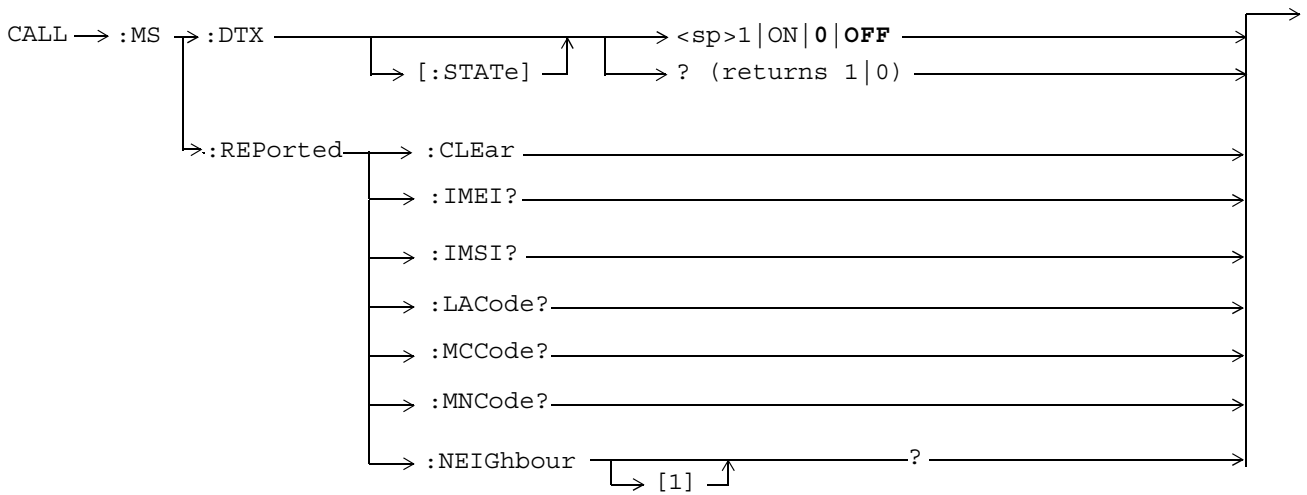
This command is not applicable to GPRS.

“Diagram Conventions” on page 313

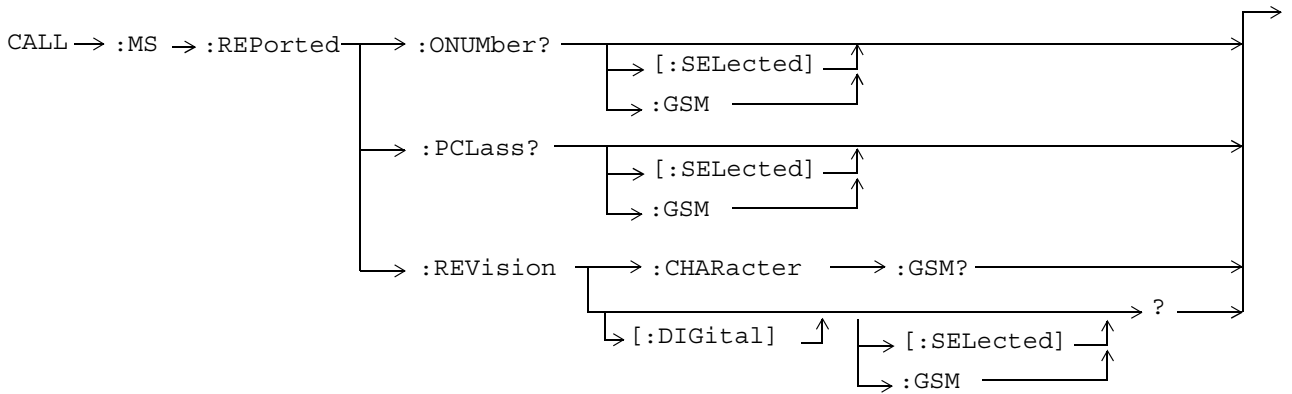
CALL[:CELL]:MNCCode

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 “CALL:ACTivated” on page 329).
	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		“Configuring the Broadcast Channel (BCH)” on page 746
Programming Example		
OUTPUT 714;“CALL:CELL:MNCODE 45” !Sets the cell’s mobile network code to 45.		

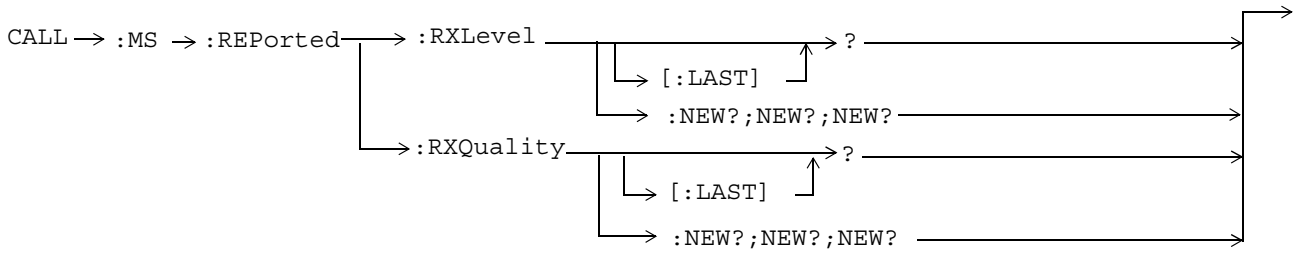
CALL:MS



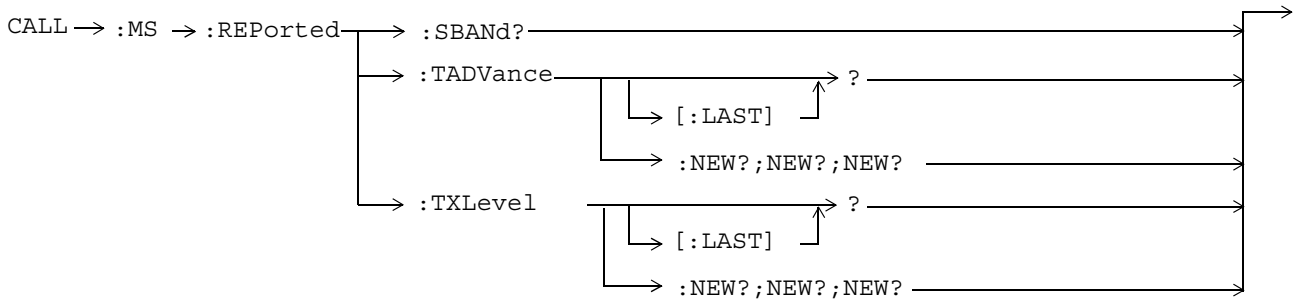
These commands are not applicable to GPRS.



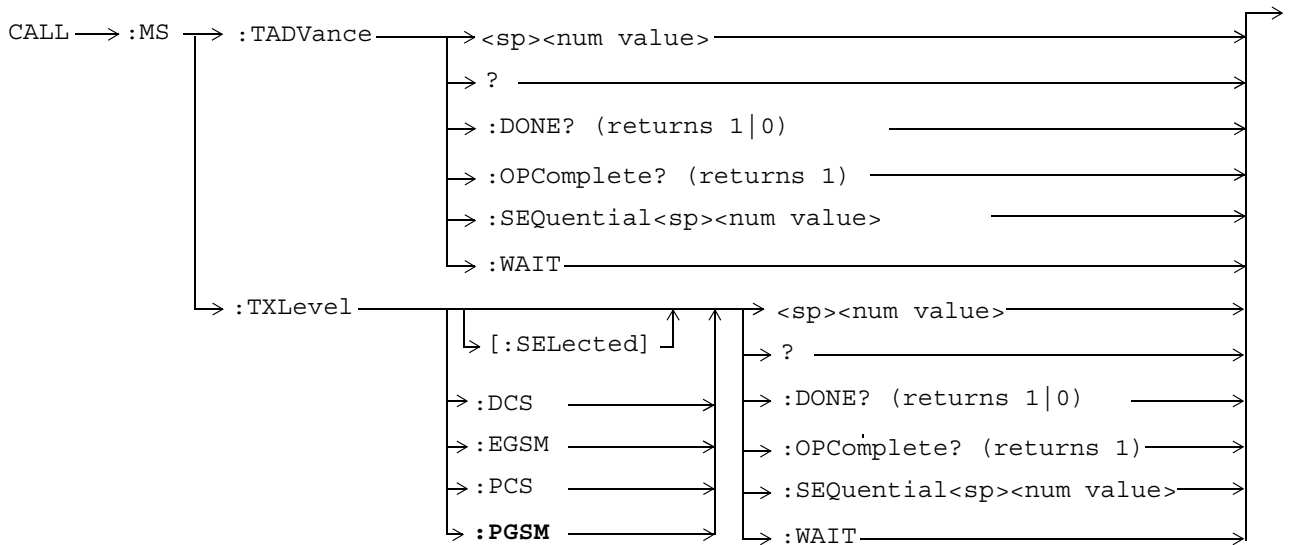
These commands are not applicable to GPRS.



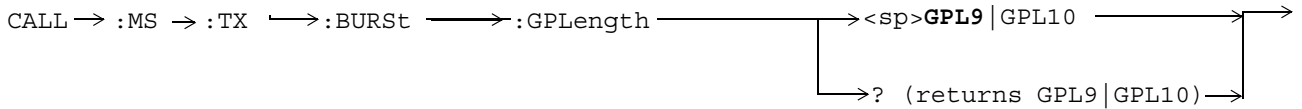
These commands are not applicable to GPRS.



CALL:MS



These commands are not applicable to GPRS.



These commands are not applicable to GSM.

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CALL:MS:DTX[:STATE]

Function	GSM	This command turns the mobile station Discontinuous Transmission (DTX) on or off. The query form returns a 1 (state = on) or a 0 (state = off). See “Configuring Mobile Station Operating Parameters” on page 756.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 0 1
*RST Setting		0 OFF
Programming Example		
<pre>OUTPUT 714;"CALL:MS:DTX OFF" !Turns mobile station discontinuous !transmission OFF.</pre>		

CALL:MS:REPorted:CLEAr

Function	GSM	This command clears the mobile station SAACH reported items. The values of the four mobile reported items - that is, Timing Adv, Tx Level, Rx Level and Rx Qual - are set to 9.91E+37 (NAN).
	GPRS	This command is not applicable to GPRS.
Programming Example		
<pre>OUTPUT 714;"CALL:MS:REPORTED:CLEAR"</pre>		

CALL:MS:REPorted:IMEI?

Function	GSM	This command queries the International Mobile Equipment Identity of the ME. An ME is a mobile station without a SIM. This parameter is reported if the IMEI:AUTO state is ON, see “CALL:IMEI” on page 362 or the mobile station 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)
Programming Example		
<pre>OUTPUT 714;"CALL:MS:REPORTED:IMEI?"</pre>		

CALL:MS**CALL:MS:REPorted:IMSI?**

Function	GSM	This command queries the International Mobile Subscriber Identity of the SIM in the mobile station.
	GPRS	This command is not applicable to GPRS.
Query		Range: up to 15 decimal digits and "" Resolution: 1
*RST Setting		"" (null string)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:IMSI?"		

CALL:MS:REPorted:LACode?

Function	GSM	This command queries the last Location Area Code the mobile station was camped on.
	GPRS	This command is not applicable to GPRS.
Range		0 to 65535 (default: NAN)
Data Type		Real
Query		Range: 0 to 65535 and 9.91E+37 Resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:LACODE?"		

CALL:MS:REPorted:MCCCode?

Function	GSM	This command queries the last Mobile Country Code the mobile station was camped on.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 999 and 9.91E+37 Resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:MCCODE?"		

CALL:MS:REPorted:MNCodE?

Function	GSM	This command queries the last Mobile Network Code the mobile station was camped on.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 99 and 9.91E+37 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 neighbor 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[:SElected]?

Function	GSM	This command queries the mobile station for the originated number keyed in on the mobile station for the active (that is the selected) radio format.
	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:SELECTED?" !Returns the phone number of the last !MS that called the test set.		

CALL:MS

CALL:MS:REPorted:ONUMber:GSM?

Function	GSM	This command queries the mobile station for the originated number keyed in on the mobile station.
	GPRS	This command is not applicable to GPRS.
Query		Range: up to 21 ASCII characters and "" Resolution: 1
*RST Setting		"" (null string)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:ONUMBER:GSM?" !Returns the phone number of the last !MS that called the test set.		

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

Function	GSM	This command queries the mobile station for its Power Class mark for the active (that is the selected) radio format.
	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:ONUMBER:SELECTED?" !Returns the phone number of the last !MS that called the test set.		

CALL:MS:REPorted:PClass:GSM?

Function	GSM	This command queries the GSM mobile station for its Power Class mark.
	GPRS	This command is not applicable to GPRS.
Query		Range: 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:GSM?" !Returns the MS reported power class.		

CALL:MS:REPorted:REVision:CHARacter:GSM?

Function	GSM	<p>Prior to the A.07 revision you would have used the command <code>CALL:MS:REPorted:REVision?</code> to query which phase of the GSM standards your mobile complies with. However, this command had to change at A.07 to allow it to operate in the fast switching environment with AMPS/136. If you previously used the old command you will need to change it to this command to allow your code to run. Sorry for the inconvenience.</p> <p>If you are using GSM A.07 and had never used the original command, it is recommended that you don't use this command. Instead, you should use the <code>"CALL:MS:REPorted:REVision[:DIGital]:GSM?"</code> command.</p>
	GPRS	This command is not applicable to GPRS.
Query		Range: UNKNown PHASe1 PHASe2
*RST Setting		PHASe2
Programming Example <pre>OUTPUT 714;"CALL:MS:REPORTED:REVISION:CHARACTER:GSM?" !Returns the MS reported ! protocol version.</pre>		

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

Function	GSM	This command queries the MS on the active (that is the selected) radio format to determine which phase of the radio standard it complies with.
	GPRS	This command is not applicable to GPRS.
Query		Range: 9.91E+37 (NAN) = Unknown +1.00000000E+000 = Phase 1 +2.00000000E+000 = Phase 2
*RST Setting		9.91E+37 (NAN)
Programming Example <pre>OUTPUT 714;"CALL:MS:REPORTED:REVISION:DIGITAL:SELECTED?" !Returns the MS reported !protocol version.</pre>		

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

Function	GSM	This command queries the mobile station to determine which phase of GSM standards it complies with.
	GPRS	This command is not applicable to GPRS.
Query		Range: 9.91E+37 (NAN) = Unknown +1.00000000E+000 = Phase 1 +2.00000000E+000 = Phase 2
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:REVISION:DIGITAL:GSM?" !Returns the MS reported !protocol version.		

CALL:MS:REPorted:RXLevel[:LAST]?

Function	GSM	This command queries the received level of the TCH in dB (relative to -110 dBm) which the mobile station measured during the last SACCH multiframe.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 63 and 9.91E+37 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	<p>This command queries the received level of the TCH in dB (relative to -110 dBm) which the mobile station measured.</p> <p>Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent.</p> <p>A hanging query that will not return until the mobile station reports a new SACCH message to test set.</p> <p>This will return 3 variables the first two must be ignored, the value from the third new query is valid data.</p>
	GPRS	This command is not applicable to GPRS.
Query	<p>Range: 0 to 68 and 9.91E+37</p> <p>Resolution: 1</p>	
*RST Setting	9.91E+37 (NAN)	
<p>Programming Example</p> <p>OUTPUT 714;"CALL:MS:REPORTED:RXLEVEL:NEW?;NEW?;NEW?" !The third result is valid.</p>		

CALL:MS:REPorted:RXQuality[:LAST]?

Function	GSM	This command queries the mobile station reported quality of the signal used for the RX Level during the last SACCH report.
	GPRS	This command is not applicable to GPRS.
Query	<p>Range: 0 to 7 and 9.91E+37</p> <p>Resolution: 1</p>	
*RST Setting	9.91E+37 (NAN)	
<p>Programming Example</p> <p>OUTPUT 714;"CALL:MS:REPORTED:RXQUALITY:LAST?"</p>		

CALL:MS**CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?**

Function	GSM	This command queries the mobile station reported received quality from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the mobile station 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	This command queries for the frequency band supported by the mobile station.
	GPRS	This command is not applicable to GPRS.
Query		Range: PGSM EGSM DCS PCS ""
*RST Setting		"" (null string)
Programming Example OUTPUT 714;"CALL:MS:REPORTED:SBAND?"		

CALL:MS:REPorted:TADVance[:LAST]?

Function	GSM	This command queries the mobile station for the last TCH Timing Advance actually used by the mobile station.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 63 and 9.91E+37 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	This command queries the mobile station reported timing advance from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the mobile station 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	This command queries the mobile station for the last reported transmit level.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 31 and 9.91E+37 Resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example OUTPUT 714;"CALL:MS:REPORTED:TXLEVEL:LAST?"		

CALL:MS**CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?**

Function	GSM	This command queries the mobile station reported transmit level from the SACCH report. Each time the :NEW? query is sent the test set hangs until report results from that measurement period are sent. A hanging query that will not return until the mobile station 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	This command sets the mobile station's uplink TCH timing advance. Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Commands" on page 43.
	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 mobile station TCH Timing Advance to 3 on !the uplink.		

CALL:MS:TX:BURSt:GPLength

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command defines the width of the guard period between the two uplink bursts. The command and parameters to use are determined by the mobile station segmentation of the TDMA frame and the particular bursts transmitted in the multislot configuration.</p> <p>Whether or not you need to use this command depends on your mobile station.</p> <p>If the mobile station segments the frame into six bursts of 156 bit duration and two bursts of 157 bit duration then this command should be set as follows:</p> <ul style="list-style-type: none"> • Use GPL10 if the first burst in the multislot configuration is timeslot 4 or 7. • Use GPL9 if the first burst in the multislot configuration is in any other timeslot.
Setting	Range: GPL9 GPL10	
Query	Range: GPL9 GPL10	
*RST Setting	GPL9	
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:MS:TX:BURSt:GPLength GPL9" !Sets the Guard Period !length to 9 bits.</pre>		

CALL:MS:TXLevel[:SElected]

Function	GSM	<p>This command selects the mobile station uplink power control level for the band already selected. See "GSM Frequency Banded Parameters" on page 724.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See "Call Processing Subsystem Overlapped Command Synchronization Commands" on page 41.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>Range: 0 to 31</p> <p>Resolution: 1</p>	
Query	<p>Range: 0 to 31</p> <p>Resolution: 1</p>	
*RST Setting	<p>Band: PGSM</p> <p>TXLevel: 15</p>	
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:MS:TXLEVEL:SELECTED 10"</pre>		

CALL:MS**CALL:MS:TXLevel:DCS**

Function	GSM	This command selects the mobile station uplink power control level for the DCS band. See “GSM Frequency Banded Parameters” on page 724. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43.
	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	This command selects the mobile station uplink power control level for the EGSM band. See “GSM Frequency Banded Parameters” on page 724. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43.
	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"		

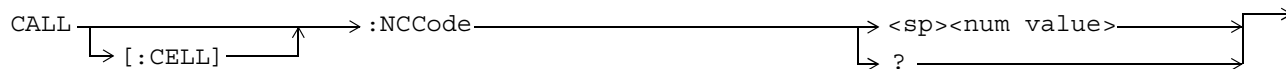
CALL:MS:TXLevel:PCS

Function	GSM	This command selects the mobile station uplink power control level for the PCS band. See “GSM Frequency Banded Parameters” on page 724. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43.
	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:TXLevel:PGSM

Function	GSM	This command selects the mobile station uplink power control level for the PGSM band. See “GSM Frequency Banded Parameters” on page 724. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43.
	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 313

CALL[:CELL]:NCCode

Function	GSM	Sets/queries the Network Color Code. See “Configuring the Broadcast Channel (BCH)” on page 746. This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 329).
	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

CALL → :OPERating:MODE → <sp>**CELL** | OFF | PBTest | PBPTest →
→ ? →

This command is not applicable to GSM.

CALL → :OPERating:MODE → <sp>**CELL** | TEST →
→ ? →

This command is not applicable to GPRS.

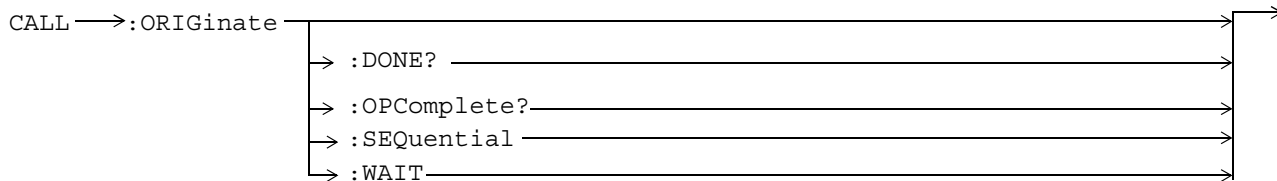
“Diagram Conventions” on page 313

CALL:OPERating

CALL:OPERating:MODE

Function	GSM	This command sets/queries the operating mode (behavior) of the test set. CELL sets the operating mode to Active Cell (see “Active Cell For GSM” on page 736). TEST sets the operating mode to Test Mode (see “GSM Test Mode Operation” on page 738).
	GPRS	This command sets/queries the operating mode (behavior) of the test set. CELL sets the operating mode to Active Cell (see “Active Cell For GPRS” on page 737). PBTest sets the operating mode to GPRS Test Mode BCH (see “GPRS Test Mode BCH Behavior” on page 744). PBPTest sets the operating mode to GPRS Test Mode BCH+PDTCH (see “GPRS Test Mode BCH + PDTCH Behavior” on page 744). OFF sets the operating mode to OFF (see “OFF Behavior” on page 745).
Setting	GSM	Range: CELL TEST
	GPRS	Range: CELL OFF PBTest PBPTest
Query	GSM	Range: CELL TEST
	GPRS	Range: CELL OFF PBTest PBPTest
*RST Setting		CELL
Programming Example (GSM) OUTPUT 714;“CALL:OPERATING:MODE TEST” !Sets the operating mode to Test Mode.		
Programming Example (GPRS) OUTPUT 714;“CALL:OPERATING:MODE PBPTest” !Sets the operating mode to GPRS Test Mode PDTCH.		

CALL:ORIGinate



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:ORIGinate

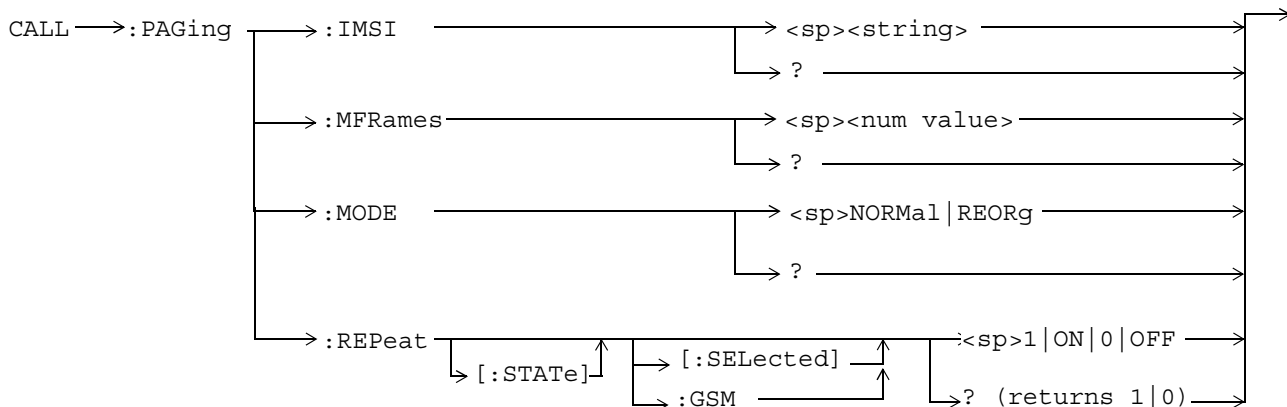
Function	GSM	Performs a BS Originated call. See “Call Processing Event Synchronization” on page 40. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 for examples.
	GPRS	This command is not applicable to GPRS.

Programming Example

```

OUTPUT 714;"CALL:ORIGINATE:SEQUENTIAL" !Originates a base station call.
                                           !Appending SEQUENTIAL to this command
                                           !causes the command to be
                                           !performed sequentially.
  
```

CALL:PAGIng



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:PAGIng:IMSI

Function	GSM	Sets/queries the paging IMSI (International Mobile Subscriber Identity) field, used for paging the MS. The test set will stay in Active Cell Status (Setup Request), see “Call Processing State Synchronization” on page 45 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: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		
<pre>OUTPUT 714;"CALL:PAGING:MODE REOR" ! MS will be sent a page on the ! next available paging subchannel</pre>		

CALL:PAGing:MFRames

Function	GSM	Sets/queries the number of multiframe 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	
Programming Example		
<pre>OUTPUT 714;"CALL:PAGING:MFRAMES 5" ! Sets the number of multiframe ! between paging subchannels.</pre>		

CALL:PAGing

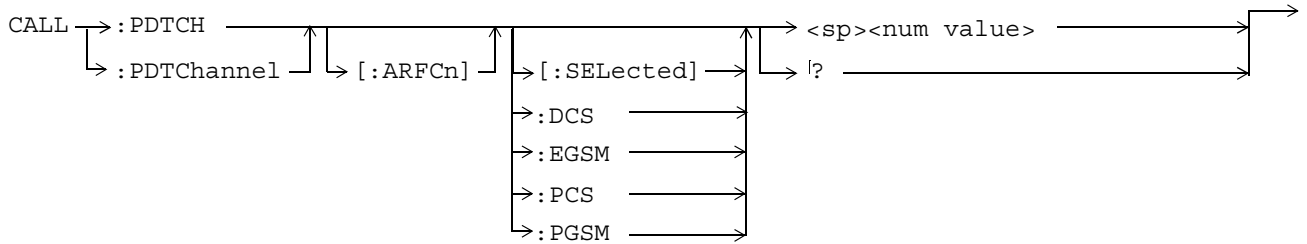
CALL:PAGing:REPeat[:STATe][:SElected]

Function	GSM	Sets/queries repeat paging state for the active (that is the selected) radio format. When the state is ON paging repeats until the test set receives a RACH. When the state is OFF the test set returns the No response to page timer T3113 expiry. See “Fixed Timer Messages” on page 837.
	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:SELECTED ON" !Turns paging repeat ON.		

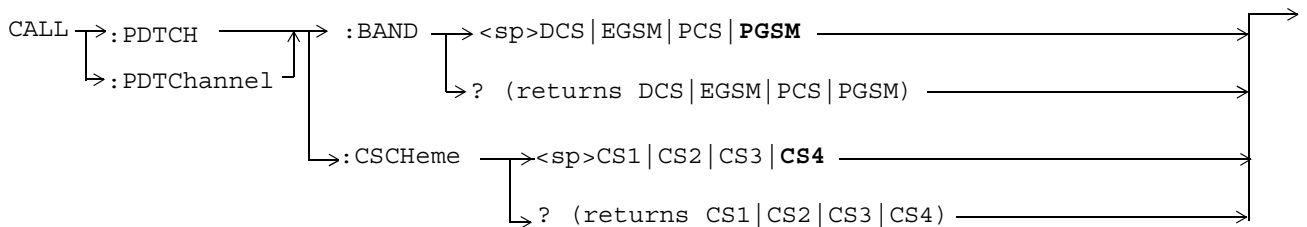
CALL:PAGing:REPeat[:STATe]:GSM

Function	GSM	Sets/queries repeat paging state for the GSM radio format . When the state is ON paging repeats until the test set receives a RACH. When the state is OFF the test set returns the No response to page timer T3113 expiry. See “Fixed Timer Messages” on page 837.
	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:GSM ON" !Turns paging repeat ON.		

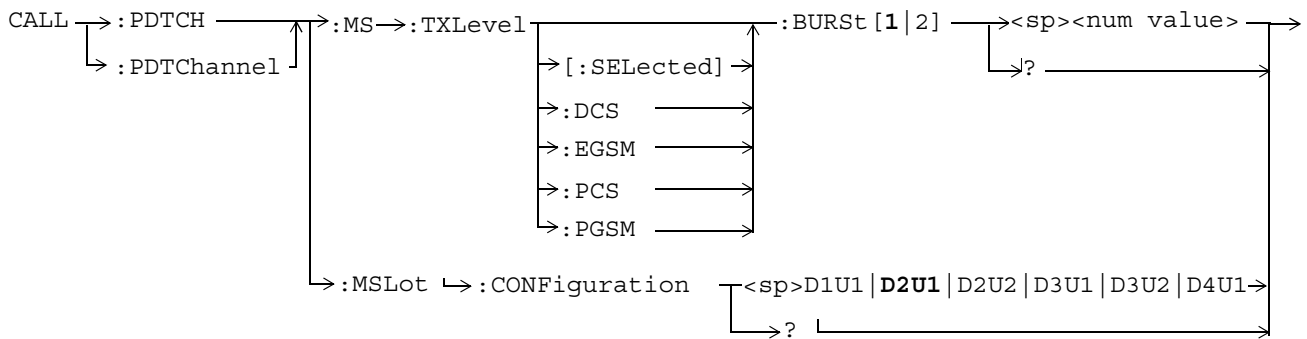
CALL:PDTCH | PDTChannel



These commands are not applicable to GSM.

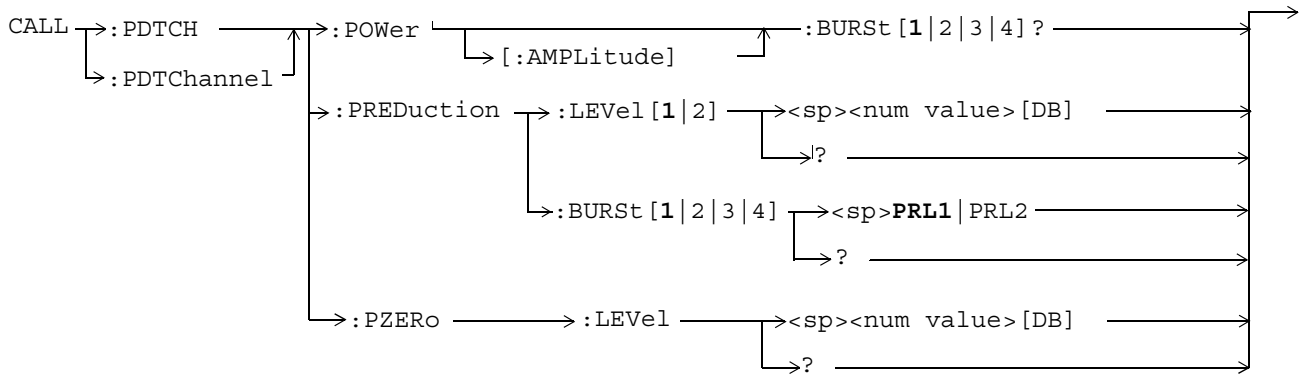


These commands are not applicable to GSM.



These commands are not applicable to GSM.

CALL:PDTCHIPDTChannel



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

CALL:PDTCH | PDTChannel[:ARFCn][:SElected]

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the ARFCN of the downlink and uplink PDTCH for the band already selected.
Setting		Range: <ul style="list-style-type: none"> • DCS band, channels 512 to 885 • EGSM band, channels 0 to 124 and 975 to 1023 • PCS band, channels 512 to 810 • PGSM band, channels 1 to 124 Resolution: 1
Query		Range: <ul style="list-style-type: none"> • DCS band, channels 512 to 885 • EGSM band, channels 0 to 124 and 975 to 1023 • PCS band, channels 512 to 810 • PGSM band, channels 1 to 124 Resolution: 1
*RST setting		PGSM and EGSM bands: 30, DCS and PCS bands: 698
Programming Example <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	This command sets/queries the ARFCN of the downlink and uplink PDTCH for the DCS band. See "Configuring the Packet Data Traffic Channel (PDTCH)" on page 753.
Setting		Range: 512 to 885 (default: 698) Resolution: 1
Query		Range: 512 to 885 Resolution: 1
*RST setting		698
Programming Example <pre>OUTPUT 714;"CALL:PDTCH:ARFCN:DCS 512" !Sets the PDTCH for the DCS band to ARFCN !512.</pre>		

CALL:PDTCHIPDTChannel

CALL:PDTCH | PDTChannel[:ARFCn]:EGSM

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the ARFCN of the downlink and uplink PDTCH for the EGSM band. See “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753.
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
Programming Example		
OUTPUT 714;“CALL:PDTCH:ARFCN:EGSM 124” !Sets the PDTCH for the EGSM band to ARFCN !124.		

CALL:PDTCH | PDTChannel[ARFCN]:PCS

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the ARFCN of the downlink and uplink PDTCH for the PCS band. See “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753.
Setting		Range: 512 to 810 (default: 698) Resolution: 1
Query		Range: 512 to 810 Resolution: 1
*RST setting		698
Programming Example		
OUTPUT 714;“CALL:PDTCH:ARFCN:PCS 512” !Sets the PDTCH for the PCS band to ARFCN !512.		

CALL:PDTCH | PDTChannel[:ARFCn]:PGSM

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the ARFCN of the downlink and uplink PDTCH for the PGSM band. See “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753.
Setting		Range: 1 to 124 (default: 30) Resolution: 1
Query		Range: 1 to 124 Resolution: 1
*RST setting		30
Programming Example		
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	This command sets/queries the PDTCH band, therefore constraining the range of PDTCH ARFCNs.
Setting		Range: PGSM EGSM DCS PCS
Query		Range: PGSM EGSM DCS PCS
*RST setting		PGSM
Programming Example		
OUTPUT 714;"CALL:PDTCH:BAND DCS" !Sets the band to DCS.		

CALL:PDTCH | PDTChannel:CSHeme

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the PDTCH coding scheme. When you make a coding scheme change, all the measurements and the Block Error Rate (BLER) reports are stopped before the change is made. They are then re-started after the change has taken effect.
Setting		Range: CS1 CS2 CS3 CS4
Query		Range: CS1 CS2 CS3 CS4
*RST setting		CS4
Programming Example		
OUTPUT 714;"CALL:PDTChannel:CSHeme CS1" !Sets the PDTCH coding scheme to CS1.		

CALL:PDTCHIPDTChannel

CALL:PDTCH | PDTChannel:MS:TXLevel[:SElected]:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	This command selects the mobile station uplink power control level for the band already selected. See "GPRS Frequency Banded Parameters" on page 725.
Setting		Range: 0 to 31 Resolution: 1
Query		Range: 0 to 31 Resolution: 1
*RST Setting		PGSM and EGSM bands: 15, DCS and PCS bands: 10
Programming Example		
OUTPUT 714;"CALL:PDTCH:MS:TXLevel:BURSt 10" !Sets the uplink power level of burst one in the !selected band to 10.		

CALL:PDTCHIPDTChannel:MS:TXLevel:DCS:BURSt[1|2]

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 "GPRS Frequency Banded Parameters" on page 725.
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:BURSt2 8" !Sets the uplink power level of burst two in !the DCS band to 8.		

CALL:PDTCHIPDTChannel

CALL:PDTCHIPDTChannel:MS:TXLevel:PGSM:BURSt[1|2]

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 "GPRS Frequency Banded Parameters" on page 725.
Setting		Range: 0 to 31 (default 15) Resolution: 1
Query		Range: 0 to 31 Resolution: 1
*RST Setting		15
Programming Example		
OUTPUT 714;"CALL:PDTCH:MS:TXLevel:PGSM:BURSt2 8" !Sets the uplink power level of burst two !in the PGSM band to 8.		

CALL:PDTCH | PDTChannel:MSLot:CONFiguration

Function	GSM	This command is not applicable to GSM.																					
	GPRS	<p>This command sets/queries the multislot configuration.</p> <p>The effect this command has on the number of uplink and downlink timeslots depends on the Data Connection Type (see “CALL:FUNCTION:DATA:TYPE” on page 358):</p> <ul style="list-style-type: none"> • Type A - The multislot configuration command only affects the number of uplink timeslots, therefore configurations D1U1, D2U1, D3U1 and D4U1 will appear similar. • Type B - The multislot configuration command constrains the number of uplink timeslots to be less than or equal to the number of downlink timeslots. • BLER - The multislot configuration command only affects the number of downlink timeslots, therefore D2U2 and D2U1 will appear similar. <p>The actual timeslots used in each configuration are fixed as follows:</p> <table border="1"> <thead> <tr> <th><i>Multislot Configuration</i></th> <th><i>Downlink Timeslots Used</i></th> <th><i>Uplink Timeslots Used</i></th> </tr> </thead> <tbody> <tr> <td>D1U1</td> <td>3</td> <td>3</td> </tr> <tr> <td>D2U1</td> <td>3, 4</td> <td>4</td> </tr> <tr> <td>D2U2</td> <td>3, 4</td> <td>3, 4</td> </tr> <tr> <td>D3U1</td> <td>3, 4, 5</td> <td>4</td> </tr> <tr> <td>D3U2</td> <td>3, 4, 5</td> <td>4, 5</td> </tr> <tr> <td>D4U1</td> <td>3, 4, 5, 6</td> <td>5</td> </tr> </tbody> </table> <p>When a multislot configuration change is executed, all measurements will be stopped before the change is made, and re-started after the change has taken effect.</p>	<i>Multislot Configuration</i>	<i>Downlink Timeslots Used</i>	<i>Uplink Timeslots Used</i>	D1U1	3	3	D2U1	3, 4	4	D2U2	3, 4	3, 4	D3U1	3, 4, 5	4	D3U2	3, 4, 5	4, 5	D4U1	3, 4, 5, 6	5
<i>Multislot Configuration</i>	<i>Downlink Timeslots Used</i>	<i>Uplink Timeslots Used</i>																					
D1U1	3	3																					
D2U1	3, 4	4																					
D2U2	3, 4	3, 4																					
D3U1	3, 4, 5	4																					
D3U2	3, 4, 5	4, 5																					
D4U1	3, 4, 5, 6	5																					
Setting		Range: D1U1 D2U1 D2U2 D3U1 D3U2 D4U1																					
Query		Range: D1U1 D2U1 D2U2 D3U1 D3U2 D4U1																					
*RST Setting		D2U1																					
Programming Example <pre>OUTPUT 714;"CALL:PDTCH:MSLot:CONFiguration D2U1" !Sets the multislot configuration to be 2 !downlink PDTCHs and 1 uplink PDTCH.</pre>																							

CALL:PDTCHIPDTChannel

CALL:PDTCH | PDTChannel:POWer[:AMPLitude]:BURSt[1|2|3|4]?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the current absolute power level of the downlink PDTCH burst. The level is calculated from the current BCH Level, current power reduction reference level P0 and the current power reduction level. For more detail on these power levels, refer to “Testing a GPRS Mobile Station” on page 767. If you do not specify a burst then burst one is assumed.
Query		Range: -169.0 to -10.0 dBm and 9.91 E+37 (NAN) Resolution: 0.1 dBm
Programming Example		
OUTPUT 714; "CALL:PDTCH:POWer:BUrSt?" !Returns current power level of downlink PDTCH burst 1.		

CALL:PDTCH | PDTChannel:PREduction:BURSt[1|2|3|4]

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the power reduction level for any of the downlink bursts. You can define the levels of PRL1 and PRL2 using “CALL:PDTCH PDTChannel:PREduction:LEVel[1 2]” on page 399. For further information see “Downlink PDTCH Power Control” on page 770. 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		
OUTPUT 714; "CALL:PDTCH:PREd:BUrS PRL1" !Sets the power reduction level of the first burst to !PRL1.		

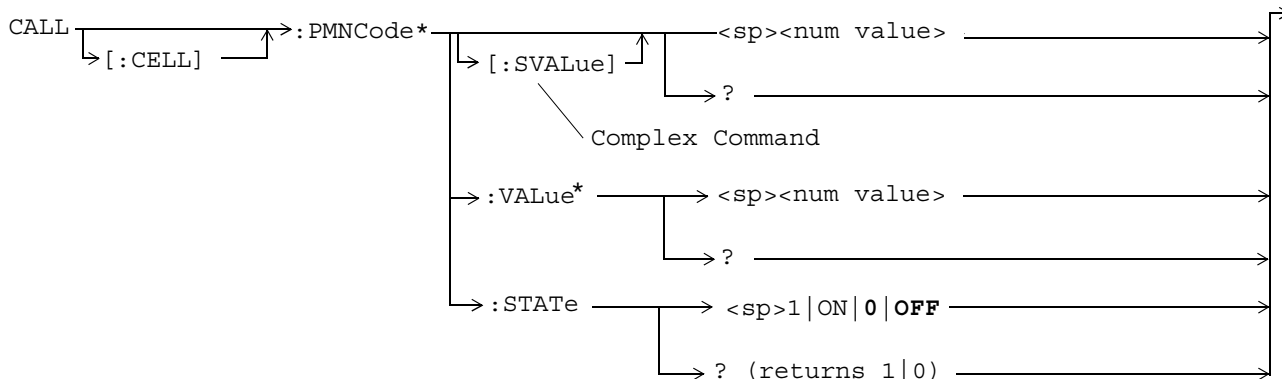
CALL:PDTCH | PDTChannel:PREduction:LEVel[1|2]

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 four bursts using "CALL:PDTCH PDTChannel:PREduction:BURSt[1 2 3 4]" on page 398. For further information see "Downlink PDTCH Power Control" on page 770.
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		
OUTPUT 714;"CALL:PDTCH:PREd:LEV2 3" !Sets the second power reduction level (PRL2) to 3 dB.		

CALL:PDTCH | PDTChannel:PZERo:LEVel

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the power reduction reference level (ETSI refers to this as P0) for downlink PDTCH power control. For further information see "Downlink PDTCH Power Control" on page 770.
Setting		Range: 0 to 30 dB Resolution: 2 dB
Query		Range: 0 to 30 dB Resolution: 2 dB
*RST setting		0 dB
Programming Example		
OUTPUT 714;"CALL:PDTCH:PZERo:LEVel 30" !Sets the power reduction reference level (P0) to 30 dB.		

CALL:PMNCode



*These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

CALL[:CELL]:PMNCode[:SVALue]

Function	GSM	This command sets/queries the 3 digit mobile network code. This command is used for the PCS band only. This command sets the PMNCode state to ON. This can only be set when the Cell Activated State parameter is set to Off (see “CALL:ACTivated” on page 329).
	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		
OUTPUT 714; "CALL:CELL:PMNCode:SVALUE 798" !Sets the value to 798 and the state !to ON. Only used for PCS 1900 band.		

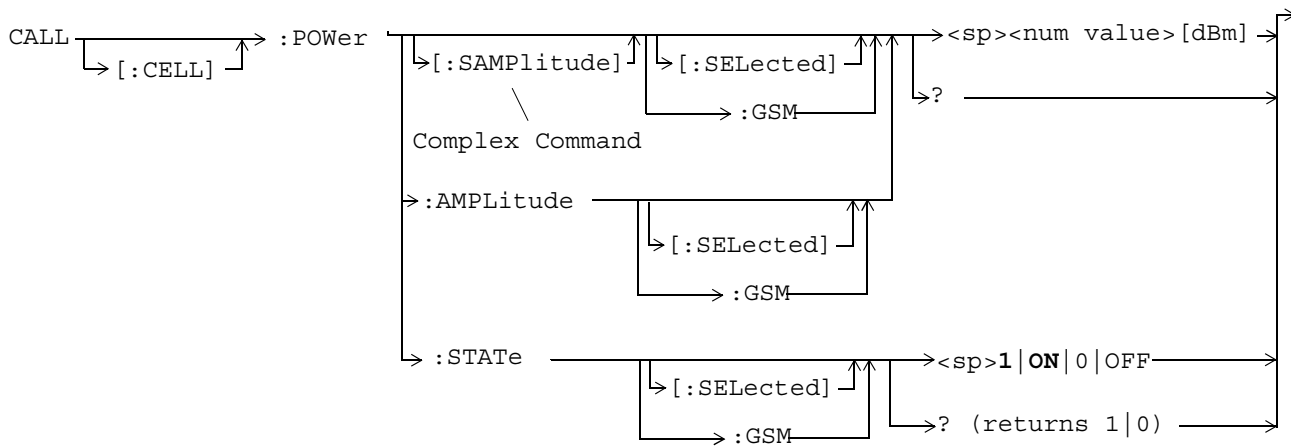
CALL[:CELL]:PMNCode:VALue

Function	GSM	This command sets/queries the 3 digit mobile network code value. This command is used for PCS band only.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 999 Resolution: 1
Query		Range: 0 to 999 Resolution: 1
*RST Setting		1
Programming Example		
OUTPUT 714;"CALL:CELL:PMNCode 798" !Sets the 3 digit MNCCode for PCS 1900 to 798.		

CALL[:CELL]:PMNCode:STATe

Function	GSM	This command sets/queries the MNC state. This command is used for the PCS band only. Setting it to ON configures the BCCH to use the 3 digit MNC. Note, this command can only be used when the Cell Operating Mode is OFF. For GSM, If the test set is in active cell operating mode, this command cannot be set unless the Cell Activated State is OFF.
	GPRS	
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 OFF
Programming Example		
OUTPUT 714;"CALL:CELL:PMNCode:STATe ON" !Enables the 3 digit MNCCode for PCS 1900.		

CALL:POWer



“Diagram Conventions” on page 313

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

Function	GSM	<p>This command sets/queries the Cell Power for the active (that is the selected) radio format and turns the state to ON.</p> <p>This is a complex command combining the cell power state and amplitude commands. The cell power state is automatically set to ON when this command is used.</p> <p>The suffix dBm is optional.</p> <p>The Cell Power is affected when there is an amplitude offset (see “Measurement Related Configuration” on page 823).</p>
	GPRS	<p>This command sets/queries the Cell Power for the active (that is the selected) radio format.</p> <p>This is a complex command combining the cell power state and amplitude commands. The cell power state is automatically set to ON when this command is used.</p> <p>The suffix dBm is optional.</p> <p>The power level of the PDTCH is also affected by the setting of this command. However, the PDTCH level is also affected by other settings (see “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753).</p> <p>The Cell Power is affected when there is an amplitude offset (see “Measurement Related Configuration” on page 823).</p>
Setting	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution: .01 dBm</p>	
Query	<p>Range: -10 dBm to -127 dBm</p> <p>Resolution: .01 dBm</p>	
*RST Setting	-85 dBm	
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:CELL:POWer:SAMPlitude:SElected -50dBm" !Sets the value to -50dBm ! and the state to ON.</pre>		

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

Function	GSM	<p>This command sets/queries the Cell Power for the GSM radio format whether or not that format is active.</p> <p>This is a complex command combining the cell power state and amplitude commands. The cell power state is automatically set to ON when this command is used.</p> <p>The suffix dBm is optional.</p> <p>The Cell Power is affected when there is an amplitude offset (see “Measurement Related Configuration” on page 823).</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: -10 dBm to -127 dBm</p> <p>Resolution: .01 dBm</p>
Query		<p>Range: -10 dBm to -127 dBm</p> <p>Resolution: .01 dBm</p>
*RST Setting		-85 dBm
Programming Example <pre>OUTPUT 714;"CALL:CELL:POWer:SAMPlitude:GSM -50dBm" !Sets the value to -50dBm !and the state to ON.</pre>		

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

Function	GSM	This command sets/queries the Cell Power for the active (that is the selected) radio format. The suffix dBm is optional. The Cell Power is affected when there is an amplitude offset (see “Measurement Related Configuration” on page 823).
	GPRS	This command sets/queries the Cell Power (BCH) for the active (that is the selected) radio format. 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 “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753). The Cell Power is affected when there is an amplitude offset (see “Measurement Related Configuration” on page 823).
Setting	Range: -10 dBm to -127 dBm Resolution: .01 dBm	
Query	Range: -10 dBm to -127 dBm Resolution: .01dBm	
*RST Setting	-85 dBm	
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:POWer:AMPLitude:SElected -50dBm" !Set the cell power from test !set to -50dBm.</pre>		

CALL[:CELL]:POWer:AMPLitude:GSM

Function	GSM	This command sets/queries the Cell Power for the GSM radio format whether or not that format is active. The suffix dBm is optional. The Cell Power is affected when there is an amplitude offset (see “Measurement Related Configuration” on page 823).
	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: .01dBm	
*RST Setting	-85 dBm	
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:POWer:AMPLitude:GSM -50dBm" !Set the cell power from test !set to -50dBm.</pre>		

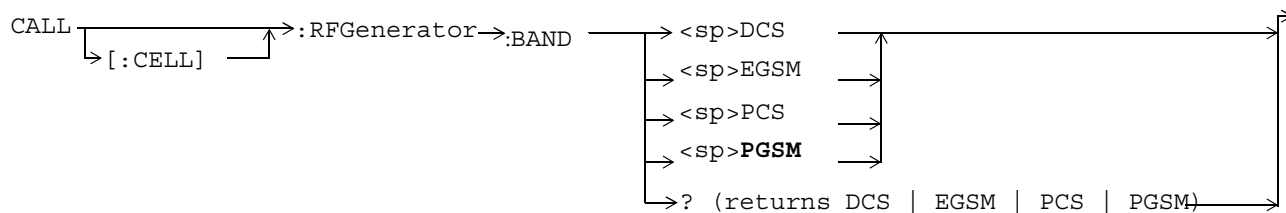
CALL:POWer**CALL[:CELL]:POWer:STATe[:SELected]**

Function	GSM	This command sets/queries the Cell Power state for the active (that is the selected) radio format.
	GPRS	When set to 1 ON, the RF power for the cell is turned on.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		ON
Programming Example		
OUTPUT 714;"CALL:CELL:POWer:STATe:SELected 1" !Sets the cell power state to ON.		

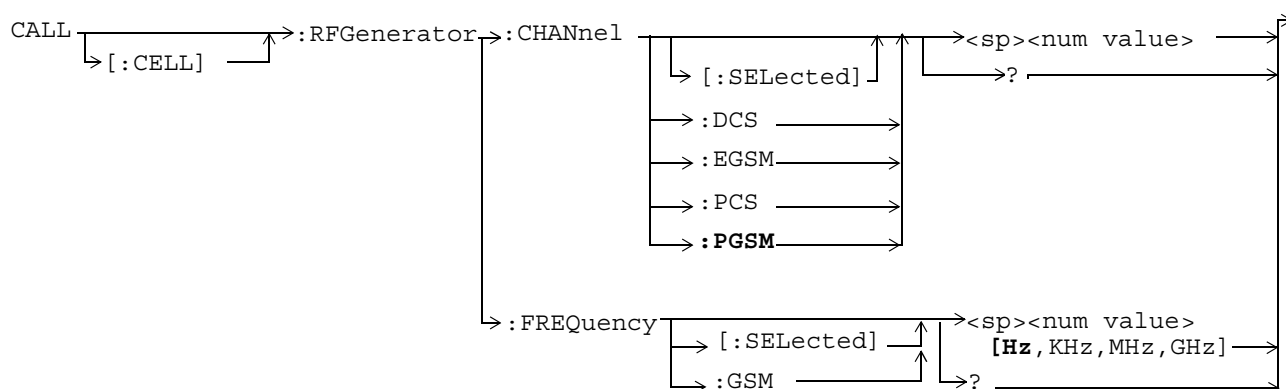
CALL[:CELL]:POWer:STATe:GSM

Function	GSM	This command sets/queries the Cell Power state for the GSM radio format. When set to 1 0, the RF power for the cell is turned on.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		ON
Programming Example		
OUTPUT 714;"CALL:CELL:POWer:STATe:GSM 1" !Sets the cell power state to ON.		

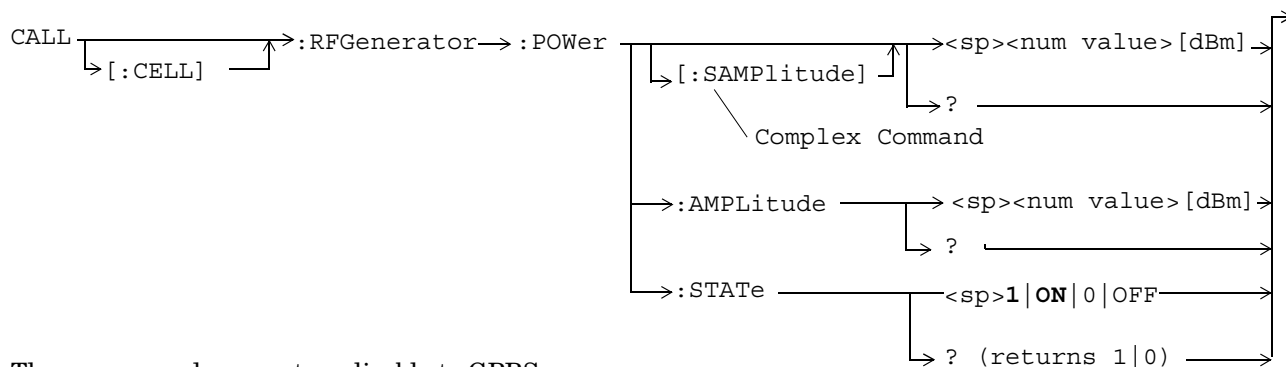
CALL:RFGenerator



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

CALL:RFGenerator**CALL[:CELL]:RFGenerator:BAND**

Function	GSM	Sets/queries the RF Gen Channel band. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 743.
	GPRS	This command is not applicable to GPRS.
Setting		Range: <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124
Query		Range: <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124
*RST Setting		20 (PGSM band)
Programming Example		
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 “CW Test Function Behavior” on page 743. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43 for examples.
	GPRS	This command is not applicable to GPRS.
Setting		Range: <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124
Query		Range: <ul style="list-style-type: none"> • DCS channels 512 to 885 • EGSM channels 975 to 1023 and 0 to 124 • PCS channels 512 to 810 • PGSM channels 1 to 124
*RST Setting		20 (PGSM band)
Programming Example <pre> OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:SELECTED 512" !Sets the RF Generator !channel to 512 for the !band already selected. </pre>		

CALL:RFGenerator**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 “CW Test Function Behavior” on page 743. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43 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 “CW Test Function Behavior” on page 743. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43 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 “CW Test Function Behavior” on page 743. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43 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 “CW Test Function Behavior” on page 743. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Commands” on page 43 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:RFGenerator**CALL[:CELL]:RFGenerator:FREQUENCY[:SElected]**

Function	GSM	Sets/queries the RF Gen Frequency for the active (that is the selected) radio format. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 743. 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:SELECTED 896.2MHZ" !Sets RF Gen frequency.		

CALL[:CELL]:RFGenerator:FREQUENCY:GSM

Function	GSM	Sets/queries the RF Gen Frequency for the GSM radio format whether or not that format is active. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 743. 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:GSM 896.2MHZ" !Sets RF Gen frequency.		

CALL[:CELL]:RFGenerator:POWER[:SAMPLitude]

Function	GSM	Sets/queries the value for RF Gen Power and turns the state to ON. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 743. The RF Gen Power field is affected when there is an amplitude offset, see “Measurement Related Configuration” on page 823.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -10 to -100 dBm Resolution: 0.01 dBm
Query		Range: -10 to -100 dBm Resolution: 0.01 dBm
*RST Setting		-85 dBm
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : POWER : SAMPLITUDE -50DBM"		

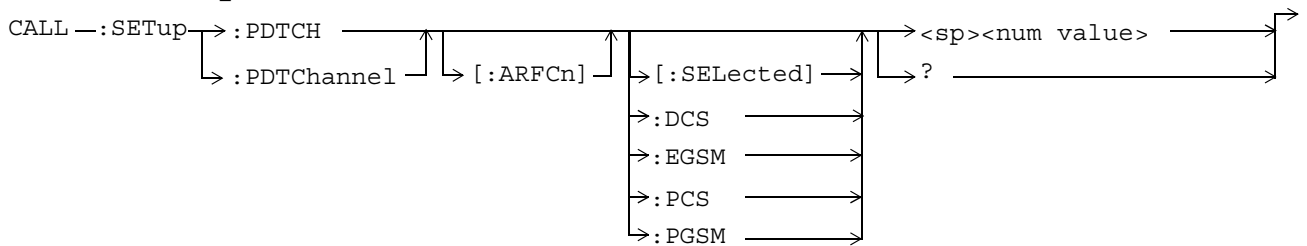
CALL[:CELL]:RFGenerator:POWER:AMPLitude

Function	GSM	Set/queries Rf Gen Power. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. see “CW Test Function Behavior” on page 743. The RF Gen Power field is affected when there is an amplitude offset, see “Measurement Related Configuration” on page 823.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -10 to -100 dBm Resolution: 0.01 dBm
Query		Range: -10 to -100 dBm Resolution: 0.01 dBm
*RST Setting		-85 dBm
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : POWER : AMPLITUDE -50DBM"		

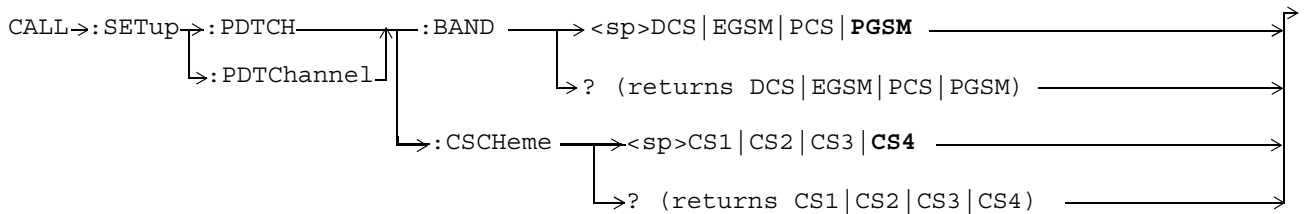
CALL:RFGenerator**CALL[:CELL]:RFGenerator:POWER:STATE**

Function	GSM	Sets/queries the RF Gen Power State. Operating mode = Test Mode and Downlink Function = CW. See “CW Test Function Behavior” on page 743.
	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"		

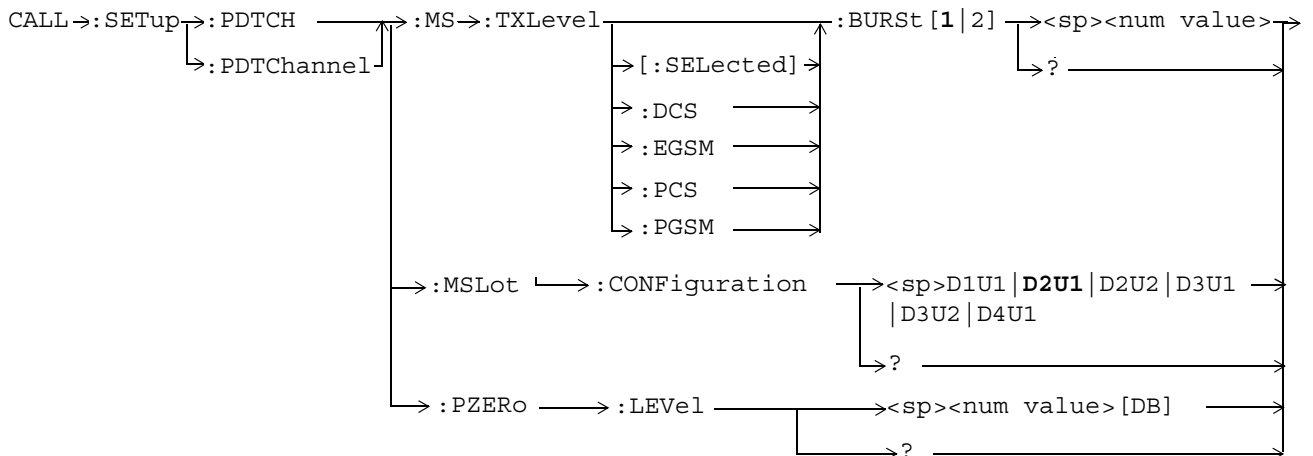
CALL:SETup



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 313

CALL:SETup

CALL:SETup:PDTCH | PDTChannel[:ARFCn][:SElected]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred PDTCH ARFCN for the band specified using the command “CALL:SETup:PDTCH PDTChannel:BAND” on page 420. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The ARFCN range varies with the selected PDTCH band. The correspondence between ARFCN and frequency differs for each band and that a single ARFCN specifies a separate frequency for uplink and downlink.</p> <p>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.</p> <p>The PDTCH ARFCN is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p>
Setting		<p>Range:</p> <ul style="list-style-type: none">• DCS band, channels 512 to 885• EGSM band, channels 0 to 124 and 975 to 1023• PCS band, channels 512 to 810• PGSM band, channels 1 to 124 <p>Resolution: 1</p>
Query		<p>Range:</p> <ul style="list-style-type: none">• DCS band, channels 512 to 885• EGSM band, channels 0 to 124 and 975 to 1023• PCS band, channels 512 to 810• PGSM band, channels 1 to 124 <p>Resolution: 1</p>
*RST setting		PGSM and EGSM bands: 30, DCS and PCS bands: 698
Programming Example		<pre>OUTPUT 714;"CALL:SETup:PDTCH 515" !Sets the ARFCN to 515 if it is !appropriate in the current band.</pre>

CALL:SETup:PDTCH | PDTChannel[:ARFCn]:DCS

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred PDTCH ARFCN within the DCS band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The ARFCN range varies with the selected PDTCH band.</p> <p>A single ARFCN specifies a separate frequency for uplink and downlink</p> <p>The PDTCH ARFCN selects the ARFCN (and thus carrier frequency) for all the PDTCHs which you can configure.</p> <p>The PDTCH ARFCN is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p>
Setting		<p>Range: 512 to 885</p> <p>Resolution: 1</p>
Query		<p>Range: 512 to 885</p> <p>Resolution: 1</p>
*RST setting		698
Programming Example OUTPUT 714;“CALL:SETup:PDTCH:ARFCn:DCS 600 !Sets the ARFCN to 600 in the DCS band.		

CALL:SETup

CALL:SETup:PDTCH | PDTChannel[:ARFCn]:EGSM

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred PDTCH ARFCN within the EGSM band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The ARFCN range varies with the selected PDTCH band.</p> <p>A single ARFCN specifies a separate frequency for uplink and downlink</p> <p>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.</p> <p>The PDTCH ARFCN is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p>
Setting		<p>Range: 0 to 124 975 to 1023</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:SETup:PDTCH:ARFCn:EGSM 987” !Sets the ARFCN to 987 in the EGSM band.		

CALL:SETup:PDTCH | PDTChannel[:ARFCn]:PCS

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred PDTCH ARFCN within the PCS band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The ARFCN range varies with the selected PDTCH band.</p> <p>A single ARFCN specifies a separate frequency for uplink and downlink</p> <p>The PDTCH ARFCN selects the ARFCN (and thus carrier frequency) for all the PDTCHs you can configure.</p> <p>The PDTCH ARFCN is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p>
Setting		<p>Range: 512 to 810</p> <p>Resolution: 1</p>
Query		<p>Range: 512 to 810</p> <p>Resolution: 1</p>
*RST setting		698
Programming Example OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:PCS 608" !Sets the ARFCN to 608 in the PCS band.		

CALL:SETup

CALL:SETup:PDTCH | PDTChannel[:ARFCn]:PGSM

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred PDTCH ARFCN within the PGSM band when selected. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The ARFCN range varies with the selected PDTCH band.</p> <p>A single ARFCN specifies a separate frequency for uplink and downlink</p> <p>The PDTCH ARFCN selects the ARFCN for all the PDTCHs which you can configure.</p> <p>The PDTCH ARFCN is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p>
Setting		Range: 1 to 124 Resolution: 1
Query		Range: 1 to 124 Resolution: 1
*RST setting		30
Programming Example		
OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:PGSM 44" !Sets the ARFCN to 44 in the PGSM band.		

CALL:SETup:PDTCH | PDTChannel:BAND

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the deferred GSM band. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).
Setting		Range: PGSM EGSM DCS PCS
Query		Range: PGSM EGSM DCS PCS
*RST setting		PGSM
Programming Example		
OUTPUT 714;"CALL:SETup:PDTCH:BAND DCS" !Sets the deferred band to DCS		

CALL:SETup:PDTCH | PDTChannel:CSCHEME

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred PDTCH coding scheme. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>When a Coding Scheme change is executed, all measurements and BLER reports are stopped before the change is made, and re-started after the change has taken effect.</p>
Setting	Range: CS1 CS2 CS3 CS4	
Query	Range: CS1 CS2 CS3 CS4	
*RST setting	CS4	
Programming Example <pre>OUTPUT 714;"CALL:SETup:PDTCH:CSCHEME CS4" !Sets the PDTCH deferred coding scheme to CS4</pre>		

CALL:SETup:PDTCH | PDTChannel:MS:TXLevel[:SElected]:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred mobile station transmit power level for the deferred PDTCH band. The transmit power is set individually for each uplink burst. Depending on the “Multislot Configuration” setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see “CALL:SETup:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 421). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p> <p>The mobile station transmit power level is a bursted parameter. Refer to “Bursted Parameters” on page 729 for a detailed description of being a bursted parameter.</p>
Setting	Range: 0 to 31 Resolution: 1	
Query	Range: 0 to 31 Resolution: 1	
*RST setting	PGSM and EGSM bands:15, DCS and PCS bands: 10	
Programming Example <pre>OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:BURSt2 13"! Sets the deferred mobile station TX !level for the 2nd uplink burst in !the currently selected band.</pre>		

CALL:SETup

CALL:SETup:PDTCH | PDTChannel:MS:TXLevel:DCS:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred mobile station transmit power level for the DCS band. The transmit power is set individually for each uplink burst. Depending on the “Multislot Configuration” setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see “CALL:SETup:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 421). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p> <p>The mobile station transmit power level is a bursted parameter. Refer to “Bursted Parameters” on page 729 for a detailed description of being a bursted parameter.</p>
Setting		Range: 0 to 31 Resolution: 1
Query		Range: 0 to 31 Resolution: 1
*RST setting		10
Programming Example <pre>OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:DCS:BURSt1 13" !Sets the deferred mobile station !TX level for the 1st uplink !burst to 13 in the DCS band.</pre>		

CALL:SETup:PDTCH | PDTChannel:MS:TXLevel:EGSM:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred mobile station transmit power level for the EGSM band. The transmit power is set individually for each uplink burst. Depending on the “Multislot Configuration” setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see “CALL:SETup:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 421). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p> <p>The mobile station transmit power level is a bursted parameter. Refer to “Bursted Parameters” on page 729 for a detailed description of being a bursted parameter.</p>
Setting	Range: 0 to 31 Resolution: 1	
Query	Range: 0 to 31 Resolution: 1	
*RST setting	15	
Programming Example <pre> OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:EGSM:BURSt1 19"! Sets the deferred mobile !station TX level for the 1st !uplink burst to 19 in the EGSM !band. </pre>		

CALL:SETup

CALL:SETup:PDTCH | PDTChannel:MS:TXLevel:PCS:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred mobile station transmit power level for the PCS band. The transmit power is set individually for each uplink burst. Depending on the “Multislot Configuration” setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see “CALL:SETup:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 421). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p> <p>The mobile station transmit power level is a bursted parameter. Refer to “Bursted Parameters” on page 729 for a detailed description of being a bursted parameter.</p>
Setting		Range: 0 to 31 Resolution: 1
Query		Range: 0 to 31 Resolution: 1
*RST setting		10
Programming Example <pre>OUTPUT 714 ; "CALL:SETup:PDTCH:MS:TXLevel:PCS:BURST2 12" !Sets the deferred mobile station !TX Level for the 2nd uplink !burst to 12 in the PCS band.</pre>		

CALL:SETup:PDTCH | PDTChannel:MS:TXLevel:PGSM:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred mobile station transmit power level for the PGSM band. The transmit power is set individually for each uplink burst. Depending on the “Multislot Configuration” setting, there will be either one or two uplink bursts (burst 1 and burst 2) - burst 1 is in the first uplink slot specified, not timeslot 1, similarly burst 2 is in the second slot specified, not timeslot 2 (see “CALL:SETup:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 421). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see “CALL:HANdOver HANdOff[:IMMediate]” on page 361).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to “Frequency Banded Parameters” on page 724 for a detailed description of the implications of being a banded parameter.</p> <p>The mobile station transmit power level is a bursted parameter. Refer to “Bursted Parameters” on page 729 for a detailed description of being a bursted parameter.</p>
Setting	Range: 0 to 31 Resolution: 1	
Query	Range: 0 to 31 Resolution: 1	
*RST setting	15	
Programming Example <pre> OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:PGSM:BURSt2 21" !Sets the deferred mobile !station TX Level for the 2nd !uplink burst to 21 in the PGSM !band. </pre>		

CALL:SETup:PDTCH | PDTChannel:MSLot:CONFiguration

Function	GSM	This command is not applicable to GSM.																					
	GPRS	<p>This command sets/queries the deferred number of downlink and uplink PDTCHs. These deferred PDTCHs are only applied when the Execute Channel Change action is initiated using “CALL:HANdOver HANdOff[:IMMediate]” on page 361.</p> <p>The effect this command has on the number of uplink and downlink timeslots depends on the Data Connection Type:</p> <ul style="list-style-type: none"> • Type A - The multislot configuration command only affects the number of uplink timeslots, therefore configurations D1U1, D2U1, D3U1, and D4U1 will appear similar. • Type B - The multislot configuration command constrains the number of uplink timeslots to be less than or equal to the number of downlink timeslots. • BLER - The multislot configuration command only affects the number of downlink timeslots, therefore D2U2 and D2U1 will appear similar. <p>The actual timeslots used in each configuration are fixed as follows:</p> <table border="1"> <thead> <tr> <th><i>Multislot Configuration</i></th> <th><i>Downlink Timeslots Used</i></th> <th><i>Uplink Timeslots Used</i></th> </tr> </thead> <tbody> <tr> <td>D1U1</td> <td>3</td> <td>3</td> </tr> <tr> <td>D2U1</td> <td>3, 4</td> <td>4</td> </tr> <tr> <td>D2U2</td> <td>3, 4</td> <td>3, 4</td> </tr> <tr> <td>D3U1</td> <td>3, 4, 5</td> <td>4</td> </tr> <tr> <td>D3U2</td> <td>3, 4, 5</td> <td>4, 5</td> </tr> <tr> <td>D4U1</td> <td>3, 4, 5, 6</td> <td>5</td> </tr> </tbody> </table> <p>When the Multislot Configuration is set to D1U1, D2U1, D3U1 or D4U1 the measurement burst is set to 1.</p> <p>When a multislot configuration change is executed, all measurements are stopped before the change is made, and restarted after the change has taken effect.</p>	<i>Multislot Configuration</i>	<i>Downlink Timeslots Used</i>	<i>Uplink Timeslots Used</i>	D1U1	3	3	D2U1	3, 4	4	D2U2	3, 4	3, 4	D3U1	3, 4, 5	4	D3U2	3, 4, 5	4, 5	D4U1	3, 4, 5, 6	5
<i>Multislot Configuration</i>	<i>Downlink Timeslots Used</i>	<i>Uplink Timeslots Used</i>																					
D1U1	3	3																					
D2U1	3, 4	4																					
D2U2	3, 4	3, 4																					
D3U1	3, 4, 5	4																					
D3U2	3, 4, 5	4, 5																					
D4U1	3, 4, 5, 6	5																					
Setting		<p>D1U1 D2U1 D2U2 D3U1 D3U2 D4U1</p> <p>“D<n>U<m>” corresponds to “Downlink<n>Uplink<m>”, where <n> indicates the number of downlink timeslots and <m> represents the number of uplink timeslots.</p>																					
Query		Range: D1U1 D2U1 D2U2 D3U1 D3U2 D4U1																					
*RST Setting		D2U1																					
<p>Programming Example</p> <pre>OUTPUT 714;"CALL:SETup:PDTCH:MSLot:CONFiguration D2U2" !Sets the number of downlink !timeslots to 2 and uplink !timeslots to 2.</pre>																							

CALL:SETup:PDTCH | PDTChannel:PZERo:LEVel

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the deferred Power Reduction reference level to be used for connections. Deferred parameters are applied when the Execute Channel Change action is initiated using "CALL:HANdOver HANdOff[:IMMediate]" on page 361. When Data Connection Type "ETSI Type A" is used, there is no downlink PDTCH and therefore changing this parameter has no effect other than remembering the new value until the Data Connection Type "ETSI Type B" or "BLER" is used.
Setting		Range: 0 to 30 dB Resolution: 2 dB
Query		Range: 0 to 30 dB Resolution: 2 dB
*RST setting		0 dB
Programming Example		
<pre>OUTPUT 714;"CALL:SETup:PDTCH:PZERo:LEVel 15 dB" ! Sets the deferred Power Reduction ! reference level to 15 dB.</pre>		

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 313

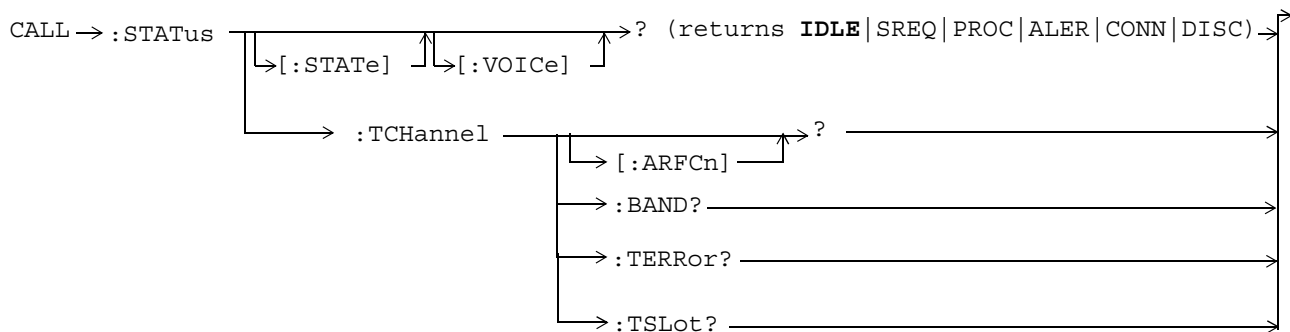
CALL:SIGNaling:MS:TXLevel:FACCH

Function	GSM	<p>Sets/queries the TX Level FACCH Signaling parameter.</p> <p>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.</p> <p>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.</p> <p>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.</p>
	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"		

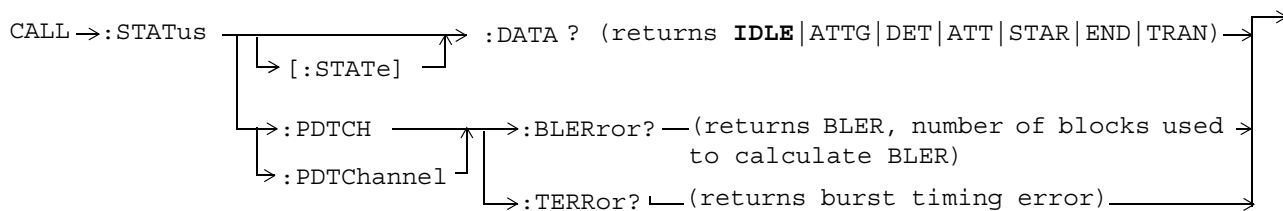
Related Topics

“Configuring the Broadcast Channel (BCH)” on page 746

CALL:STATUS



These commands are not applicable to GPRS.



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

CALL:STATUS

CALL:STATUS[:STATE][:VOICE]?

Function	GSM	This query returns the status of the call. For details on the call states see “Call Processing State Synchronization” on page 45.
	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. For details on the data connection states see “Data Connection Processing State Synchronization” on page 60.
Setting		Range: IDLE ATTG DET ATT STAR END TRAN
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 type is set to BLER (see “CALL:FUNCTION:DATA:TYPE” on page 358).</p> <p>The BLER result is only updated when the data connection state is transferring (TRAN). See “CALL:STATUS[:STATE]:DATA?” on page 430. To reset the BLER result you must use “SYSTEM:MEASUREMENT:RESET” on page 716. The BLER result does not reset automatically when you connect a different GPRS mobile station.</p> <p>If you require more details on BLER, see “Block Error Rate (BLER) Report Measurement Description” on page 88.</p>
Query		<p>Block error rate</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 1 <p>Blocks tested</p> <ul style="list-style-type: none"> • Range: 0 to 100000 and 9.91E+37 (NAN) • Resolution: 1
*RST setting		Block error rate: 9.91E+37 (NAN), Blocks tested: 9.91E+37 (NAN)
Programming Example OUTPUT 714 ; "CALL:STATUS:PDTCH:BLERror?"		

CALL:STATUS:PDTCH | PDTChannel:TERRor?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This query returns the burst timing error report which provides a course indication of the difference between the actual and expected burst reception times. The error is calculated on a burst by burst basis from the adaptive equalization filter coefficients. The reporting period for burst timing error is approximately 0.5 seconds, and the value returned is the peak timing error occurring during the period. Note that this report is not based on a demodulated midamble position.</p> <p>When there are no active PDTCHs, Burst Timing Error results are not available</p>
Query		<p>Range: -8 to +30 T and 9.91 E+37 (NAN)</p> <p>Resolution: 0.25 T</p>
Programming Example OUTPUT 714 ; "CALL:STATUS:PDTCH:TERRor?"		

CALL:STATUS

CALL:STATUS:TCHannel[:ARFCN]?

Function	GSM	This query returns the TCH ARFCN for the current band. The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE][:VOICE]?” on page 430.
	GPRS	This command is not applicable to GPRS.
Query		Range: <ul style="list-style-type: none">• DCS band, channels 512 to 885• EGSM band, channels 975 to 1023 and 0 to 124• PCS band, channels 512 to 810• PGSM band, channels 1 to 124• 9.91E+37 Resolution: 1
*RST setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714 ; "CALL : STATUS : TCHANNEL : ARFCN ?"		

CALL:STATUS:TCHannel:BAND?

Function	GSM	This query returns the current TCH band. See “Configuring the Traffic Channel (TCH)” on page 749. The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE][:VOICE]?” on page 430.
	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 ?"		

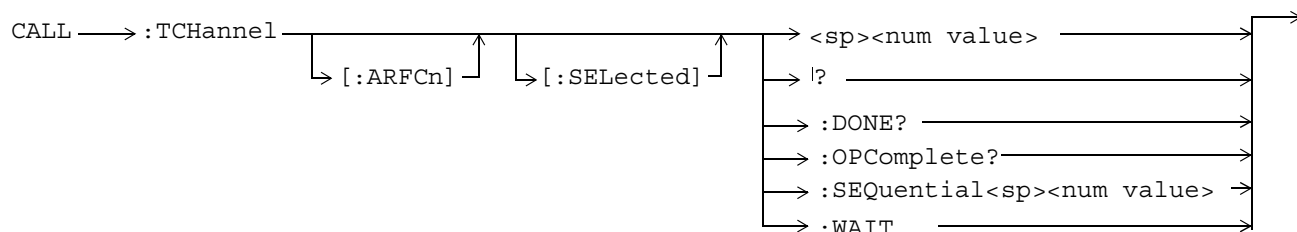
CALL:STATUS:TCHannel:TERRor?

Function	GSM	<p>This query returns the last burst timing error measurement.</p> <p>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).</p> <p>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).</p> <p>The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE][:VOICE]?” on page 430.</p> <p>Burst timing error is continuously updated every 480 ms. Burst timing error is displayed in the Call Setup window.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: -8 to +30 T and 9.91E+37 (NAN)</p> <p>Resolution: 0.25 T</p>
*RST setting		9.91E+37 (NAN)
Programming Example OUTPUT 714; "CALL:STATUS:TCHANNEL:TERROR?" ! Returns Burst Timing Error.		

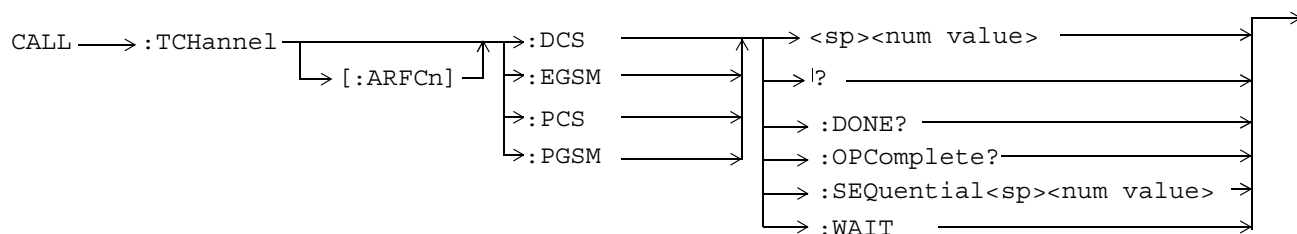
CALL:STATUS:TCHannel:TSLot?

Function	GSM	<p>This query returns the Timeslot that the BS Emulator is using for the TCH. See “Configuring the Traffic Channel (TCH)” on page 749.</p> <p>The CALL:STATUS:STATE must be connected, see “CALL:STATUS[:STATE][:VOICE]?” on page 430.</p>
	GPRS	This command is not applicable to GPRS.
Query		Range: 3 4 5 9.91E+37
*RST setting		9.91E+37 (NAN)
Programming Example OUTPUT 714; "CALL:STATUS:TCHANNEL:TSLOT?"		

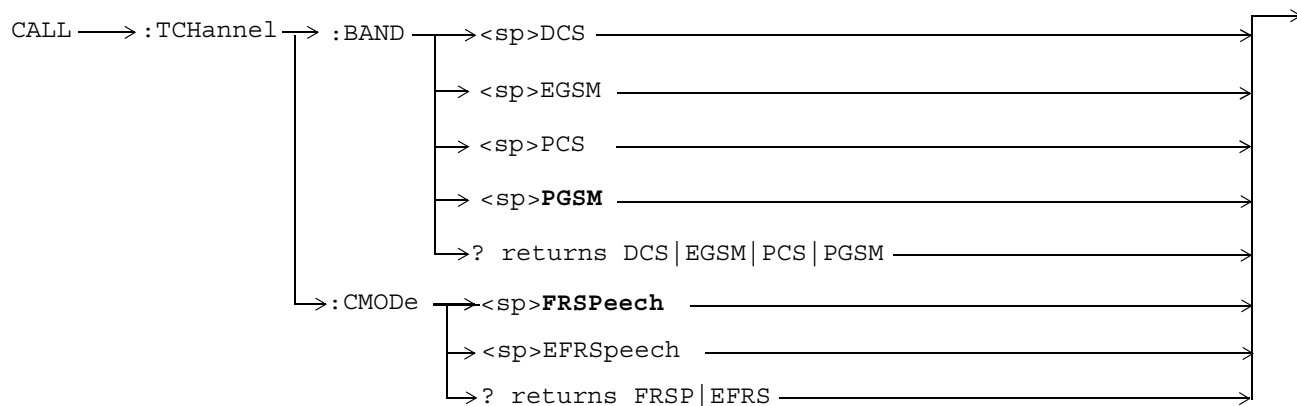
CALL:TCHannel



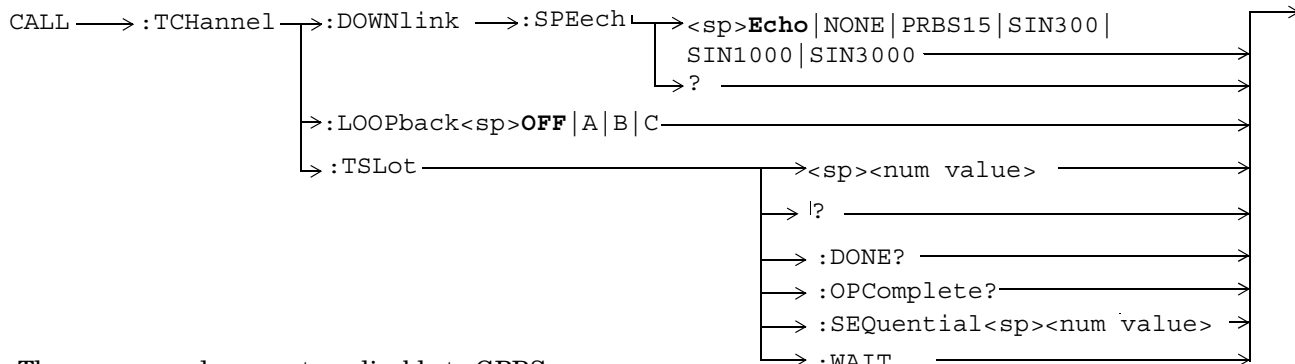
These commands are not applicable to GPRS.



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 313

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 “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 for examples.
	GPRS	This command is not applicable to GPRS.
Setting		Range: <ul style="list-style-type: none"> DCS band, channels 512 to 885 (default: 698) EGSM band, channels 0 to 124 and 975 to 1023 (default: 30) PCS band, channels 512 to 810 (default: 698) PGSM band, channels 1 to 124 (default: 30) Resolution: 1
Query		Range: <ul style="list-style-type: none"> DCS band, channels 512 to 885 EGSM band, channels 0 to 124 and 975 to 1023 PCS band, channels 512 to 810 PGSM band, channels 1 to 124 Resolution: 1
*RST Setting		PGSM and EGSM bands: 30, DCS and PCS bands: 698
Programming Example OUTPUT 714; "CALL:TCHANNEL:ARFCN:SELECTED 512" !Selects ARFCN of 512 on the !test set.		

CALL:TCHannel

CALL:TCHannel[:ARFCn]:DCS

Function	GSM	Sets/queries the channel number for downlink and uplink TCH for DCS band. See “Configuring the Traffic Channel (TCH)” on page 749. TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATus[:STATe][:VOICe]?” on page 430. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 for examples.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 512 to 885 (default: 698) Resolution: 1
Query		Range: 512 to 885 Resolution: 1
*RST Setting		698
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:DCS 512"		

CALL:TCHannel[:ARFCn]:EGSM

Function	GSM	Sets/queries channel number for downlink and uplink TCH for EGSM band. See “Configuring the Traffic Channel (TCH)” on page 749. TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATus[:STATe][:VOICe]?” on page 430. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 for examples.
	GPRS	This command is not applicable to GPRS.
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
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:EGSM 124"		

CALL:TCHannel[ARFCN]:PCS

Function	GSM	Sets/queries channel number for downlink and uplink TCH for PCS band. See “Configuring the Traffic Channel (TCH)” on page 749. TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATus[:STATE][:VOICE]?” on page 430. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 for examples.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 512 to 810 (default: 698) Resolution: 1
Query		Range: 512 to 810 Resolution: 1
*RST Setting		698
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:PCS 512"		

CALL:TCHannel[:ARFCn]:PGSM

Function	GSM	Set channel number for downlink and uplink TCH for PGSM band. See “Configuring the Traffic Channel (TCH)” on page 749. TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see “CALL:STATus[:STATE][:VOICE]?” on page 430. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 for examples.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 124 (default: 30) Resolution: 1
Query		Range: 1 to 124 Resolution: 1
*RST Setting		30
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:PGSM 124"		

CALL:TCHannel

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 “CALL:STATUS:STATE[:VOICE]?” on page 430. The test set uses this command to perform a channel assignment, see “How the Test Set Performs a Dualband Handover” on page 176 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 “Traffic Band Parameter” on page 726 .
Programming Example OUTPUT 714 ; " CALL : TCHANNEL : BAND DCS "		

CALL:TCHannel:CMODE

Function	GSM	Sets/queries which channel mode the mobile station should use for speech data. This setting is either full rate speech (FRSPeech) or enhanced full rate speech (EFRSPeech). See “Programming a Channel Mode Change” on page 174.
	GPRS	This command is not applicable to GPRS.
Setting		Range: FRSPeech EFRSPeech
Query		Range: FRSP EFRS
*RST Setting		FRSPeech
Programming Example 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 “Configuring the Traffic Channel (TCH)” on page 749 or “Fast Bit Error Measurement Description” on page 111 or “Test Mode Operating Modes” on page 738.
	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

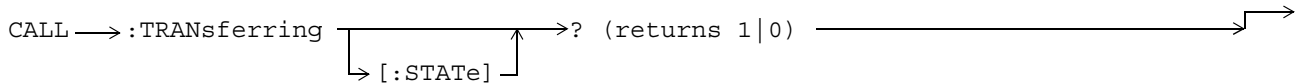
Function	GSM	Sets traffic channel loopback state and type for the MS. The loopback type must be set before a Fast Bit Error or a Bit Error measurement will function. The test set will automatically set the correct loopback type if the signalling loopback control is set to on, after the measurement the test set will automatically set the loopback to off. See “SETup:BERror:SLControl[:STATE]” on page 574 or “SETup:FBERror:SLControl[:STATE]” on page 580. See “Fast Bit Error Measurement Description” on page 111 or “GSM Bit Error Measurement” on page 78.
	GPRS	This command is not applicable to GPRS.
Setting	Range: <ul style="list-style-type: none"> • OFF - Sets the TCH Loop state for the MS to OFF. The loop back is open. • A- Sets the TCH Loop state for the MS to type A. Full-rate speech TCH loopback with signalling of erased frames, (residual). • B- Sets the TCH Loop state for the MS to type B. Full-rate speech TCH loopback without signalling of erased frames, (non-residual). • C - Sets the TCH Loop state for the MS to type C. TCH burst by burst loopback. 	
*RST Setting	OFF	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:LOOPBACK C" !Sets loopback type.		

CALL:TCHannel

CALL:TCHannel:TSLot

Function	GSM	Sets the Timeslot number used for downlink and uplink Traffic Channel. See “Configuring the Traffic Channel (TCH)” on page 749. Additional commands can be appended to aid in controller/Mobile Station synchronization. See “Call Processing Subsystem Overlapped Command Synchronization Commands” on page 41 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
Programming Example		
OUTPUT 714;"CALL:TCHANNEL:TSLot 5" !Sets time slot number.		

CALL:TRANSferring



This diagram is not applicable to GSM.

“Diagram Conventions” on page 313

CALL:TRANSferring[:STATE]?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries whether or not the data connection is in the transferring state. 1 is returned if the data connection is in the transferring state. 0 is returned if the data connection is in any other non-transitory state. For more details on the Transferring State query or the data connection states, see “Data Connection Processing State Synchronization” on page 60.
Query	Range: 0 1	
*RST Setting	0 OFF	
Programming Example		
OUTPUT 714; "CALL:TRANSferring:STATE?"		

DISPlay Subsystem

Description

The DISPlay subsystem is used to configure the test set's display mode or display brightness . Use of the DISPlay subsystem is not required to set or query any data or results.

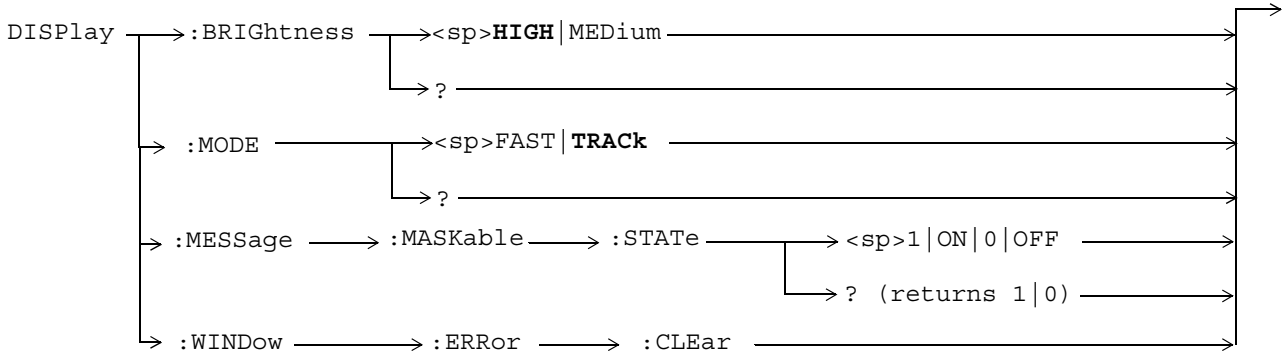
Display Backlight Dimming

The test set's display brightness parameter has two settings at this time, high and medium. The life of the display's backlight will be maximized when brightness is set to medium. The test set has an auto dimming feature that will lower the display brightness automatically if approximately 10 minutes pass without a key being pressed on the test set's front panel. The display will return to the brightness level shown in the Display Brightness field when the test set is set to local and any front panel key is pressed. There is no other user control for this feature.

Syntax Diagram and Command Descriptions

“DISPlay”

DISPlay



“Diagram Conventions” on page 313

DISPlay

DISPlay:BRIGhtness

Function	GSM	Sets/queries the test set's display brightness.
	GPRS	A display backlight dimming feature lowers the display brightness after approximately 10 minutes without any manual user interaction with the test set. See "Display Backlight Dimming" on page 442.
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	GSM	Sets/queries the test set's display mode.
	GPRS	See "Display Mode (Track/Fast)" on page 816.
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	GSM	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.
	GPRS	
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	GSM	Clears the error message from the display screen but not from the Message Log.
	GPRS	

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 447

“FETCh:BErRor” on page 456

“FETCh:DAUDio” on page 464

“FETCh:DPOWer” on page 468

“FETCh:FBERror” on page 471

“FETCh:GBERror” on page 474

“FETCh:IQTuning” on page 477

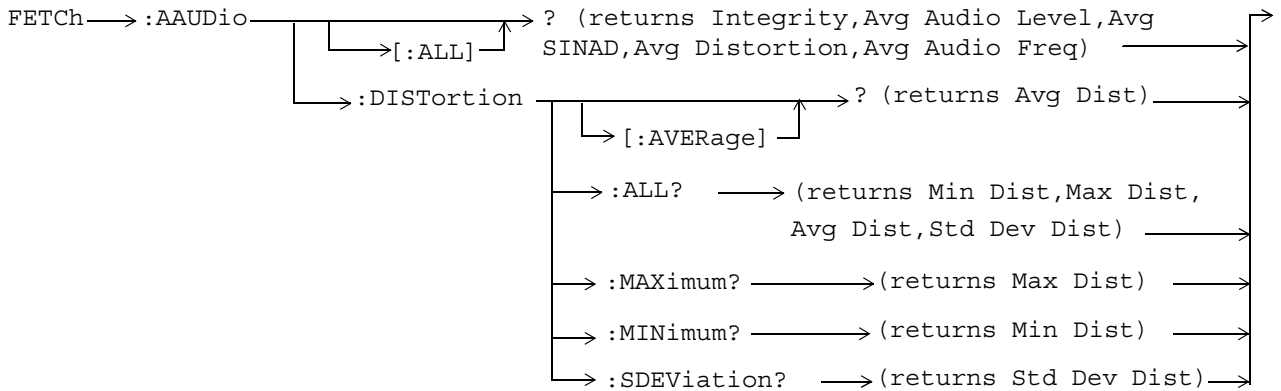
“FETCh:ORFSpectrum” on page 481

“FETCh:PFERror” on page 488

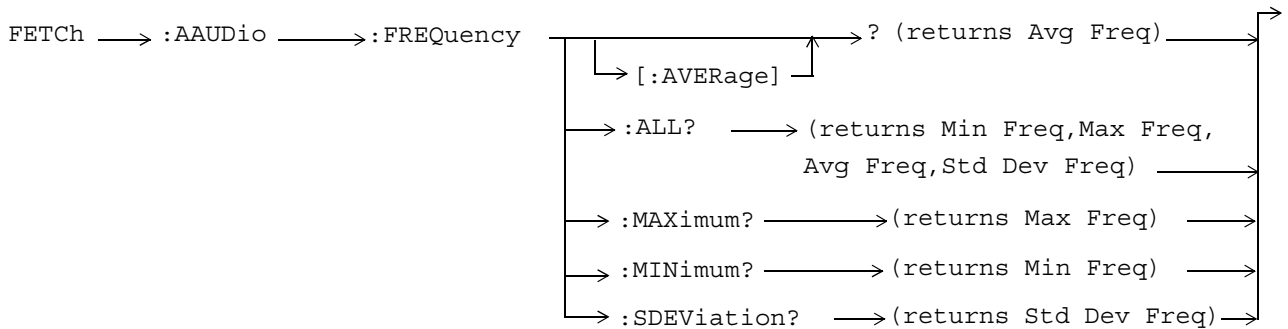
“FETCh:PVTime” on page 495

“FETCh:TXPower” on page 521

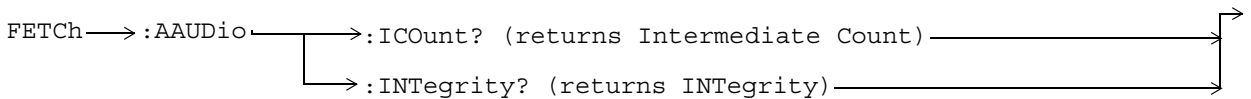
FETCh:AAUDio



These commands are not applicable to GPRS.

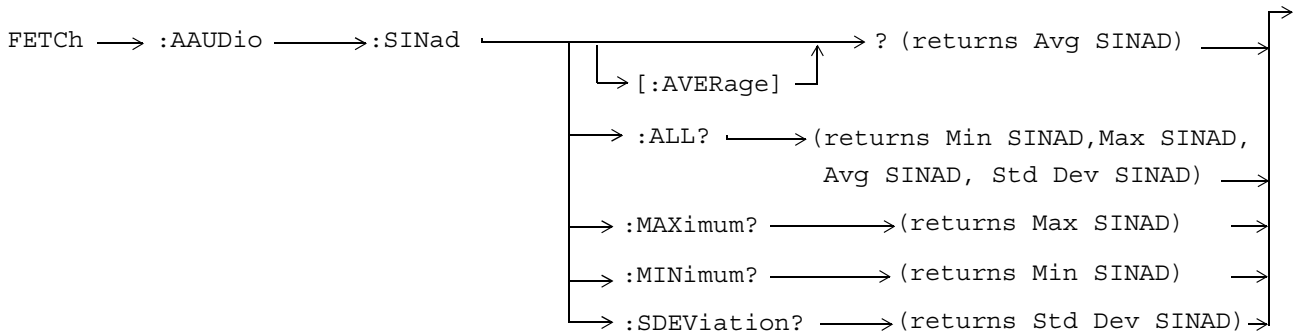


These commands are not applicable to GPRS.

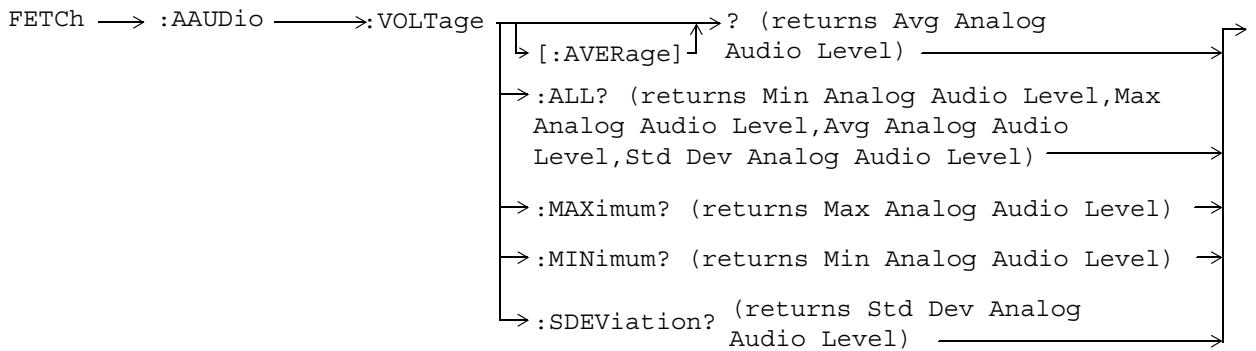


These commands are not applicable to GPRS.

FETCh:AAudio



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

FETCh:AAUDio[:ALL]?

Function	GSM	This query returns the analog audio measurement results. This query returns an integrity indicator (see “Integrity Indicator” on page 183), average analog audio level, average SINAD, average distortion and the average audio frequency. 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		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Average analog audio level</p> <ul style="list-style-type: none"> • Range: 10 mV_{rms} to 20 V_{rms} • Resolution: 0.1 mV_{rms} <p>Average SINAD</p> <ul style="list-style-type: none"> • Range: -99 to 99 dB, 9.91 E+37 • Resolution: 0.01 dB <p>Average distortion</p> <ul style="list-style-type: none"> • Range: 0 to 99% • Resolution: 0.01% <p>Average audio frequency</p> <ul style="list-style-type: none"> • Range: 0 to 99999 Hz • Resolution: 0.01 Hz

FETCh:AAUDio:DISTortion[:AVERage]?

Function	GSM	This query returns the average audio distortion measurement.
	GPRS	This command is not applicable to GPRS.
Query		<p>Average audio distortion</p> <ul style="list-style-type: none"> • Range: 0 to 99%, 9.91 E+37 • Resolution: 0.01%

FETCh:AAUDio:DIS TORTion:ALL?

Function	GSM	This query returns the audio distortion measurements. The measurement results are returned in the following order: minimum distortion, maximum distortion, average distortion, and standard deviation distortion.
	GPRS	This command is not applicable to GPRS.
Query		<p>Minimum, maximum, and average audio distortion:</p> <ul style="list-style-type: none"> • Range: 0 to 99%, 9.91 E+37 • Resolution: 0.01% <p>Standard deviation audio distortion:</p> <ul style="list-style-type: none"> • Range: 0 to 99%, 9.91 E+37 • Resolution: 0.001%

FETCh:AAUDio:DIS TORTion:MAXimum?

Function	GSM	This query returns the maximum audio distortion.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 99%, 9.91 E+37</p> <p>Resolution: 0.01%</p>

FETCh:AAUDio:DIS TORTion:MINimum?

Function	GSM	This query returns the minimum audio distortion.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 99%, 9.91 E+37</p> <p>Resolution: 0.01%</p>

FETCh:AAUDio:DIS TORTion:SDEVIation?

Function	GSM	This query returns the standard deviation audio distortion.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 99%, 9.91 E+37</p> <p>Resolution: 0.001%</p>

FETCh:AAUDio:FREQuency[:AVERAge]?

Function	GSM	This query returns the average audio frequency measurement.
	GPRS	This command is not applicable to GPRS.
Query		<p>Average audio frequency</p> <ul style="list-style-type: none"> • Range: 0 to 99999 Hz, 9.91 E+37 • Resolution: 0.01 Hz

FETCh:AAUDio:FREQuency:ALL?

Function	GSM	<p>This query returns the audio frequency measurements.</p> <p>The measurement results are returned in the following order: minimum frequency, maximum frequency, average frequency, standard deviation frequency.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Minimum, maximum, and average audio frequency:</p> <ul style="list-style-type: none"> • Range: 0 to 99999 Hz, 9.91 E+37 • Resolution: 0.01 Hz <p>Standard deviation audio frequency:</p> <ul style="list-style-type: none"> • Range: 0 to 99999 Hz, 9.91 E+37 • Resolution: 0.001 Hz

FETCh:AAUDio:FREQuency:MAXimum?

Function	GSM	This query returns the maximum audio frequency.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 99999 Hz, 9.91 E+37</p> <p>Resolution: 0.01 Hz</p>

FETCh:AAUDio:FREQuency:MINimum?

Function	GSM	This query returns the minimum audio frequency.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 99999 Hz, 9.91 E+37</p> <p>Resolution: 0.01 Hz</p>

FETCh:AAUDio**FETCh:AAUDio:FREQuency:SDEVIation?**

Function	GSM	This query returns the standard deviation audio frequency.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 99999 Hz, 9.91 E+37 Resolution: 0.01 Hz

FETCh:AAUDio:ICount?

Function	GSM	This query returns the intermediate count of analog audio multi-measurements completed. This value is not available over the manual interface.
	GPRS	This command is not applicable to GPRS.
Query		Range: 1 to 999 Resolution: 1

FETCh:AAUDio:INTegrity?

Function	GSM	This query returns the integrity indicator for the last analog audio measurement completed. Zero indicates a normal measurement. See “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See “Integrity Indicator” on page 183. Resolution: 1

FETCh:AAUDio:SINad[:AVERage]?

Function	GSM	This query returns the average SINAD measurement.
	GPRS	This command is not applicable to GPRS.
Query		Average SINAD <ul style="list-style-type: none"> • Range:-99 to 99 dB, 9.91 E+37 • Resolution: 0.01 dB

FETCh:AAUDio:SINad:ALL?

Function	GSM	Queries the SINAD measurements. Measurement results are returned in the following order: minimum SINAD, maximum SINAD, average SINAD, and standard deviation SINAD.
	GPRS	This command is not applicable to GPRS.
Query		Minimum, maximum, average SINAD: <ul style="list-style-type: none"> • Range: -99 to 99 dB, 9.91 E+37 • Resolution: 0.01 dB Standard deviation SINAD <ul style="list-style-type: none"> • Range: -99 to 99 dB, 9.91 E+37 • Resolution: 0.001 dB

FETCh:AAUDio:SINad:MAXimum?

Function	GSM	This query returns the maximum SINAD measurement.
	GPRS	This command is not applicable to GPRS.
Query		Range: -99 to 99 dB, 9.91 E+37 Resolution: 0.01 dB

FETCh:AAUDio:SINad:MINimum?

Function	GSM	This query returns the minimum SINAD measurement.
	GPRS	This command is not applicable to GPRS.
Query		Range: -99 to 99 dB, 9.91 E+37 Resolution: 0.01 dB

FETCh:AAUDio:SINad:SDEVIation?

Function	GSM	This query returns the standard deviation SINAD measurements.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 99 dB, 9.91 E+37 Resolution: 0.001 dB

FETCh:AAUDio:VOLTage[:AVERage]?

Function	GSM	This query returns the average analog audio level. Value is returned in units of V_{rms} .
	GPRS	This command is not applicable to GPRS.
Query		Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms}

FETCh:AAUDio:VOLTage:ALL?

Function	GSM	This query returns the analog audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list.
	GPRS	This command is not applicable to GPRS.
Query		<p>Minimum</p> <ul style="list-style-type: none"> Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms} <p>Maximum</p> <ul style="list-style-type: none"> Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms} <p>Average</p> <ul style="list-style-type: none"> Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms} <p>Standard deviation</p> <ul style="list-style-type: none"> Range: 0 V to 14.14214 V Resolution: 0.01 mV

FETCh:AAUDio:VOLTage:MAXimum?

Function	GSM	This query returns the analog audio multi-measurement maximum analog audio voltage.
	GPRS	This command is not applicable to GPRS.
Query		Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms}

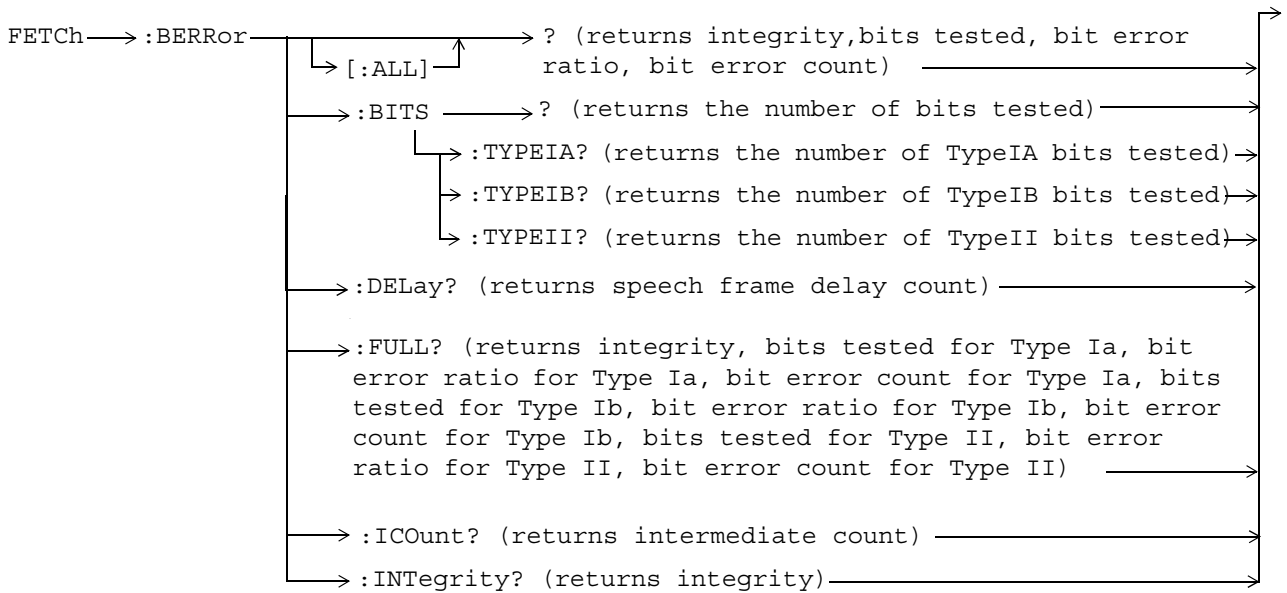
FETCh:AAUDio:VOLTage:MINimum?

Function	GSM	This query returns the analog audio multi-measurement minimum analog audio voltage.
	GPRS	This command is not applicable to GPRS.
Query		Range: 10 mV_{rms} to 20 V_{rms} Resolution: 0.1 mV_{rms}

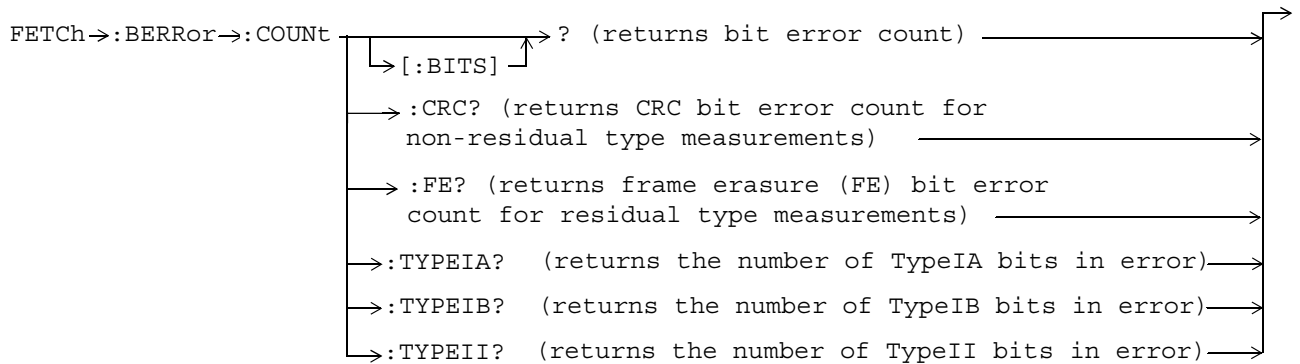
FETCh:AAUDio:VOLTage:SDEVIation?

Function	GSM	This query returns the analog audio multi-measurement standard deviation.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 V to 14.14214 V Resolution: 0.01 mV

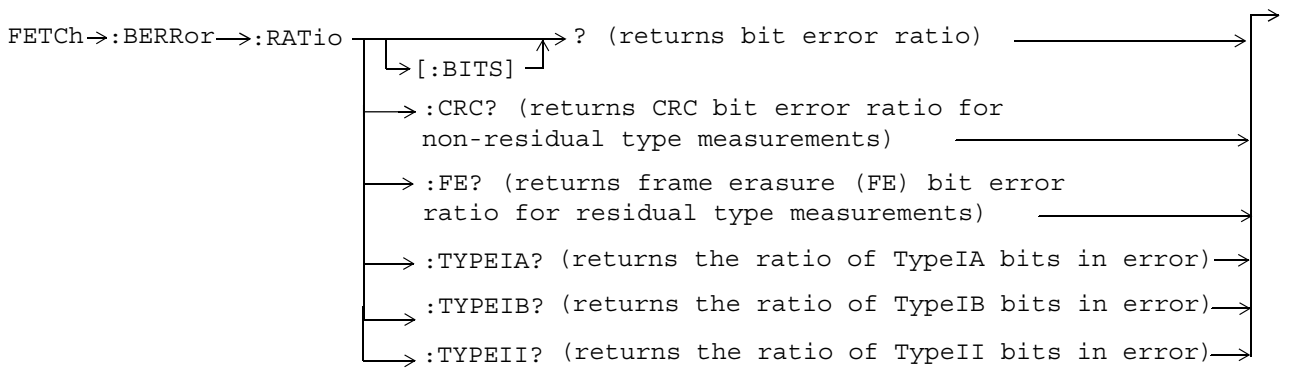
FETCh:BERRor



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

FETCh:BERRor

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 461, returns the same results but for all bit types simultaneously.) See "Bit Error Measurement Description" on page 78.
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none">• Range: See "Integrity Indicator" on page 183.• Resolution: 1 <p>Bits tested</p> <ul style="list-style-type: none">• Range: 0 to 999,131 and 9.91 E+37 (NAN)• Resolution: 1 <p>Bit error ratio</p> <ul style="list-style-type: none">• Range: 0 to 100 and 9.91 E+37 (NAN)• Resolution: 0.01 <p>Bit error count</p> <ul style="list-style-type: none">• Range: 1 to 999,131 and 9.91 E+37 (NAN)• Resolution: 1

FETCh:BERRor:BITS?

Function	GSM	Queries the number of bits actually tested. This query only returns the result of the bit type set using the SETup:BERRor[:TYPE] command. 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 78
	GPRS	This command is not applicable to GPRS.
Query		<p>Bits tested</p> <ul style="list-style-type: none">• Range: 0 to 999,131 and 9.91 E+37 (NAN)• Resolution: 1
*RST Setting		10,000

FETCh:BERRor:BITS:TYPEIA|TYPEIB|TYPEII?

Function	GSM	Queries the number of bits which have been tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See “Bit Error Measurement Description” on page 78
	GPRS	This command is not applicable to GPRS.
Query		<p>Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN)</p> <p>Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN)</p> <p>Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

FETCh:BERRor:COUNT[:BITS]?

Function	GSM	<p>Queries the number of bits that were in error during the last bit error test. See “Bit Error Measurement Description” on page 78</p> <p>The manual user must set the measurement unit to count.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 1 to 999,131 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

FETCh:BERRor:COUNT:CRC?

Function	GSM	<p>Queries the number of bad cyclic redundancy checks (CRCs) for a non-residual measurement type, loopback type B test. See “Bit Error Measurement Description” on page 78</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 unit to count.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 19,980 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

FETCh:BERRor**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 “Bit Error Measurement Description” on page 78
	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 “SETup:BERRor:MANual:DELay” on page 573 and “SETup:BERRor:LDControl:AUTO” on page 573. Refer also to the “Bit Error Measurement Description” on page 78 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 “Integrity Indicator” on page 183, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II bits. (A similar query, “FETCh:BERRor[:ALL]?” on page 458, returns the same results but only for the bit type previously set using the SETUp:BERRor[:TYPE] command.) See “Bit Error Measurement Description” on page 78</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 999,000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 999,000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 2,637,369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 2,637,369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 15,584,400 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type II Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 1,558,440 and 9.91E+37 (NAN) • Resolution: 1

FETCh:BERRor

FETCh:BERRor:ICOut?

Function	GSM	Queries the intermediate count of bits tested (measurement progress report). See “Measurement Progress Report” on page 190
	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 “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See “Integrity Indicator” on page 183. Resolution: 1

FETCh:BERRor:RATio[:BITS]?

Function	GSM	Queries the ratio of bits in error to the number of bits tested during the last bit error test and returns it as a percentage. See “Bit Error Measurement Description” on page 78 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	Queries the ratio of bad cyclic redundancy checks (CRCs) to the total number of CRCs received for a non-residual measurement type, looback type B test and returns it as a percentage. See “Bit Error Measurement Description” on page 78 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’s unit to %.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01

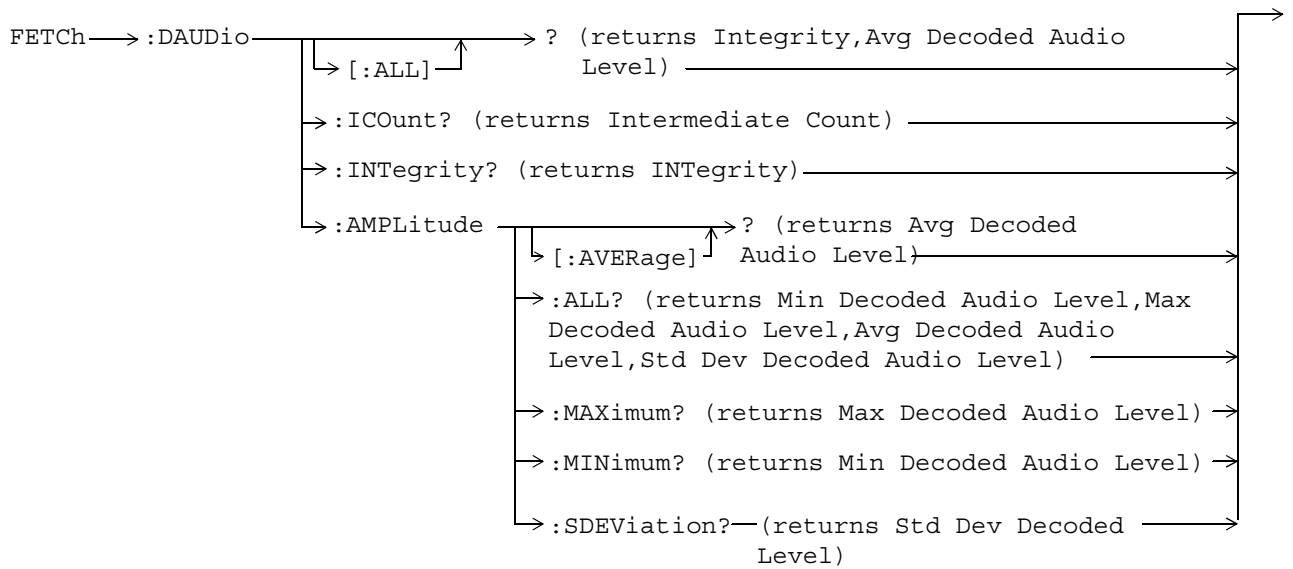
FETCh:BERRor:RATIo:FE?

Function	GSM	Queries the ratio of erased frames to the total number of frames received for a residual measurement type, looback type A test and returns them as a percentage. See “Bit Error Measurement Description” on page 78 The manual user must set the measurement’s unit to %.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01

FETCh:BERRor:RATIo:TYPEIA|TYPEIB|TYPEII?

Function	GSM	Queries the number of bits in error to the number of bits tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. The result is returned as a percentage. See “Bit Error Measurement Description” on page 78
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01

FETCh:DAUDio



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

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"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 Decoded audio: <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS

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 “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See “Integrity Indicator” on page 183. 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"> • Range: 0 to 100% • Resolution: 0.01% FS <p>Maximum:</p> <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS <p>Average:</p> <ul style="list-style-type: none"> • Range: 0 to 100% • Resolution: 0.01% FS <p>Standard deviation:</p> <ul style="list-style-type: none"> • Range: 0 to 71% • Resolution: 0.001% FS

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		<p>Range: 0 to 100%</p> <p>Resolution: 0.01% FS</p>

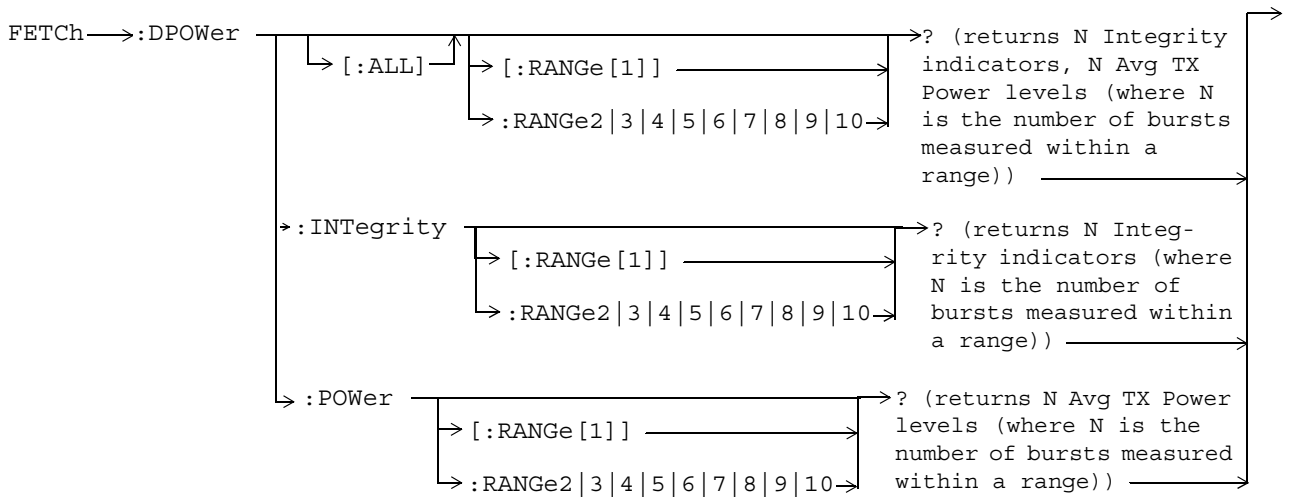
FETCh:DAUDio:AMPLitude:MINimum?

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		<p>Range: 0 to 100%</p> <p>Resolution: 0.01% FS</p>

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 313

FETCh:DPOWer[:ALL][:RANGe[1]]?
FETCh:DPOWer[:ALL]:RANGe2|3|4|5|6|7|8|9|10?

Function	GSM	Queries the Dynamic Power measurement results. Query returns N integrity indicators and N average TX power levels (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWer:COUNT:NUMBer[:SElected]” on page 592. Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 250 bursts you must use range 1, range 2 and range 3 to obtain all your results.
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicators for each individual burst <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 Average TX power levels for each individual burst <ul style="list-style-type: none"> • Range: -100 to +100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dBm
Programming Example		
OUTPUT 714;"FETCh:DPOWer?" !Queries the Dynamic Power measurement results for the first 100 bursts.		

FETCh:DPOWer:INTEgrity[:RANGe[1]]?
FETCh:DPOWe:INTEgrity:RANGe2|3|4|5|6|7|8|9|10?

Function	GSM	Returns N integrity indicators (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWer:COUNT:NUMBer[:SElected]” on page 592. Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 160 bursts you must use range 1 and range 2 to obtain all the integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See “Integrity Indicator” on page 183. Resolution: 1
Programming Example		
OUTPUT 714;"FETCh:DPOWer:INTEgrity:RANGe3?" !Queries the integrity results for bursts 201 through 300.		

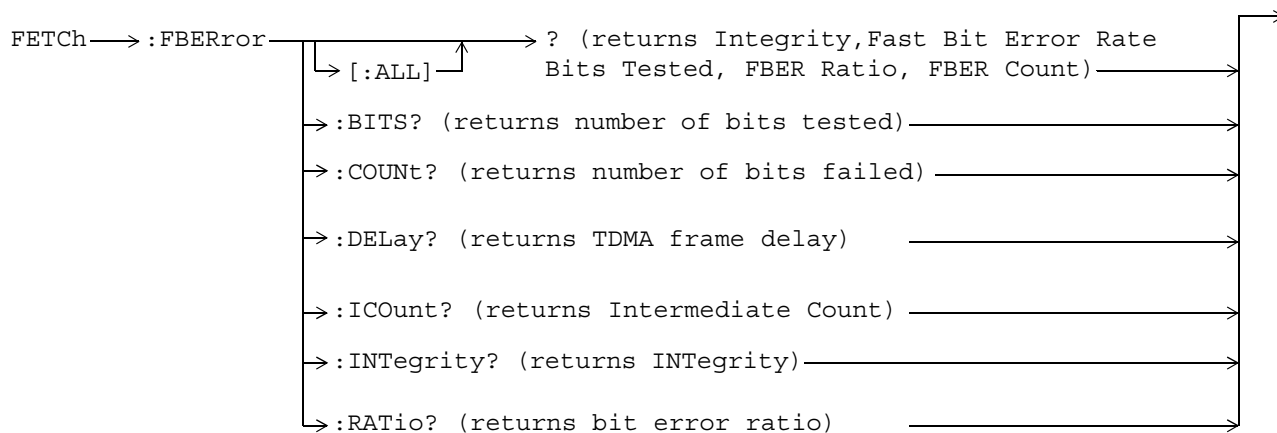
FETCh:DPOWer

FETCh:DPOWer:POWer[:RANGe[1]]?

FETCh:DPOWer:POWer:RANGe2|3|4|5|6|7|8|9|10?

Function	GSM	Queries the average TX power levels for the Dynamic Power measurement. Returns N average power levels (where N is the number of bursts measured. To set the number of bursts you want to measure, see “SETUp:DPOWer:COUNt:NUMBer[:SELEcted]” on page 592. Each of the ranges can query up to 100 bursts. Therefore if you have set up to measure 400 bursts you must use range 1, range 2, range 3 and range 4 to obtain all your TX power level results.
	GPRS	This command is not applicable to GPRS.
Query		Range: -100 to +100 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB
Programming Example		
OUTPUT 714;"FETCh:DPOWer:POWer:RANGe2?" !Queries the average TX power for bursts 101 through 200.		

FETCh:FBERror



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

FETCh:FBERror

FETCh:FBERror[:ALL]?

Function	GSM	Queries the fast bit error measurement. Query returns integrity indicator, bits tested, bit error ratio, and bit error count. Bit error ratio is displayed in the Fast Bit Error field. The other values returned by this query are not available on the front panel display.
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicator: <ul style="list-style-type: none">• See “Integrity Indicator” on page 183.• Resolution: 1 Bits tested: <ul style="list-style-type: none">• Range: 1 to 999,455 and 9.91 E+37 (NAN)• Resolution: 1 Bit error ratio: <ul style="list-style-type: none">• Range: 0 to 100 and 9.91 E+37 (NAN)• Resolution: 0.01 Fast bit error count: <ul style="list-style-type: none">• Range: 1 to 999,455 and 9.91 E+37 (NAN)• Resolution: 1

FETCh:FBERror:BITS?

Function	GSM	Queries the total number of information bits tested during the last fast bit error measurement. See “SETup:FBERror:COUNT” on page 579 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: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	<p>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.</p> <p>This value is displayed in the TDMA Frame Delay field.</p> <p>This value can be determined automatically, or set by the user. See “SETup:FBERror:MANual:DELay” on page 580 and “SETup:FBERror:LDControl:AUTO” on page 579 for setting this value manually.</p> <p>Refer also to the “Fast Bit Error Measurement Description” on page 111 for a description of frame delay and how it is used in the fast bit error measurement.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 26 and 9.91 E+37</p> <p>Resolution: 1</p>

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

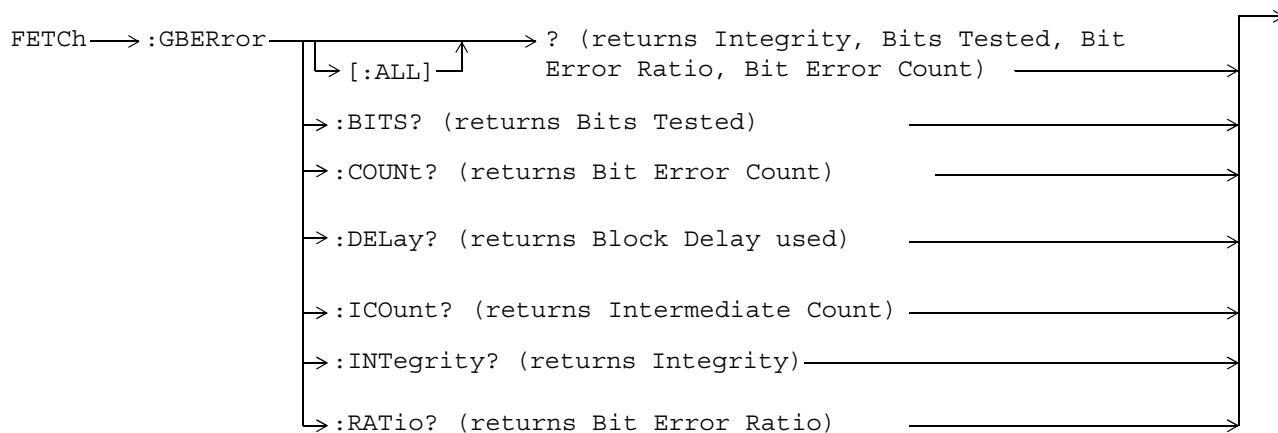
FETCh:FBERror:INTEgrity?

Function	GSM	<p>Returns the integrity indicator value for the last fast bit error measurement performed. Zero indicates a normal result.</p> <p>See “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: See “Integrity Indicator” on page 183.</p> <p>Resolution: 1</p>

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		<p>Range: 0 to 100 and 9.99 E+37</p> <p>Resolution: 0.01</p>

FETCh:GBERror



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

FETCh:GBERror[:ALL]?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the bit error measurement results. The integrity indicator, bits tested, bit error ratio, and bit error count are returned.
Query		<p>Integrity indicator:</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Bits tested:</p> <ul style="list-style-type: none"> • Range: 0 to 999,427 and 9.91 E+37 (NAN) • Resolution: 1 <p>Bit error ratio:</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91 E+37 (NAN) • Resolution: 0.01 <p>Bit error count:</p> <ul style="list-style-type: none"> • Range: 0 to 999,427 and 9.91 E+37 (NAN) • Resolution: 1

FETCh:GBERror:BITS?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the total number of information bits tested during the last bit error measurement. See “FETCh:GBERror:COUNT?” on page 475.
Query		<p>Range: 0 to 999,427 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

FETCh:GBERror:COUNT?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the count of erroneous bits found during the last bit error measurement.
Query		<p>Range: 0 to 999,427 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

FETCh:GBERror

FETCh:GBERror:DELay?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the block delay the test set used during the last bit error measurement. This value can be determined automatically by the test set, or you can set it manually. See “SETup:GBERror:MANual:DELay” on page 599 and “SETup:GBERror:LDControl:AUTO” on page 599 for setting this value manually. Refer also to the “GPRS Bit Error Measurement” on page 81 for a description of block delay and how it is used in the bit error measurement.
Query		Range: 1 to 6 and 9.91 E+37 (NAN) Resolution: 1

FETCh:GBERror:ICount?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the intermediate count (measurement progress report) of bits tested.
Query		Range: 0 to 999,455 and 9.91 E+37 (NAN)

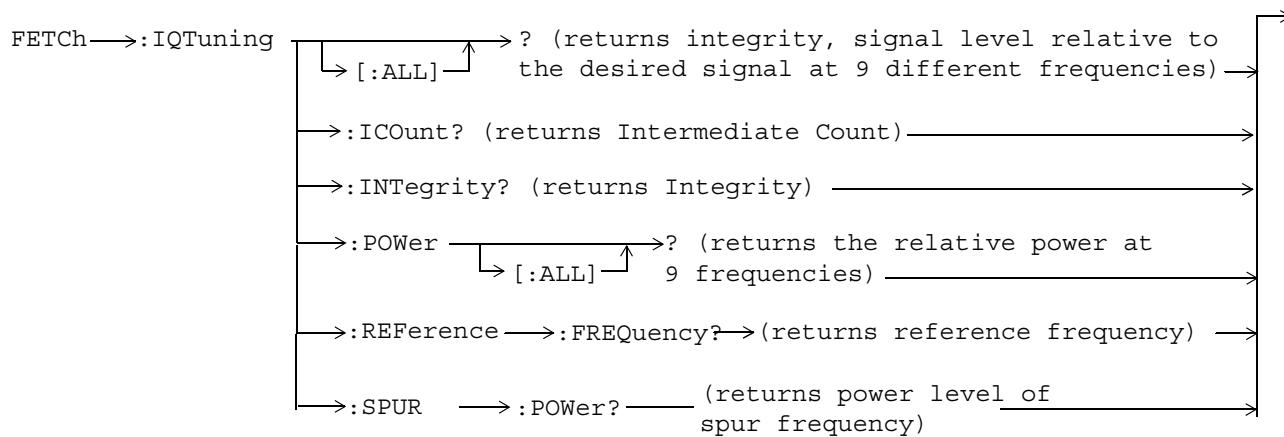
FETCh:GBERror:INTegrity?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result. See “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.
Query		Range: See “Integrity Indicator” on page 183. Resolution: 1

FETCh:GBERror:RATIo?

Function	GSM	This command is not applicable to GSM.
	GPRS	This query returns the ratio of erroneous bits found during the last bit error measurement.
Query		Range: 0 to 100 and 9.91 E+37 (NAN) Resolution: 0.01

FETCh:IQTuning



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

FETCh:IQTuning

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">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none">• Range: -100 to +100 dB and 9.91 E+37 (NAN)• Resolution: 0.01 dB <p>The order of the signal level results are:</p> <ul style="list-style-type: none">• -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 <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none">• Range: -100 to +100 dB and 9.91E+37 (NAN)• Resolution: 0.01 dB

FETCh:IQTuning:ICount?

Function	GSM	Queries the intermediate number of I/Q Tuning multi-measurements completed.
	GPRS	This command is not applicable to GPRS.
Query		<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: See “Integrity Indicator” on page 183. Resolution: 1

FETCh:IQTuning:POWER[:ALL]?

Function	GSM	Queries the I/Q Tuning measurement results. Query returns the relative power level at the following offset frequencies: carrier frequency, ± 67.7083 kHz, ± 135.417 kHz, ± 203.125 kHz, ± 270.833 kHz. The spur measurement result is also returned.
	GPRS	This command is not applicable to GPRS.
Query		<p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> • -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 <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91E+37 (NAN) • Resolution: 0.01 dB

FETCh:IQTuning:REFERENCE:FREQUENCY?

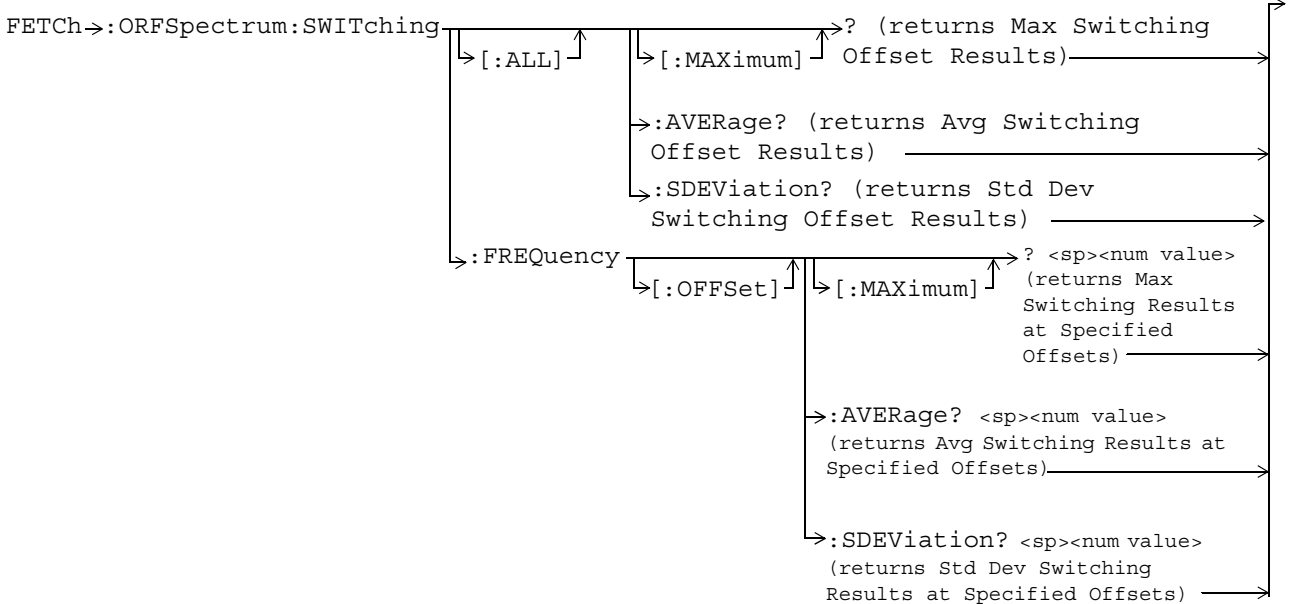
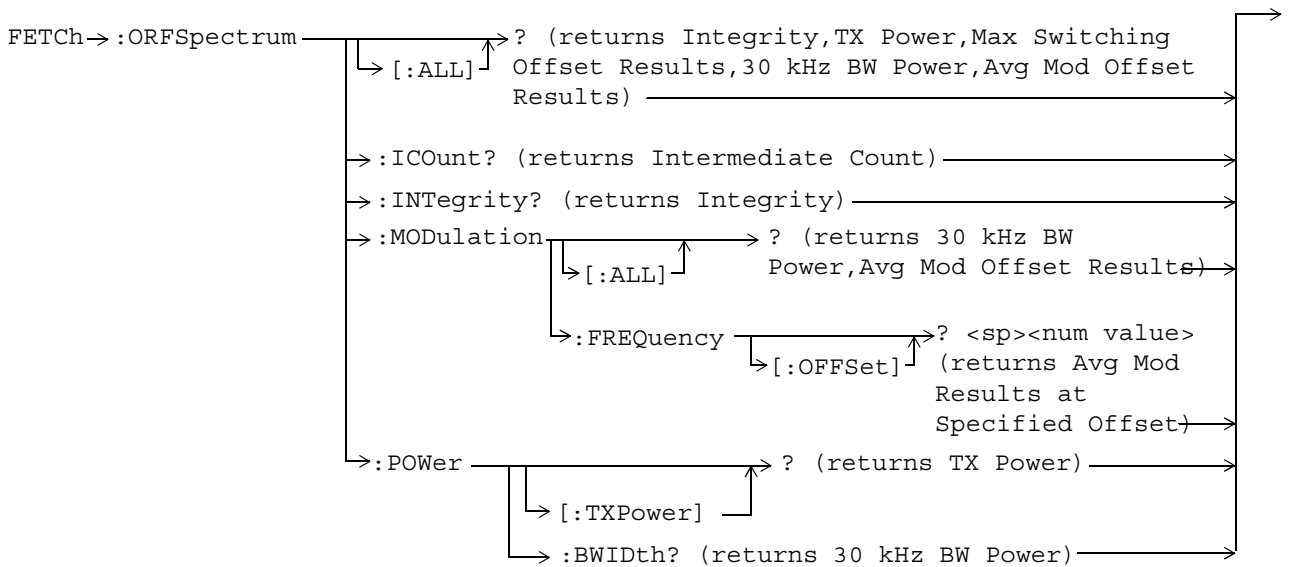
Function	GSM	Queries the offset frequency being used as the reference for the measurement.
	GPRS	This command is not applicable to GPRS.
Query		NEG67KHZ ZEROKHZ POS67KHZ UNKNOWN

FETCh:IQTuning

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 313

FETCh:ORFSpectrum

FETCh:ORFSpectrum[:ALL]?

Function	GSM	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.
	GPRS	<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>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 <p>TX Carrier Power</p> <ul style="list-style-type: none">• Range: –100 dBm to +100 dBm and 9.91 E+37• Resolution: 0.01 dB <p>Output RF Spectrum Due to Switching (Max)</p> <ul style="list-style-type: none">• Range: –100 dBm to +100 dBm and 9.91 E+37• Resolution: 0.01 dB <p>30 kHz Bandwidth Power</p> <ul style="list-style-type: none">• Range: –100 dBm to +100 dBm and 9.91 E+37• Resolution: 0.01 dB <p>Output RF Spectrum due to Modulation (Average)</p> <ul style="list-style-type: none">• Range: –200 dB to +100 dB and 9.91 E+37• Resolution: 0.01 dB

FETCh:ORFSpectrum:ICount?

Function	GSM	Queries the intermediate count of ORFS multi-measurements completed. This number will climb to the number returned by “SETup:ORFSpectrum:ICount:MAXimum?” on page 622.
	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 “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.
Query		Range: See “Integrity Indicator” on page 183. 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 “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 output RF spectrum due to modulation results.
Query		TX Carrier Power <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB 30 kHz Bandwidth Power <ul style="list-style-type: none"> • Range: –100 dBm to +100 dBm and 9.91 E+37 • Resolution: 0.01 dB Output RF Spectrum due to Modulation (Average) <ul style="list-style-type: none"> • Range: –200 dB to +100 dB and 9.91 E+37 • Resolution: 0.01 dB

FETCh:ORFSpectrum

FETCh:ORFSpectrum:MODulation:FREQuency[:OFFSet]?

Function	GSM	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. Frequencies must have a one-to-one correspondence to ORFS due to modulation frequency offsets that are currently turned on. Frequencies must be separated by commas. (See "SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]" for the command that turns on frequency offsets.) Each frequency value is (optionally) followed by: HZ KHZ MHZ GHZ . The default units are HZ (hertz).
	GPRS	
Query		Range: -200 dB to +100 dB and 9.91 E+37 Resolution: 0.01 dB
Programming Example 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.		

FETCh:ORFSpectrum:POWER?

Function	GSM	Returns the TX carrier power measurement result from the last ORFS measurement. This measurement is made using the method described in the "Transmit Power Measurement Description" on page 160.
	GPRS	
Query		Range: -100 dBm to +100 dBm and NAN. Resolution: 0.01 dB
Programming Example OUTPUT 714;"FETCh:ORFSpectrum:POWER:TXPOWER?" !Returns TX carrier power.		

FETCh:ORFSpectrum:POWER:BWIDth?

Function	GSM	Queries the ORFS 30 kHz bandwidth power measurement. See “Output RF Spectrum Measurement Description” on page 117.
	GPRS	
Query		Range: -100 dBm to +100 dBm and NAN. Resolution: 0.01 dB

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). 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.
	GPRS	
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). 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.
	GPRS	
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 "SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]" 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>Programming Example</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 "SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]" 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>Programming Example</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>		

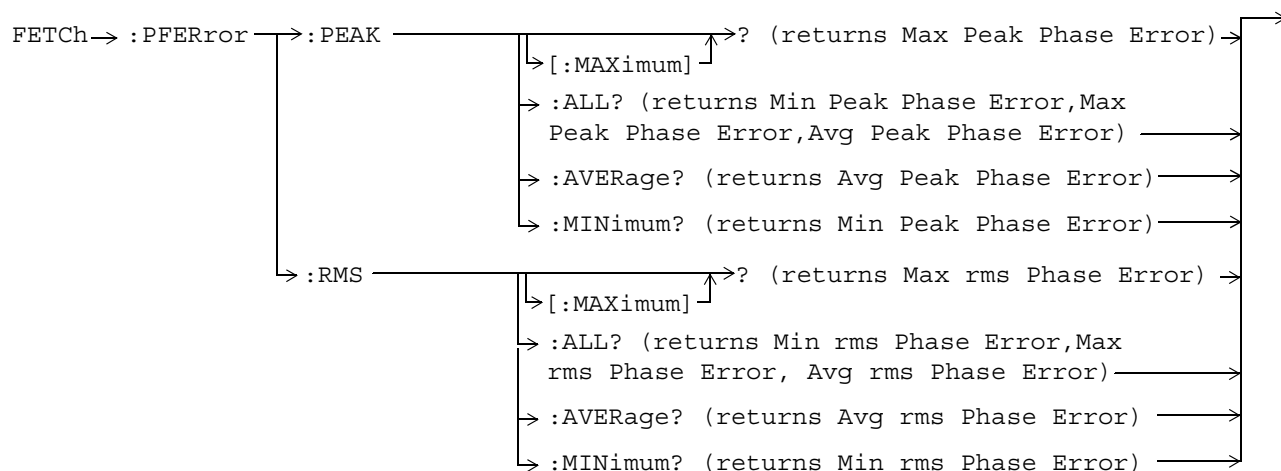
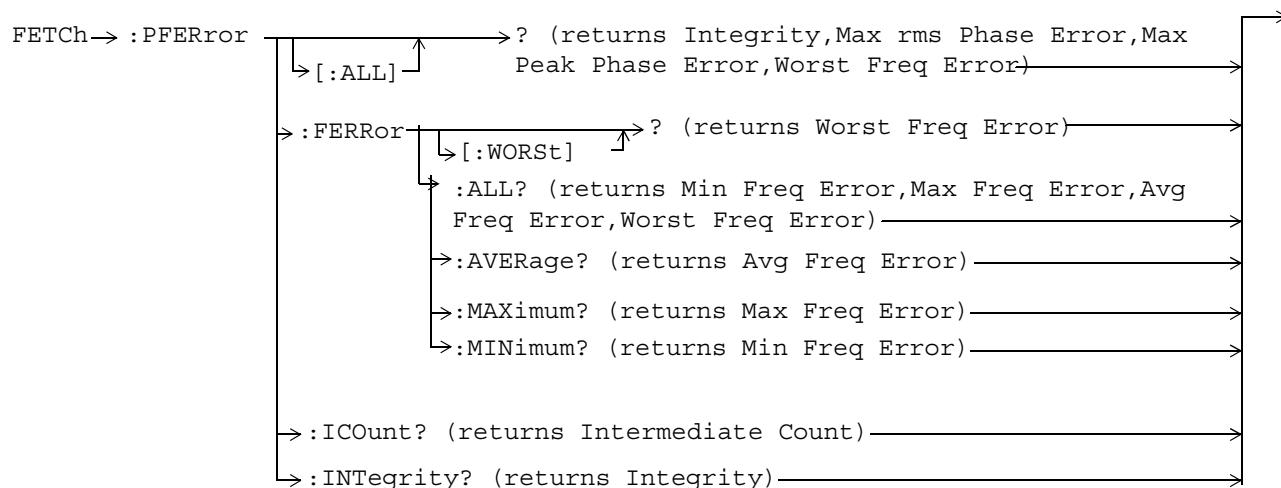
FETCh:ORFSpectrum:SWITChing:FREQuency[:OFFSet]:SDEVIation?

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 “SETup:ORFSpectrum:SWITChing:FREQuency[:OFFSet]” 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>Programming Example</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 “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.</p>
	GPRS	
Query		<p>Range: -100 dBm to +100 dBm and 9.91 E+37</p> <p>Resolution: 0.01 dB</p>
<p>Programming Example</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 313

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"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Worst Frequency Error</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) • Resolution: 0.1 kHz
<p>Programming Example</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

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">• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)• Resolution: 0.1 kHz <p>Maximum Frequency Error</p> <ul style="list-style-type: none">• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)• Resolution: 0.1 kHz <p>Average Frequency Error</p> <ul style="list-style-type: none">• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)• Resolution: 0.1 kHz <p>Worst Frequency Error</p> <ul style="list-style-type: none">• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)• Resolution: 0.1 kHz
Programming Example		
OUTPUT 714;"FETCh:PFERror:FERRor:ALL?" !Returns minimum, maximum, average and !worst frequency error results.		

FETCh:PFERror:FERRor AVERAge?

Function	GSM	Queries the single or average (from a multi-measurement) frequency error measurement result, in Hz.
	GPRS	
Query		<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:ICOut?

Function	GSM	Queries the intermediate count of phase and frequency multi-measurements completed. This number will increase to the value returned by "SETup:PFERror:COUNT:NUMBer" on page 630.
	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 "Integrity Indicator" on page 183 for descriptions of non-zero integrity indicators.
	GPRS	
Query		Range: See "Integrity Indicator" on page 183. 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

FETCh:PFERror:PEAK:ALL?

Function	GSM	Queries the minimum, maximum, and average peak phase error measurement result, in degrees.
	GPRS	
Query		Minimum Peak Phase Error <ul style="list-style-type: none">• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)• Resolution: 0.01 degrees
		Maximum Peak Phase Error <ul style="list-style-type: none">• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)• Resolution: 0.01 degrees
		Average Peak Phase Error <ul style="list-style-type: none">• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)• Resolution: 0.01 degrees
Programming Example		
OUTPUT 714;"FETCh:PFERror:PEAK:ALL?" !Returns minimum, maximum, and average peak phase error results.		

FETCh:PFERror:PEAK:AVERAge?

Function	GSM	Queries the single or average (from a multi-measurement) peak phase error measurement result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees

FETCh:PFERror:PEAK:MINImun?

Function	GSM	Queries the minimum (from a multi-measurement) peak phase error measurement result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees

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"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees <p>Average rms Phase Error</p> <ul style="list-style-type: none"> • Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) • Resolution: 0.01 degrees
Programming Example		
OUTPUT 714;"FETCh:PFERror:rms:ALL?" !Returns minimum, maximum, and average !rms phase error.		

FETCh:PFERror:RMS:AVERAge?

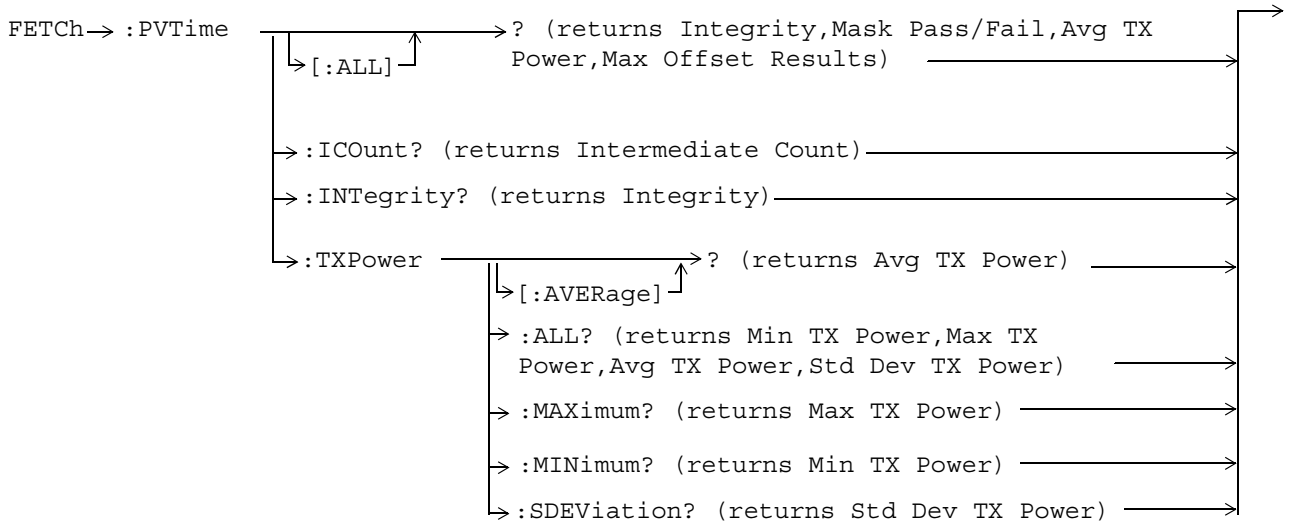
Function	GSM	Queries the single or average (from a multi-measurement) rms phase error measurement result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees

FETCH:PFERror

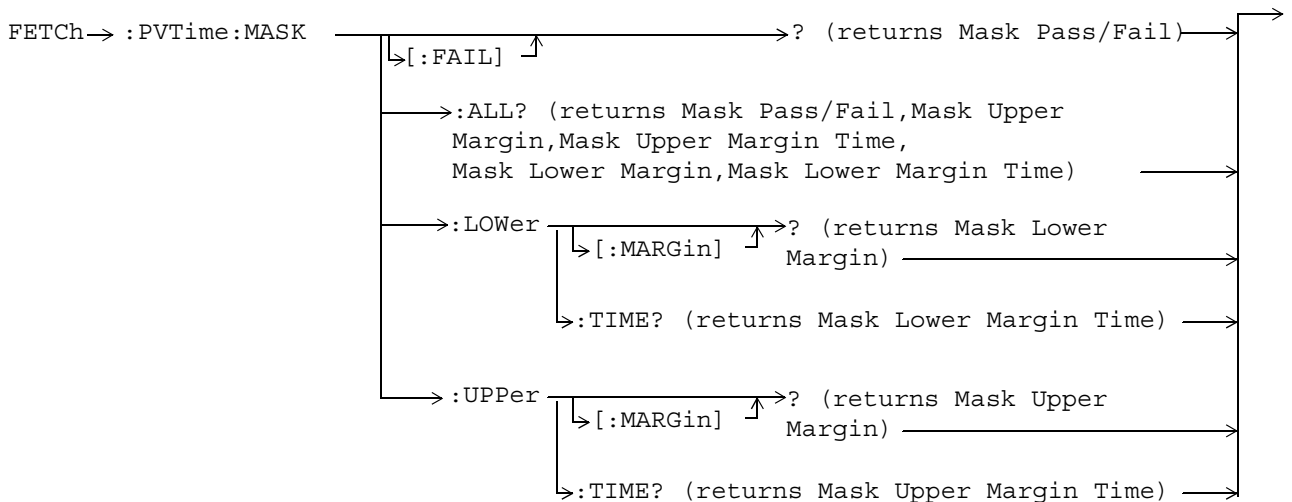
FETCH:PFERror:RMS:MINimum?

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

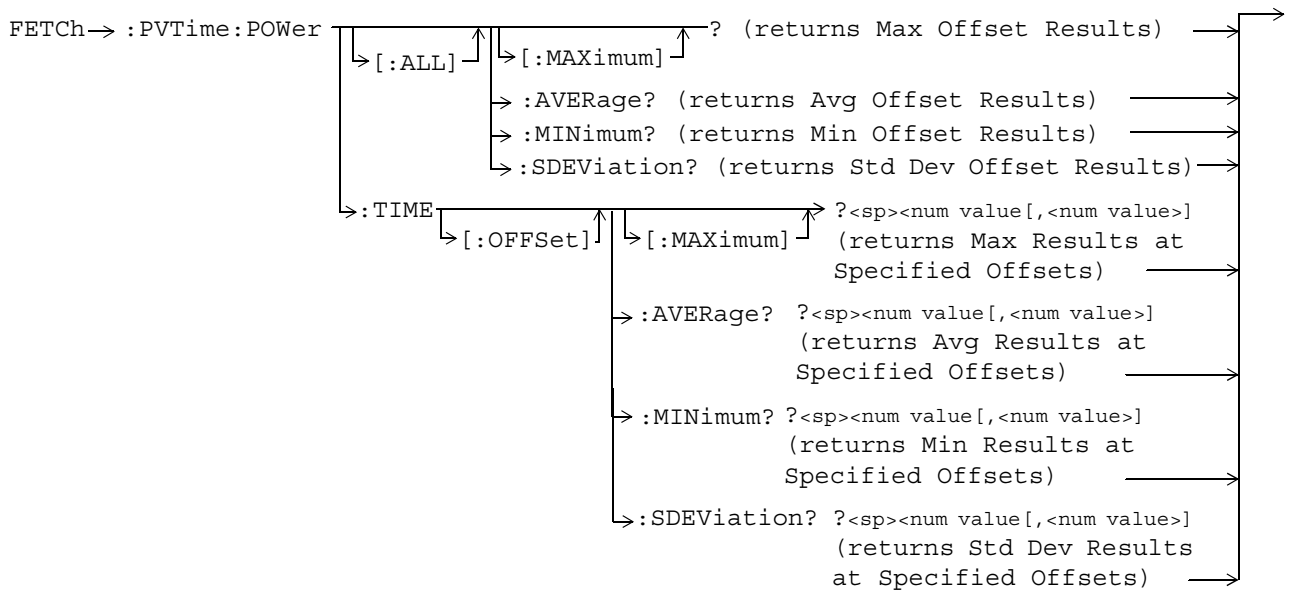


These commands are not applicable to GPRS.

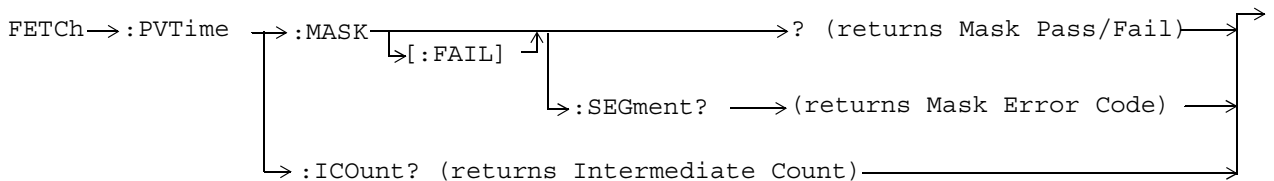


These commands are not applicable to GPRS.

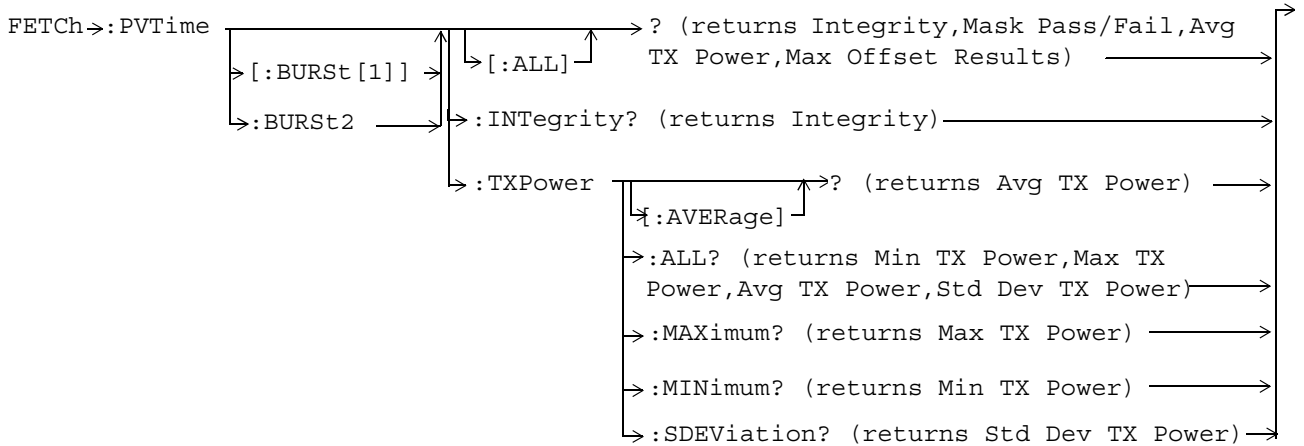
FETCh:PVTime



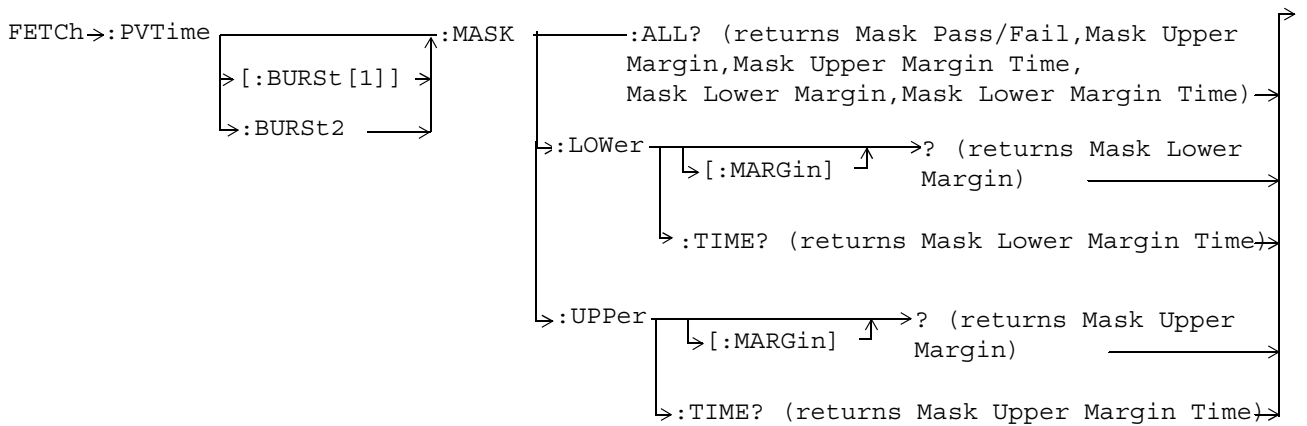
These commands are not applicable to GPRS.



These commands are not applicable to GSM.

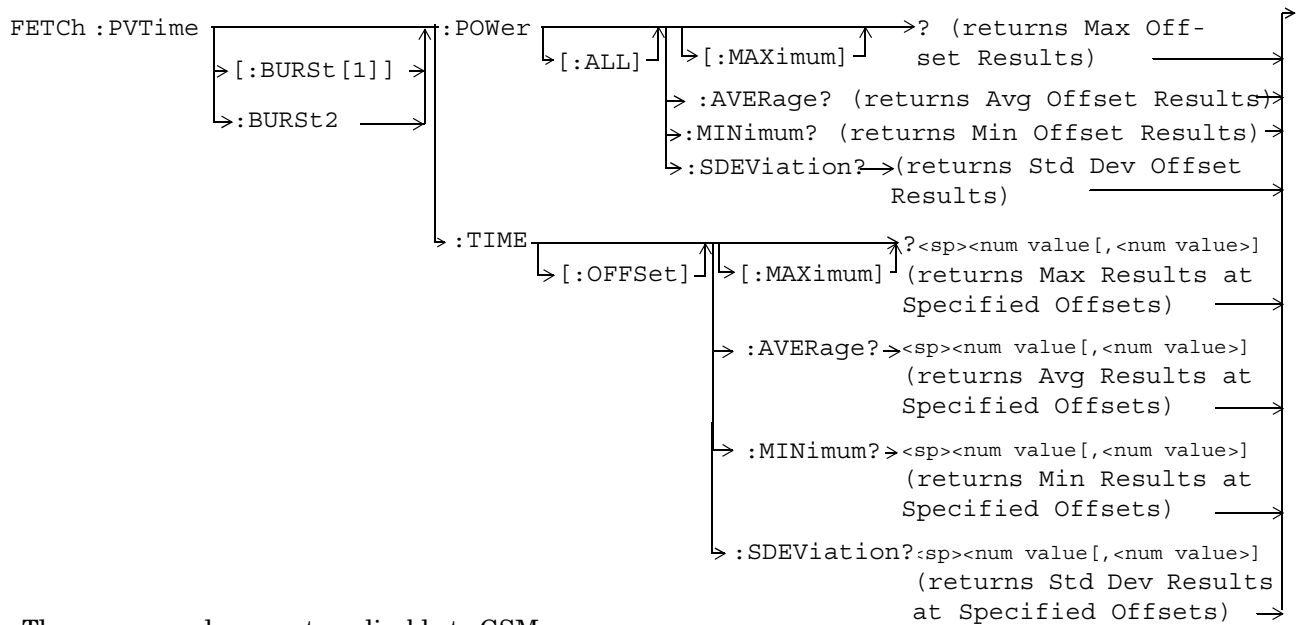


These commands are not applicable to GSM.



These commands are not applicable to GSM.

FETCh:PVTime



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

FETCh:PVTime[:ALL]?

Function	GSM	<p>Queries integrity indicator, mask pass/fail indicator, power versus time (PvT) transmit power (average), and PvT power (maximum) at up to 12 time offsets.</p> <p>The number of PvT measurement offsets that will be returned can be queried using the “SETup:PVTime:TIME:POINTs?” on page 639. The time offsets are set up using the command “SETup:PVTime:TIME[:OFFSet]” on page 637.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) <p>Power versus time TX carrier power</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time power (maximum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB

FETCh:PVTime:TXPower:ALL?

Function	GSM	Queries power versus time carrier power (average), power versus time carrier power (minimum), power versus time carrier power (maximum), and power versus time carrier power (standard deviation).
	GPRS	This command is not applicable to GPRS.
Query		<p>Power versus time carrier power (average)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (minimum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (maximum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (standard deviation)</p> <ul style="list-style-type: none"> • Range: 0 dB to 100 dB and 9.91 E+37 (NAN) • Resolution: 0.001 dB

FETCh:PVTime:TXPower:MINimum?

Function	GSM	Queries power versus time carrier power (minimum).
	GPRS	This command is not applicable to GPRS.
Query		<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	This command is not applicable to 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	This command is not applicable to 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	This command is not applicable to 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"> • Upper limit margin time • Upper limit margin result • Lower limit margin time • Lower limit margin result <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 “Typical GSM PvT Measurement” on page 136.</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 “Typical GSM PvT Measurement” on page 136.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) <p>Power versus time upper limit margin time worst case result</p> <ul style="list-style-type: none"> • Range: -50 μs to 593 μs and 9.91 E+37 (NAN) • Resolution: 1 ns <p>Power versus time upper limit margin worst case result:</p> <ul style="list-style-type: none"> • Range: -100 dB to 0 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time lower limit margin time worst case result</p> <ul style="list-style-type: none"> • Range: -50 μs to 593 μs and 9.91 E+37 (NAN) • Resolution: 1 ns <p>Power versus time lower limit margin worst case result</p> <ul style="list-style-type: none"> • Range: -100 dB to 0 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB

FETCh:PVTime:MASK[:FAIL]?

Function	GSM	Queries power versus time measurement mask pass/fail indicator.
	GPRS	
Query	Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)	

FETCh:PVTime:MASK[:FAIL]:SEGment?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This query returns the mask error code for the entire multislot configuration. This error code indicates which parts, if any are causing the multislot configuration to fail the power versus time mask.</p> <p>The error codes are:</p> <ul style="list-style-type: none"> • 0 = No Mask Failures • 1 (bit 1) = Rising Edge Failure • 2 (bit 2) = Falling Edge Failure • 4 (bit 3) = Active Part of First Burst • 8 (bit 4) = First Guard Period • 16 (bit 5) = Active Part of Second Burst <p>The above list shows values which can be returned if any single error causes the multislot configuration to fail the mask. (For example, if 4 is returned the failure is due to the active part of the first burst. Note that the value returned could indicate a combination of errors which is causing the multislot configuration to fail. For example, if 9 is returned, this indicates that a rising edge failure and the first guard period has caused the failure.</p>
Query	Range: 0 to 31	

FETCh:PVTime:MASK:UPPer[:MARGin]?

Function	GSM	<p>Queries the power versus time measurement upper limit margin worst case result.</p> <p>The upper limit margin, worst case result is the power versus time measurement with the least difference between measured power and the power level boundary specified by the power versus time mask. See the “Typical GSM PvT Measurement” on page 136.</p>
	GPRS	This command is not applicable to GPRS.
Query	<p>Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>	

FETCh:PVTime:MASK:UPPer:TIME?

Function	GSM	Queries the power versus time measurement's upper limit margin time, worst case result. The upper limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the upper power level boundary specified by the power versus time mask). See the "Typical GSM PvT Measurement" on page 136.
	GPRS	This command is not applicable to GPRS.
Query		Range: -50 μ s to 593 μ 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. The lower limit margin, worst case result is the power versus time measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask. See the "Typical GSM PvT Measurement" on page 136.
	GPRS	This command is not applicable to GPRS.
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. The lower limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement (the measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask). See the "Typical GSM PvT Measurement" on page 136.
	GPRS	This command is not applicable to GPRS.
Query		Range: -50 μ s to 593 μ s and 9.91 E+37 (NAN) Resolution: 1 ns

FETCh:PVTime:POWer[:ALL]:MINimum?

Function	GSM	Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Power levels are relative to the power versus time carrier power measurement. 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.
	GPRS	This command is not applicable to GPRS.
Query		Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN) Resolution: 0.01 dB

FETCh:PVTime:POWer[:ALL]:MAXimum?

Function	GSM	Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Power levels are relative to the power versus time carrier power measurement. 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.
	GPRS	This command is not applicable to GPRS.
Query		Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN) Resolution: 0.01 dB

FETCh:PVTime:POWer[:ALL]:AVERage?

Function	GSM	Queries the average power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on. Results are relative to the power versus time carrier power measurement. 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.
	GPRS	This command is not applicable to GPRS.
Query		Range: –100 dBc to +10 dBc and 9.91 E+37 (NAN) Resolution: 0.01 dB

FETCh:PVTime:POWer[:ALL]:SDEviation?

Function	GSM	<p>Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset that is currently turned on.</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	This command is not applicable to GPRS.
Query		<p>Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.001 dB</p>

FETCh:PVTime:POWer:TIME[OFFSet]:MINimum?

Function	GSM	<p>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).</p> <p>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. Measurements will be returned by this query in the same order they are listed in the command.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query.
<p>Programming Example</p> <pre> 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. </pre>		

FETCh:PVTime:Power:TIME[:OFFSet][:MAXimum]?

Function	GSM	<p>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).</p> <p>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. Measurements will be returned by this query in the same order they are listed in the command.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the "SETup:PVTime:TIME[:OFFSet]" query.
<p>Programming Example</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	<p>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).</p> <p>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. Measurements will be returned by this query in the same order they are listed in the command.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query.
<p>Programming Example</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 “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.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN) • Resolution: 0.001 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETUp:PVTime:TIME[:OFFSet]” query.
<p>Programming Example</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:ICOut?

Function	GSM	Queries the intermediate count of power versus time multi-measurements completed.
	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 “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: See “Integrity Indicator” on page 183.</p> <p>Resolution: 1</p>

**FETCh:PVTime[:BURSt[1]][:ALL]?
FETCh:PVTime:BURSt2[:ALL]?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries integrity indicator, mask pass/fail indicator, power versus time (PvT) transmit power (average), and PvT power (maximum) at up to 12 time offsets for the burst of the multislot configuration that you specify.</p> <p>The number of PvT measurement offsets that will be returned can be queried using the “SETup:PVTime[BURSt[1]]:TIME:POINts? SETup:PVTime:BURSt2:TIME:POINts?” on page 639. The time offsets are set up using the command “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” on page 637.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) <p>Power versus time TX carrier power</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time power (maximum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB

FETCh:PVTime[:BURSt[1]]:TXPower:ALL?FETCh:PVTime:BURSt2:TXPower:ALL?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the power versus time carrier power results for the burst of the multislot configuration that you specify. It returns the average, minimum, maximum, and standard deviation.
Query		<p>Power versus time carrier power (average)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (minimum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (maximum)</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time carrier power (standard deviation)</p> <ul style="list-style-type: none"> • Range: 0 dB to 100 dB and 9.91 E+37 (NAN) • Resolution: 0.001 dB

FETCh:PVTime[:BURSt[1]]:TXPower:MINimum?**FETCh:PVTime:BURSt2:TXPower:MINimum?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries power versus time minimum carrier power for the burst of the multislot configuration that you specify.
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

FETCh:PVTime[:BURSt[1]]:TXPower:MAXimum?**FETCh:PVTime:BURSt2:TXPower:MAXimum?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries power versus time maximum carrier power for the burst of the multislot configuration that you specify.
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

FETCh:PVTime**FETCh:PVTime[:BURSt[1]]:TXPower[:AVERage]?****FETCh:PVTime:BURSt2:TXPower[:AVERage]?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries power versus time average carrier power for the burst of the multislot configuration that you specify.
Query		Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB

FETCh:PVTime[:BURSt[1]]:TXPower:SDEVIation?**FETCh:PVTime:BURSt2:TXPower:SDEVIation?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries power versus time standard deviation for the burst of the multislot configuration that you specify.
Query		Range: 0 dB to 100 dB and 9.91 E+37 (NAN) Resolution: 0.001 dB

FETCh:PVTime[:BURSt[1]]:MASK:ALL?

FETCh:PVTime:BURSt2:MASK:ALL?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the mask pass/fail indicator and the following worst case margins for the specified burst of the multislot configuration:</p> <ul style="list-style-type: none"> • Upper limit margin time • Upper limit margin result • Lower limit margin time • Lower limit margin result <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 “Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 141.</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 “Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 141.</p>
Query		<p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN) <p>Power versus time upper limit margin time worst case result</p> <ul style="list-style-type: none"> • Range: -50 μs to 593 μs and 9.91 E+37 (NAN) • Resolution: 1 ns <p>Power versus time upper limit margin worst case result:</p> <ul style="list-style-type: none"> • Range: -100 dB to 0 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time lower limit margin time worst case result</p> <ul style="list-style-type: none"> • Range: -50 μs to 593 μs and 9.91 E+37 (NAN) • Resolution: 1 ns <p>Power versus time lower limit margin worst case result</p> <ul style="list-style-type: none"> • Range: -100 dB to 0 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB

FETCh:PVTime[:BURSt[1]]:MASK[:FAIL]?**FETCh:PVTime:BURSt2:MASK[:FAIL]?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries power versus time measurement mask pass/fail indicator for the burst of the multislot configuration that you specify.
Query		Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)

FETCh:PVTime[:BURSt[1]]:MASK:UPPer[:MARGIn]?**FETCh:PVTime:BURSt2:MASK:UPPer[:MARGIn]?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the power versus time measurement upper limit margin worst case result for the burst of the multislot configuration that you specify. The upper limit margin, worst case result is the power versus time measurement with the least difference between measured power and the power level boundary specified by the power versus time mask. See the “Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 141.
Query		Range: -100 dB to 0 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB

FETCh:PVTime[:BURSt[1]]:MASK:UPPer:TIME?**FETCh:PVTime:BURSt2:MASK:UPPer:TIME?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the power versus time measurement’s upper limit margin time, worst case result for the burst of the multislot configuration that you specify. The upper limit margin time result is the point in time, relative to bit 0 in the burst, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the upper power level boundary specified by the power versus time mask). See the “Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 141.
Query		Range: -50 μ s to 593 μ s and 9.91 E+37 (NAN) Resolution: 1 ns

FETCh:PVTime[:BURSt[1]]:MASK:LOWer[:MARGin]?
FETCh:PVTime:BURSt2:MASK:LOWer[:MARGin]?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the power versus time measurement's lower limit margin, worst case result for the burst of the multislot configuration that you specify. The lower limit margin, worst case result is the power versus time measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask. See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 141.
Query		Range: -100 dB to 0 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB

FETCh:PVTime[:BURSt[1]]:MASK:LOWer:TIME?
FETCh:PVTime:BURSt2:MASK:LOWer:TIME?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the power versus time measurement's lower limit margin time, worst case result for the burst of the multislot configuration that you specify. The lower limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement (the measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask). See the "Typical GPRS PvT Mask for a Two Burst Multislot Configuration" on page 141.
Query		Range: -50 μ s to 593 μ s and 9.91 E+37 (NAN) Resolution: 1 ns

FETCh:PVTime[:BURSt[1]]:POWER[:ALL]:MINimum?
FETCh:PVTime:BURSt2:POWER[:ALL]:MINimum?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify. Power levels are relative to the power versus time carrier power measurement. The "SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]" command sets up the number of offsets that are turned on and their time values. The "SETup:PVTime[BURSt[1]]:TIME:POINts? SETup:PVTime:BURSt2: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: -100 dBc to +10 dBc and 9.91 E+37 (NAN) Resolution: 0.01 dB

**FETCh:PVTime[:BURSt[1]]:POWer[:ALL][:MAXimum]?
FETCh:PVTime:BURSt2:POWer[:ALL][:MAXimum]?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify. Power levels are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime[BURSt[1]]:TIME:POINts? SETup:PVTime:BURSt2: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>
Query		<p>Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCh:PVTime[:BURSt[1]]:POWer[:ALL]:AVERage?
FETCh:PVTime:BURSt2:POWer[:ALL]:AVERage?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the average power levels, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify. Results are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime[BURSt[1]]:TIME:POINts? SETup:PVTime:BURSt2: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>
Query		<p>Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

FETCh:PVTime[:BURSt[1]]:POWEr[:ALL]:SDEVIation?**FETCh:PVTime:BURSt2:POWEr[:ALL]:SDEVIation?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset that is currently turned on for the burst of the multislot configuration that you specify.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. The “SETup:PVTime[BURSt[1]]:TIME:POINts? SETup:PVTime:BURSt2: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>
Query		<p>Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)</p> <p>Resolution: 0.001 dB</p>

FETCh:PVTime[:BURSt[1]]:POWEr:TIME[OFFSet]:MINimum?**FETCh:PVTime:BURSt2:POWEr:TIME[OFFSet]:MINimum?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the minimum power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2: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.</p>
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” query.
<p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MINIMUM? 0US, 570.8US" !Returns the minimum of power versus time measurements at the 0.0 us and !570.8 us offsets.</pre>		

FETCh:PVTime[:BURSt[1]]:POWer:TIME[:OFFSet][:MAXimum]?
FETCh:PVTime:BURSt2:POWer:TIME[:OFFSet][:MAXimum]?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the maximum power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. Measurements are returned by this query in the same order they are listed in the command.</p>
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” query.
<p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MAXIMUM? 0US, 570.8US" !Returns the maximum of power versus time measurements at the 0.0 us !and 570.8 us offsets.</pre>		

FETCh:PVTime[:BURSt[1]]:POWER:TIME[:OFFSet]:AVERAge?
FETCh:PVTime:BURSt2:POWER:TIME[:OFFSet]:AVERAge?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the average power levels, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. Measurements are returned by this query in the same order they are listed in the command.</p>
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN) <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” query.
<p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PVTIME:BURSt2:POWER:TIME:OFFSET:AVERAGE? 0US, 570.8US" !Returns the average of power versus time measurements at the !0.0 us and 570.8 us offsets.</pre>		

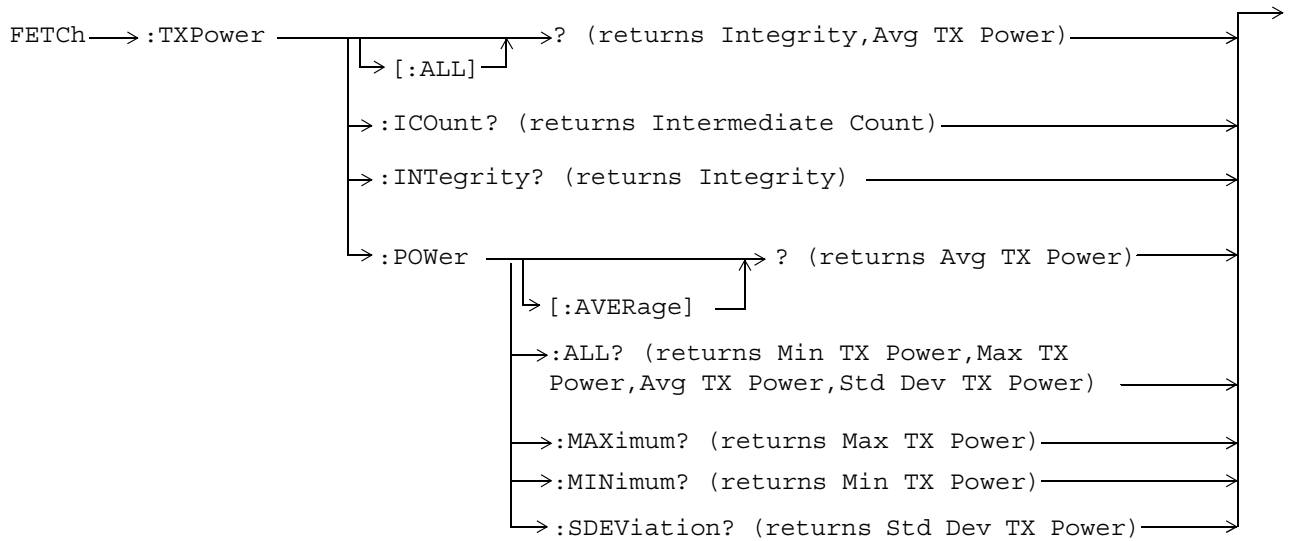
FETCh:PVTime[:BURSt[1]]:POWER:TIME[:OFFSet]:SDEVIation?
FETCh:PVTime:BURSt2:POWER:TIME[:OFFSet]:SDEVIation?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset appended to this command. The query returns the results for the burst that you specify. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) is returned for specified offsets that do not correspond to offsets currently turned on).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” command sets up the number of offsets that are turned on and their time values. Measurements are returned by this query in the same order they are listed in the command.</p>
Query		<p>Power levels:</p> <ul style="list-style-type: none"> • Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN) • Resolution: 0.001 dB <p>Time offsets:</p> <ul style="list-style-type: none"> • 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). • Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet] SETup:PVTime:BURSt2:TIME[:OFFSet]” query.
<p>Programming Example</p> <pre>OUTPUT 714;"FETCh:PVTime:POWER:TIME:OFFSet:SDEVIation? 0US, 570.8US" !Returns the standard deviation of power versus time measurements at the 0.0 us and 570.8 us offsets.</pre>		

FETCh:PVTime[:BURSt[1]]:INTEgrity?
FETCh:PVTime:BURSt2:INTEgrity?

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the integrity indicator for the power versus time measurement. This query returns the integrity indicator for the burst that you specify. Zero indicates a normal result.</p> <p>See “Integrity Indicator” on page 183 for descriptions of non-zero integrity indicators.</p>
Query		<p>Range: See “Integrity Indicator” on page 183.</p> <p>Resolution: 1</p>

FETCh:TXPower



“Diagram Conventions” on page 313

FETCh:TXPower

FETCh:TXPower[:ALL]?

Function	GSM	Queries integrity indicator and average transmit power.
	GPRS	A value of zero for the integrity indicator is normal. See “Integrity Indicator” on page 183 for non-zero integrity indicators.
Query		Integrity: <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 Transmit power: <ul style="list-style-type: none">• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)• Resolution: 0.01 dB

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 “Integrity Indicator” on page 183.
Query		Range: See “Integrity Indicator” on page 183. 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"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Minimum:</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Maximum:</p> <ul style="list-style-type: none"> • Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>Standard deviation:</p> <ul style="list-style-type: none"> • Range: 0 dB to 100 dB and 9.91 E+37 (NAN) • Resolution: 0.001 dB

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 526

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 191.

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 216.

NOTE Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. The best practice (during remote operation) is to use single measurement mode. This simplifies the tasks of starting concurrent measurements, then using the INIT subsystem commands to determine which measurements are ready to be FETChed.

```

10 OUTPUT 714;"SETup:ALL:CONTinuous:OFF" ! selects single measurement mode
20 OUTPUT 714;"INITiate:TXPower;PFERror" ! starts TX power/phase frequency error measurement
30 LOOP
40 OUTPUT 714;"INITiate:DONE?" !query to find out if any measurements are done
50 ENTER 714;Meas_complete$
60 SELECT Meas_complete$
70 CASE "TXP" !tests for the string "TXP" which would indicate TX power measurement is done
80 OUTPUT 714;"FETCh:TXPower:POWer?" !Queries average TX power measurement
90 ENTER 714;Avg_tx_power
100 CASE "PFER" !tests for the string "PFER" which would indicate phase/frequency error
measurement is done
110 OUTPUT 714;"FETCh:PFERror:RMS?" !Queries PFER maximum phase error measurement
120 ENTER 714;Max_phs_error
130 END SELECT
140 EXIT IF Meas_complete$ = "NONE"
150 END LOOP
160 END

```

INITiate commands should be sent only when the test set has finished performing any operations, such as handovers, that require settling. For example, the following code performs a handover to a new traffic channel using the :SEQ (sequential) appendage, then initiates a TX power measurement.

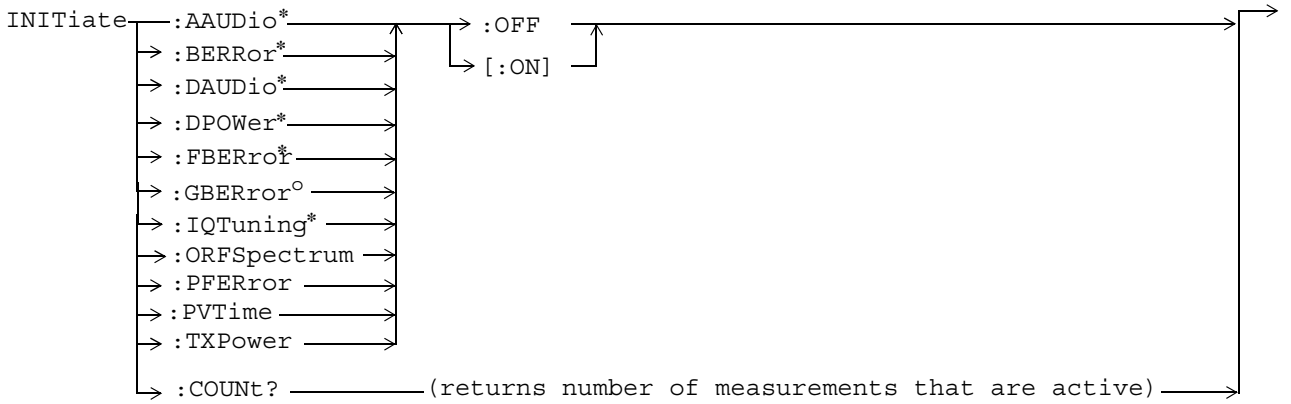
```

OUTPUT 714;"CALL:TCH:SEQ 65"
!Hands over traffic channel to channel 65, waits for process to complete before accepting next
command

OUTPUT 714;"INITiate:TXPower"
!Initiates TX power measurement

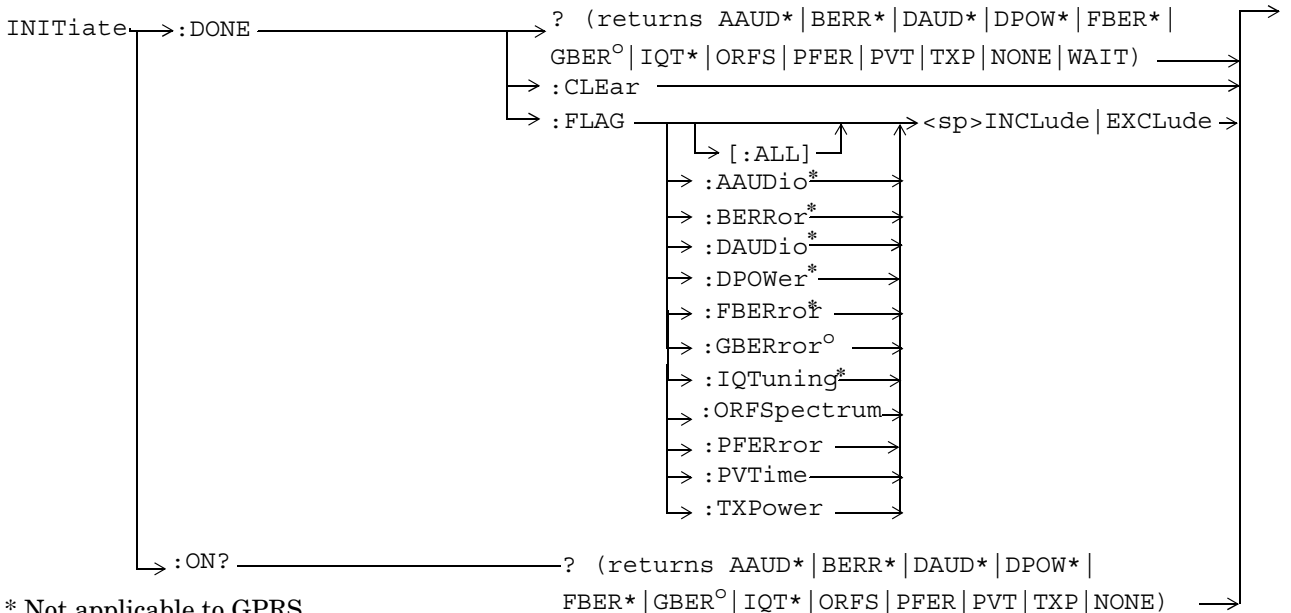
```

INITiate



* Not applicable to GPRS

° Not applicable to GSM



* Not applicable to GPRS.

° Not applicable to GSM

“Diagram Conventions” on page 313

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 “SETup Subsystem” on page 559 and “FETCh? Subsystem” on page 446. One or more measurements may be initiated on the same program line. See “Concurrent Measurements” on page 179. This command is also used to activate a measurement. See “INITiate Programming Examples (how INIT commands are used)” on page 524.

Programming Example

```
OUTPUT 714;"INITIATE:TXPOWER:ON" !Initiates a TX Power measurement.
OUTPUT 714;"INITIATE:TXPOWER;PFERROR:ON" !Initiates TX Power and
!phase and frequency error measurements.
OUTPUT 714;"INITIATE:PVTIME;ORFSPECTRUM;FBERROR:ON" !Initiates power
!versus time output RF spectrum, and fast bit error rate measurements.
```

INITiate:<measurement mnemonic>:OFF

Function	GSM	Deactivates the selected measurement. See “Measurement States” on page 216.
	GPRS	Only one measurement can be deactivated at a time. To stop one or more measurements and leave them in the active state, see “ABORt” on page 316.

Programming Example

```
OUTPUT 714;"INITIATE:TXPOWER:OFF" !Deactivates TX power measurement.
```

INITiate:COUNT?

Function	GSM	Queries the number of measurements that have been initiated (that are activate). See “Measurement States” on page 216.
	GPRS	
Query		Range: 0 to 10 Resolution: 1

INITiate

INITiate:DONE?

Function	GSM	Queries (one at a time) which measurements if any are available or have timed out.
	GPRS	See “Measurement Event Synchronization” on page 191 for details on how to use this command. See “Measurement States” on page 216 to understand the test set’s measurement states. See “INITiate:DONE:FLAG:<measurement mnemonic>” on page 529 for include or exclude commands. Note that WAIT is returned when no measurements are done. NONE is returned when all measurements are done.
Query	GSM	Range: NONE TXP PVT PFER ORFS AAUD DAUD DPOW FBER BERR IQT WAIT
	GPRS	Range: NONE TXP PVT PFER ORFS GBER WAIT

INITiate:DONE:CLEar

Function	GSM	Clears the done flag from all measurements. See “INITiate:DONE?” on page 528.
	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.
	GPRS	If a measurements trigger arm, see “Trigger Arm (Single or Continuous) Description” on page 216, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see “INITiate:DONE?” on page 191. 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 “Preset Descriptions” on page 772.
Setting		Range <ul style="list-style-type: none">• INCLude: include all measurements• EXCLude: exclude all measurements
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 “Trigger Arm (Single or Continuous) Description” on page 216, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see “INITiate:DONE?” on page 191. 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 “Preset Descriptions” on page 772.</p>
Setting	GSM	<p>Range</p> <ul style="list-style-type: none"> INCLude :AAUDio :BERRor :DAUDio :DPOWer :FBERRor :IQTuning :ORFSpectrum :PFERRor :PVTime :TXPower EXCLude :AAUDio :BERRor :DAUDio :DPOWer :FBERRor :IQTuning :ORFSpectrum :PFERRor :PVTime :TXPower
	GPRS	<p>Range</p> <ul style="list-style-type: none"> INCLude GBERRor :ORFSpectrum :PFERRor :PVTime :TXPower EXCLude GBERRor :ORFSpectrum :PFERRor :PVTime :TXPower
Related Topics		“INITiate:DONE?” on page 528
<p>Programming Example</p> <pre>OUTPUT 714;" INITIATE:DONE:FLAG:PFERROR EXCLUDE" !excludes PFERROR measurements !from contributing to 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 “INITiate:<measurement mnemonic>:[ON]” on page 527.
	GPRS	
Query	GSM	Range: AAUD BERR DAUD DPOW FBERR IQT NONE ORFS PFER PVT TXP
	GPRS	Range: GBER NONE ORFS PFER PVT TXP

READ? Subsystem

Syntax Diagram and Command Descriptions

“READ”

Description

The READ? command provides a sequential method to make measurements and retrieve the results. READ? will hang the GPIB bus until the measurement is completed, or until the timeout value has been exceeded. Associated SETUp commands (for each measurement) are used with the READ? command to retrieve desired measurement results in a sequential manner.

Sending a READ? command is equivalent to an INITiate/FETCh cycle for a measurement. A READ? command executes an abort action on that measurement followed by an INITiate and a FETCh?.

READ? commands can be mixed with FETCh? queries in order to make combinations of sequential and overlapped operations. One measurement can be issued a READ? command (sequential), and the next measurement can be issued INITiate/FETCh? commands (overlapped), if necessary.

The advantage of using the READ? commands to obtain measurement results, as opposed to the INITiate/FETCh method is:

- It is simpler. Fewer commands are required to obtain measurement results.

Some disadvantages of using READ? over INITiate and FETCh are:

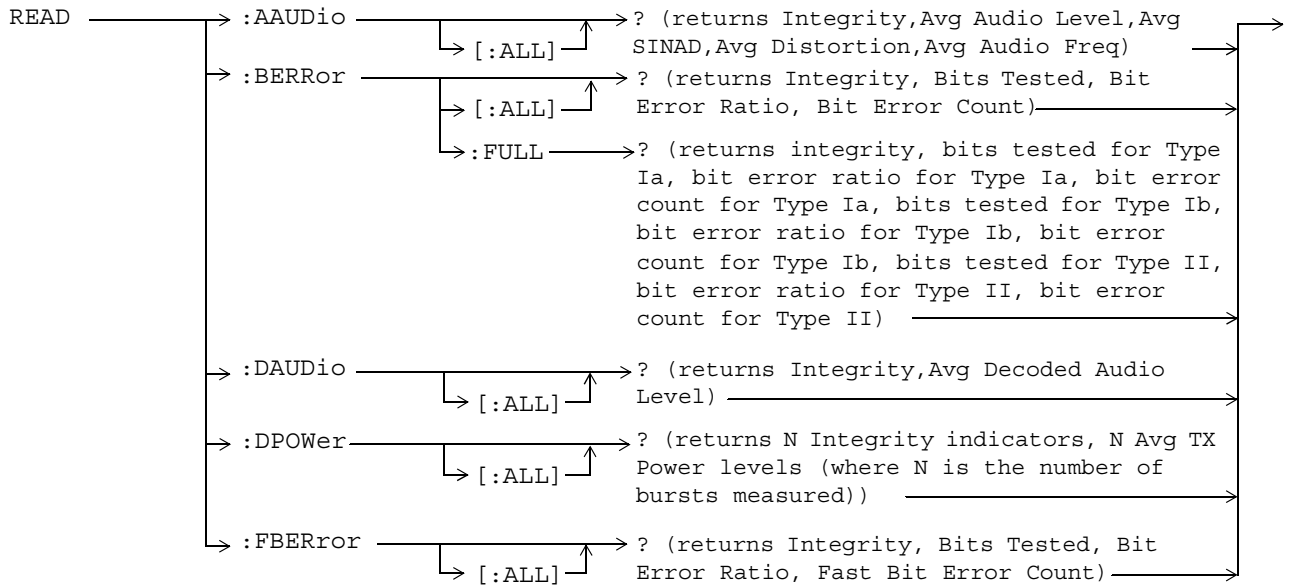
- The test set does not process any additional GPIB commands until the requested measurement results are available.
- The sequential nature of the READ? command does not allow the user to make concurrent measurements. Concurrent measurements require the overlapped commands INITiate, DONE? and FETCh? .
- The READ? command does not provide measurement results such as statistics that are available using the INITiate/FETCh method.
- The READ? commands have pre-defined measurement results. If additional results are needed from a measurement they may be obtained with a FETCh? query.

NOTE Trigger arming for each measurement is controlled in the SETUp subsystem. Best practice during remote operation is to set trigger arm to single (Continuous Off).

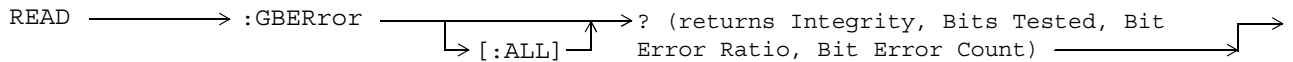
Programming Example

```
OUTPUT 714;"READ:TXPower?" !Starts TX power measurement. As soon as the
                             !measurement cycle has completed, the test set
                             !provides the TX power measurement results to the
                             !controlling application.
ENTER 714;integrity, tx_carrier_power !Enters the integrity indicator and
                                       !TX carrier power measurement into
                                       !controlling application.
```

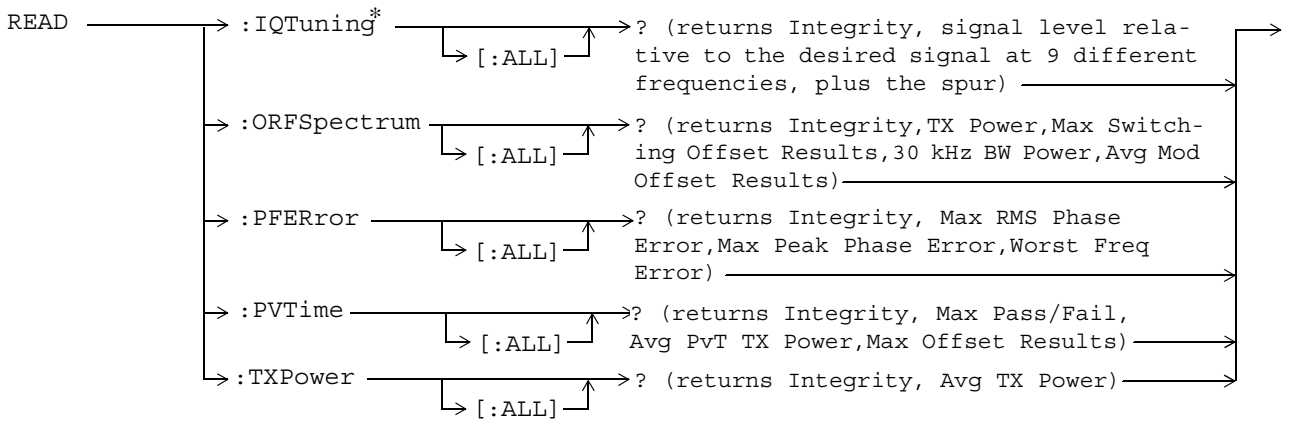
READ



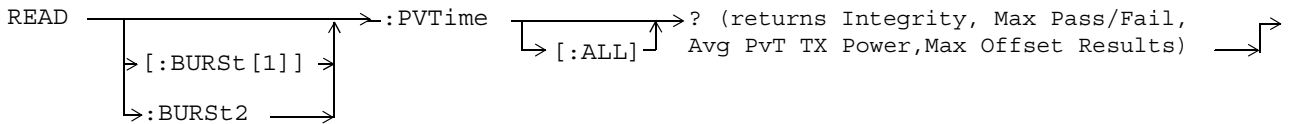
These commands are not applicable to GPRS.



* This command is not applicable to GSM.



* Not applicable to GPRS.



This command is not applicable to GSM.

“Diagram Conventions” on page 313

READ

READ:AAudio[:ALL]?

Function	GSM	<p>Queries (initiates and fetches) one analog audio measurement as a sequential operation.</p> <p>Returns an integrity indicator (see “Integrity Indicator” on page 183), average analog audio level, average SINAD, average distortion and the average audio frequency. Values are returned in a comma-separated list.</p> <p>Returns Integrity Indicator, see “Integrity Indicator” on page 183 and analog audio (average). The FETCh command should be used to obtain other measurement results. See “FETCh:AAudio” on page 447.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Analog audio (average)</p> <ul style="list-style-type: none"> • Range: 0 to 20 volts • Resolution: 0.1mv

READ:BERRor[:ALL]?

Function	GSM	<p>Queries (initiates and fetches) one RX bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator see “Integrity Indicator” on page 183, Bits Tested, Bit Error Ratio and Bit Error Count, for the bit type set using “SETup:BERRor[:TYPE]” on page 571. (A similar query, “READ:BERRor:FULL?” on page 535, returns the same results but for all residual, or all non-residual bit types simultaneously.) The FETCh command should be used to obtain other measurement results. See “FETCh:BERRor” on page 456.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to (<RX bits to test +131) and 9.91E+37 (NAN) • Resolution: 1 <p>Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 1 <p>Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to (<RX bits to test +131) and 9.91E+37 (NAN) • Resolution: 1

READ:BERRor:FULL?

Function	GSM	<p>Queries (initiates and fetches) one RX bit error measurement as a sequential operation. Either all of the residual or non-residual results are returned, depending on the type of bit error measurement set using "SETup:BERRor[:TYPE]" on page 571.</p> <p>Returns Integrity Indicator (see "Integrity Indicator" on page 183), Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II.</p> <p>(A similar query, "READ:BERRor[:ALL]?" on page 534, returns the same results but only for the bit type previously set using "SETup:BERRor[:TYPE]" on page 571.)</p> <p>The FETCh command should be used to obtain other measurement results. See "FETCh:BERRor" on page 456.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See "Integrity Indicator" on page 183. • Resolution: 1 <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 999000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 999000 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 2637369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 2637369 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to 15584400 and 9.91E+37 (NAN) • Resolution: 1 <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 0.01 <p>Type II Bit error count</p> <ul style="list-style-type: none"> • Range: 0 to 15584400 and 9.91E+37 (NAN) • Resolution: 1

READ

READ:DAUDIO[:ALL]?

Function	GSM	Queries (initiates and fetches) one decoded audio (uplink speech level) measurement as a sequential operation. Returns Integrity Indicator see “Integrity Indicator” on page 183 and decoded audio (average). The FETCh command should be used to obtain other measurement results. See “FETCh:DAUDIO” on page 464.
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicator <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 Decoded audio (average) <ul style="list-style-type: none">• Range: 0 to 100% FS (full scale)• Resolution: 0.01% FS

READ:DPOWER[:ALL]?

Function	GSM	Queries the Dynamic Power measurement results. Query returns N integrity indicators and N average TX power levels (where N is the number of bursts measured). To set the number of bursts you want to measure, use “SETup:DPOWER:COUNT:NUMBER[:SElected]” on page 592.
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicators for each individual burst <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 Average TX power levels for each individual burst <ul style="list-style-type: none">• Range: -100 to +100 dBm and 9.91 E+37 (NAN)• Resolution: 0.01 dBm

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 “Integrity Indicator” on page 183, 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 “FETCh:FBERror” on page 471.</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Bits tested</p> <ul style="list-style-type: none"> • Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN) • Resolution: 1 <p>Bit error ratio</p> <ul style="list-style-type: none"> • Range: 0 to 100 and 9.91E+37 (NAN) • Resolution: 1 <p>Fast bit error count</p> <ul style="list-style-type: none"> • Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN) • Resolution: 1

READ

READ:GBERror[:ALL]?

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries (initiates and fetches) one bit error measurement as a sequential operation. Returns Integrity Indicator see “Integrity Indicator” on page 183, Bits Tested, Bit Error Ratio, and Bit Error Count. The FETCh command should be used to obtain other measurement results. See “FETCh:GBERror” on page 474.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 <p>Bits tested</p> <ul style="list-style-type: none">• Range: 0 to 999,427 and 9.91E+37 (NAN)• Resolution: 1 <p>Bit error ratio</p> <ul style="list-style-type: none">• Range: 0 to 100 and 9.91E+37 (NAN)• Resolution: 1 <p>Bit error count</p> <ul style="list-style-type: none">• Range: 0 to 999,427 and 9.91E+37 (NAN)• Resolution: 1

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, ± 67.7083 kHz, ± 135.417 kHz, ± 203.125 kHz, ± 270.833 kHz. The spur measurement result is also returned.</p> <p>The FETCh command should be used to return other measurement results. See “FETCh:IQTuning” on page 477.</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91 E+37 (NAN) • Resolution: 0.01 dB <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> • -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 <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> • Range: -100 to +100 dB and 9.91E+37 (NAN) • Resolution: 0.01 dB

READ

READ:ORFSpectrum[:ALL]?

Function	GSM	Queries (initiates and fetches) one output RF spectrum measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see “Integrity Indicator” on page 183, TX Power, Output RF Spectrum due to Switching (Max), 30 kHz Bandwidth Power, and Output RF Spectrum due to Modulation (Average). The FETCh command should be used to obtain other measurement results. See “FETCh:ORFSpectrum” on page 481.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 <p>TX power</p> <ul style="list-style-type: none">• Range: -100 to +100 dBm and 9.91E+37 (NAN)• Resolution: 0.01 dB <p>Output RF spectrum due to switching (Max)</p> <ul style="list-style-type: none">• Range: 0 to 8 comma separated values -100 to +100 dBm and 9.91E+37 (NAN)• Resolution: 0.01 dB <p>30 kHz bandwidth power</p> <ul style="list-style-type: none">• Range: -100 to +100 dBm and 9.91E+37 (NAN)• Resolution: 0.01 dB <p>Output RF spectrum due to modulation (average)</p> <ul style="list-style-type: none">• Range: 0 to 22 comma separated values -200 to +100 dBm and 9.91E+37 (NAN)• Resolution: 0.01 dB

READ:PFERror[:ALL]?

Function	GSM	Queries (initiates and fetches) one Phase and Frequency Error measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see “Integrity Indicator” on page 183, RMS Phase Error (Max), Peak Phase Error(Max), Frequency Error (Worst). The FETCh command should be used to obtain other measurement results. See “FETCh:PFERror” on page 488. Worst frequency error (negative or positive) is the value furthest from zero.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>rms phase error (max)</p> <ul style="list-style-type: none"> • Range: 0 to 180 degrees and 9.91E+37 (NAN) • Resolution: 0.01 dB <p>Peak phase error (max)</p> <ul style="list-style-type: none"> • Range: 0 to 180 degrees and 9.91E+37 (NAN) • Resolution: 0.01 degrees <p>Frequency error (worst)</p> <ul style="list-style-type: none"> • Range: -750 kHz to +750 kHz and 9.91E+37 (NAN) • Resolution: 0.01 Hz

READ

READ:PVTime[:ALL]?

Function	GSM	Queries (initiates and fetches) one power versus time measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see “Integrity Indicator” on page 183, Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See “FETCh:PVTime” on page 495.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none">• Range: See “Integrity Indicator” on page 183.• Resolution: 1 <p>Mask pass/fail</p> <ul style="list-style-type: none">• Range: 0 1 and 9.91E+37 (NAN) <p>Power versus time transmit power</p> <ul style="list-style-type: none">• Range: -100 to +100 dBm and 9.91E+37 (NAN)• Resolution: 0.01 dB <p>Power versus time offset (max)</p> <ul style="list-style-type: none">• 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)• Resolution: 0.01 dB

**READ[:BURSt[1]]:PVTime[:ALL]?
 READ:BURSt2:PVTime[:ALL]?**

Function	GSM	This command is not applicable for GSM.
	GPRS	Queries (initiates and fetches) one power versus time measurement as a sequential operation for the burst in the multislot configuration that you specify. Returns Integrity Indicator see “Integrity Indicator” on page 183, Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See “FETCh:PVTime” on page 495.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Mask pass/fail</p> <ul style="list-style-type: none"> • Range: 0 1 and 9.91E+37 (NAN) <p>Power versus time transmit power</p> <ul style="list-style-type: none"> • Range: -100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB <p>Power versus time offset (max)</p> <ul style="list-style-type: none"> • 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) • Resolution: 0.01 dB

READ:TXPower[:ALL]?

Function	GSM	Queries (initiates and fetches) one TX power measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see “Integrity Indicator” on page 183 and transmit power (average). The FETCh command should be used to obtain other measurement results. See “FETCh:TXPower” on page 521.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> • Range: See “Integrity Indicator” on page 183. • Resolution: 1 <p>Transmit power (average)</p> <ul style="list-style-type: none"> • Range: -100 to +100 dBm and 9.91E+37 (NAN) • Resolution: 0.01 dB

RFANalyzer Subsystem

Last updated: February 22, 2001

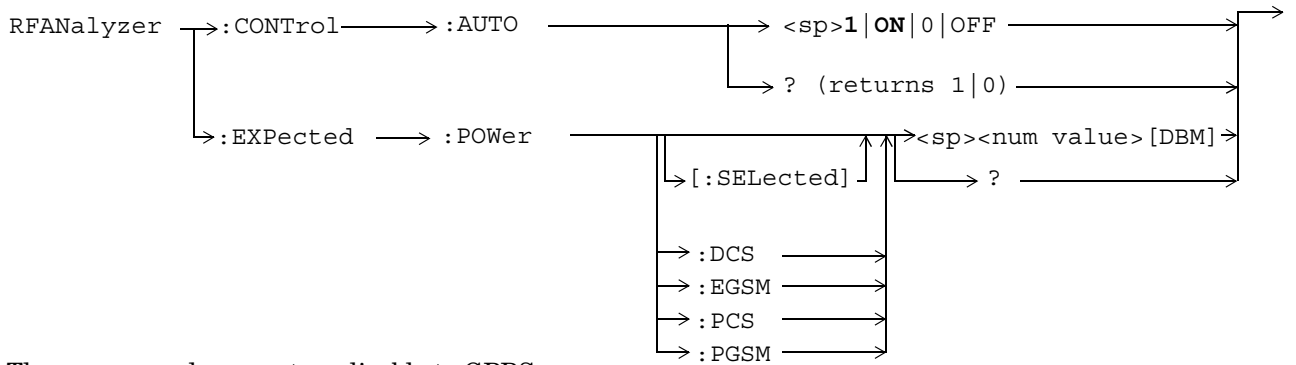
Description

The RFANalyzer command subsystem performs “lower-level” functions that control the Test Set's measuring receiver. Most of these functions are normally controlled indirectly by commands in other subsystems. One exception would be when operating in Test Mode. For example, the command `CALL:TChannel:<channel number>` would set the `RFANalyzer:EXpected:FREquency` parameter to the frequency that maps to the uplink traffic channel specified.

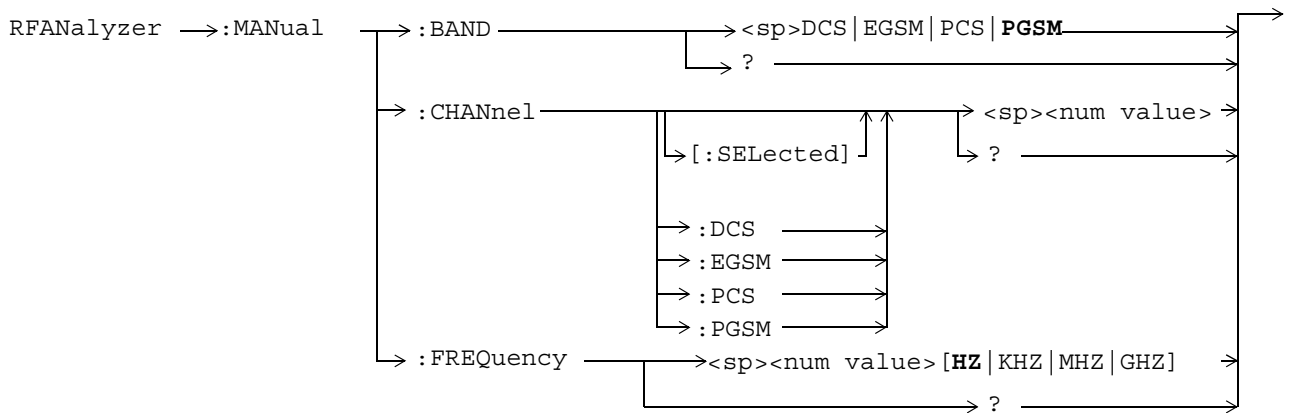
Syntax Diagrams and Command Descriptions

“RFANalyzer” on page 545

RFAnalyzer

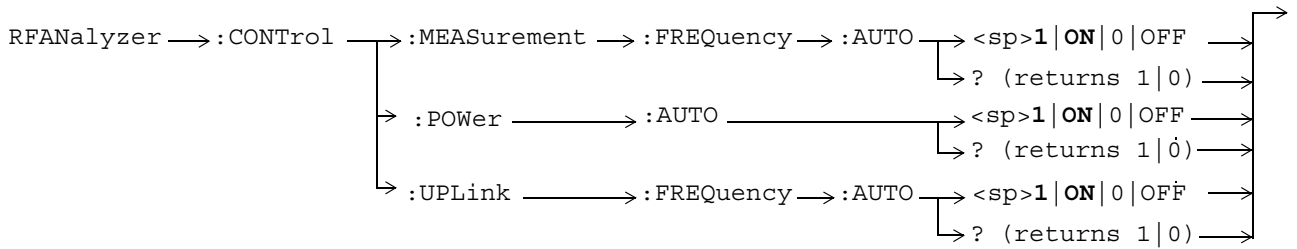


These commands are not applicable to GPRS.

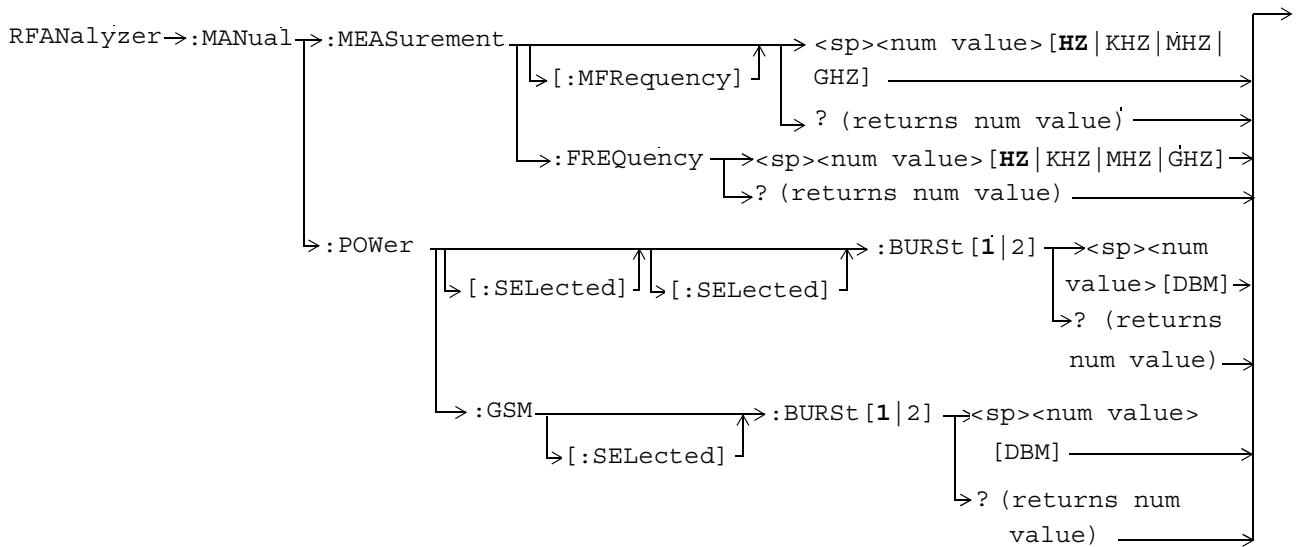


These commands are not applicable to GPRS.

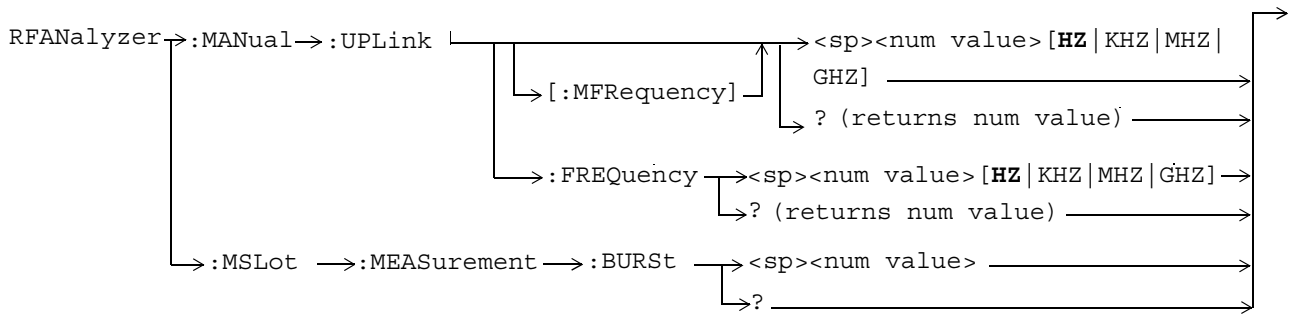
RFAnalyzer



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 313

RFAnalyzer:EXpected:POWer:DCS

Function	GSM	Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See “Receiver Control” on page 760.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See “Measurement Related Configuration” on page 823. Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see “Measurement Related Configuration” on page 823. Resolution: .01 dBm
*RST setting		Sets the receiver control to auto Band: PGSM Expected Power: +13dBm
Programming Example		
<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 “Receiver Control” on page 760.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See “Measurement Related Configuration” on page 823. Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See “Measurement Related Configuration” on page 823. Resolution: .01 dBm
*RST setting		Sets the receiver control to auto Band: PGSM Expected Power: +13 dBm
Programming Example		
<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 "Receiver Control" on page 760.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Measurement Related Configuration" on page 823. Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Measurement Related Configuration" on page 823. Resolution: .01 dBm
*RST setting		Sets the receiver control to auto Band: PGSM Expected Power: +13 dBm
Programming Example		
<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 "Receiver Control" on page 760.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Measurement Related Configuration" on page 823. Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See "Measurement Related Configuration" on page 823. Resolution: .01 dBm
*RST setting		Sets the receiver control to auto Band: PGSM Expected Power: +13 dBm
Programming Example		
<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 “Receiver Control” on page 760. The receiver control is set to manual when a manual band is selected. See “RFAnalyzer:CONTRol:AUTO” on page 548. 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 “Receiver Control” on page 760. The manual band must be set before the manual channel will update.
	GPRS	This command is not applicable to GPRS.
Setting	Any ARFCN within the currently selected frequency band.	
Query	Any ARFCN within the currently selected frequency band.	
*RST setting	Sets the receiver control to auto Band: PGSM Traffic Channel: 30	
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:SELECTED 512" !Configures the test set to !ARFCN 512 if appropriate.</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 “Receiver Control” on page 760. The manual band must be set before the manual channel will update. see“RFAnalyzer:MANual:BAND” on page 551.
	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 DSC 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 “Receiver Control” on page 760 The manual band must be set before manual channel will update. See “RFAnalyzer:MANual:BAND” on page 551.
	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 “Receiver Control” on page 760. The manual band must be set before manual channel will update. See “RFAnalyzer:MANual:BAND” on page 551.
	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
Programming Example <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 “Receiver Control” on page 760 The manual band must be set before manual channel will update. See “RFAnalyzer:MANual:BAND” on page 551.
	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
Programming Example <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 “Receiver Control” on page 760. 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 “RFAnalyzer:CONTRol:AUTO” on page 548.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 292.5 MHz to 2700 MHz Resolution: 0.01 Hz	
Query	Range: 292.5 MHz to 2700 MHz Resolution: 0.01 Hz	
*RST setting	896 MHz	
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 942.6MHZ" !Sets the expected frequency !to 942.6 MHz in manual !receiver mode.</pre>		

RFAnalyzer:CONTRol:MEASurement:FREQUENCY:AUTO

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries whether the test set's receiver is set to automatic (AUTO ON) or manual (AUTO OFF) measurement frequency control. See “Receiver Control” on page 760.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST setting	1 ON	
Programming Example		
<pre>OUTPUT 714;"RFANalyzer:CONTRol:MEASurement:FREQUENCY:AUTO OFF" !Enables manual control of the measurement receiver's frequency.</pre>		

RFANalyzer:CONTROL:POWER:AUTO

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries whether the test set receiver's expected power setting is set to automatic (AUTO ON) or manual (AUTO OFF) power control. See "Receiver Control" on page 760.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST setting	1 ON	
Programming Example		
OUTPUT 714;"RFANalyzer:CONTROL:POWER:AUTO OFF"		

RFANalyzer:CONTROL:UPLink:FREQUENCY:AUTO

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries whether the test set's demodulation receiver is set to automatic (AUTO ON) or manual (AUTO OFF) uplink frequency control. See "Receiver Control" on page 760.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST setting	1 ON	
Programming Example		
OUTPUT 714;"RFANalyzer:CONTROL:UPLink:FREQUENCY:AUTO OFF" !The test set's demodulation !receiver is set to manual !uplink frequency control.		

RFANalyzer:MANual:MEASurement[:MFRrequency]

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the frequency used to tune the test set's measuring receiver for all mobile carriers: analog (including CW) or digital systems (cellular or PCS band). This command automatically sets the receiver to manual mode and changes the measurement frequency.
Setting	Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz	
Query	Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz	
*RST setting	896.000 MHz	
Programming Example		
OUTPUT 714;"RFANalyzer:MANual:MEASurement:MFRrequency 942.6 MHZ" !Enables manual receiver control and sets the test set's receiver frequency to 942.6 MHz.		

RFAnalyzer:MANual:POWer:GSM[:SELEcted]:BURSt[1|2]

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the burst power level in dBm that the test set's receiver is expecting the mobile station uplink burst to transmit at for the GPRS system type.
Setting		Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see "Measurement Related Configuration" on page 823.
Query		Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see "Measurement Related Configuration" on page 823. Resolution: 0.01 dBm
*RST setting		PGSM and EGSM bands: 13 dBm, DCS and PCS bands: 10 dBm
Programming Example <pre>OUTPUT 714;"RFAnalyzer:MANual:POWer:GSM:BURSt 7" ! Sets the test set receiver expected !GPRS burst power level to 7 dBm.</pre>		

RFAnalyzer:MANual:UPLink[:MFRequency]

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the test set's demodulation receiver frequency, used to demodulate information from the mobile's reverse channel transmission.
Setting		Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query		Range: 292.5 MHz to 2700 MHz
*RST setting		896.000 MHz
Programming Example <pre>OUTPUT 714;"RFAnalyzer:MANual:UPLink:MFRequency 1955.030 MHz" !Enables manual !demodulation receiver control !and sets the test set's !demodulation receiver !frequency to 1955.030 MHz.</pre>		

RFAnalyzer:MANual:UPLink:FREQUENCY

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the test set's demodulation receiver frequency used to demodulate information from the mobile's reverse channel transmission when manual mode is selected (RFAnalyzer:CONTRol:MEASurement:FREQUENCY:AUTO OFF).
Setting		Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query		Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz
*RST setting		896.000 MHz
Programming Example OUTPUT 714;"RFAnalyzer:MANual:UPLink:FREQUENCY 942.6 MHZ" !Sets the test set's demodulation receiver frequency to 942.6 MHz.		

RFAnalyzer:MSLot:MEASurement:BURSt

Function	GSM	This command is not applicable to GSM.													
	GPRS	<p>Sets/queries the mobile station uplink burst number on which the measurement is performed. The choice is based on the selection table under the multislot selection command, see "CALL:SETup:PDTCH PDTChannel:MSLot:CONFIguration" on page 426.</p> <p>The actual uplink timeslots used in each configuration are fixed as follows:</p> <table border="0"> <thead> <tr> <th><i>Multislot Configuration</i></th> <th><i>Uplink Timeslots Used</i></th> </tr> </thead> <tbody> <tr> <td>D1U1</td> <td>3</td> </tr> <tr> <td>D2U1</td> <td>4</td> </tr> <tr> <td>D2U2</td> <td>3, 4</td> </tr> <tr> <td>D3U1</td> <td>4</td> </tr> <tr> <td>D3U2</td> <td>4, 5</td> </tr> <tr> <td>D4U1</td> <td>5</td> </tr> </tbody> </table> <p>If the CALL:PDTCH PDTChannel:MSLot:CONFIguration command is set to D1U1, D2U1 or D3U1, then the measurement burst is set to 1 and any subsequent attempts to set the measurement burst to 2 generates an out of range error (see "CALL:PDTCH PDTChannel:MSLot:CONFIguration" on page 397).</p>	<i>Multislot Configuration</i>	<i>Uplink Timeslots Used</i>	D1U1	3	D2U1	4	D2U2	3, 4	D3U1	4	D3U2	4, 5	D4U1
<i>Multislot Configuration</i>	<i>Uplink Timeslots Used</i>														
D1U1	3														
D2U1	4														
D2U2	3, 4														
D3U1	4														
D3U2	4, 5														
D4U1	5														
Setting		Range: 1 2													
Query		Range: 1 2													
*RST setting		1													
Programming Example OUTPUT 714;"RFAnalyzer:MSLot:MEASurement:BURSt 2" !Sets the measurement burst number to !2															

SETup Subsystem

Description

The SETup subsystem is used to configure the test set for each measurement. Typical settings include:

- Multi-Measurement Count, how many measurements will be made each time a measurement is initiated.
- Trigger Arm, determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).
- Trigger Source, how a measurement is triggered.
- Trigger Delay, controls the delay time between the trigger and the start of sampling.
- Measurement Timeout, length of time before a measurement times out.

NOTE Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. In most cases, it is a best practice (during remote operation) to use “single” measurement mode. This simplifies the tasks of starting concurrent measurements, using the INIT subsystem commands to determine which measurements are ready to be fetched, then using the FETCh subsystem to obtain results. The command “SETup:CONTInuous:OFF sets all measurements to “single” trigger mode.

Syntax Diagrams and Command Descriptions

“SETup:AAUDio” on page 560

“SETup:BERRor” on page 569

“SETup:CONTInuous” on page 583

“SETup:DAUDio” on page 584

“SETup:DPOWer” on page 590

“SETup:FBERRor” on page 576

“SETup:GBERRor” on page 597

“SETup:IQTuning” on page 602

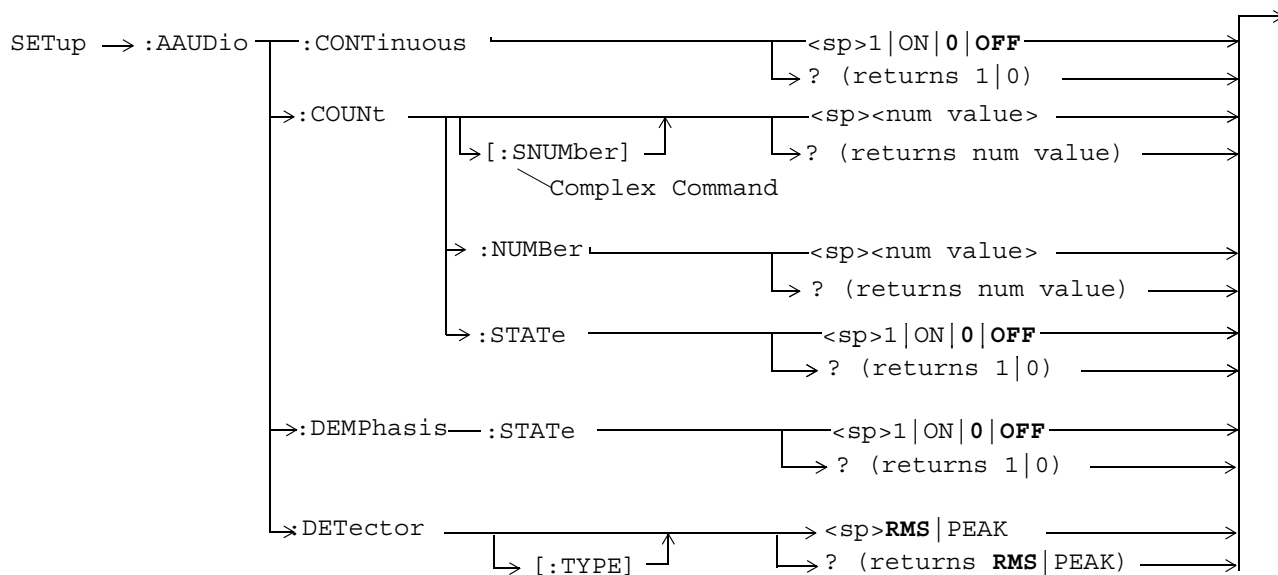
“SETup:ORFSpectrum” on page 619

“SETup:PFERRor” on page 628

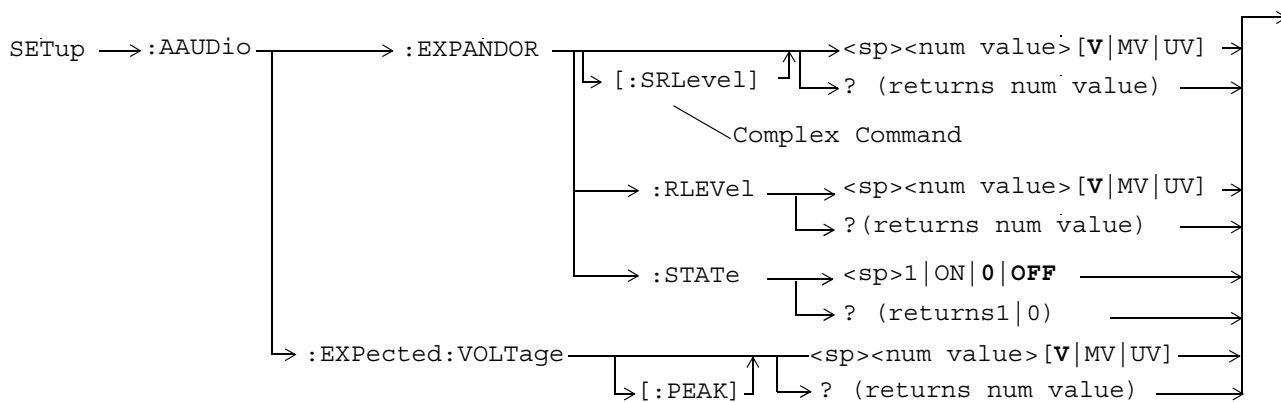
“SETup:PVTime” on page 633

“SETup:TXPower” on page 642

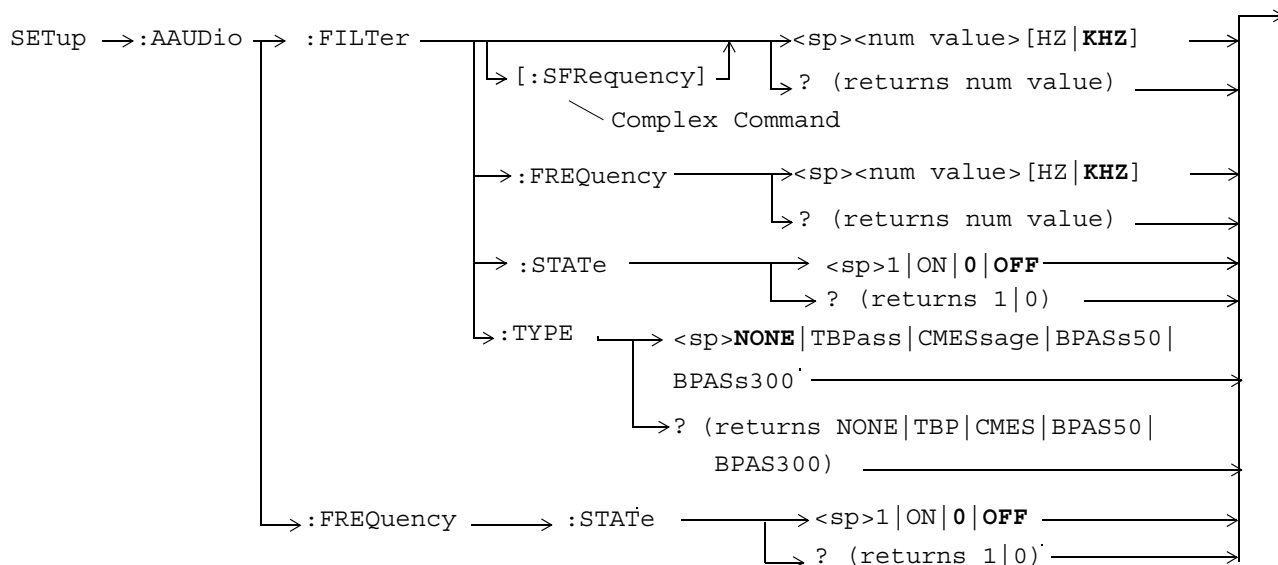
SETup:AAudio



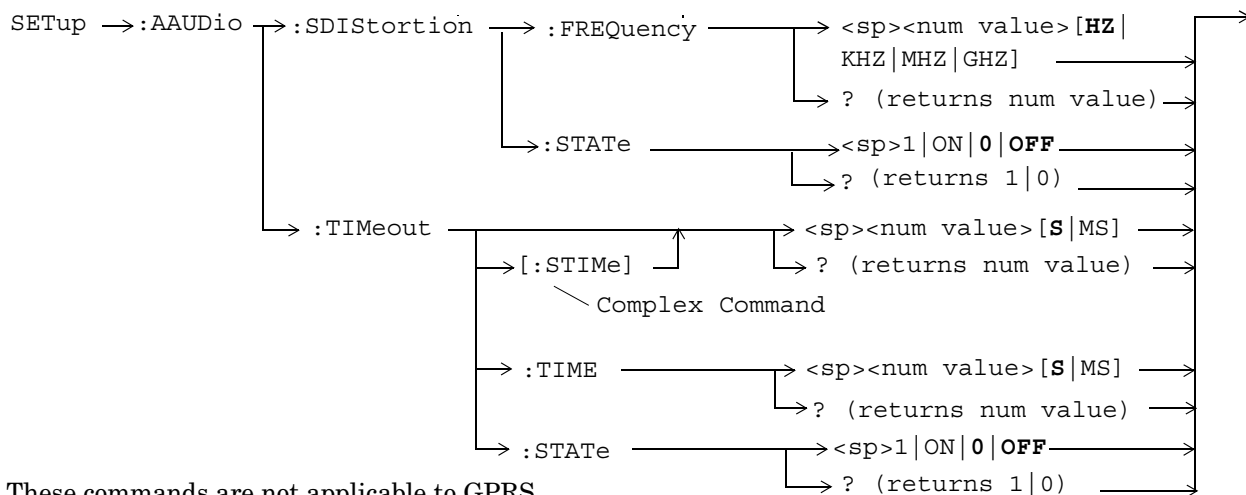
These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

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		Range: <ul style="list-style-type: none">• Continuous trigger arm mode = 1 ON• Single trigger arm mode = 0 OFF
Query		Range: 0 1
*RST setting		Single
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:CONTINUOUS OFF" !Selects single trigger mode.		

SETup:AAUDio:COUNT[:SNUMber]

Function	GSM	Selects the number of Analog Audio multi-measurements the test set will make and sets the count state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST setting		10
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:COUNT:SNUMBER 5" !Sets the value to 5 and the state to on.		

SETup:AAUDio:COUNT:NUMBer

Function	GSM	Selects/queries the number of Analog Audio measurements the test set will make when the "SETup:AAUDio:COUNT:STATE" is ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 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 to 10.		

SETup:AAudio:COUNT:STATE

Function	GSM	Selects/queries the Analog Audio multi-measurement count state.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST setting	0 (off)	
Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:COUNT:STATE ON" !Turns the analog audio measurement !multi-measurement count state on.</pre>		

SETup:AAudio:DEMPHasis:STATE

Function	GSM	Sets/queries whether 750 us de-emphasis is enabled.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 ON 0 OFF	
Query	Range: 1 0	
*RST setting	0 (off)	
Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:DEMPHasis:STATE ON" !Turns the de-emphasis on.</pre>		

SETup:AAudio:DETECTOR[:TYPE]

Function	GSM	Sets/queries the detector type for audio level measurements.
	GPRS	This command is not applicable to GPRS.
Setting	Range: RMS PEAK	
Query	Range: RMS PEAK	
*RST setting	RMS	
Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:DETECTOR:TYPE PEAK"</pre>		

SETup:AAUDio

SETup:AAUDio:EXPANDOR[:SRLevel]

Function	GSM	Sets/queries the expander's reference level and automatically sets the expander's state to ON. The units (V MV UV) are optional, if no units are specified then units default to V.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 10 mV to 10 V Resolution: 1 mV
Query		Range: 10 mV to 10 V Resolution: 1 mV
*RST setting		1 V
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:SRLEVEL 5V" !Sets expander state to on and level to 5 V.		

SETup:AAUDio:EXPANDOR:RLeveI

Function	GSM	Sets/queries the expander's reference level to be used when the expander's state is set to ON. The units (V MV UV) are optional, if no units are specified then units default to V.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 10 mV to 10 V Resolution: 1 mV
Query		Range: 10 mV to 10 V Resolution: 1 mV
*RST setting		1 V
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:RLEVEL 5V" !Sets expander reference level to 5 V.		

SETup:AAUDio:EXPANDOR:STATe

Function	GSM	Sets/queries whether the expander is enabled.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST setting		0 OFF
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:STATE ON"		

SETup:AAudio:EXpected:VOLTage[:PEAK]

Function	GSM	Sets/queries the maximum expected peak voltage (clipping level) of the Analog Audio signal to be measured. The units (V MV UV) are optional, if no units are specified then units default to V. See “SETup:AAudio” on page 560.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 10 mV to 20 V peak Resolution: 0.1 mV
Query		Range: 10 mV to 20 V peak Resolution: 0.1 mV
*RST setting		20 V
Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:EXPECTED:VOLTAGE 5V" !Sets the clipping level of !Analog Audio measurements !to 5 volts.</pre>		

SETup:AAudio:FILTer[:SFrequency]

Function	GSM	Sets/queries the center frequency for the 100 Hz bandpass filter applied to Analog Audio measurements and sets the state to on. Units (KHZ HZ) are optional, if no units are specified then units default to Hz.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 200 Hz to 20.0 kHz Resolution: 0.1 Hz
Query		Range: 200 Hz to 20.0 kHz Resolution: 0.1 Hz
*RST setting		1000 Hz
Programming Example <pre>OUTPUT 714;"SETUP:AAUDIO:FILTER:SFREQUENCY 1000" !This sets the audio filter state !to on and sets the bandpass !filter frequency to 1 kHz.</pre>		

SETup:AAUDio

SETup:AAUDio:FILTer:FREQUency

Function	GSM	Sets/queries the center frequency for the 100 Hz bandpass filter applied to Analog Audio measurements. Units (KHZ HZ) are optional, if no units are specified then units default to Hz. See "SETup:AAUDio" on page 560.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 200 Hz to 20.0 kHz Resolution: 0.1 Hz
Query		Range: 200 Hz to 20.0 kHz Resolution: 0.1 Hz
*RST setting		1000 Hz
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:FILTER:FREQUENCY 217HZ" !Set aaudio bandpass filter to 217 hz.		

SETup:AAUDio:FILTer:STATE

Function	GSM	Selects/queries the state of the Analog Audio bandpass filter. see "SETup:AAUDio" on page 560
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:FILTER:STATE ON" !Sets filter state on.		

SETup:AAUDio:FILTer:TYPE

Function	GSM	Sets/queries the filter type for audio measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Range: NONE TBPAss CMESsage BPASs50 BPASs300
Query		Range: NONE TBP CMES BPAS50 BPAS300
*RST setting		NONE
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:FILTER:TYPE BPASS50" !Selects the 50 Hz to 15 kHz bandpass filter.		

SETup:AAUDIO:FREQUENCY:STATE

Function	GSM	Sets/queries whether the audio frequency measurement is enabled.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST setting		0 (off)
Programming Example		
OUTPUT 714 ; "SETUP:AAUDIO:FREQUENCY:STATE ON"		

SETup:AAUDIO:SDISTORTION:FREQUENCY

Function	GSM	Sets/queries the fundamental frequency setting for the SINAD/distortion measurement. Units (KHZ HZ) are optional, if no units are specified then units default to Hz.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 100.0 to 10000 Hz Resolution: 0.1 Hz
Query		Range: 100.0 to 10000 Hz Resolution: 0.1 Hz
*RST setting		1000 Hz
Programming Example		
10 OUTPUT 714 ; SETUP:AAUDIO:SDISTORTION:FREQUENCY 300HZ"		

SETup:AAUDIO:SDISTORTION:STATE

Function	GSM	Sets/queries whether the SINAD/distortion measurement is enabled.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST setting		0 (off)
Programming Example		
10 OUTPUT 714 ; SETUP:AAUDIO:SDISTORTION:STATE ON"		

SETup:AAUDio

SETup:AAUDio:TIMEout[:STIME]

Function	GSM	Selects/queries the timeout value in seconds that will be used for Analog Audio measurements and sets the timeout state to ON. Units (S MS) are optional, if no units are specified then units default to S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STIME 3" !Sets the timeout !state to on and sets the !timeout value.		

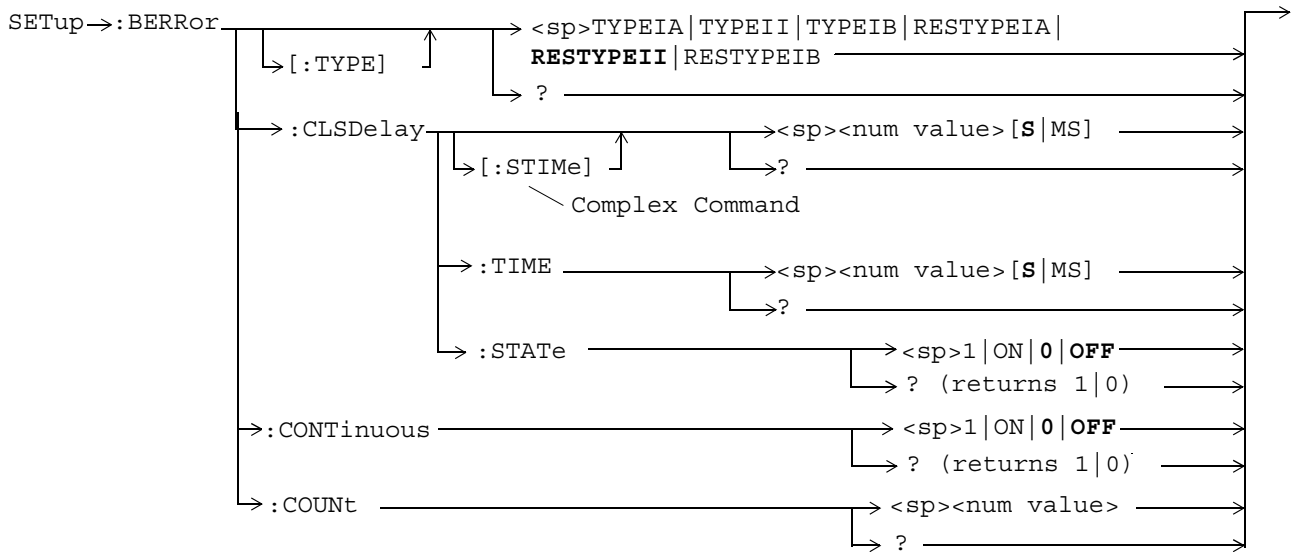
SETup:AAUDio:TIMEout:STATE

Function	GSM	Selects/queries the Analog Audio measurement timeout state.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.		

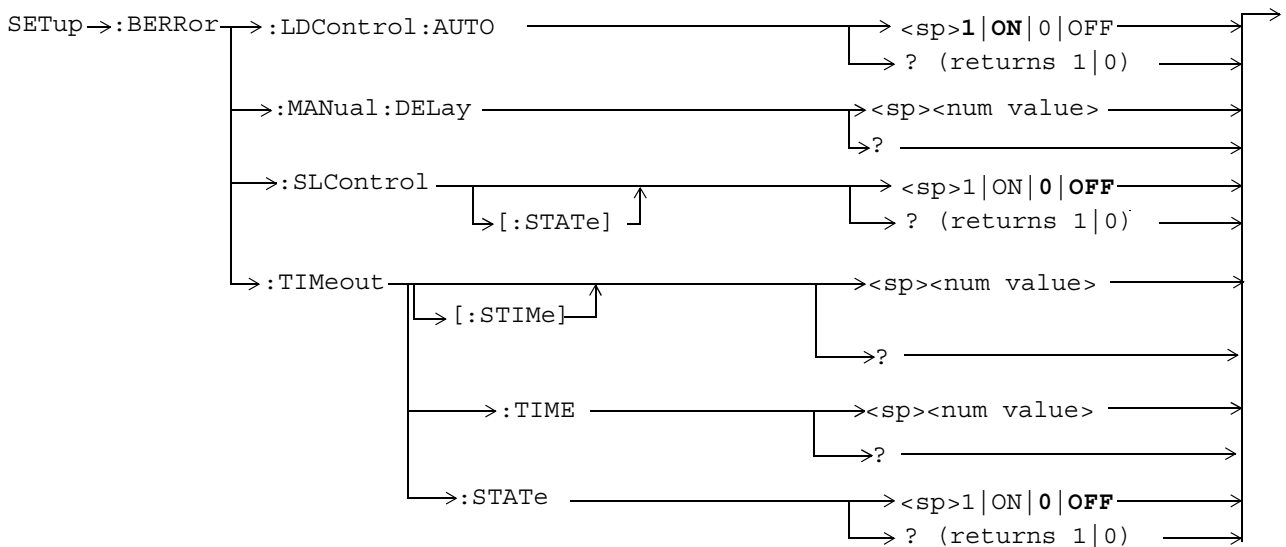
SETup:AAUDio:TIMEout:TIME

Function	GSM	Selects/queries the timeout value in seconds that will be used for Analog Audio measurements when the timeout state is ON. Unit (S MS) are optional, if no units are specified then units default to S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST setting		10 seconds
Programming Example		
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 313

SETup:BERRor

SETup:BERRor:CLSDElay[:STIME]

Function	GSM	Selects/queries the closed loop signalling delay time in seconds for Bit Error measurements and sets the delay state to ON. The units (S MS) are optional, if no units are specified than units default to S. 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. When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 5 seconds Resolution: 100 ms
Query		Range: 0 to 5 seconds Resolution: 100 ms
*RST Setting		500 ms
Programming Example		
OUTPUT 714;"SETUP:BERROR:CLSDELAY:STIME 400 MS" ! Set state to on ! and delay time		

SETup:BERRor:CLSDElay:TIME

Function	GSM	Selects/queries the closed loop signalling delay time in seconds for Bit Error measurements. The units (S MS) are optional, if no units are specified than units default to S. 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. When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 5 seconds Resolution: 100 ms
Query		Range: 0 to 5 seconds Resolution: 100 ms
*RST Setting		500 ms
Programming Example		
OUTPUT 714;"SETUP:BERROR:CLSDELAY:TIME 600MS" ! Set delay time		

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)	
Programming Example 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	
Programming Example 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	Range: 0 1	
*RST Setting	0 (off)	
Programming Example		
OUTPUT 714;"SETup:BERROR:CONTINUOUS OFF" !Sets BER measurement to single trigger mode.		

SETup:BERRor:COUNT

Function	GSM	Sets/queries the number of BER measurements the test set will make when the count state is on
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 to 999,000 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	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. If speech frames delay control mode is manual (not Auto), the test set will use the frame delay value entered in the Speech Frames Delay field. Refer to. see“SETup:BERRor:MANual:DELAy” on page 573 Refer also to the “Bit Error Measurement Description” on page 78 for a description of frame delay and its use in the BER measurement.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0 OFF 1 ON	
Query	0 1	
*RST Setting	1 (automatic)	
Related Topics	“SETup:BERRor:MANual:DELAy” on page 573	
Programming Example		
<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	Sets/queries the number of frames the test set will use to correlate uplink information bits with downlink information bits when loop delay control mode is manual (AUTO OFF). To set the delay mode to manual, refer to “SETup:BERRor:LDControl:AUTO” on page 573. 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). Refer to “Bit Error Measurement Description” on page 78 for a description of frame delay and how it is used in this measurement.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 to 15 Resolution : 1	
Query	Range: 1 to 15 Resolution : 1	
*RST Setting	5	
Programming Example		
<pre>OUTPUT 714;"SETUP:BERROR:MANUAL:DELAY 4" !Set delay of 4 speech frames.</pre>		

SETup:BERRor

SETup:BERRor:SLControl[:STATE]

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 Mobile Loopback (F12) on Call Parms menu 1 of 4. See "CALL:TChannel:LOOPback" on page 439 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: 0.1 to 999 Resolution: 0.1	
Query	Range: 0.1 to 999 Resolution: 0.1	
*RST Setting	10 seconds	
Programming Example		
OUTPUT 714;"SETUP:BERR:TIMEOUT:STIME 8" !Sets BER measurement timeout to !8 seconds and the state to on.		

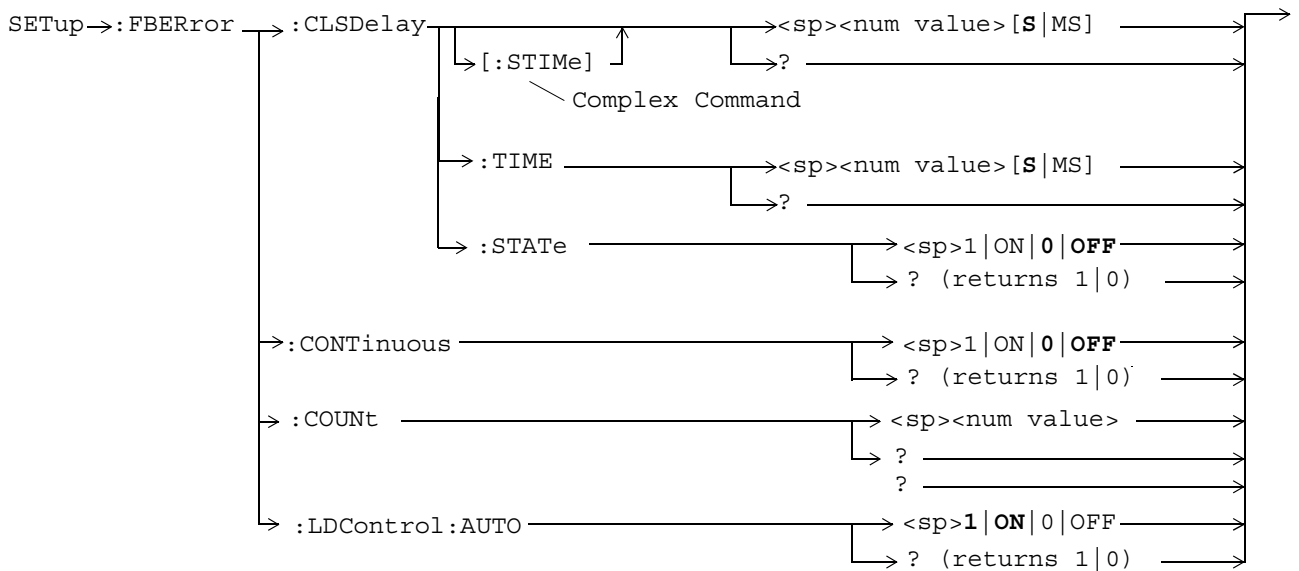
SETup:BERRor:TIMEout:TIME

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: 0.1 to 999 Resolution: 0.1
Query		Range: 0.1 to 999 Resolution: 0.1
*RST Setting		10 seconds
Programming Example		
<pre>OUTPUT 714;"SETUP:BERR:TIMEOUT:TIME 8" !Sets BER measurement timeout to !8 seconds.</pre>		

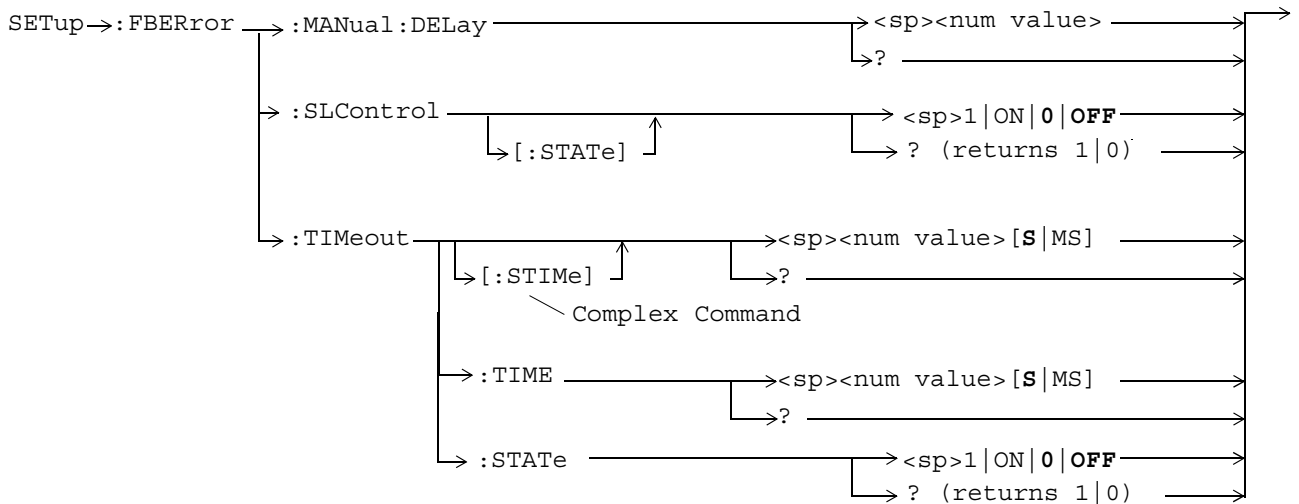
SETup:BERRor:TIMEout:STATe

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		Range: 0 1
*RST Setting		0 (off)
Programming Example		
<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 313

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	
Programming Example <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	
Programming Example <pre>OUTPUT 714;"SETUP:FBERROR:CLSDELAY:TIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.</pre>		

SETup:FBERror

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)	
Programming Example		
<pre>OUTPUT 714;"SETUP:FBERROR:CLSDelay:STATE ON" ! Sets the Close Loop Delay ! state to on.</pre>		

SETup:FBERror:CONTinuous

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: <ul style="list-style-type: none">• Continuous trigger mode = 1 ON• Single trigger mode = 0 OFF	
Query	Range: 1 0	
*RST Setting	0 (single)	
Programming Example		
<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	<p>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. .</p> <p>If loopback delay control mode is manual (auto off) , the test set will use the frame delay value entered in the TDMA Frames Delay field. Refer to “SETup:FBERror:MANual:DELay” on page 580 .</p> <p>Refer also to the “Fast Bit Error Measurement Description” on page 111 for a description of frame delay and its use in the fast bit error rate measurement.</p>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST Setting		1 (automatic)
Related Topics		see “SETup:FBERror:MANual:DELay” on page 580
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

SETup:FBERror:MANual:DELay

Function	GSM	<p>This command sets/queries the number of frames the test set will use to correlate uplink information bits with downlink information bits when loopback delay control mode is manual (auto off). To set the loopback delay mode to manual, refer to “SETup:FBERror:LDControl:AUTO” on page 579.</p> <p>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).</p> <p>Refer to “Fast Bit Error Measurement Description” on page 111 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: 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 “SETup:FBERror:LDControl:AUTO” on page 579.
Programming Example		
OUTPUT 714;“SETUP:FBERROR:MANUAL:DELAY 6” !Set frame delay to 6 frames.		

SETup:FBERror:SLControl[:STATe]

Function	GSM	<p>This command selects/queries the Signalling loopback control state for an FBER measurement.</p> <p>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.</p> <p>The loopback type is controlled manually from the Mobile Loopback F12 key, see “CALL:TCHannel:LOOPback” on page 439 for a program example and details about the command.</p>
	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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example <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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example <pre>OUTPUT 714;"SETUP:FBERROR:TIMEOUT:TIME 20" !Sets the timeout value to !20 seconds.</pre>		

SETup:FBError

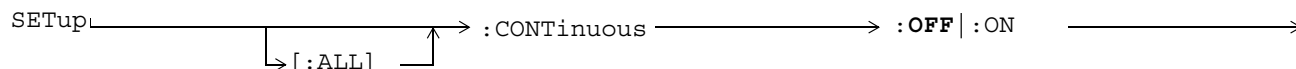
SETup:FBError:TIMEout:STATE

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)

Programming Example

```
OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STATE ON" !Sets the timeout state to on.
```

SETup:CONTInuous

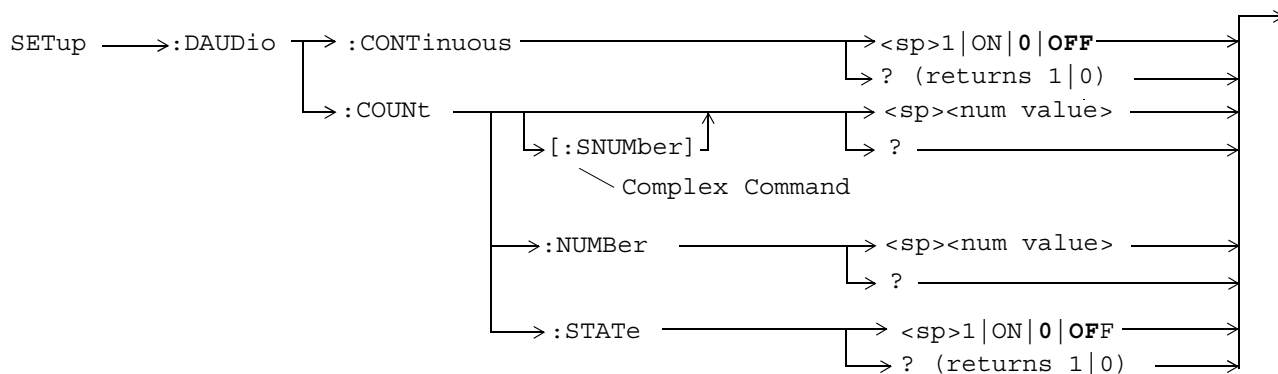


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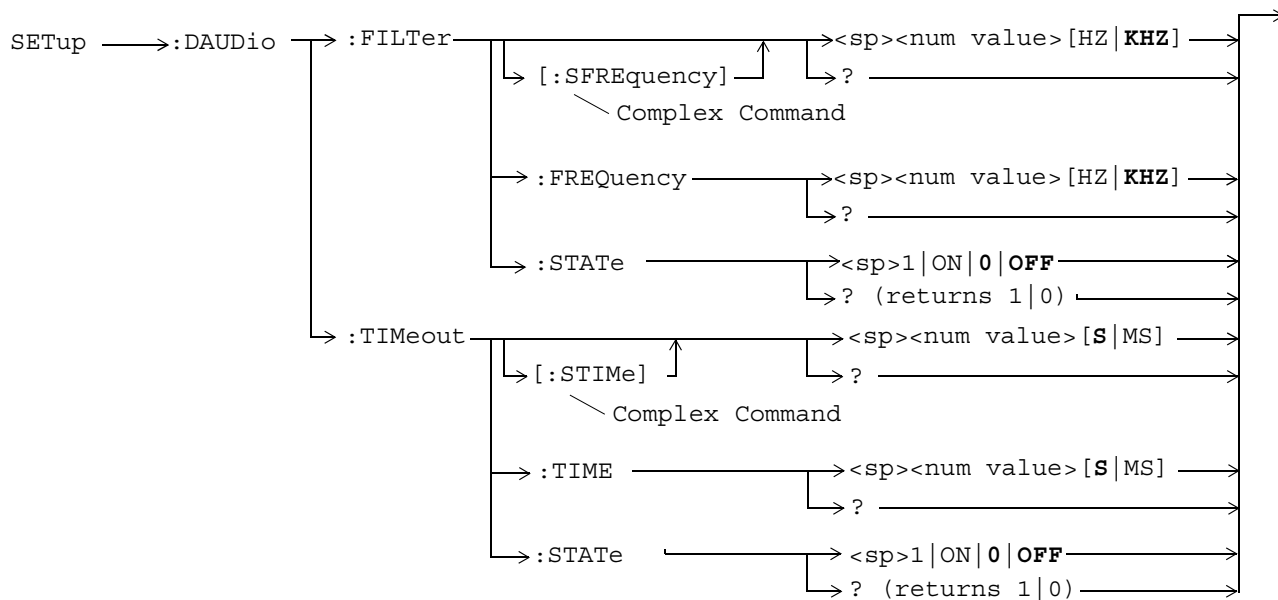
SETup[:ALL]:CONTInuous

Function	GSM	This command sets trigger arm to OFF (single trigger) or ON (continuous trigger) for all measurements. See “Trigger Arm (Single or Continuous) Description” on page 216. At power-on and a (manual user) full preset the trigger arm is set to continuous. Partial preset has no effect on the trigger arm state. See “Preset Descriptions” on page 772.
	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, “SETup:PVTime:CONTInuous” on page 635 allows you to set the trigger arm for the Power versus Time measurement.)
Setting		Range: <ul style="list-style-type: none"> • Continuous trigger = ON • Single trigger = OFF
*RST Setting		Single
Programming Example		
<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 313

SETup:DAUDIO:CONTInuous

Function	GSM	This command selects/queries the trigger state for Decoded Audio measurements.
	GPRS	This command is not applicable to GPRS.
Setting	Range: <ul style="list-style-type: none"> • Continuous = 1 ON • Single = 0 OFF 	
Query	Range: 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

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		
OUTPUT 714;"SETUP:DAUDIO:COUNT:NUMBER 25" !Sets the number of DAUDIO !measurements that will be made.		

SETup:DAUDio:COUNT:STATE

Function	GSM	This command selects/queries the Decoded Audio multi-measurement count state.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:COUNT:STATE OFF" !Sets trigger state for !DAUDIO measurement.		

SETup:DAUDIO:FILTER [:SFREquency]

Function	GSM	This command sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. This command sets the count state to ON. The units (HZ KHZ) are optional, if no units are specified then units default to KHZ. see “Decoded Audio Measurement Description” on page 91
	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		
<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 “Decoded Audio Measurement Description” on page 91
	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		
<pre>OUTPUT 714;"DAUDIO:FILTER:FREQUENCY 217HZ" !Sets bandpass filter frequency.</pre>		

SETup:DAUDIO:FILTER:STATe

Function	GSM	This command selects/queries the Decoded Audio bandpass filter state. see “Decoded Audio Measurement Description” on page 91
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 OFF
Query		Range: 1 0

SETup:DAUDio

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:DAUDio:TIMEout[:STIME]

Function	GSM	This command selects/queries the timeout value in seconds that will be used for Decoded Audio measurements. This command sets the timeout state to ON. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 Resolution: 0.1
Query		Range: 0.1 to 999 Resolution: 0.1
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STIME 6" !Sets the value to 6 seconds and the !state to on.		

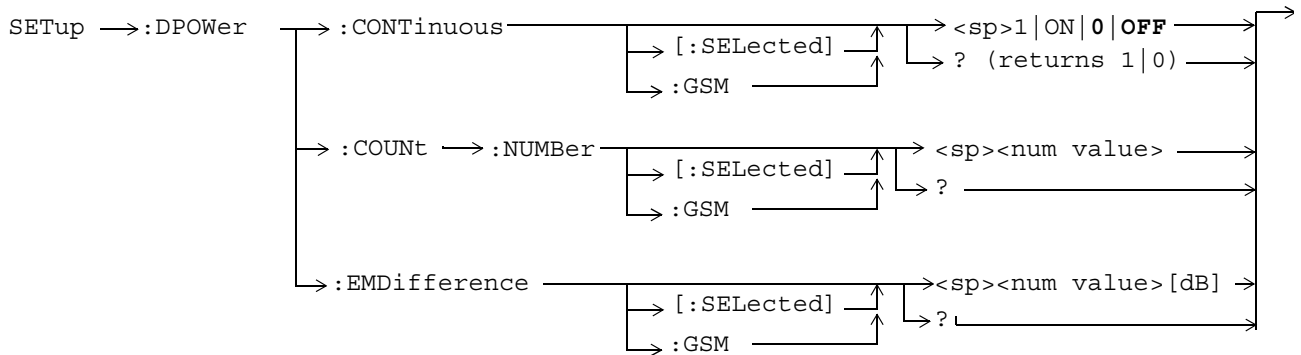
SETup:DAUDio:TIMEout:TIME

Function	GSM	This command selects/queries the timeout value used for Decoded Audio measurements when the timeout state is ON. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:TIME 15" !Sets timeout value to 15 seconds.		

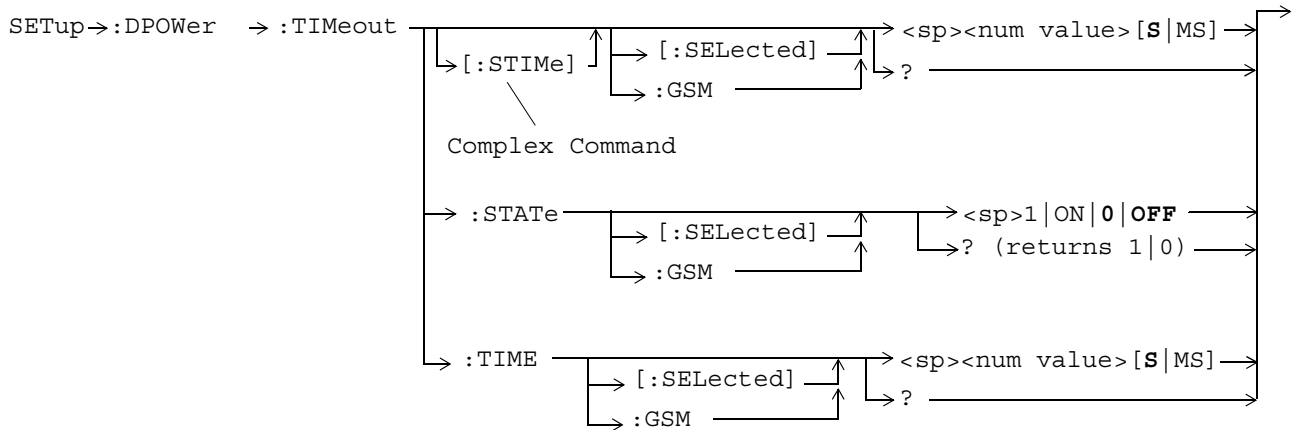
SETup:DAudio:TIMEout:STATe

Function	GSM	This command selects/queries the Decoded Audio measurement timeout state.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 ON 0 Off
Query		Range: 1 0
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.		

SETup:DPOWER



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

SETup:DPOWER:CONTInuous[:SElected]

Function	GSM	This command selects/queries the trigger state for Dynamic Power measurements in the active (that is the selected) radio format.
	GPRS	This command is not applicable to GPRS.
Setting		Range: <ul style="list-style-type: none"> Continuous trigger mode: 1 ON Single trigger mode: 0 OFF
Query		Range: 1 0
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:DPOWER:CONTINUOUS:SELECTED ON" !Sets trigger mode to Continuous.		

SETup:DPOWER:CONTInuous:GSM

Function	GSM	This command selects/queries the trigger state for Dynamic Power measurement in the GSM radio format whether or not that format is active.
	GPRS	This command is not applicable to GPRS.
Setting		Range: <ul style="list-style-type: none"> Continuous trigger mode: 1 ON Single trigger mode: 0 OFF
Query		Range: 1 0
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:DPOWER:CONTINUOUS:GSM ON" !Sets trigger mode to Continuous.		

SETup:DPOWer

SETup:DPOWer:COUNT:NUMBER[:SElected]

Function	GSM	This command sets/queries the number of bursts for the Dynamic Power measurement in the active (that is the selected) radio format.
	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:DPOWER:COUNT:NUMBER:SELECTED 25" !Sets the number of measurement bursts.		

SETup:DPOWer:COUNT:NUMBER:GSM

Function	GSM	This command sets/queries the number of bursts for the Dynamic Power measurement in the GSM radio format whether or not that format is active.
	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:DPOWER:COUNT:NUMBER:GSM 50" !Sets the number of measurement bursts.		

SETup:DPOWER:EMDifference[:SElected]

Function	GSM	<p>This command sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement in the active (that is the selected) radio format. The units dB are optional.</p> <p>The Expected Maximum Difference from Previous Measurement parameter is used with the measured transmit power from the previous burst to set the maximum RF power that the base station emulator is expecting the mobile to transmit in the next burst.</p> <p>The setting of this parameter does not affect the receiver Expected Power parameter. See “RFANalyzer:EXpected:POWer[:SElected]” on page 548.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>Range: -30 dB to +30 dB</p> <p>Resolution: 0.01 dB</p>	
Query	<p>Range: -30 dB to +30 dB</p> <p>Resolution: 0.01 dB</p>	
Programming Example <pre>OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE:SELECTED 20" !Sets the Expected Maximum Difference !in measurement value.</pre>		

SETup:DPOWER:EMDifference:GSM

Function	GSM	<p>This command sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement in the GSM radio format whether or not that format is active. The units dB are optional.</p> <p>The Expected Maximum Difference from Previous Measurement parameter is used with the measured transmit power from the previous burst to set the maximum RF power that the base station emulator is expecting the mobile to transmit in the next burst.</p> <p>The setting of this parameter does not affect the receiver Expected Power parameter. See “RFANalyzer:EXpected:POWer[:SElected]” on page 548.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>Range: -30 dB to +30 dB</p> <p>Resolution: 0.01 dB</p>	
Query	<p>Range: -30 dB to +30 dB</p> <p>Resolution: 0.01 dB</p>	
Programming Example <pre>OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE:GSM 10" !Sets the Expected Maximum Difference !in measurement value.</pre>		

SETup:DPOWer

SETup:DPOWer:TIMEout[:STIME][:SElected]

Function	GSM	This command sets/queries the Dynamic Power measurement timeout value in seconds and sets the time-out state to on for the active (that is the selected) radio format. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME:SELECTED 12S" !Sets the timeout state and value.		

SETup:DPOWer:TIMEout[:STIME]:GSM

Function	GSM	This command sets/queries the Dynamic Power measurement timeout value in seconds and sets the time-out state to on for the GSM radio format whether or not that format is active. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STIME:GSM 20" !Sets the timeout state and value.		

SETup:DPOWer:TIMEout:STATE[:SElected]

Function	GSM	This command sets/queries the time-out state for the Dynamic Power measurement in the active (that is the selected) radio format.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	0 (off)	
Programming Example		
OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STATE:SELECTED ON" !Sets the timeout state.		

SETup:DPOWer:TIMEout:STATE:GSM

Function	GSM	This command sets/queries the time-out state for the Dynamic Power measurement in the GSM radio format whether or not that format is active.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	0 (off)	
Programming Example		
OUTPUT 714;"SETUP:DPOWER:TIMEOUT:STATE:GSM ON" !Sets the timeout state.		

SETup:DPOWer:TIMEout:TIME[:SElected]

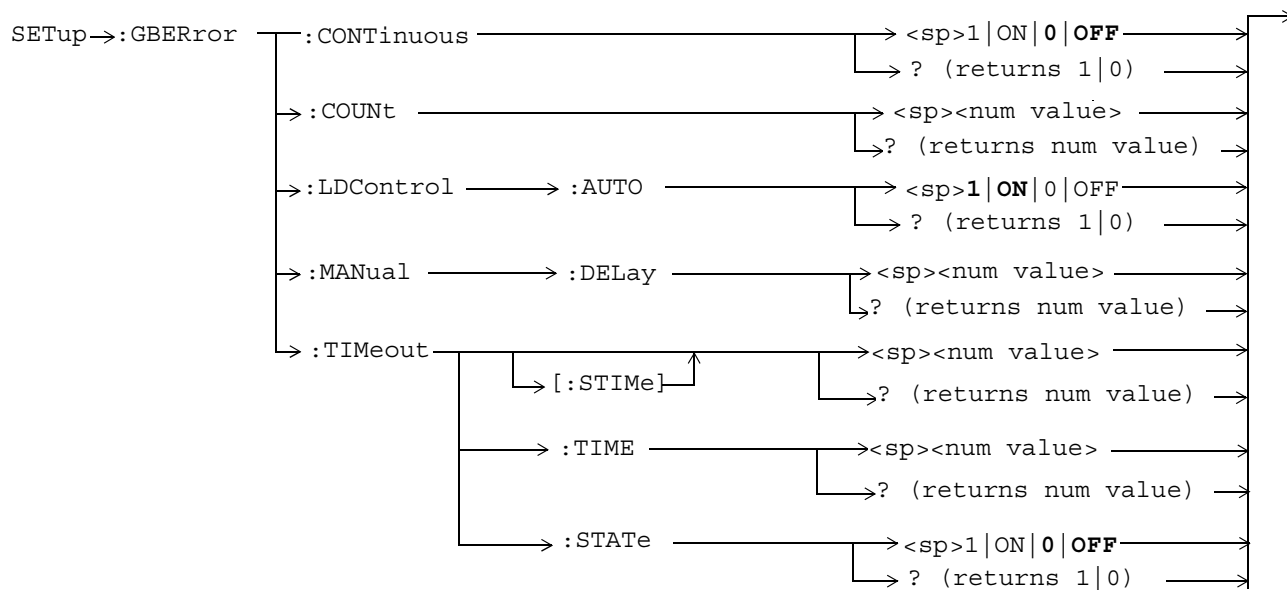
Function	GSM	This command sets/queries the time-out value in seconds that is used for the Dynamic Power measurement for the active (that is the selected) radio format. The time-out state must be ON. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 seconds	
Query	Range: 0.1 to 999 seconds Resolution: 0.1 seconds	
*RST Setting	10 seconds	
Programming Example		
OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME:SELECTED 15" !Sets the timeout value.		

SETup:DPOWer

SETup:DPOWer:TIMEout:TIME:GSM

Function	GSM	This command sets/queries the time-out value in seconds that is used for the Dynamic Power measurements when the time-out state is ON for the GSM radio format whether or not that format is active. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME:GSM 10S" !Sets the timeout value.		

SETup:GBERror



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

SETup:GBERror

SETup:GBERror:CONTInuous

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the trigger state to single trigger mode or continuous trigger mode for the BER measurement.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETup:GBERror:CONTInous OFF" !Sets BER measurement to single trigger mode.		

SETup:GBERror:COUNT

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the number of bits to measure when the count state is ON.
Setting		Range: 1 to 999,000 Resolution: 1
Query		Range: 1 to 999,000 Resolution: 1
*RST Setting		10,000
Programming Example		
OUTPUT 714;"SETup:GBERror:COUNT 880" !Sets the number of bits to measure to 880.		

SETup:GBERror:LDControl:AUTO

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the loopback delay control mode. If loopback delay control mode is automatic (ON), the test set determines the block delay value that allows the correlation between uplink and downlink data. If loopback delay control mode is manual (OFF), the test set uses the block delay you specify using "SETup:GBERror:MANual:DELay" on page 599. Refer to "How is a Bit Error (BER) Measurement Made?" on page 81 for a description of block delay and its use in the BER measurement.
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	1 (on)	
Programming Example		
<pre>OUTPUT 714;"SETup:GBERror:LDControl:AUTO OFF" !Sets the loopback delay control mode !to manual.</pre>		

SETup:GBERror:MANual:DELay

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the block delay when loopback delay control mode is manual. To set the delay mode to manual, refer to "SETup:GBERror:LDControl:AUTO" on page 599. Refer to "GPRS Bit Error Measurement" on page 81 for a description of block delay and how it is used in this measurement.
Setting	Range: 1 to 6 Resolution : 1	
Query	Range: 1 to 6 Resolution : 1	
*RST Setting	2	
Programming Example		
<pre>OUTPUT 714;"SETup:GBERror:MANual:DELay 6" !Sets the number of blocks to 6.</pre>		

SETup:GBERror

SETup:GBERror:TIMEout[:STIME]

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the timeout value in seconds for the trigger state during BER measurements and turns the timeout state on. The units (S MS) are optional, if no units are specified than units default to S.
Setting		Range: 0.1 to 999 Resolution: 0.1
Query		Range: 0.1 to 999 Resolution: 0.1
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETup:GBERror:TIMEout:STIME 12" !Sets BER measurement timeout to !12 seconds and the state to on.		

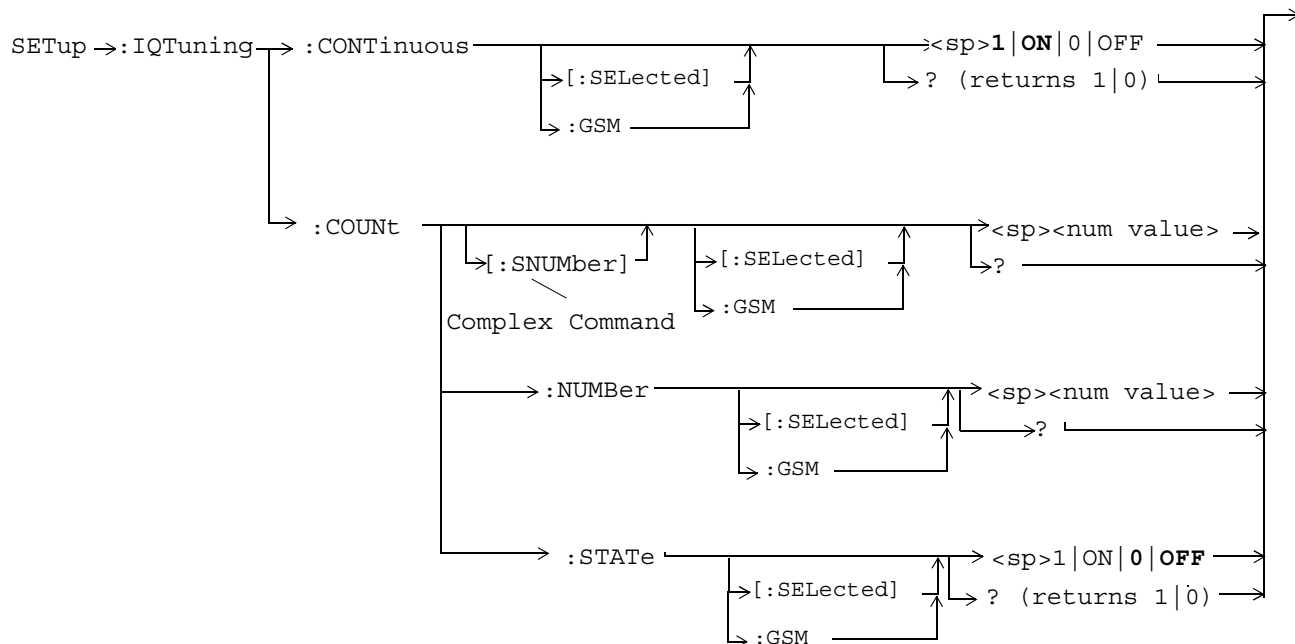
SETup:GBERror:TIMEout:TIME

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the timeout value in seconds for the trigger state during BER measurements. The units (S MS) are optional, if no units are specified than units default to S (seconds).
Setting		Range: 0.1 to 999 Resolution: 0.1
Query		Range: 0.1 to 999 Resolution: 0.1
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETup:GBERror:TIMEout:TIME 8" !Sets BER measurement timeout to !8 seconds.		

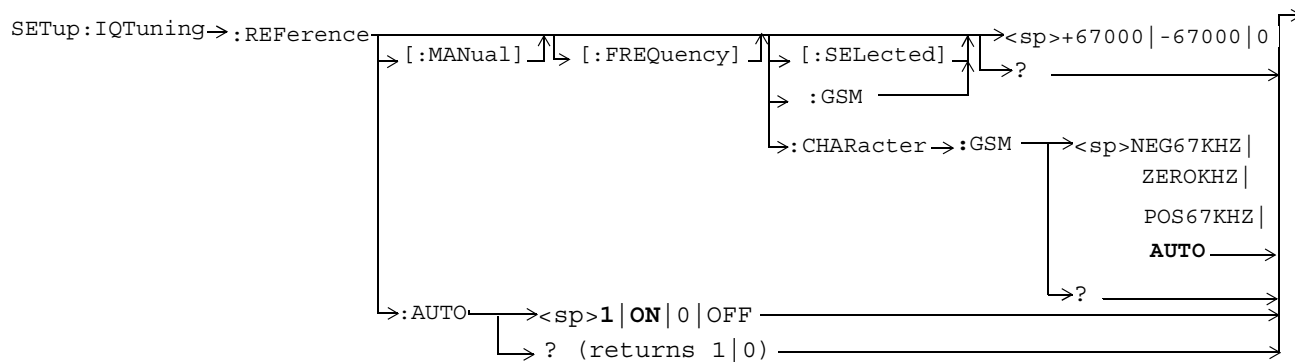
SETup:GBERror:TIMEout:STATE

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the timeout state for BER measurements.
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	0 (off)	
Programming Example		
OUTPUT 714;"SETup:GBERror:TIMEout:STATE ON" !Sets the timeout state to on.		

SETup:IQTuning

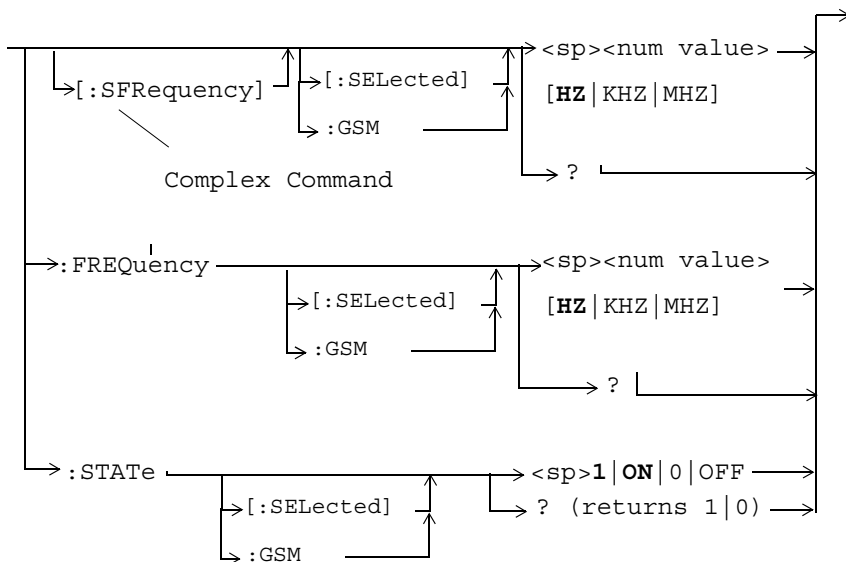


These commands are not applicable to GPRS.



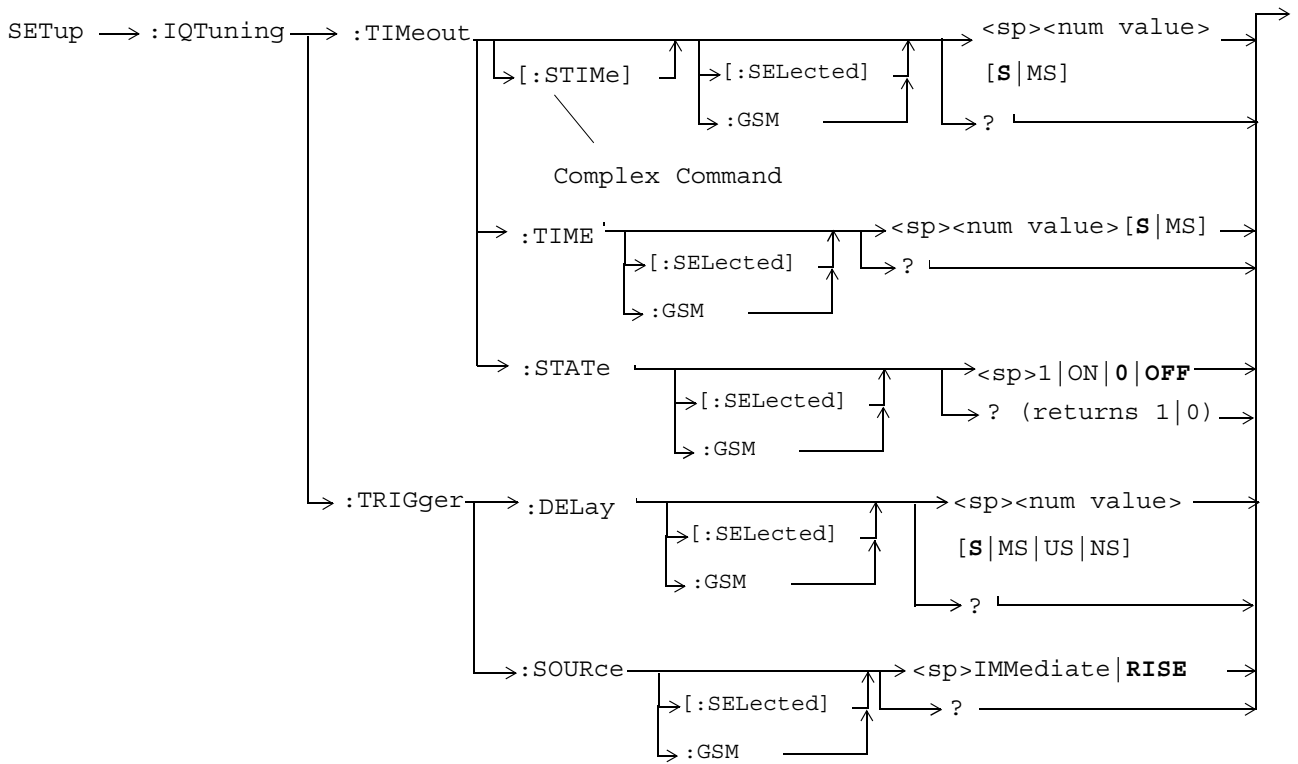
These commands are not applicable to GPRS.

SETup → :IQTuning → :SPUR



These commands are not applicable to GPRS.

SETup:IQTuning



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

SETup:IQTuning:CONTInuous[:SElected]

Function	GSM	Sets/queries the trigger arm state for the IQ tuning measurement in the active (that is the selected) radio format. Determines whether measurement will make one measurement then stop (0 OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1 ON (continuous)).
	GPRS	This command is not applicable to GPRS.
Setting	Range: <ul style="list-style-type: none"> • Continuous trigger mode = 1 ON • Single trigger mode = 0 OFF 	
Query	Range: 1 0	
*RST Setting	1 (on)	
Programming Example		
OUTPUT 714; "SETUP:IQTUNING:CONTINUOUS:SELECTED ON" !Sets measurement to continuous trigger mode.		

SETup:IQTuning:CONTInuous:GSM

Function	GSM	Sets/queries the trigger arm state for the IQ tuning measurement in the GSM radio format whether or not that format is active. Determines whether measurement will make one measurement then stop (0 OFF (single)), or automatically rearm upon completion of one measurement and repeat the process (1 ON (continuous)).
	GPRS	This command is not applicable to GPRS.
Setting	Range: <ul style="list-style-type: none"> • Continuous trigger mode = 1 ON • Single trigger mode = 0 OFF 	
Query	Range: 1 0	
*RST Setting	1 (on)	
Programming Example		
OUTPUT 714; "SETUP:IQTUNING:CONTINUOUS:GSM ON" !Sets measurement to continuous trigger mode.		

SETup:IQTuning

SETup:IQTuning:COUNT:STATe[:SELEcted]

Function	GSM	Sets/queries the multi-measurement state for the IQ tuning measurement in the active (that is the selected) radio format.
	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:SELECTED ON" !Turns on multi-measurements.		

SETup:IQTuning:COUNT:STATe:GSM

Function	GSM	Sets/queries the multi-measurement state for the IQ tuning measurement in the GSM radio format whether or not that format is active.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE:GSM ON" !Turns on multi-measurements.		

SETup:IQTuning:COUNT:NUMBer[:SELEcted]

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the active (that is the selected) radio format. The multi-measurement count state must be on. See "I/Q Tuning Measurement Description" on page 105.
	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:SELECTED 30" !Sets the number of multi-measurements.		

SETup:IQTuning:COUNT:NUMBER:GSM

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the GSM radio format whether or not that format is active. The multi-measurement count state must be on. See "I/Q Tuning Measurement Description" on page 105.
	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:GSM 30" !Sets the number of multi-measurements.		

SETup:IQTuning:COUNT[:SNUMBER][:SElected]

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the active (that is the selected) radio format. 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 OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER:SELECTED 30" !Turns on multi-measurement and sets the number of multi-measurements to 30.		

SETup:IQTuning

SETup:IQTuning:COUNT[:SNUMBer]:GSM

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes in the GSM radio format whether or not that format is active. This command sets the count state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
Programming Example OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER:GSM 30" !Turns on multi-measurement and sets the number of multi-measurements to 30.		

SETup:IQTuning:REFerence:AUTO

Function	GSM	This command allows you to specify whether or not the test set selects the most appropriate offset to be used for the measurement.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		0 1
*RST Setting		1 ON
Programming Example OUTPUT 714;"SETUP:IQTUNING:REFERENCE:AUTO 1" !Sets the test set to select the reference offset.		

SETup:IQTuning:REfERENCE[:MANual][:FREQUency][:SELEcted]

Function	GSM	This command sets/queries the reference offset frequency to be used for the measurement in the active (that is the selected) radio format. If your mobile is transmitting all ones you should set this command to -67000, and if your mobile is transmitting all zeros it should be set to +67000.
	GPRS	This command is not applicable to GPRS.
Setting	-67000 +67000 0	
Query	-67000 +67000 0	
*RST Setting	This command is not affected by *RST.	
Programming Example OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:SELECTED -67000" !Sets reference frequency for IQ Tuning measurement.		

SETup:IQTuning:REfERENCE[:MANual][:FREQUency]:GSM

Function	GSM	This command sets/queries the reference offset frequency to be used for the measurement in the GSM radio format whether or not that format is active. This means that if your mobile is transmitting all ones you should set this command to -67000, and if your mobile is transmitting all zeros it should be set to +67000.
	GPRS	This command is not applicable to GPRS.
Setting	-67000 +67000 0	
Query	-67000 +67000 0	
*RST Setting	This command is not affected by *RST.	
Programming Example OUTPUT 714;"SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:GSM +67000" !Sets reference frequency for IQ Tuning measurement.		

SETup:IQTuning

SETup:IQTuning:REfERENCE[:MANual][:FREQUency]:CHARacter:GSM

Function	GSM	<p>Prior to the A.07 revision you would have used the command <code>SETUP:IQTuning:REfERENCE[:FREQUency]</code> to set/query the reference offset. However, this command had to change at A.07 to allow it to operate in the fast switching environment with AMPS/136. If you previously used the old command you must change it to this command to allow your code to run.</p> <p>If you are using GSM A.07 and had never used the original command, it is recommended that you don't use this command. Instead, you should use the "SETup:IQTuning:REfERENCE[:MANual][:FREQUency]:GSM" on page 609 command. Alternatively you could use "SETup:IQTuning:REfERENCE:AUTO" on page 608 which allows the test set to select the most appropriate offset.</p> <p>This command sets/queries the reference offset frequency to be used for the measurement in the GSM radio format whether or not that format is active.</p> <p>This means that if your mobile is transmitting all ones you should set this command to NEG67KHZ, and if your mobile is transmitting all zeros it should be set to POS67KHZ. Alternatively you could select AUTO which allows the test set to select the most appropriate offset.</p>
	GPRS	This command is not applicable to GPRS.
Setting	NEG67KHZ ZEROKHZ POS67KHZ AUTO	
Query	NEG67KHZ ZEROKHZ POS67KHZ AUTO	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714 ; "SETUP:IQTUNING:REFERENCE:MANUAL:FREQUENCY:CHARACTER:GSM AUTO" !Sets reference frequency for IQ Tuning measurement (old command).		

SETup:IQTuning:SPUR:FREQUency[:SElected]

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement in the active (that is the selected) radio format. The units (HZ KHZ MHZ) are optional, if no units are specified then the default is HZ.
	GPRS	This command is not applicable to GPRS.
Setting	Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz Resolution: 100 Hz	
Query	Range: -19 MHz to +19 MHz Resolution: 100 Hz	
*RST Setting	0 MHz	
Programming Example		
OUTPUT 714 ; "SETUP:IQTUNING:SPUR:FREQUENCY:SELECTED 10MHZ" !Sets spur measurement frequency.		

SETup:IQTuning:SPUR:FREQUENCY:GSM

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement in the GSM radio format whether or not that format is active. The units (HZ KHZ MHZ) are optional, if no units are specified then the default is HZ.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz Resolution: 100 Hz
Query		Range: -19 MHz to +19 MHz Resolution: 100 Hz
*RST Setting		0 MHz
Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY:GSM 10MHZ" !Sets spur measurement frequency.</pre>		

SETup:IQTuning:SPUR:STATE[:SElected]

Function	GSM	This command sets/queries the spur state for the I/Q Tuning measurement in the active (that is the selected) radio format.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE:SELECTED ON" !Sets state for spur measurement.</pre>		

SETup:IQTuning

SETup:IQTuning:SPUR:STATE:GSM

Function	GSM	This command sets/queries the spur state for the I/Q Tuning measurement in the GSM radio format whether or not that format is active.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714; "SETUP:IQTUNING:SPUR:STATE:GSM ON" !Sets state for spur measurement.		

SETup:IQTuning:SPUR[:SFrequency][:SElected]

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement in the active (that is the selected) radio format. The units (HZ KHZ MHZ) are optional, if no units are specified then the default is HZ. This command sets the spur state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz 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)
Programming Example		
OUTPUT 714; "SETUP:IQTUNING:SPUR:SFREQUENCY:SELECTED 10MHZ" !Sets frequency value and state for spur measurement.		

SETup:IQTuning:SPUR[:SFRequency]:GSM

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement in the GSM radio format whether or not that format is active. The units (HZ KHZ MHZ) are optional, if no units are specified then the default is HZ. This command sets the spur state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz 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)
Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:SPUR:SFREQUENCY:GSM 10MHZ" !Sets frequency value and state for spur measurement.</pre>		

SETup:IQTuning:TIMEout:STATe[:SElected]

Function	GSM	This command sets/queries the timeout state for the I/Q Tuning measurement in the active (that is the selected) radio format.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STATE:SELECTED 25" !Sets timeout state.</pre>		

SETup:IQTuning

SETup:TIMEout:STATe:GSM

Function	GSM	This command sets/queries the timeout state for the I/Q Tuning measurement in the GSM radio format whether or not that format is active.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STATE:GSM 25" !Sets timeout state.		

SETup:IQTuning:TIMEout[:STIME][:SELEcted]

Function	GSM	This command sets/queries the I/Q Tuning measurement time-out value in seconds in the active (that is the selected) radio format. This command 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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME:SELECTED 25" !Sets timeout value and state.		

SETup:IQTuning:TIMEout[:STIME]:GSM

Function	GSM	This command sets/queries the I/Q Tuning measurement time-out value in seconds for the GSM radio format whether or not that format is active. This command sets the timeout 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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME:GSM 25" !Sets timeout value and state.</pre>		

SETup:IQTuning:TIMEout:TIME[:SElected]

Function	GSM	This command sets/queries the time-out value in seconds that is used for the I/Q Tuning measurements in the active (that is the selected) radio format. The timeout state must be on. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME:SELECTED 25" !Sets timeout time value.</pre>		

SETup:IQTuning

SETup:IQTuning:TIMEout:TIME:GSM

Function	GSM	This command sets/queries the time-out value in seconds that is used for the I/Q Tuning measurements in the GSM radio format whether or not that format is active. The time-out state must be on. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: .1 to 999 seconds Resolution: .1 seconds
*RST Setting		10 seconds
Programming Example OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME:GSM 25" !Sets timeout time value.		

SETup:IQTuning:TRIGger:DELAy[:SElected]

Function	GSM	This command sets/queries the trigger delay time in seconds for an I/Q Tuning measurement in the active (that is the selected) radio format. 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
Programming Example OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY:SELECTED 1.1MS" !Sets trigger delay time.		

SETup:IQTuning:TRIGger:DELay:GSM

Function	GSM	This command sets/queries the trigger delay time in seconds for an I/Q Tuning measurement in the GSM radio format whether or not that format is active. 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
Programming Example OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY:GSM 1.1MS" !Sets trigger delay time.		

SETup:IQTuning:TRIGger:SOURce[:SElected]

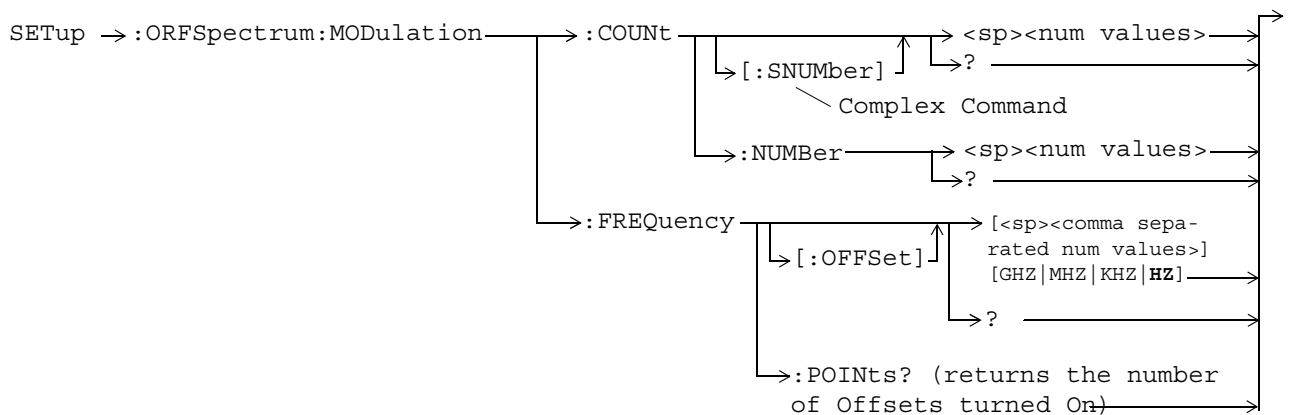
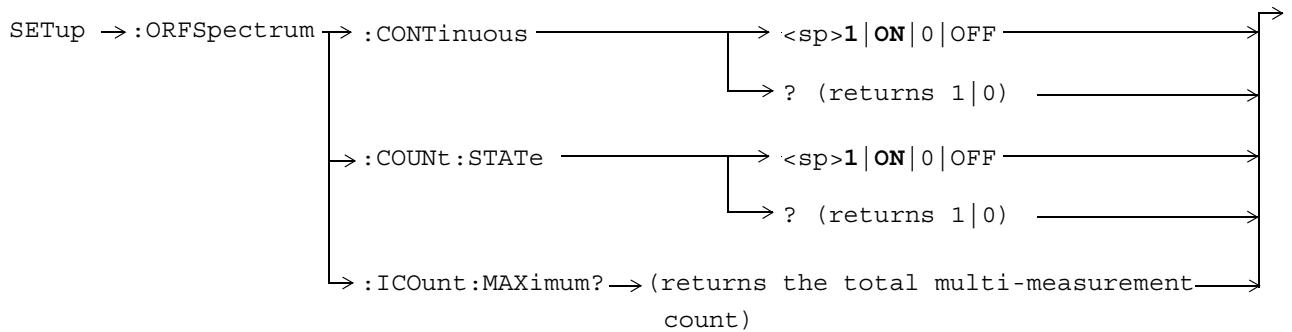
Function	GSM	This command sets/queries the trigger source for an I/Q Tuning measurement in the active (that is the selected) radio format.
	GPRS	This command is not applicable to GPRS.
Setting		RISE IMMEDIATE See "Triggering of Measurements" on page 214.
Query		RISE IMM
*RST Setting		RISE
Programming Example OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE:SELECTED IMMEDIATE" !Sets trigger delay source.		

SETup:IQTuning

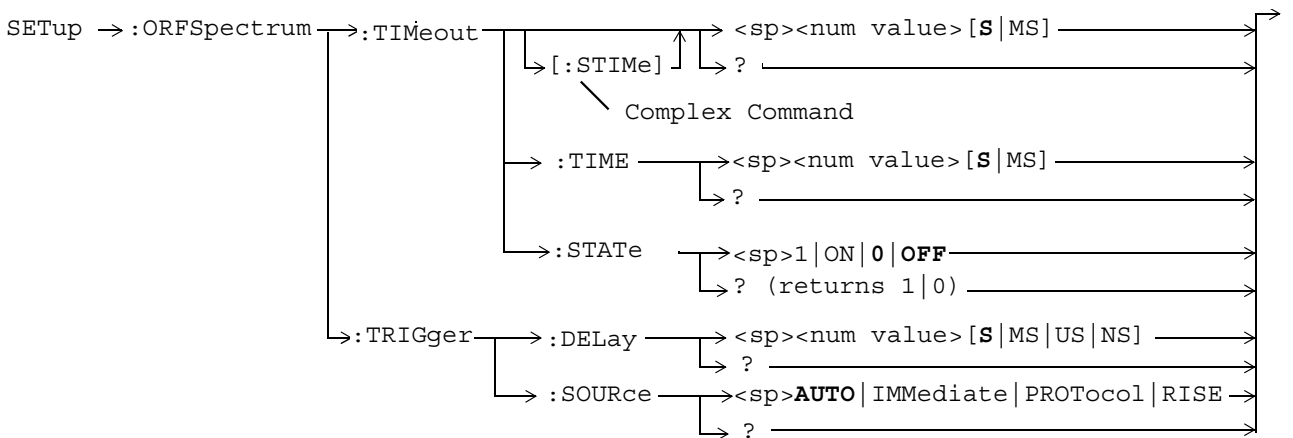
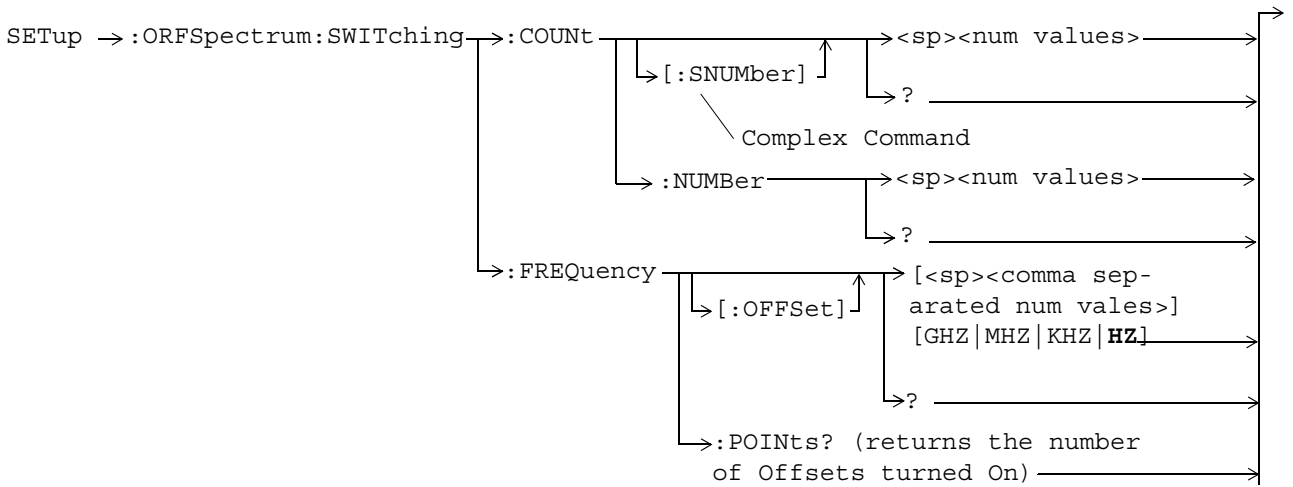
SETup:IQTuning:TRIGger:SOURce:GSM

Function	GSM	This command sets/queries the trigger source for an I/Q Tuning measurement in the GSM radio format whether or not that format is active.
	GPRS	This command is not applicable to GPRS.
Setting		RISE IMMEDIATE See “Triggering of Measurements” on page 214.
Query		RISE IMM
*RST Setting		RISE
Programming Example OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE:GSM IMMEDIATE" !Sets trigger delay source.		

SETup:ORFSpectrum



SETup:ORFSpectrum



“Diagram Conventions” on page 313

SETup:ORFSpectrum:CONTInuous

Function	GSM	This command selects/queries the trigger state for output RF spectrum measurements.
	GPRS	
Setting	Range: <ul style="list-style-type: none"> • Continuous trigger mode = 1 ON • Single trigger mode = 0 OFF 	
Query	Range: 1 0	
*RST Setting	1 (on)	
Programming Example OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress. OUTPUT 714;"SETUP:CONTINUOUS OFF" !Sets trigger mode to single for an ORFS measurement.		

SETup:ORFSpectrum:COUNT:STATE

Function	GSM	This command selects/queries the ORFS due to switching and modulation multi-measurement count state.
	GPRS	
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	1 (on)	
Programming Example OUTPUT 714;"SETUP:ORFSPECTRUM:COUNT:STATE ON" !Sets count state for both ORFS due to switching and modulation measurements.		

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>Where:</p> <p>$M = (\text{the number of modulation offsets}) \times (\text{the number of multi-measurements for ORFS due to modulation}).$</p> <p>$S = (\text{the number of switching offsets}) \times (\text{the number of multi-measurements for ORFS due to switching}).$</p> <p>See "Output RF Spectrum Measurement Description" on page 117 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 "Output RF Spectrum Measurement Description" on page 117.
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		20
Programming Example <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 "Output RF Spectrum Measurement Description" on page 117.
	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 <pre>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.</pre>		

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 "Output RF Spectrum Measurement Description" on page 117.
	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
Programming Example		
<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 "Output RF Spectrum Measurement Description" on page 117.
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
Programming Example		
<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 “Output RF Spectrum Measurement Description” on page 117.
	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
Programming Example OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET 400 KHZ, 700 KHZ" !Turns on the first two ORFS due to switching measurement offsets and sets them !to 400 kHz and 700 kHz offsets. All other offsets are in the off state. OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET 700 KHZ" !Turns on the first ORFS due to switching measurement offset and sets it to 700 kHz !offsets. All other offsets are in the off state. OUTPUT 714;"SETUP:ORFSPECTRUM:SWITCHING:FREQUENCY:OFFSET" !Turns all of the ORFS due to switching measurements offsets to off.		

SETup:ORFSpectrum:SWITching:FREQUENCY:POINTs?

Function	GSM	This command queries the number of frequency offsets currently on during an ORFS due to switching measurement. See “Output RF Spectrum Measurement Description” on page 117.
	GPRS	
Query		Range: 0 to 8 Resolution: 1

SETup:ORFSpectrum

SETup:ORFSpectrum:TIMEout:TIME

Function	GSM	This command selects/queries the timeout value in seconds that will be used for ORFS measurements when the "SETup:ORFSpectrum:TIMEout:STATE" is ON. The units (S MS) are optional. If no units are specified than units default to S.
	GPRS	
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:TIME 15" !Sets the timeout value to 15 seconds.		

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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STIME 12" !Sets the timeout value to 12 seconds and the state to on.		

SETup:ORFSpectrum:TIMEout:STATE

Function	GSM	This command selects/queries the ORFS measurement timeout state.
	GPRS	
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STATE ON" !Sets timeout state to on.		

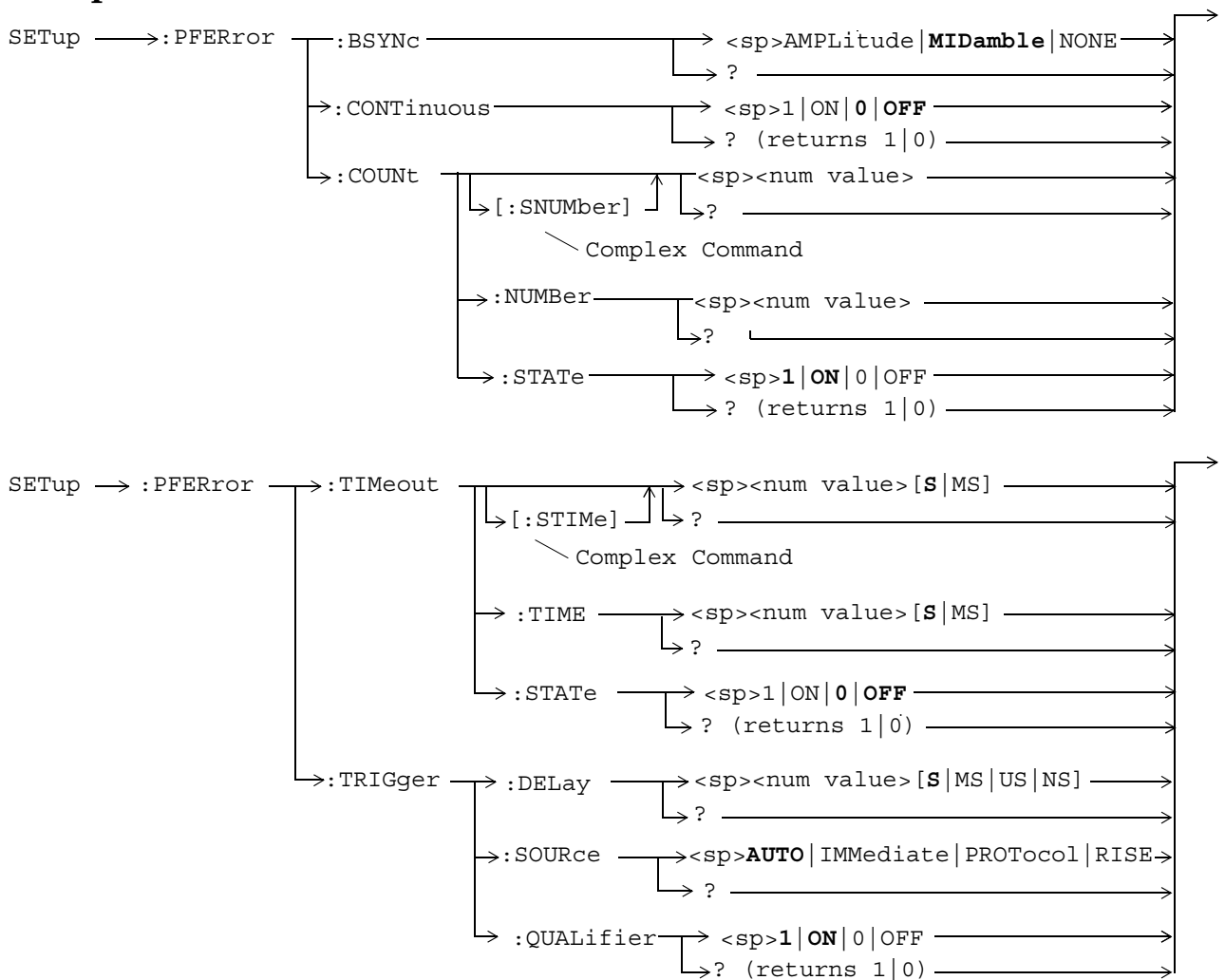
SETup:ORFSpectrum:TRIGger:DELay

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		
<pre>OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:DELAY 1MS" !Sets the trigger delay value to 1 millisecond.</pre>		

SETup:ORFSpectrum:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for ORFS measurements. See “Output RF Spectrum Measurement Description” on page 117.
	GPRS	
Setting		Range: AUTO IMMEDIATE PROTOCOL RISE See “Triggering of Measurements” on page 214.
Query		Range: AUTO IMM PROT RISE
*RST Setting		AUTO
Programming Example		
<pre>OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO" !Sets the trigger source to automatic.</pre>		

SETup:PFERror



“Diagram Conventions” on page 313

SETup:PFERror:BSYNc

Function	GSM	This command sets/queries the burst synchronization mode for phase/frequency measurements. See “Burst Synchronization of Measurements” on page 172.
	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	Range: <ul style="list-style-type: none"> • Single trigger mode = 0 OFF • Continuous trigger mode = 1 ON 	
Query	Range: 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 (seconds).
	GPRS	
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 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 (seconds).
	GPRS	
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 seconds	
Query	Range: 0.1 to 999 seconds Resolution: 0.1 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 (seconds). See "Phase and Frequency Error Measurement Description" on page 125.
	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 milliseconds		

SETup:PFERror

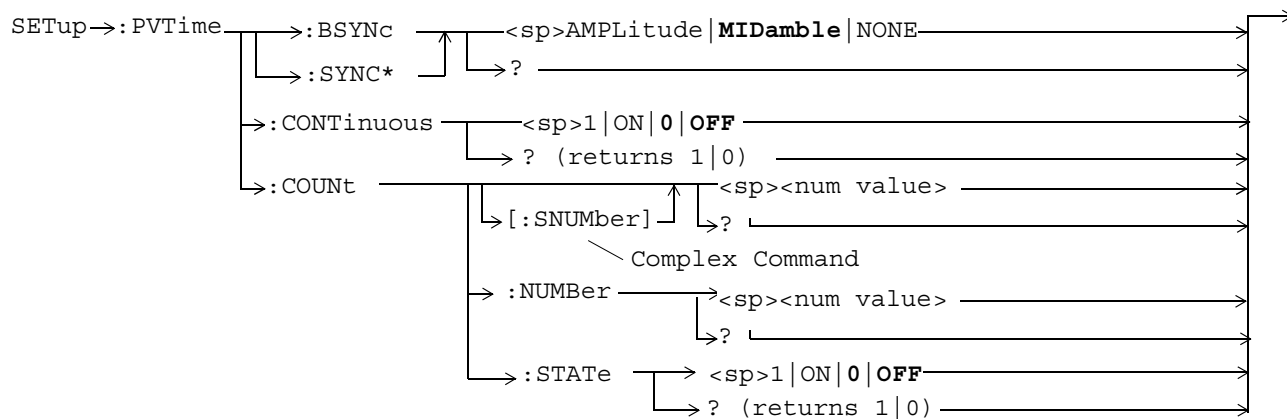
SETup:PFERror:TRIGger:SOURce

Function	GSM	This command sets/queries the trigger source for phase/frequency measurements. See “Phase and Frequency Error Measurement Description” on page 125.
	GPRS	
Setting	AUTO PROTOcol RISE IMMEDIATE See “Triggering of Measurements” on page 214.	
Query	AUTO PROT RISE IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Sets trigger source to automatic.		

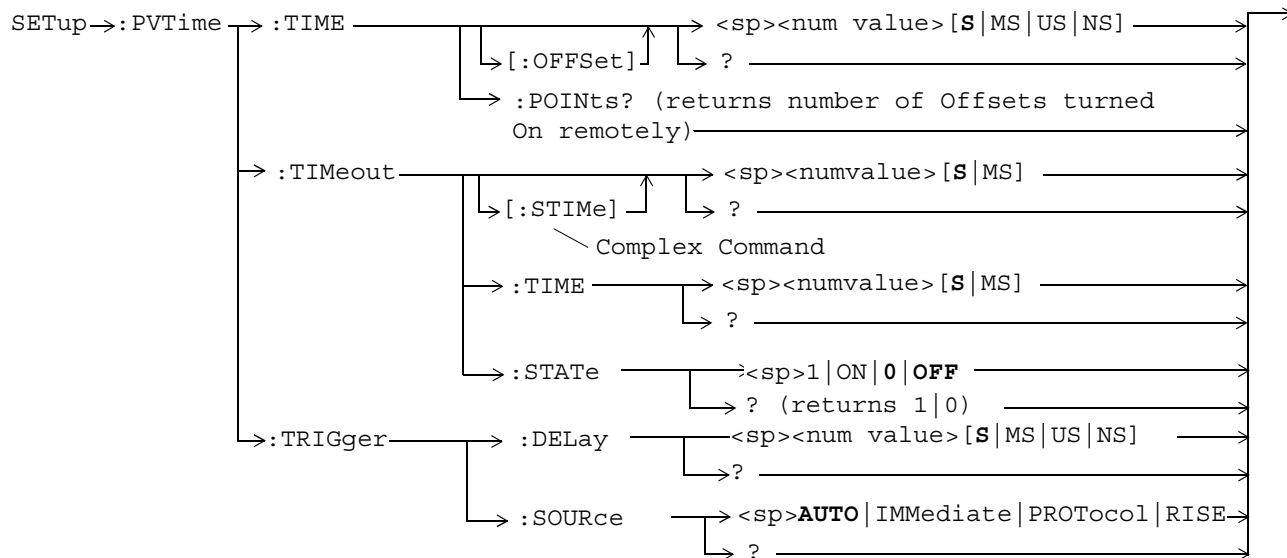
SETup:PFERror:TRIGger:QUALifier

Function	GSM	This command selects/queries the trigger qualifier for phase/frequency measurements. See “Trigger Qualifier Description” on page 217.
	GPRS	
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	1 (on)	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TRIGGER:QUALIFIER OFF" !Sets trigger qualifier state to off.		

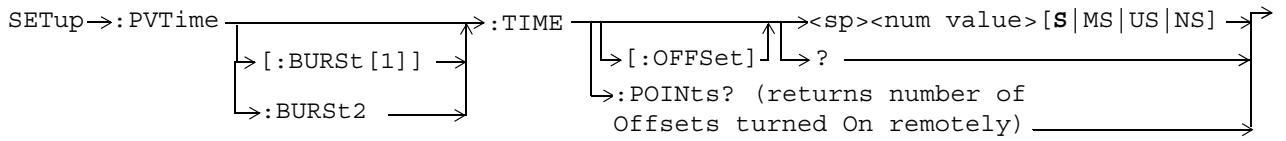
SETup:PVTime



* Not applicable to GSM



SETup:PVTime



These commands are not applicable to GSM.

“Diagram Conventions” on page 313

SETup:PVTime:BSYNc

Function	GSM	This command sets/queries the burst synchronization mode for power versus time measurements. See "Burst Synchronization of Measurements" on page 172.
	GPRS	
Setting	MIDamble AMPLitude NONE	
Query	MID AMPL NONE	
*RST Setting	MID	
Programming Example <pre>OUTPUT 714;"SETUP:PVTIME:BSYNC MIDAMBLE" !Selects burst synchronization to on midamble for power versus time measurements.</pre>		

SETup:PVTime:CONTInuous

Function	GSM	This command sets/queries the trigger state for power versus time measurements. See "Measurement States" on page 216.
	GPRS	
Setting	Range: <ul style="list-style-type: none"> • Single trigger mode = 0 OFF • Continuous trigger mode = 1 ON 	
Query	Range: 0 1	
*RST Setting	0 (off)	
Programming Example <pre>OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Specifies single trigger mode for power versus time measurements.</pre>		

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 <pre>OUTPUT 714;"SETUP:PVTIME:COUNT:SNUMBER 25" !Sets the state to on and the multi-measurement count value to 25.</pre>		

SETup:PVTime

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		
OUTPUT 714;"SETUP:PVTIME:COUNT:NUMBER 20" !Sets multi-measurement count value to 20.		

SETup:PVTime:COUNT:STATE

Function	GSM	This command sets/queries the power versus time multi-measurement count state.
	GPRS	
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:PVTIME:COUNT:STATE ON" !Sets multi-measurement count state to on.		

SETup:PVTime:SYNC

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the burst synchronization mode for power versus time measurements. See "Burst Synchronization of Measurements" on page 172.
Setting		MIDamble AMPLitude NONE
Query		MID AMPL NONE
*RST Setting		MID
Programming Example		
OUTPUT 714;"SETUP:PVTIME:SYNC MIDAMBLE" !Selects burst synchronization to midamble for GPRS power versus time measurements.		

SETup:PVTime:TIME[:OFFSet]

Function	GSM	<p>This command sets/queries the time offsets in seconds for power vs time power measurement, (not the mask measurement).</p> <p>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see “Power versus Time Measurement Description” on page 133. These values are referenced to the occurrence of bit 0 in a normal burst.</p> <p>The units (S MS US NS) are optional, if no units are specified then units default to S.</p>
	GPRS	
Setting	<p>Range: 0 to 12 comma-separated values ranging from: -50 us to 593 μs</p> <p>Resolution: 1 ns</p>	
Query	<p>Range: 1 to 12 comma-separated values ranging from: -50 us to 593 μs and 9.91E+37 (NAN) if no offsets are specified</p> <p>Resolution: 1 ns</p>	
*RST Setting	<p>Time offsets 1 through 12 are on and set to these values:</p> <p>time offset 1 = -28 us time offset 2 = -18 us time offset 3 = -10 us time offset 4 = 0 us time offset 5 = 321.2 us time offset 6 = 331.2 us time offset 7 = 339.2 us time offset 8 = 349.2 us time offset 9 = 542.8 us time offset 10 = 552.8 us time offset 11 = 560.8 us time offset 12 = 570.8 us</p>	
<p>Programming Example</p> <pre>OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0US, -18.0US, -10.0US, 0" !Configures the first four time offset points and turns the remaining eight off. !Using the query form of this command would return four time offset values OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET -28.0US" !Configures the first time offset !point and turns the remaining !eleven off. Using the query form !of this command would return one !time offset value OUTPUT 714;"SETUP:PVTIME:TIME:OFFSET" !Turns all 12 offset points off. Using the !query form of this command would return !9.91E+37 (NAN)</pre>		

SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]

SETup:PVTime:BURSt2:TIME[:OFFSet]

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the time offsets (for the specified burst of the multislot configuration) for the power vs time power measurement, (not the mask measurement).</p> <p>All 12 time offsets are set to on by default. If less than 12 values are sent with this command, the remaining offsets are turned off, see “Power versus Time Measurement Description” on page 133. These values are referenced to the occurrence of bit 0 in a normal burst.</p> <p>The units (S MS US NS) are optional, if no units are specified then units default to S.</p>
Setting		<p>Range: 0 to 12 comma-separated values ranging from: -50 us to 593 μs</p> <p>Note that there is a further restriction on this range to ensure that a valid result is returned when testing a GPRS mobile which supports a multislot configuration with two uplink timeslots. For more details, see “Time Offset Range Restrictions for GPRS Mobiles Which Support Two Uplink Timeslots” on page 147.</p> <p>Resolution: 1 ns</p>
Query		<p>Range: 1 to 12 comma-separated values ranging from: -50 us to 593 μs and 9.91E+37 (NAN) if no offsets are specified</p> <p>Resolution: 1 ns</p>
*RST Setting		<p>Time offsets 1 through 12 are on and set to these values:</p> <p>Burst 1</p> <p>time offset 1 = -28 us time offset 2 = -18 us time offset 3 = -10 us time offset 4 = 0 us time offset 5 = 321.2 us time offset 6 = 331.2 us time offset 7 = 339.2 us time offset 8 = 349.2 μs time offset 9 = 542.8 us time offset 10 = 552.8 us time offset 11 = 560.8 us time offset 12 = 570.8 us</p> <p>Burst 2</p> <p>time offset 1 = 0 us time offset 2 = 0 us time offset 3 = 0 us time offset 4 = 0 us time offset 5 = 321.2 us time offset 6 = 331.2 us time offset 7 = 339.2 us time offset 8 = 349.2 us time offset 9 = 542.8 us time offset 10 = 552.8 us time offset 11 = 560.8 us time offset 12 = 570.8 us</p>

Programming Example

```
OUTPUT 714;"SETUP:PVTIME:BURSt2:TIME:OFFSet 0US, 0US, 0US, 0US, 321.2.0US, 331.2US"
```

!Configures the first six time offset points and turns the remaining six off for burst 2.
!Using the query form of this command would return six time offset values.

SETup:PVTime: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 are returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet]" query is sent, and how many power values are returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 505 command is sent.
Query		Range: 0 to 12 Resolution: 1
*RST Setting		12

SETup:PVTime[BURSt[1]]:TIME:POINTs?

SETup:PVTime:BURSt2:TIME:POINTs?

Function	GSM	This command is not applicable to GSM.
	GPRS	This command queries the number of the specified burst's Measurement Offset points that are turned on during a power versus time measurement. This command is useful for determining how many time values are returned in a comma-separated list when the "SETup:PVTime:TIME[:OFFSet]" query is sent, and how many power values are returned when the "FETCh:PVTime:POWer[:ALL][:MAXimum]?" on page 505 command is sent.
Query		Range: 0 to 12 Resolution: 1
*RST Setting		12

SETup:PVTime

SETup:PVTime:TIMEout[:STIME]

Function	GSM	This command sets/queries the timeout value in seconds that is 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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STIME 4" !Sets the state to on and the timeout !value to 4 seconds.		

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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TIMEOUT:TIME 6" !Sets the timeout value to 6 seconds.		

SETup:PVTime:TIMEout:STATE

Function	GSM	This command sets/queries power versus time timeout state.
	GPRS	
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STATE ON" !Sets timeout state to on.		

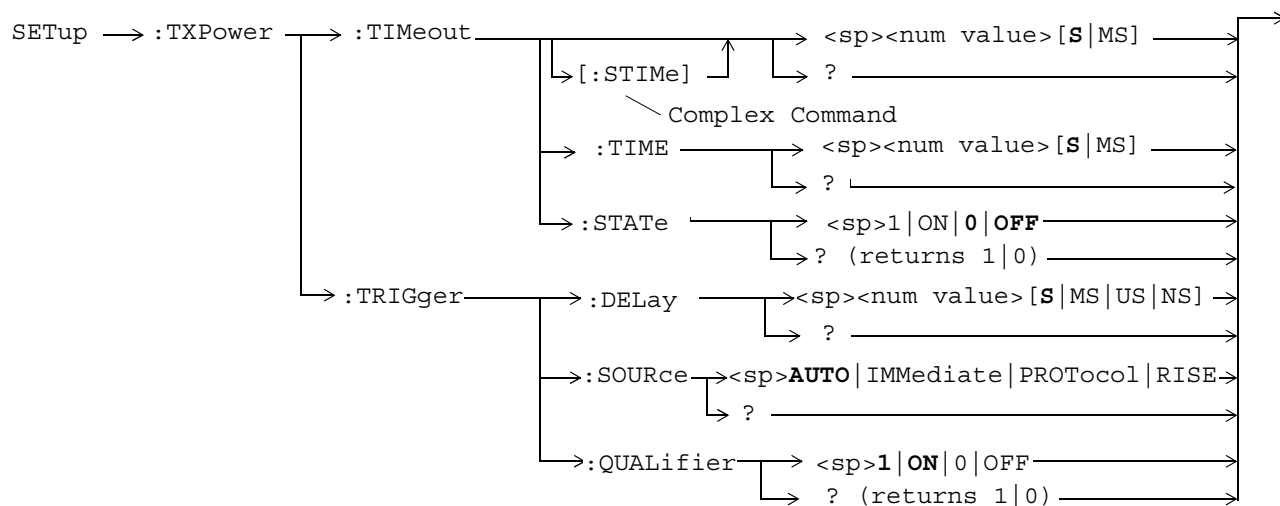
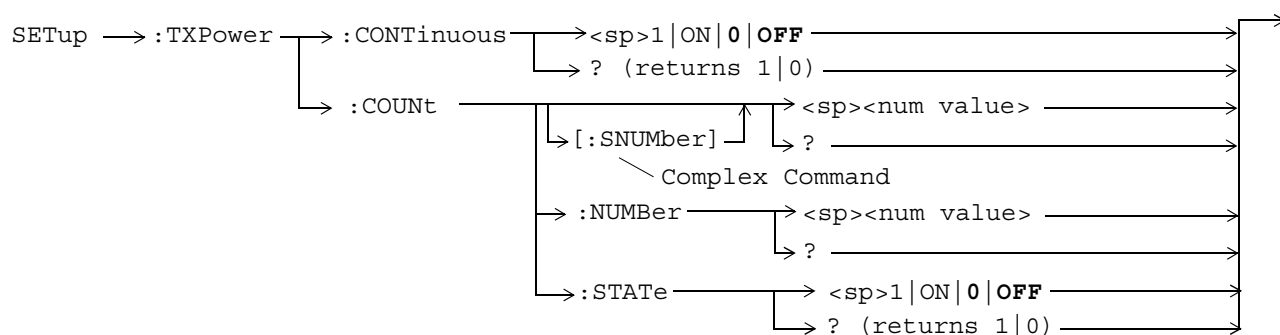
SETup:PVTime:TRIGger:DELay

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		
<pre>OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY 1.1MS" !Sets trigger delay value to 1.1 !milli-seconds.</pre>		

SETup:PVTime:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for power versus time measurements. See "Triggering of Measurements" on page 214.
	GPRS	
Setting	AUTO PROTOcol RISE IMMEDIATE	
Query	AUTO PROT RISE IMM	
*RST Setting	AUTO	
Programming Example		
<pre>OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Sets trigger source to automatic.</pre>		

SETup:TXPower



“Diagram Conventions” on page 313

SETup:TXPower:CONTinuous

Function	GSM	This command sets/queries the trigger state for TX carrier power measurements.
	GPRS	
Setting	Range: <ul style="list-style-type: none"> • Single trigger mode = 0 OFF • Continuous trigger mode = 1 ON 	
Query	Range: 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-measurementcount number to 5.		

SETup:TXPower

SETup:TXPower:COUNT:STATE

Function	GSM	This command sets/queries the TX power multi-measurement count state.
	GPRS	
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE ON" !Sets the multi-measurement count state to on.		

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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:STIME 20" !Sets the state to on and the timeout value to 20 seconds.		

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: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:TIMEOUT:TIME 20" !Sets the TX power measurement timeout to 20 seconds.		

SETup:TXPower:TIMEout:STATe

Function	GSM	This command selects/queries TX carrier power measurement timeout state.
	GPRS	
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	0 (off)	
Programming Example <pre>OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE 1" !Turns the TX carrier power timeout state on.</pre>		

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 <pre>OUTPUT 714;"SETUP:TXPOWER:TRIGGER:DELAY 1.5MS" !Set trigger delay time to 1.5 milliseconds</pre>		

SETup:TXPower:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for TX carrier power measurements. See "Triggering of Measurements" on page 214.
	GPRS	
Setting	AUTO PROTOcol RISE IMMEDIATE	
Query	AUTO PROT RISE IMM	
*RST Setting	AUTO	
Programming Example <pre>OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Sets trigger source to automatic.</pre>		

SETup:TXPower

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 “Trigger Qualifier Description” on page 217.
	GPRS	
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	1 (on)	
Programming Example		
OUTPUT 714 ; "SETUP:TXPOWER:TRIGGER:QUALIFIER ON" !Sets trigger qualifier state to on.		

STATus Subsystem Description

Description

The STATus subsystem is used to communicate current test set status information to the controlling application program.

Syntax Diagrams and Command Descriptions

“STATus:OPERation” on page 648

“STATus:PRESet” on page 670

“STATus:QUEStionable” on page 671

“Standard Event Status Register” on page 690

“Status Byte Register” on page 689

Status Register Bit Definitions

“Status Byte Register Bit Assignments” on page 689

“Standard Event Status Register Bit Assignment” on page 691

“STATus:QUEStionable Condition Register Bit Assignment” on page 676

“STATus:QUEStionable:CALL Condition Register Bit Assignment” on page 677

“STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment” on page 679

“STATus:QUEStionable:ERRors Condition Register Bit Assignment” on page 683

“STATus:QUEStionable:ERRors:GSM Condition Register Bit Assignment” on page 686

“STATus:QUEStionable:HARDware Condition Register Bit Assignment” on page 688

“STATus:OPERation Condition Register Bit Assignment” on page 653

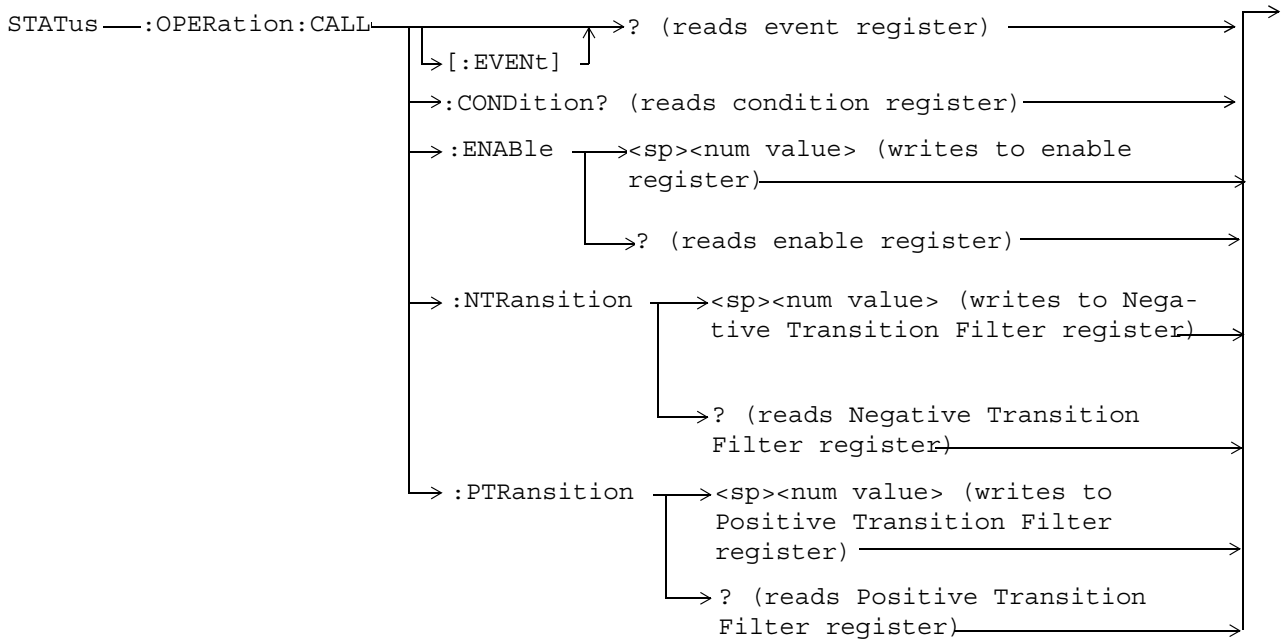
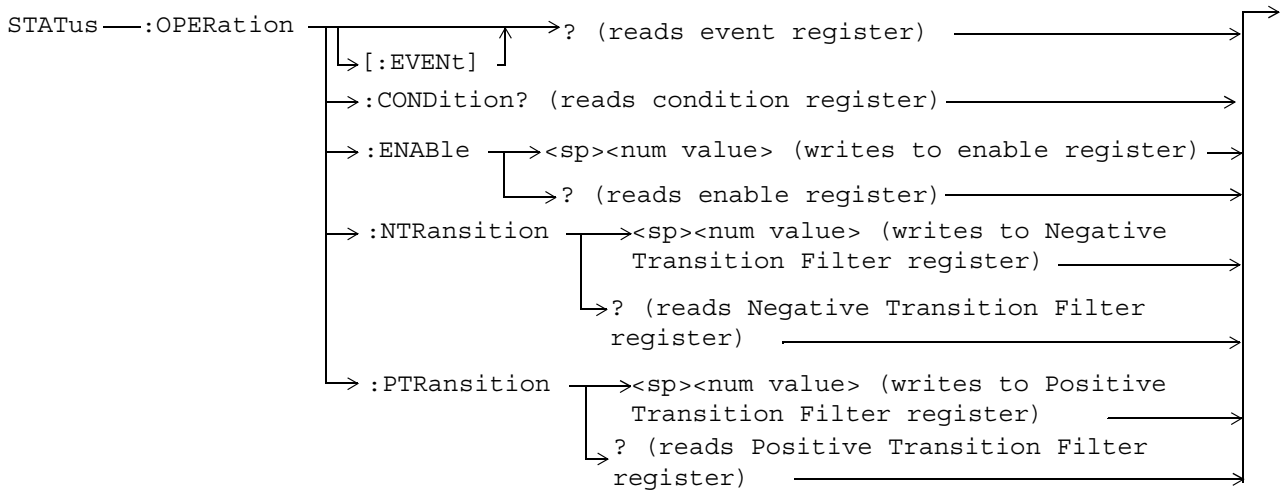
“STATus:OPERation:CALL Condition Register Bit Assignment” on page 655

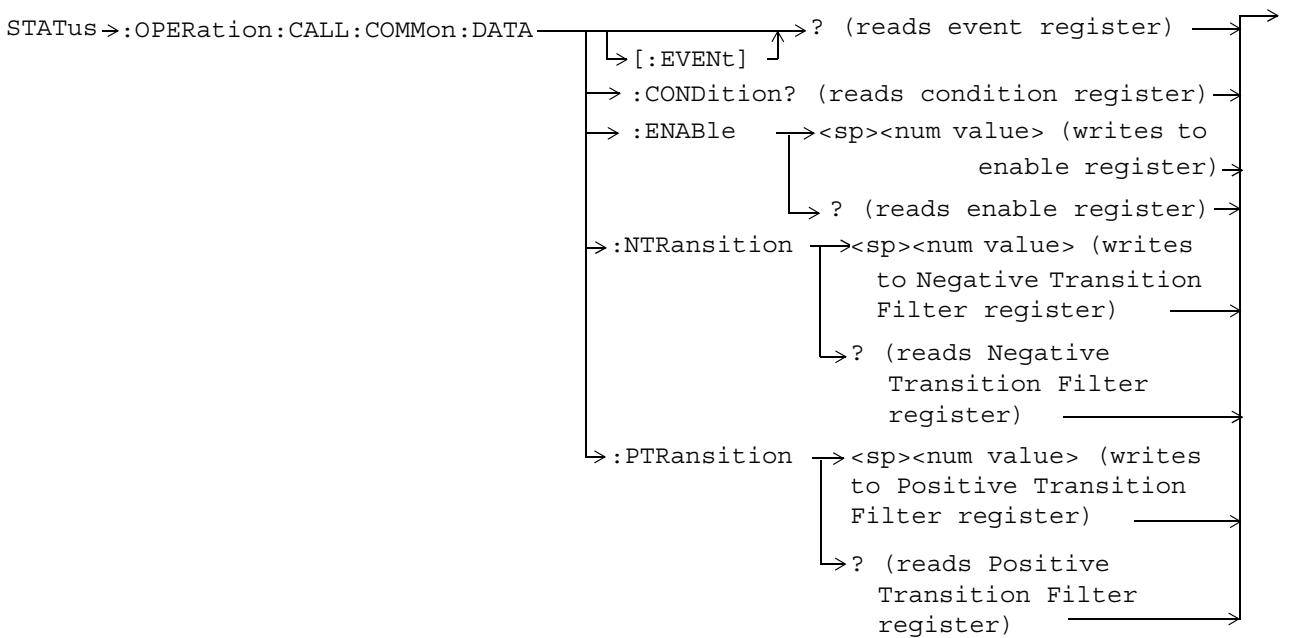
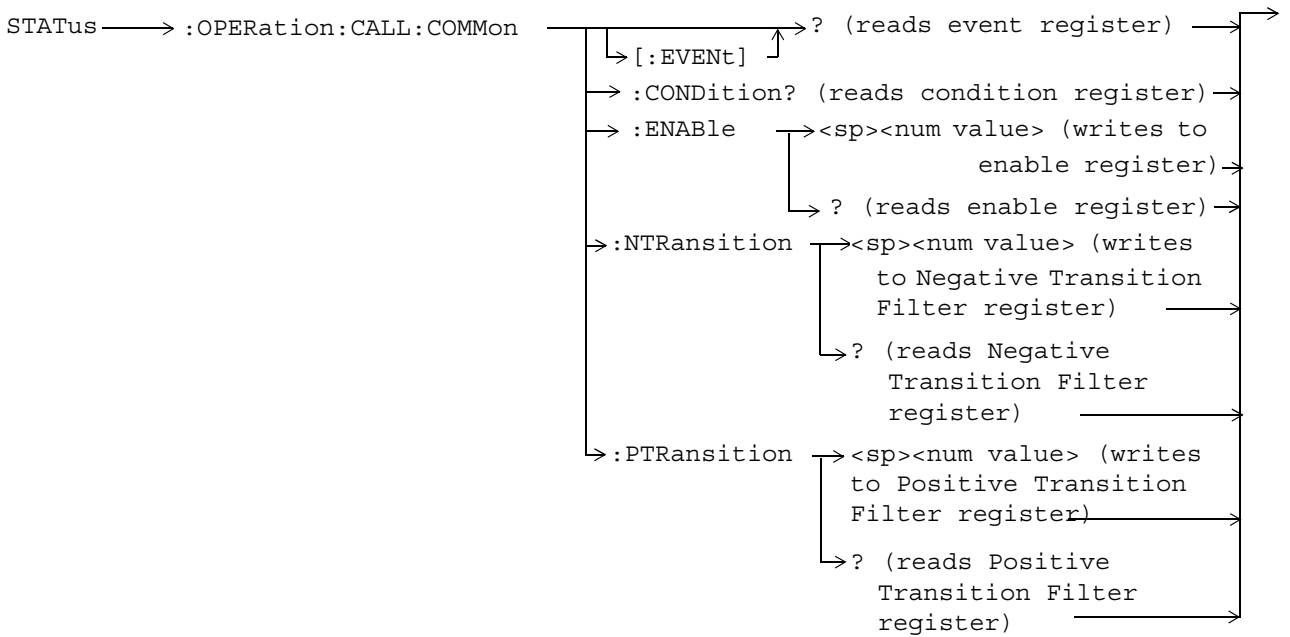
“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 659

“STATus:OPERation:NMRReady Condition Register Bit Assignment” on page 663

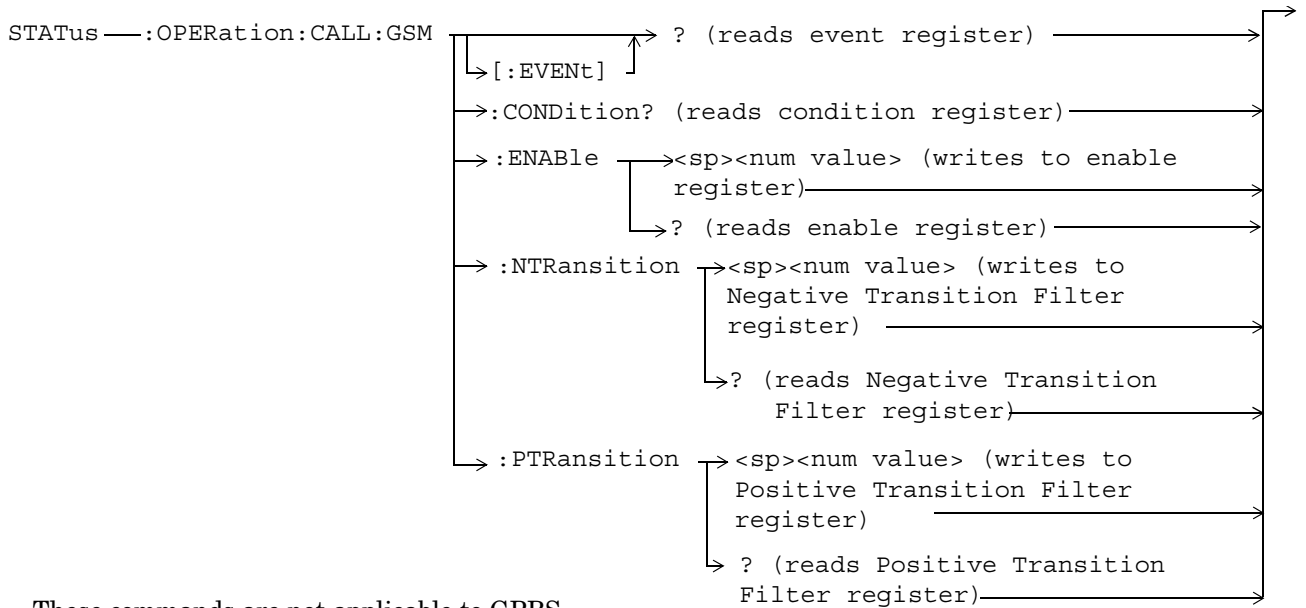
“STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 667

STATUS:OPERation

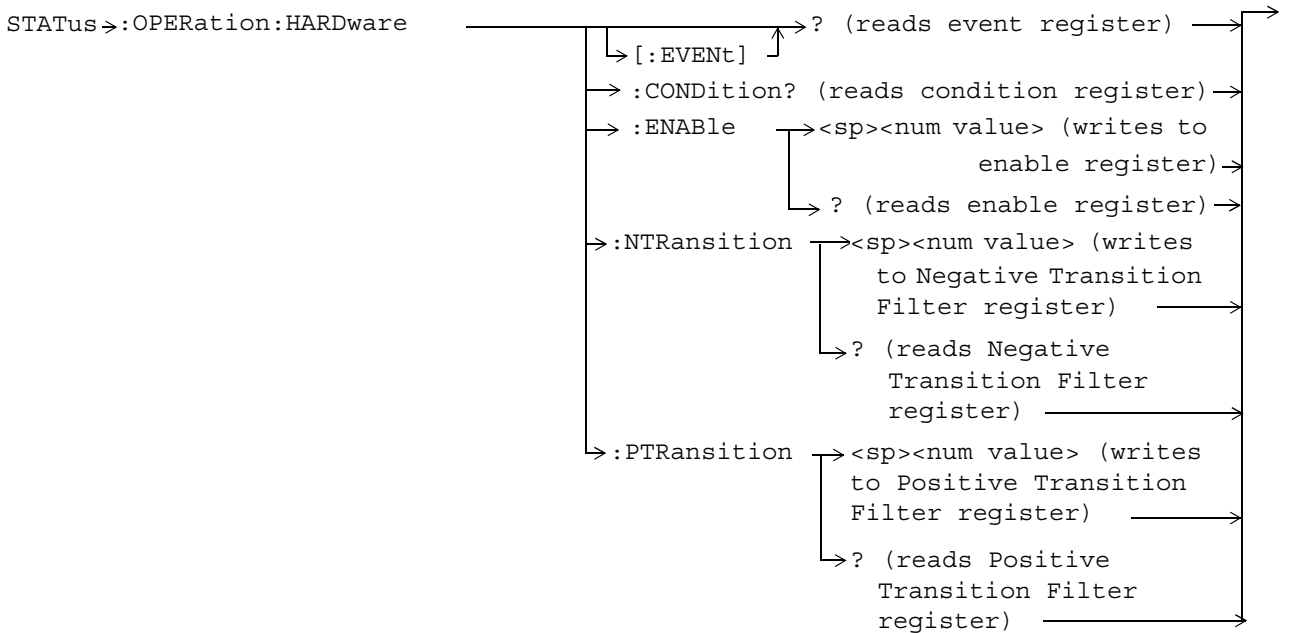


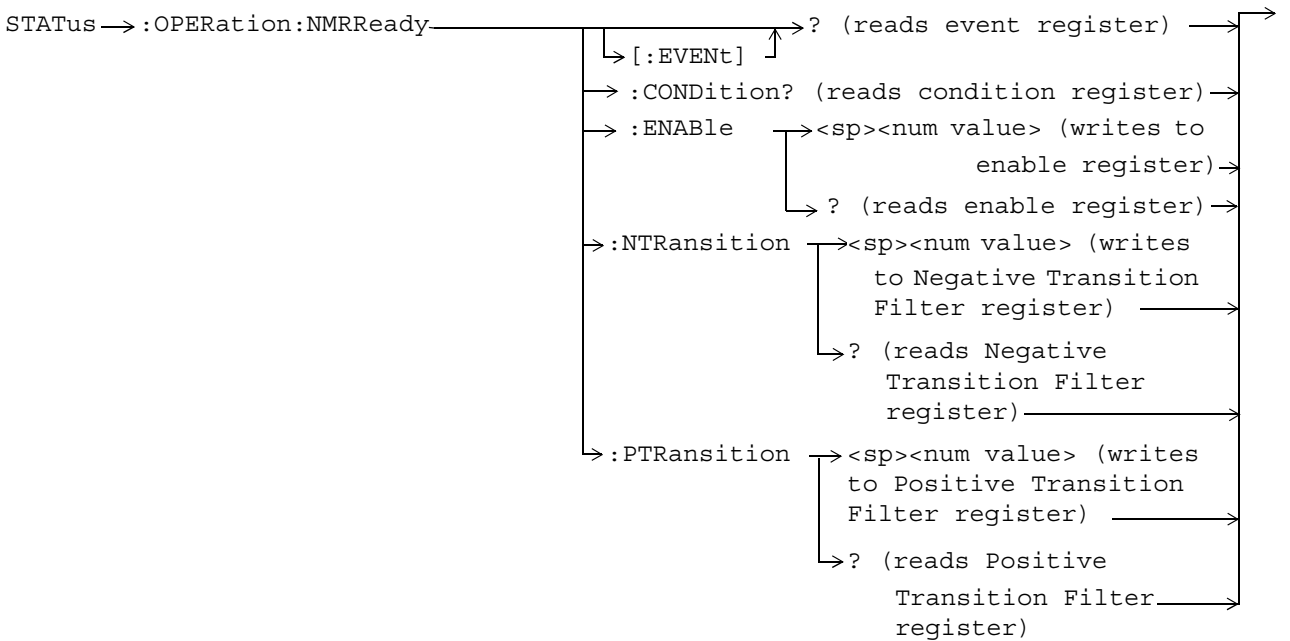
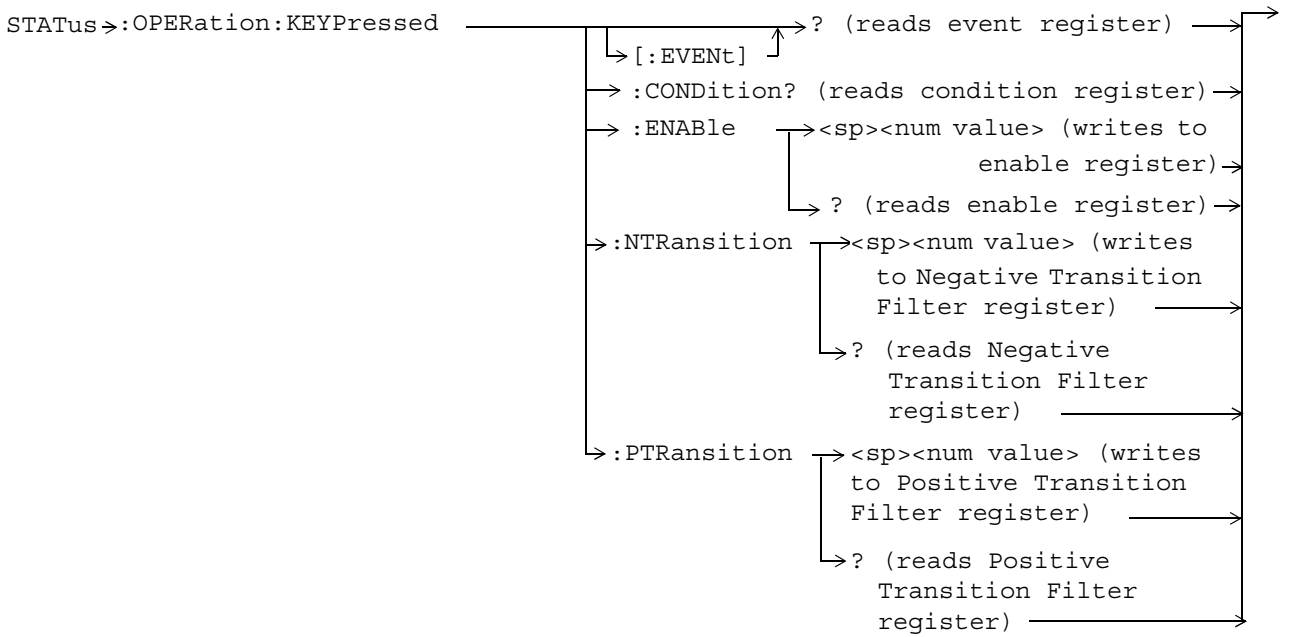


STATUS:OPERation

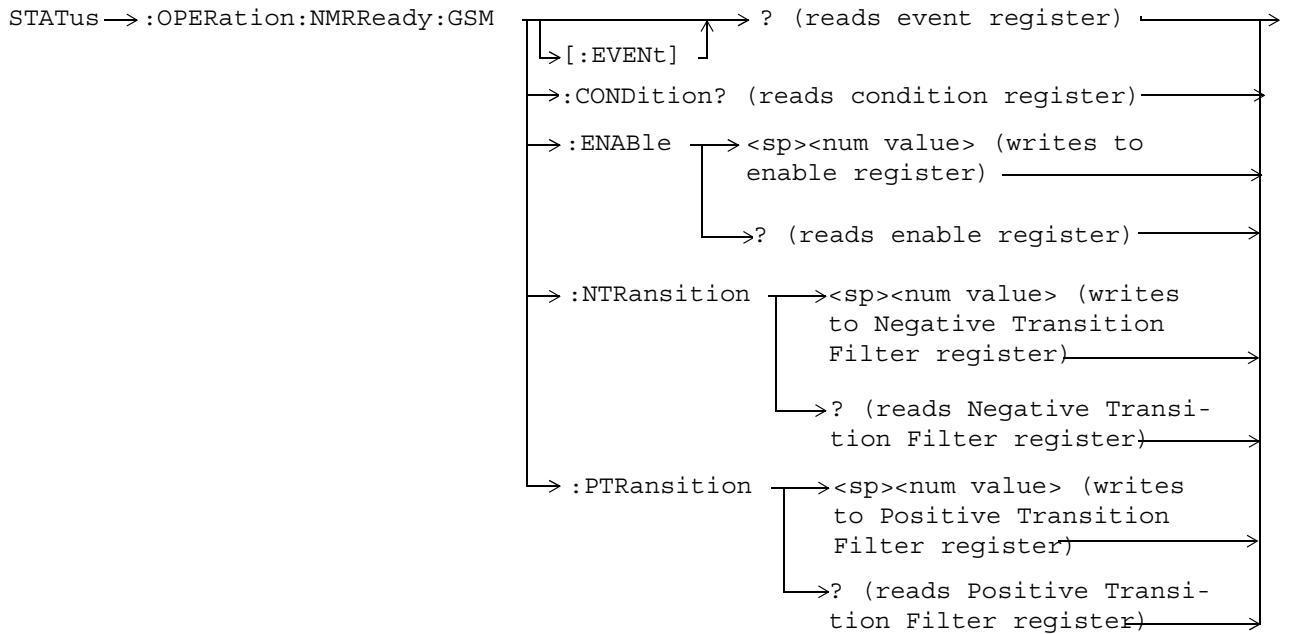
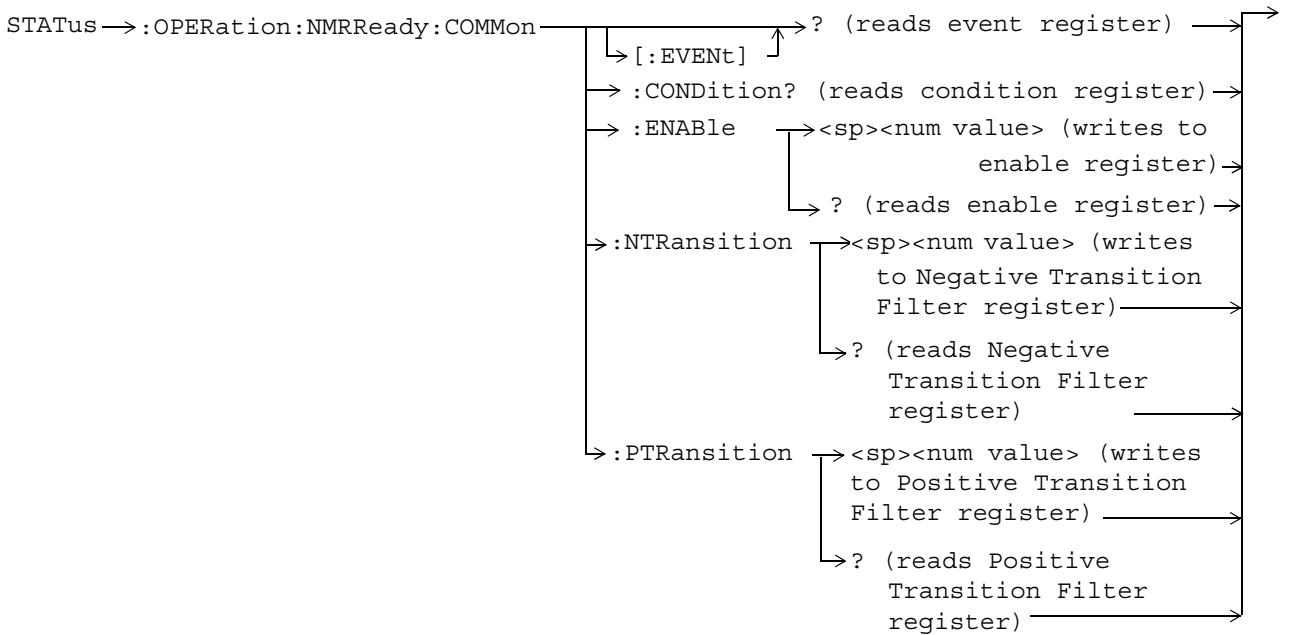


These commands are not applicable to GPRS.





STATUS:OPERation



“Diagram Conventions” on page 313

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 are used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	COMMOon Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:COMMOon 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:OPERation:CALL:COMMon register bits are used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	DATA Summary bit.	This bit is the summary message bit for the STATus:OPERation:CALL:COMMon:DATA register.
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"> • Active Cell mode - the call processing state leaves the idle state • Test mode - the test set has noted a base station origination.
6	64	Call Control Status Changing	This bit is set to a 1 when the call control status change detector has been armed.
5	32	Reserved for future use.	This bit 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:COMMon:DATA Condition Register Bit Assignment

The STATUS:OPERation:CALL:COMMon:DATA register bits are used to indicate status of processes that occur during normal data connection processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	Starting Data Connection	This bit will be a 1 when: <ul style="list-style-type: none"> Active Cell mode - the data connection status leaves the idle state Test mode - the test set has noted a base station origination.
6	64	Data Connection Status Changing	This bit is set to a 1 when the data connection status change detector has been armed.
5	32	Reserved for future use	This bit will always be a 0.
4	16	Reserved for future use	This bit will always be a 0.
3	8	Data Connection Status Transferring	This bit will be a 1 when the data connection status is Transferring.
2	4	Data Connection Status Attached	This bit will be a 1 when the data connection status is Attached.
1	2	Data Connection Status Idle	This bit will be a 1 when the data connection status is Idle.
0	1	Extension Bit	This bit will always be 0.

Program Examples STATUS:OPERation:CALL:COMMON:DATA

```

OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:EVENT?" !Queries and clears the Operation
                                           !Call Common Data Event Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:CONDITION?" !Queries and clears the Operation
                                           !Call Common Data Condition
                                           !Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:DATA:ENABLE 128" !Sets the Operation Call Common
                                           !Data Enable Register for bit 7
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:NTRANSITION 2" !Sets the Operation Call Common
                                           !Data Negative Transition Filter
                                           !Register for bit 1
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:PTRANSITION 2" !Set the Operation Call Common
                                           !Data Positive Transition Filter
                                           !Register for bit 1
    
```

STATUS:OPERation:CALL:GSM Condition Register Bit Assignment

The STATUS:OPERation:CALL:GSM register bits are used to indicate status of processes that occur during normal GSM call processing operations. These register bits are not applicable to GPRS.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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"> Active Cell mode - the call processing state reaches (or is in) the idle state Test mode - the test set has noted a base station termination.
7	128	BS Originating	This bit will be a 1 when: <ul style="list-style-type: none"> Active Cell mode - the call processing state leaves the idle state Test mode - the test set has noted a base station origination.
6	64	Call Control Status Changing	This bit is set to a 1 when the call control status change detector has been armed.

STATUS:OPERation

Bit Number	Binary Weighting	Condition	Description
5	32	TCH Assignment in Progress	This bit will be a 1 when: <ul style="list-style-type: none"> The channel assignment is successfully completed (when a call is established). The test set notes a change in the TCH ARFCN, cell band, TCH timeslot, or mobile station timing advance. An error message is generated.
4	16	BCH Changing	This bit will be a 1 when: <ul style="list-style-type: none"> The downlink signal is transmitting on the new broadcast channel. The test set has noted a change in cell band.
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:HARDware Register Bit Assignments

The STATUS:OPERation:HARDware register bits indicate information about the test set's hardware during normal operation.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	External Timebase in use	This bit is a 1 if a suitable external timebase is connected to the test set's 10 MHz REF IN connector on the rear panel of the test set.
0	1	Extension Bit	This bit will always be 0.

Program Examples - STATUS:OPERation:HARDware

```

OUTPUT 714;"STATUS:OPERATION:HARDWARE:EVENT?" !Queries the Hardware Event Register.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:CONDITION?" !Queries the Hardware Condition Register.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:ENABLE 16" !Sets New Measurement Results Hardware for bit 16.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:NTR 2" !Sets the Hardware Negative Transition
!Register for bit 4.
OUTPUT 714;"STATUS:OPERATION:HARDWARE:PTR 4" !Sets the Hardware Positive Transition
!Register for bit 4.

```

STATUS:OPERation:KEYPressed Register Bit Assignments

The STATUS:OPERation:KEYpressed register bits indicate when a softkey on the test set's front panel has been pressed while the test set is in remote operating mode.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	F12 softkey	This bit will be a 1 when the F12 softkey has been pressed.
10	1024	F11 softkey	This bit will be a 1 when the F11 softkey has been pressed.
9	512	F10 softkey	This bit will be a 1 when the F10 softkey has been pressed.
8	256	F9 softkey	This bit will be a 1 when the F9 softkey has been pressed.
7	128	F8 softkey	This bit will be a 1 when the F8 softkey has been pressed.
6	64	F7 softkey	This bit will be a 1 when the F7 softkey has been pressed.
5	32	F6 softkey	This bit will be a 1 when the F6 softkey has been pressed.
4	16	F5 softkey	This bit will be a 1 when the F5 softkey has been pressed.
3	8	F4 softkey	This bit will be a 1 when the F4 softkey has been pressed.
2	4	F3 softkey	This bit will be a 1 when the F3 softkey has been pressed.
1	2	F2 softkey	This bit will be a 1 when the F2 softkey has been pressed.
0	1	F1 softkey	This bit will be a 1 when the F1 softkey has been pressed.

Program Examples - STATUS:OPERation:KEYPressed

OUTPUT 714;"STATUS:OPERATION:KEYPRESSED:EVENT?" !Queries the Keypressed Event Register.

STATUS:OPERation:NMRReady Condition Register Bit Assignment

The STATUS:OPERation:NMRReady register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	COMMOm Summary bit	This bit is the summary bit for the OPERation:NMRReady:COMMOm register.
0	1	Extension Bit	This bit will always be 0.

STATUS:OPERation

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: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.

STATus:OPERation

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: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	GBERror 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 “Triggering of Measurements” on page 214.
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 “Triggering of Measurements” on page 214.
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 “Triggering of Measurements” on page 214.
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 “Triggering of Measurements” on page 214.
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 “Triggering of Measurements” on page 214.
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 “Triggering of Measurements” on page 214.

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 “Triggering of Measurements” on page 214.</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 “Triggering of Measurements” on page 214.</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 “Triggering of Measurements” on page 214.</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 “Triggering of Measurements” on page 214.</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 “Triggering of Measurements” on page 214.</p>
0	1	Extension Bit	This bit will always be 0.

Program Examples - STATUS:OPERation:NMRReady:GSM

```

OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:EVENT?" !Queries and clears the Operation
                                           !New Measurement Results Ready
                                           !GSM Event Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:CONDITION?" !Queries and clears the Operation
                                           !New Measurement Results Ready
                                           !GSM Condition Register
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:ENABLE 1024" !Sets the Operation
                                           !New Measurement Results Ready
                                           !GSM Enable
                                           !Register for bit 10
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:NTRANSITION 2" !Sets the Operation
                                           !New Measurement Results Ready
                                           !GSM Negative Transition
                                           !Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:NMRREADY:GSM:PTRANSITION 2" !Sets the Operation
                                           !New Measurement Results Ready
                                           !GSM Positive Transition
                                           !Filter Register for bit 1

```

Related Topics

“Triggering of Measurements” on page 214

STATus:PRESet

STATus → :PRESet

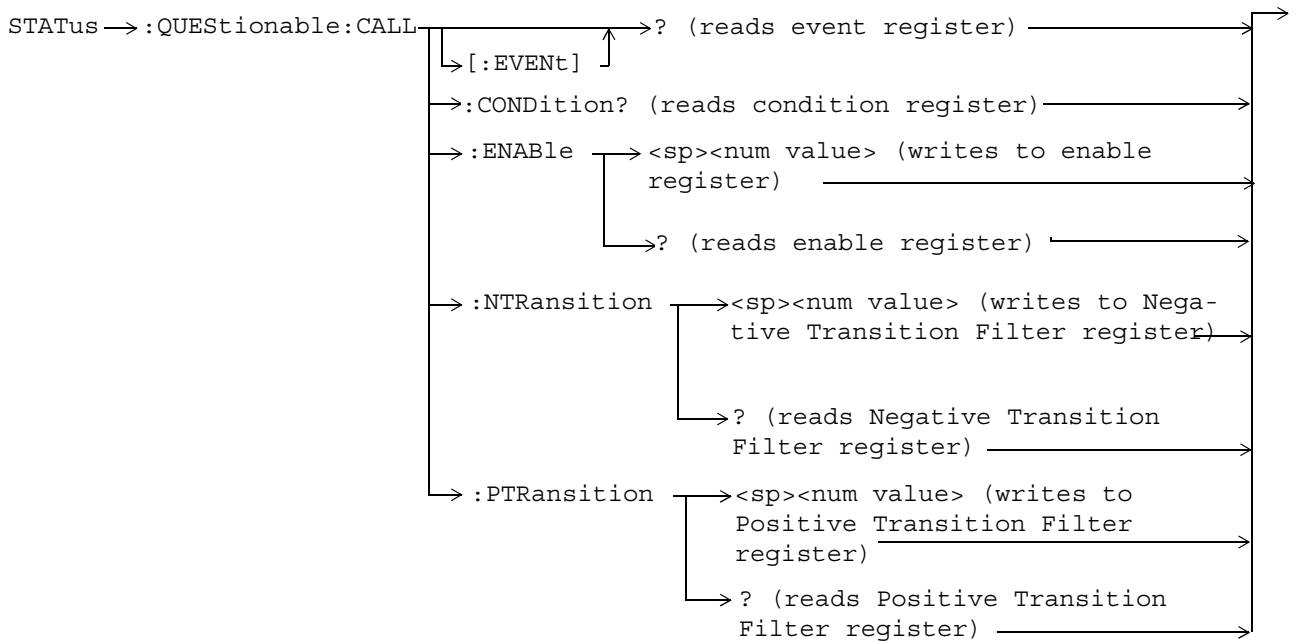
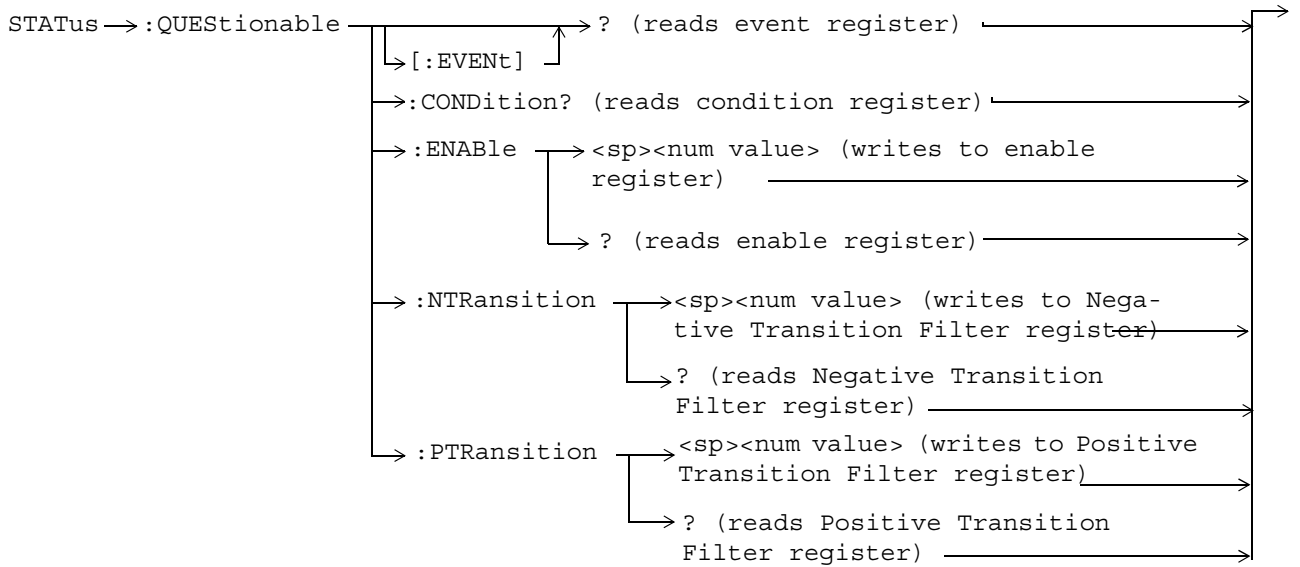


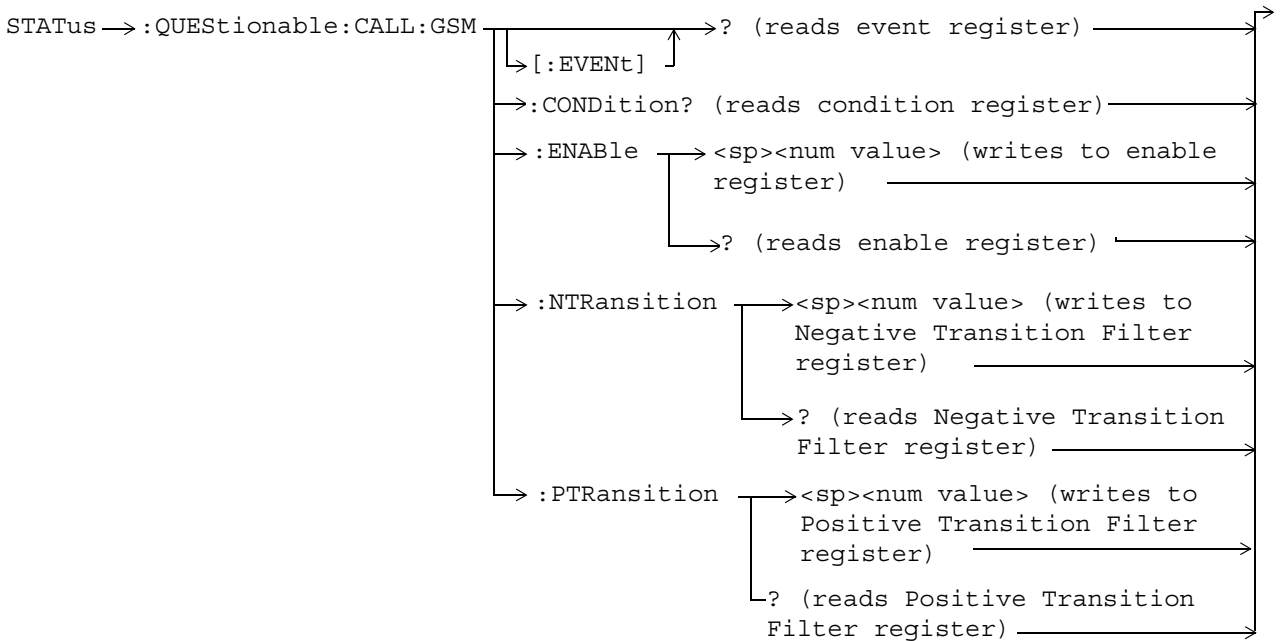
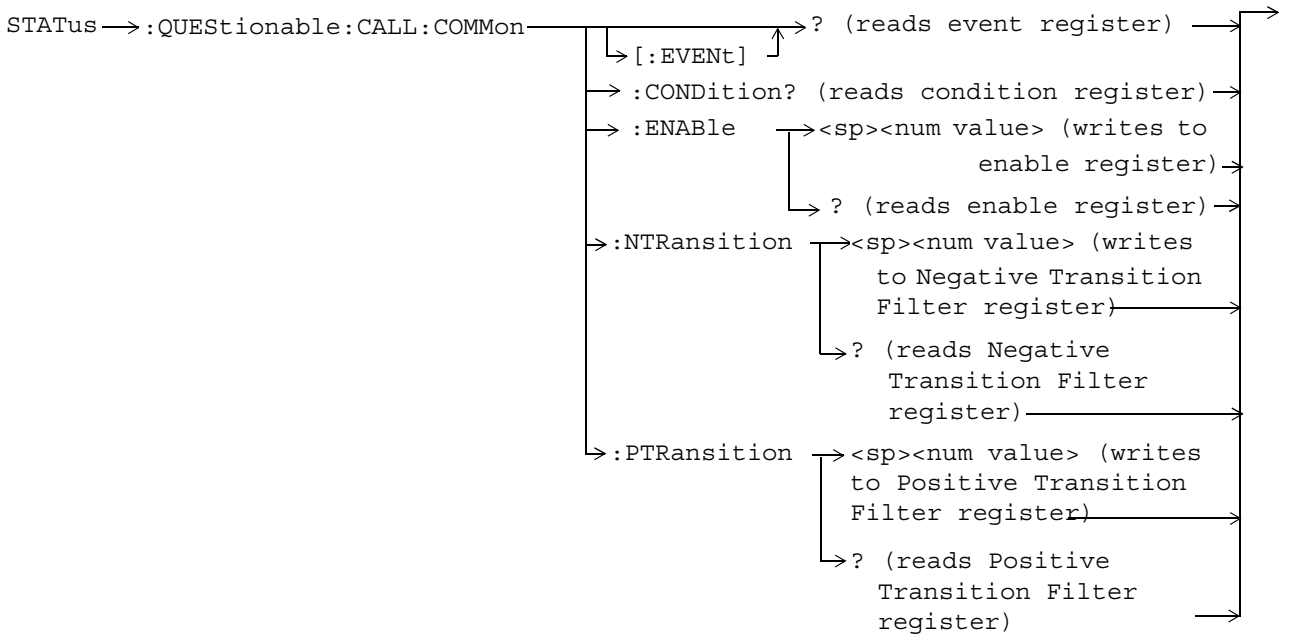
“Diagram Conventions” on page 313

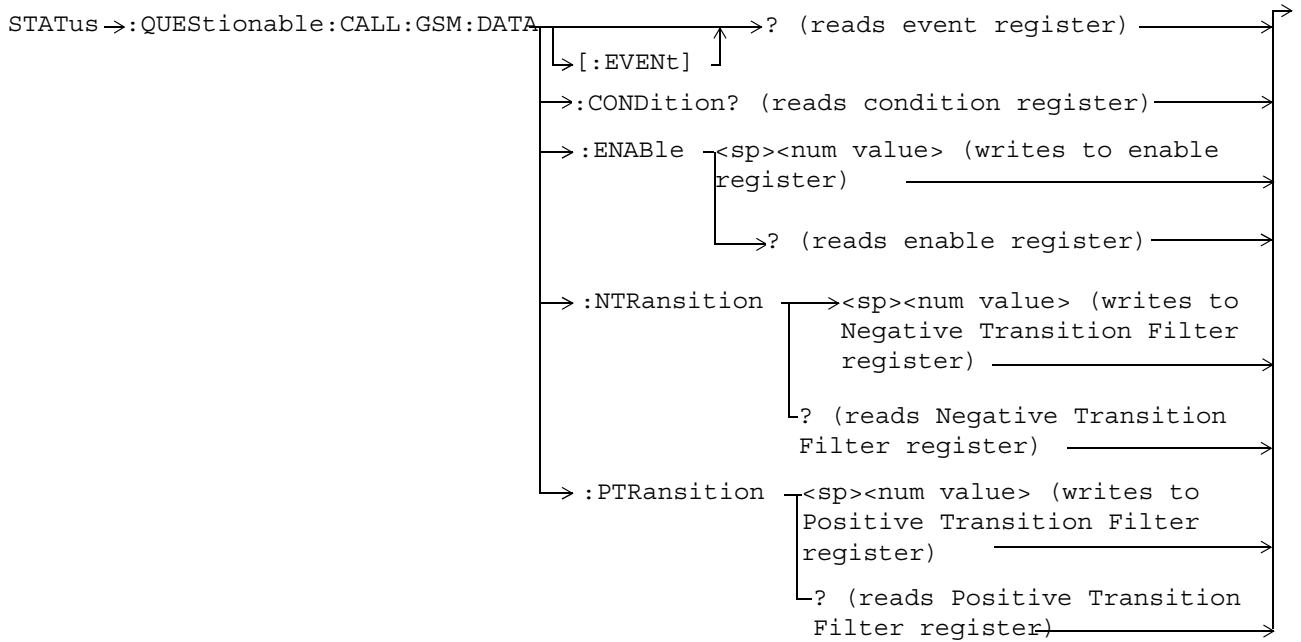
STATus:PRESet

Function	GSM	Presets the Status Subsystem Sets all Enable Registers to 0 (not enabled).
	GPRS	Sets all Positive Transition Registers (PTR) to 1 (positive transitions enabled). Sets all Negative Transition Registers (NTR) to 0 (negative transitions disabled).

STATUS:QUESTIONable

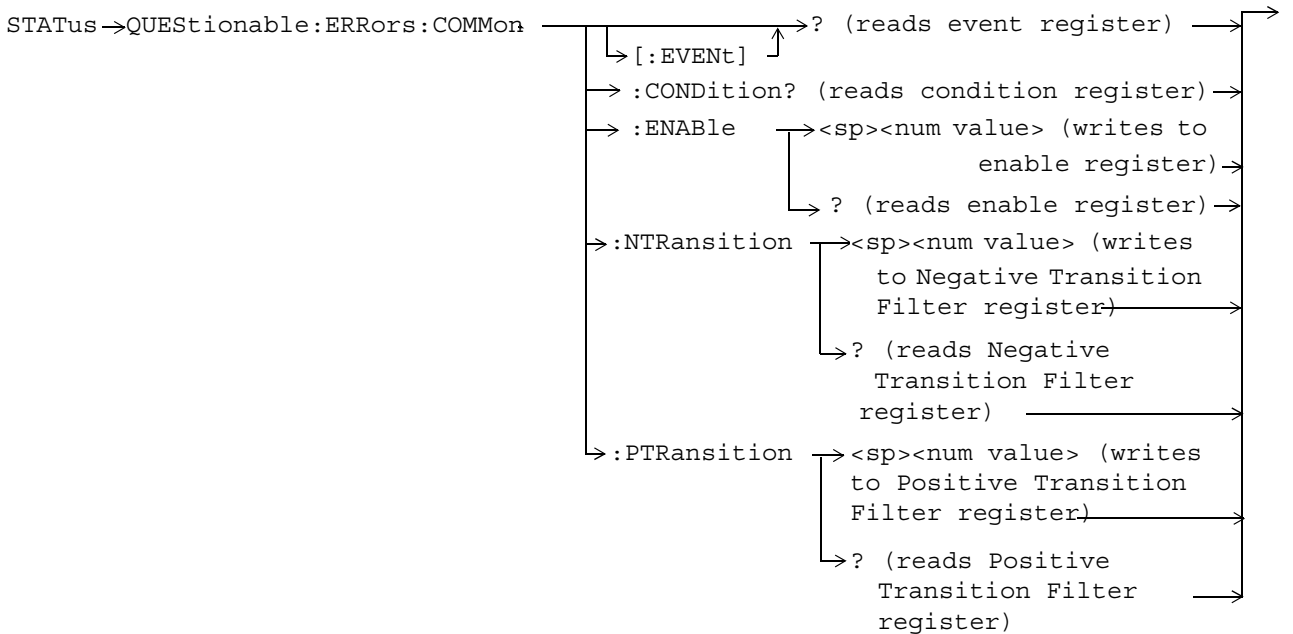
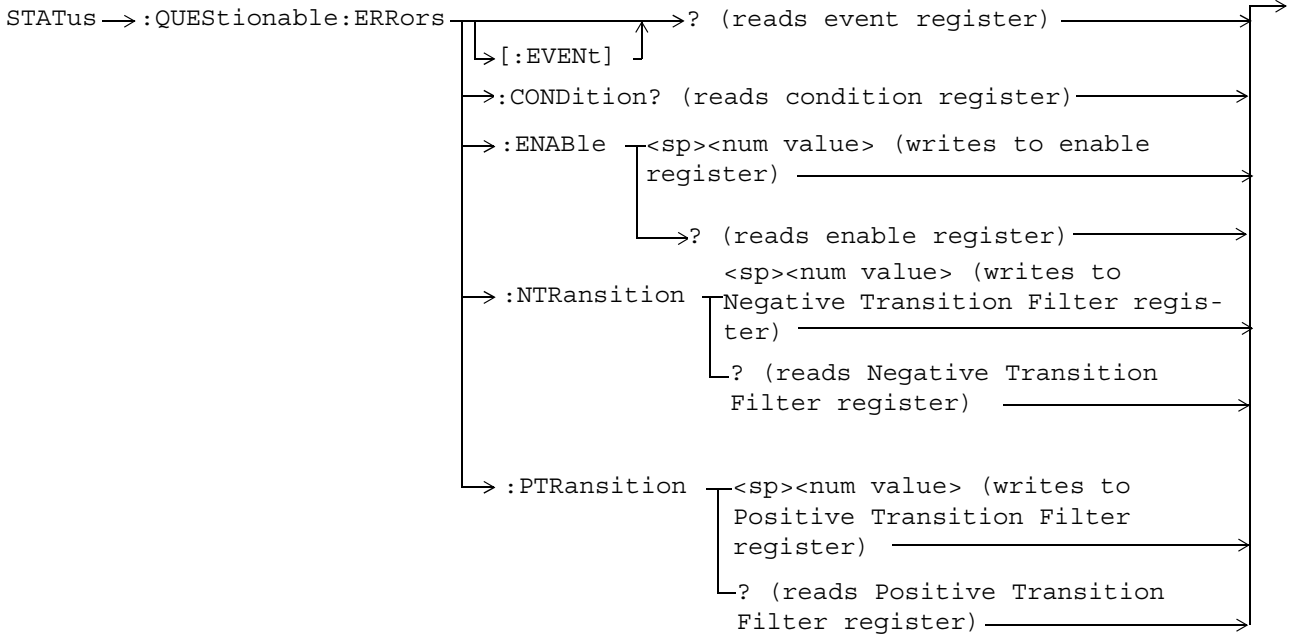


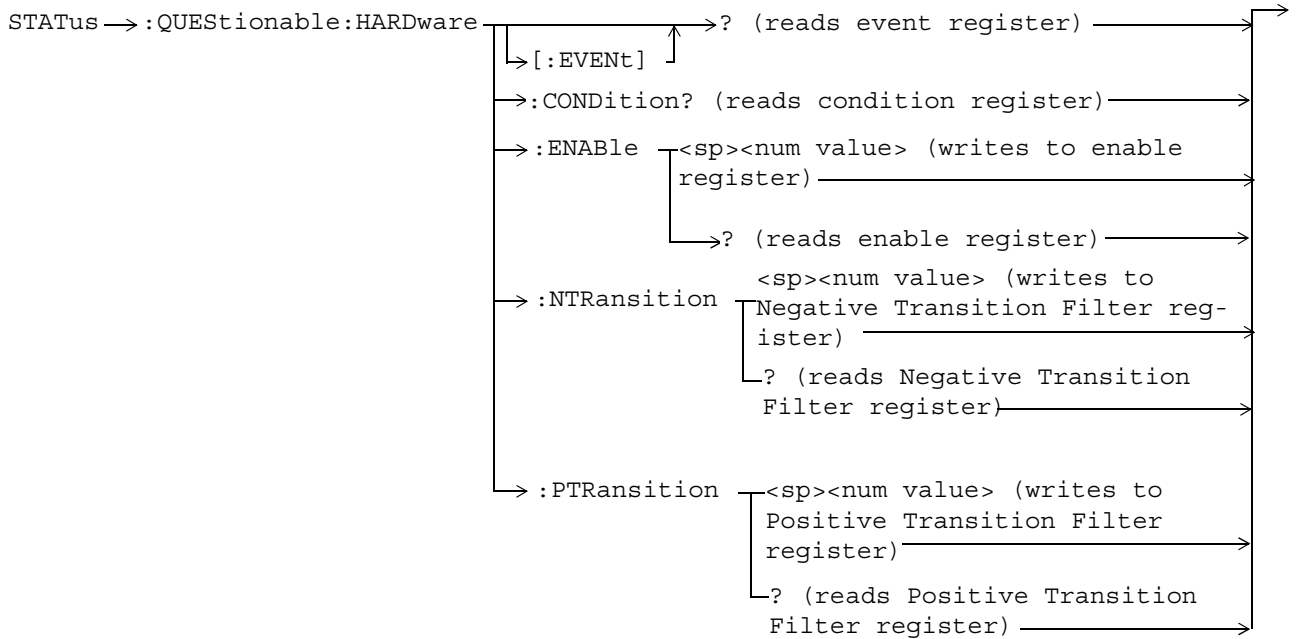
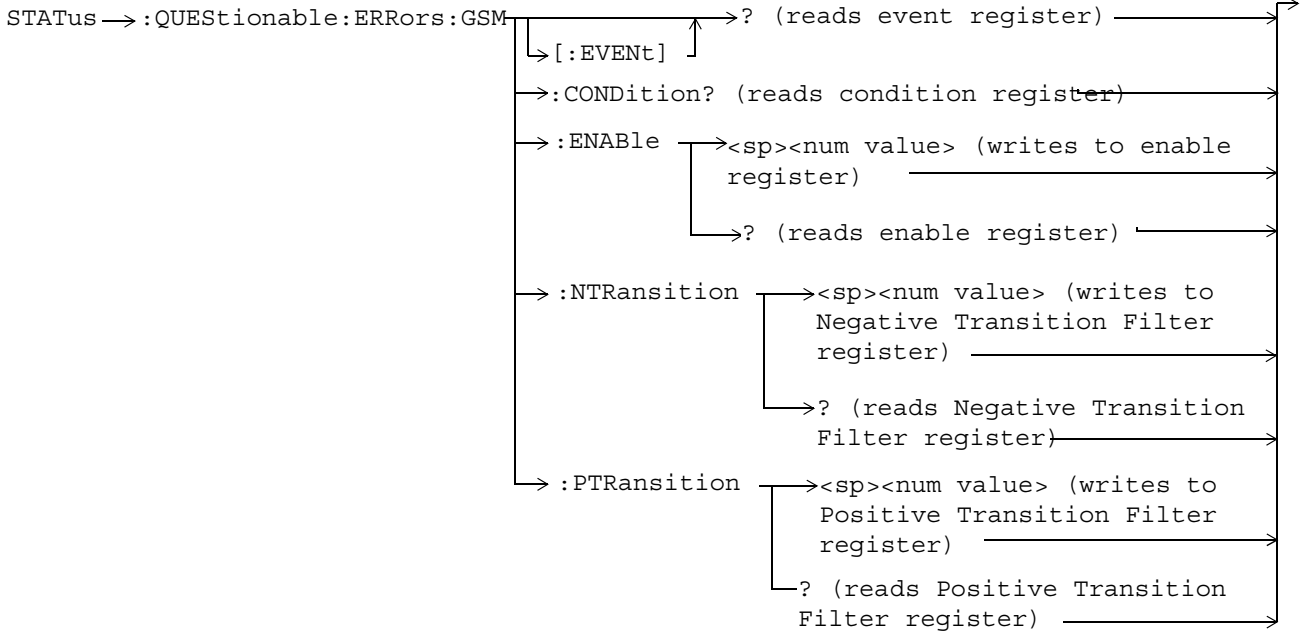




These commands are not applicable to GSM.

STATUS:QUESTIONable





“Diagram Conventions” on page 313

STATUS:QUESTIONable Condition Register Bit Assignment

The STATUS:QUESTIONable register contains bits which give an indication that the data currently being acquired or generated is of questionable quality due to some condition affecting the functionality associated with that bit.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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:QUESTIONABLE:CALL registers contain information about which event(s) occurred during call processing that indicate what call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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 Registerfor bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:PTRANSITION 2"
    !Sets the Questionable Call Positive Transition Filter Register for bit 1
    
```

STATUS:QUESTIONable:CALL:COMMON Condition Register Bit Assignment

The STATUS:QUESTIONable:CALL:COMMON registers contain information about which event(s) occurred during normal call processing that indicate why the call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	Reserved for future use.	This bit will always be 0.
0	1	Extension Bit	This bit will always be 0.

Program Example - STATUS:QUESTIONable:CALL:COMMON Condition Register Bit Assignment

```

OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:EVENT?" !Queries and clears the Questionable
                                     !Call Common Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:CONDITION?" !Queries and clears the Questionable
                                     !Call Common Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:ENABLE 1024" !Sets the Questionable Call Common
                                     !Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:COMMON:NTRANSITION 2" !Sets the Questionable Call
                                     !Common Negative Transition
                                     !Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:PTRANSITION 2" !Sets the Questionable Call
                                     !Common Positive Transition
                                     !Filter Register for bit 1
    
```

STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment

The STATus:QUEStionable:CALL:GSM registers contain information about which event(s) occurred during GSM call processing that indicate why the call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	DATA Summary bit.	This bit is the summary message bit for the STATus:QUEStionable:CALL:GSM:DATA register.
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.
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.

STATUS:QUESTIONable

Bit Number	Binary Weighting	Condition	Description
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:CALL:GSM:DATA Condition Register Bit Assignment

The STATUS:QUESTIONABLE:CALL:GSM:DATA registers contain information about which event(s) occurred during GSM call processing, relating to a data connection, that indicate why the call processing procedure failed. These register bits are not applicable to GSM.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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	End Data Connection Failure	This bit is a 1 if the test set timed out waiting for the data connection to end.
9	512	MS Unexpectedly Ended TBF	This bit is a 1 if the mobile station unexpectedly ended the TBF (temporary block flow).
8	256	Downlink Immediate Assignment Failure	This bit is a 1 if the mobile station did not respond to the downlink immediate assignment.
7	128	Uplink Immediate Assignment Failure	This bit is a 1 if the mobile station did not respond to the uplink immediate assignment.
6	64	Downlink Timed Out	This bit is a 1 if the mobile station timed out ACK (Acknowledged) or NACK (Not Acknowledged) exchanges and released the TBF (temporary block flow).
5	32	No Data Received Recently	This bit is a 1 if no data was received from the mobile station in the allowed time.
4	16	Start Data Connection Failure	This bit is a 1 if the GPRS test application was unable to start the data connection with the DUT (Device Under Test).
3	8	Routing Area Update Failure	This bit is a 1 if the Routing Area Update procedure failed after five attempts. The Data Connection Status will not be changed.
2	4	Detach Failure	This bit is a 1 if the Detach procedure failed after five attempts. The Data Connection Status will be set to Idle.
1	2	Attach Failure	This bit is a 1 if the Attach procedure failed after five attempts. The Data Connection Status will be set to Idle.
0	1	Extension Bit	This bit will always be 0.

STATUS:QUESTIONable

Program Example - STATUS:QUESTIONable:CALL:GSM Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:DATA:EVENT?" !Queries and clears the Questionable
!Call GSM Data Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:DATA:CONDITION?" !Queries and clears the
!Questionable Call GSM Data
!Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:DATA:ENABLE 1024" !Sets the Questionable Call GSM
!Data Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:DATA:NTRANSITION 2" !Sets the Questionable Call
!GSM Data Negative Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:GSM:DATA:PTRANSITION 2" !Sets the Questionable Call
!GSM Data Positive Transition Filter
!Register for bit 1
```

STATUS:QUESTIONABLE:ERRORS Condition Register Bit Assignment

The STATUS:QUESTIONABLE:ERRORS register bits are used to indicate information about test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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:QUESTIONABLE:ERRORS:COMMON register bits are used to indicate information about the COMMON test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	RUI Maskable Messages.	This bit is a 1 when a Maskable Message occurs.
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 is pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.

Bit Number	Binary Weighting	Condition	Description
4	16	+400 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
3	8	+300 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit is pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you can query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

Program Example - STATUS:QUESTIONABLE:ERRORS: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:QUESTIONable:ERRORs:GSM register bits are used to indicate information about GSM test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit 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: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 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 313

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"> • An IEEE 488.2 syntax error. The test set received a message that did not follow the syntax defined by the standard. • A semantic error. For example the test set received an incorrectly spelled command. • The test set received a group execution trigger (GET) inside a program message
4	16	Execution Error	This bit is set to 1 if the test set detects an error while trying to execute a command. The following events cause a execution error: <ul style="list-style-type: none"> • A <PROGRAM DATA> element received in a command is outside the legal range for the test set, or it is inconsistent with the operation of the test set. • The test set could not execute a valid command due to some test set hardware/firmware condition.
3	8	Device Dependent Error	This bit is set to 1 if a test set operation does not execute properly due to an internal condition (such as, overrange). This bit indicates that the error was not a command, query, or execution error.

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">• An attempt is made to read data from the output queue when no data is present or is pending.• Data in the output queue has been lost. An example of this would be an output queue overflow.
1	2	Reserved for future use.	This bit will always be 0.
0	1	Operation Complete	This bit is set to 1 when the test set has completed all pending operations and is ready to accept new commands. This bit is only generated in response to the *OPC IEEE 488.2 common command.

Program Example - Standard Event Status Register

```
OUTPUT 714;"*ESR?" !Queries (reads) the Standard Event Status Register.
```


SYSTem Subsystem

Description

The SYSTem subsystem performs system level configuration functions of the test set.

Syntax Diagrams and Command Descriptions

“SYSTem:APPLication” on page 694

“SYSTem:BEEPer” on page 700

“SYSTem:COMMunicate” on page 701

“SYSTem:CONFigure” on page 705

“SYSTem:CORRection” on page 706

“SYSTem:CURRent:TA” on page 712

“SYSTem:ERRor?” on page 713

“SYSTem:FTRigger” on page 714

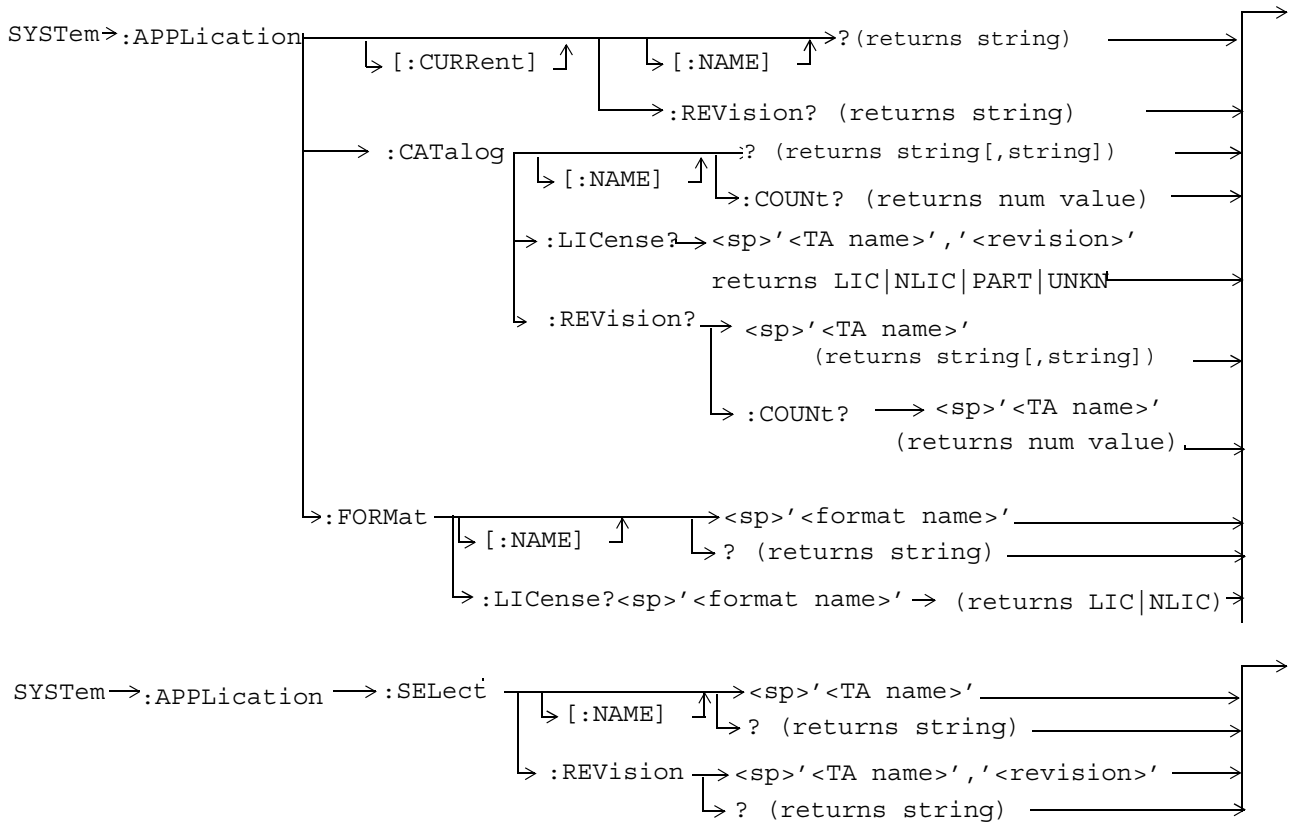
“SYSTem:MEASurement” on page 716

“SYSTem:PRESet” on page 717

“SYSTem:ROSCillator” on page 719

“SYSTem:SYNChronized” on page 720

SYSTEM:APPLICATION



“Diagram Conventions” on page 313

SYSTem:APPLication[:CURRent][:NAME]?

Function	GSM	Queries the test set for the name of the currently running test application.
	GPRS	
Query		Range: A string up to 25 characters including null. See “SYSTem:APPLication:CATalog[:NAME]?” on page 695.
Programming Example		
OUTPUT 714;“SYSTEM:APPLICATION:CURRENT:NAME?”		

SYSTem:APPLication[:CURRent]:REVision?

Function	GSM	Queries the test set for the currently running test application revision number.
	GPRS	
Query		Range: Any string up to 20 characters including null. A typical example would be A.01.01 for a licensed version.
Programming Example		
OUTPUT 714;“SYSTEM:APPLICATION:CURRENT:REVISION?”		

SYSTem:APPLication:CATalog[:NAME]?

Function	GSM	Queries the test set for all of the names of the test applications stored on the hard drive.
	GPRS	This query returns one or more strings, each string is separated by a comma.
Query		Range: <ul style="list-style-type: none"> • AMPS/136 Mobile Test • CDMA 2000 Mobile Test • GSM Mobile Test • GSM/GPRS Mobile Test • GSM_AMPS/136 Mobile
Programming Example		
OUTPUT 714;“SYSTEM:APPLICATION:CATALOG:NAME?”		

SYSTem:APPLication:CATalog[:NAME]:COUNT?

Function	GSM	Queries 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**SYSTEM:APPLICATION:CATALOG:LICENSE? '<test application name>','<revision>'**

Function	GSM	Queries 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"> • “LIC” indicates this is a licensed test application. • “NLIC” indicates this is not a licensed test application. • “PART” only part of the test application with multiple radio formats is licensed • “UNKN” indicates that license status is unknown.
Query		Range: LIC NLIC PART UNKN
Programming Example OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.00'"		

SYSTEM:APPLICATION:CATALOG:REVISION? '<test application name>'

Function	GSM	Queries the test set for all of the revision numbers stored on the test set's hard drive. You must specify a test application.
	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	Queries the test set for the number of revisions present on the hard disk for a specified test application. Up to 30 revisions can be stored for a test application.
	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:FORMat[:NAME] '<format name>'

Function	Switches radio formats in a fast switching test application. A licensed fast switching test application must be selected to use this command. Queries the test set for the name of the fast switching test application. This string is not case sensitive.
Setting	Range: <ul style="list-style-type: none"> • GSM • AMPS/136
Query	Range: A string up to 25 characters, or the null string. <ul style="list-style-type: none"> • GSM • AMPS/136
Programming Example OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME 'AMPS/136'" OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:NAME?"	

SYSTem:APPLication:FORMat:LICense? '<format name>'

Function	Query the test set for the license status of the fast switching test application. The returned values are: <ul style="list-style-type: none"> • "LIC" indicates this is a licensed test application. • "NLIC" indicates this is not a licensed test application.
Query	Range: LIC NLIC
Programming Example OUTPUT 714;"SYSTEM:APPLICATION:FORMAT:LICENSE? 'AMPS/136'"	

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>NOTE Selecting the correct name and the desired revision of a test application is important. This information should be reviewed before proceeding. The directions for how to determine test application name and revision are found in this document.</p> <hr/>
	GPRS	
Setting	Range: See "SYSTEM:APPLICATION:CATALOG[:NAME]?" on page 695.	
Query	Range: See "SYSTEM:APPLICATION:CATALOG[:NAME]?" on page 695.	
<p>Programming Example</p> <p>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME 'AMPS/136 MOBILE TEST'"</p> <p>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME?"</p>		

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>NOTE GSM Mobile Test; revisions before A.04.00 did not have test application switching and provide no way to return to revisions that have switching. 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'"
```

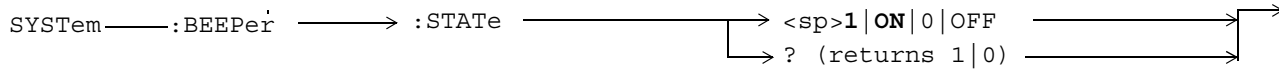
Related Topics

“Test Application Switching” on page 830

“Test Application Revisions and Licenses” on page 828

“Test Application Name” on page 827

SYSTem:BEEPer

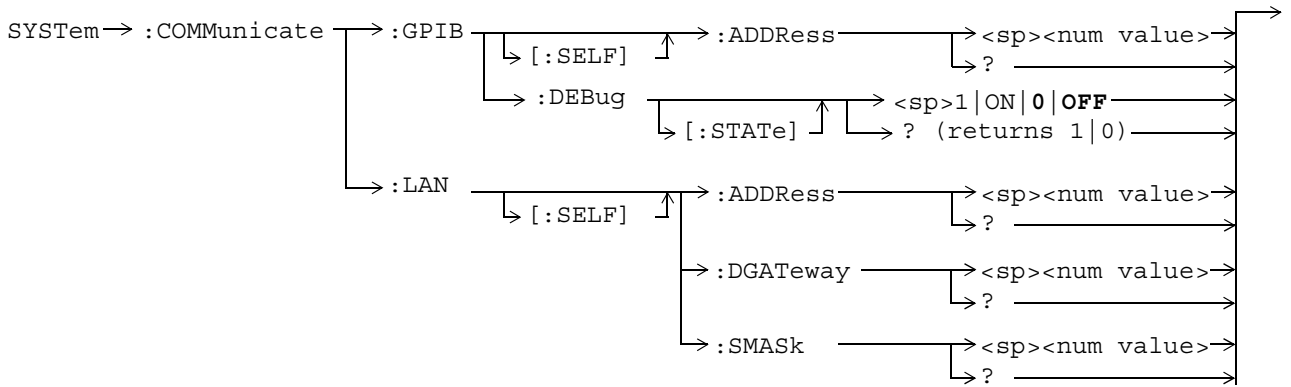


“Diagram Conventions” on page 313

SYSTem:BEEPer:STATe

Function	GSM	Sets/queries the beeper state of the test set.
	GPRS	
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
*RST Setting	1 (on)	
Programming Example		
OUTPUT 714;"SYSTEM:BEEPER:STATE OFF" !Sets beeper state to off.		

SYSTem:COMMunicate



“Diagram Conventions” on page 313

SYSTEM:COMMunicate

SYSTEM:COMMunicate:GPIB[:SELF]:ADDRESS

Function	GSM	Sets/queries the test set's GPIB address.
	GPRS	
Setting		Range: 0 to 30 Resolution: 1
Query		Range: 0 to 30 Resolution: 1
Factory setting		14 (this parameter is not affected by any reset operation and can only be changed by direct user access)
Related Topics		"Configuring the Test Set's GPIB Address" on page 819
Programming Example		
OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:SELF:ADDRESS 14" !Sets the GPIB address to 14.		

SYSTEM:COMMunicate:GPIB:DEBUg[:STATE]

Function	GSM	Sets/queries the test set's SCPI debugger state. When the state is on, enhanced error messages (generated from GPIB commands with syntax errors) are shown on the test set display. The error message is printed along with the syntax. <ERR> is displayed at the end of the incorrect node. Non-printable characters will be replaced with the \$ symbol. See "Error Messages" on page 834 for a list of the errors. The debugger state should be set to on only during GPIB code development. Test times will increase if the debugger state is left on.
	GPRS	
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST setting		0 (off)
Programming Example		
OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:DEBUG:STATE ON" !Sets debugger to on.		

SYSTem:COMMunicate:LAN[:SELF]:ADDRess

Function	GSM	Sets/queries the test set's LAN IP address. The value of A is used to determine the subnet mask, see "SYSTem:COMMunicate:LAN[:SELF]:SMASk" on page 704. 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>	"LAN IP Address" on page 821	
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:ADDRESS '130.015.156.255'" !Sets the !LAN IP !address.</pre>		

SYSTem:COMMunicate:LAN[:SELF]:DGATeway

Function	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)	
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:DGATEWAY '130.2.6.200'"</pre>		

SYSTEM:COMMunicate**SYSTEM:COMMunicate:LAN[:SELF]:SMASK**

Function	GSM	<p>Sets/queries the subnet mask of the test set based on the LAN IP address selected. The subnet mask changes according to the value of A used for the LAN IP address.</p> <p>If A is less than or equal to 127, the subnet mask is 255.0.0.0.</p> <p>If A is greater than 127 and less or equal to 191, the subnet mask is 222.255.0.0.</p> <p>If A is greater than 191, the subnet mask is 255.255.255.0.</p> <p>If the LAN address is changed the subnet mask should be checked to insure that it is set to the proper class for that LAN address.</p>
	GPRS	
Setting	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D are between = 0 to 255 (no embedded spaces)	
Query	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D are between = 0 to 255 (no embedded spaces)	
Factory setting	0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access)	
Programming Example <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 313

SYSTem:CONFigure:INFormation:HARDware:VERBoSe?

Function	GSM	Queries the manufacturer, model number, model number of the test application running, serial number, revision, board ID, and cal file information. The information provided by the query represents the configuration that existed when the test set was powered up. For an example of how to use this command, see “Hardware Configuration Report” on page 817.
	GPRS	
*RST Setting		Resets have no effect on this information. The information is gathered during the power up cycle.

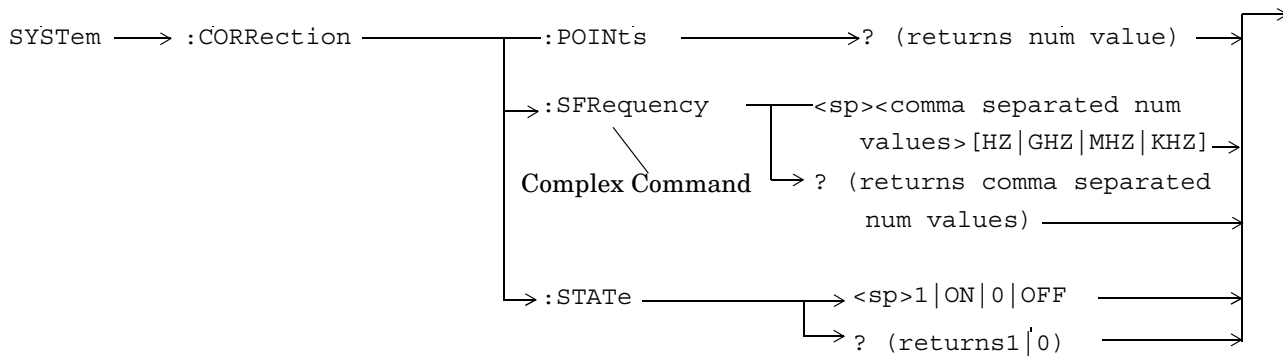
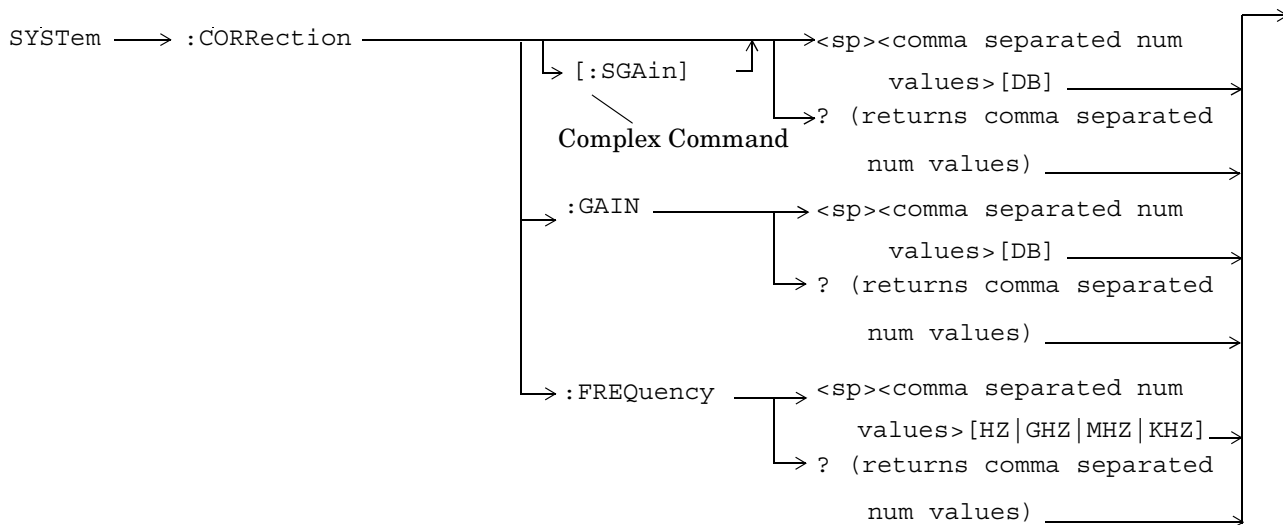
Related Topics

“Hardware Configuration Report” on page 817

“SYSTem:CURRent:TA” on page 712

“Obtaining Identification Information *IDN?” on page 820

SYSTem:CORRection



“Diagram Conventions” on page 313

SYSTem:CORRection:[:SGAin]

Function	GSM	Sets/queries the up to 20 comma separated offset values in dB. This command sets the state to On. See "Measurement Related Configuration" on page 823. 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.
	GPRS	
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>Programming Example</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 "Measurement Related Configuration" on page 823. 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"> 1. 800.00 MHz Off 2. 810.00 MHz Off 3. 820.00 MHz Off 4. 830.00 MHz Off 5. 840.00 MHz Off 6. 850.00 MHz Off 7. 860.00 MHz Off 8. 870.00 MHz Off 9. 880.00 MHz Off 10. 890.00 MHz Off 11. 900.00 MHz Off 12. 910.00 MHz Off 13. 920.00 MHz Off 14. 930.00 MHz Off 15. 940.00 MHz Off 16. 950.00 MHz Off 17. 960.00 MHz Off 18. 970.00 MHz Off 19. 980.00 MHz Off 20. 990.00 MHz Off 	
<p>Programming Example</p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY 1784.8 MHz,1879.8 MHz" !Sets up to 20 comma separated frequencies OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY" !Sets the state for all frequencies and offsets to Off </pre>		

SYSTem:CORRection:GAIN

Function	GSM	Sets/queries the up to 20 comma separated offset values in dB.
	GPRS	See “Measurement Related Configuration” on page 823. The units, dB, are optional. If no units are specified, units default to dB. Sending a null list (no values) sets the state of all offsets to Off.
Setting		Range: 0 to 20 values between -100 to +100 Resolution: 0.01
Query		Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37) Resolution: 0.01
Factory Setting		Offsets 1 through 20, are set to 0.00 dB, state is set to off
<p>Programming Example</p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:GAIN -3.12,-3.68,-4.23" !Sets up to 20 comma separated offset values OUTPUT 714;"SYSTEM:CORRECTION:GAIN" !Sets the state for all frequencies and offsets to Off </pre>		

SYSTem:CORRection:POINTs

Function	GSM	Queries the number of offsets that are in their On state when the RF IN/OUT Amplitude Offset State is also set to On.
	GPRS	See “Measurement Related Configuration” on page 823.
Query		Range: 1 to 20, and NAN (9.91E+37) Resolution: 1
<p>Programming Example</p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:POINTS?" !Returns the number of frequencies and offsets !with their state set to On </pre>		

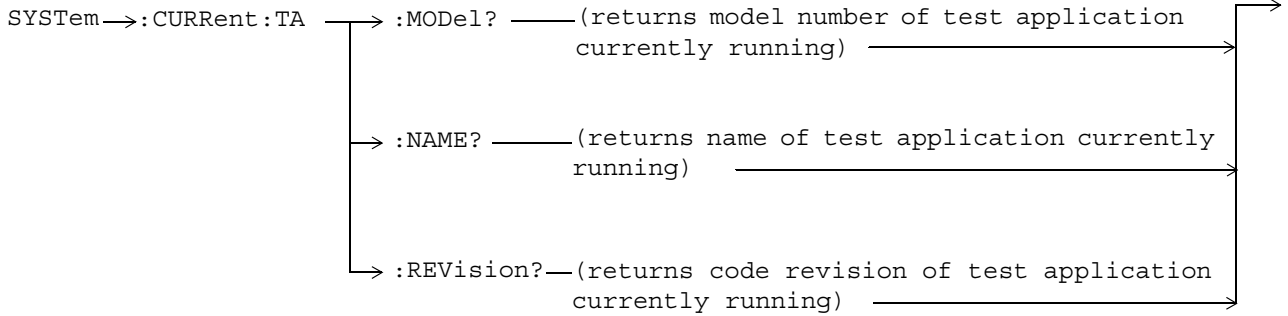
SYSTEM:CORRection:SFRequency

Function	GSM GPRS	Sets/queries up to 20 comma separated frequency values in MHz. This command sets the state to On. The units (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to MHz. See “Measurement Related Configuration” on page 823. Sending a null list (no values) sets the state of all frequencies to Off.
Setting	Range: 0 to 20 comma separated values from 292.5 MHz to 2700 MHz Resolution: 1 Hz	
Query	Range: 1 to 20 comma separated values from 292.5 MHz to 2700 MHz, and NAN (9.91E+37) Resolution: 1 HZ	
Factory Setting	<ol style="list-style-type: none"> 1. 800.00 MHz Off 2. 810.00 MHz Off 3. 820.00 MHz Off 4. 830.00 MHz Off 5. 840.00 MHz Off 6. 850.00 MHz Off 7. 860.00 MHz Off 8. 870.00 MHz Off 9. 880.00 MHz Off 10. 890.00 MHz Off 11. 900.00 MHz Off 12. 910.00 MHz Off 13. 920.00 MHz Off 14. 930.00 MHz Off 15. 940.00 MHz Off 16. 950.00 MHz Off 17. 960.00 MHz Off 18. 970.00 MHz Off 19. 980.00 MHz Off 20. 990.00 MHz Off 	
<p>Programming Example</p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY 1710.2 MHz,1805.2 MHz,1784.8 MHz,1879.8 MHz" !Sets up to 20 comma separated frequencies and sets the state to On for the frequency, !offset, and RF IN/OUT Amplitude Offset State OUTPUT 714;"SYSTEM:CORRECTION:SFREQUENCY" !Sets the state for all frequencies and offsets to Off </pre>		

SYSTem:CORRection:STATe

Function	GSM	<p>Sets/queries the RF IN/OUT Amplitude Offset State. The state must be On before any of the offsets are active regardless of the state for any of the frequencies or offsets.</p> <p>When the RF IN/OUT Amplitude Offset State is On, the Instrument Status Area will indicate “Offset” regardless of the state for any of the frequencies or offsets.</p> <p>Setting any of the frequency or offset states to On will set the RF IN/OUT Amplitude Offset State to On.</p> <p>See “Measurement Related Configuration” on page 823.</p>
	GPRS	
Setting	Range: 0 OFF 1 ON	
Query	Range: 0 1	
Factory Setting	0 (off)	
<p>Programming Example</p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:STATE ON" !Sets the RF IN/OUT !Amplitude Offset State to On </pre>		

SYSTem:CURRent:TA



“Diagram Conventions” on page 313

SYSTem:CURRent:TA:MODEl?

Function	GSM	Queries the model number of the test application running. Printable ASCII characters up to a 15 character string.
	GPRS	
Query		Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting		non volatile, read from the test set’s hard disk

SYSTem:CURRent:TA:NAME?

Function	GSM	Queries the name of the test application running. Printable ASCII characters up to a 25 character string. This is not the recommended command, see “SYSTem:APPLication” on page 694 for the recommended command.
	GPRS	
Query		Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting		non volatile, read from the test set’s hard disk

SYSTem:CURRent:TA:REVisIon?

Function	GSM	Queries the coordinated codeware revision for the test application running. Printable ASCII characters up to a 20 character string. This is not the recommended command, see “SYSTem:APPLication” on page 694 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?

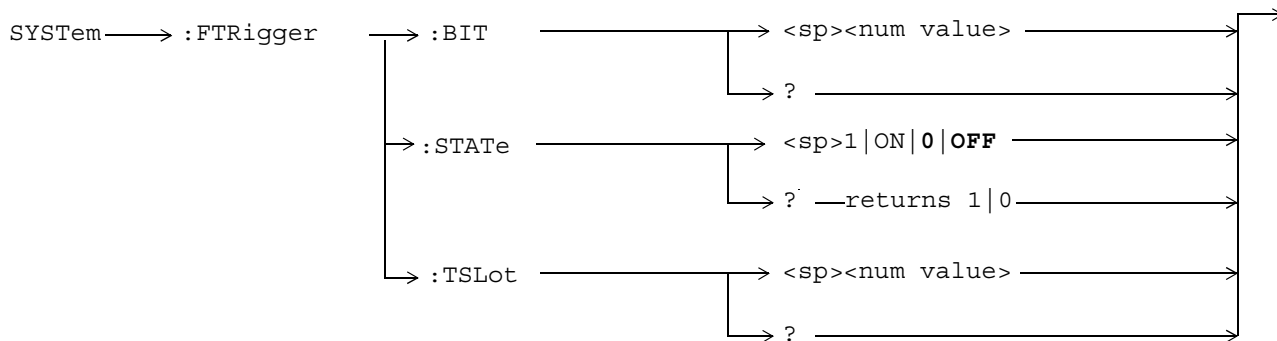
SYSTem → :ERRor? (returns contents of error/event queue) →

“Diagram Conventions” on page 313

SYSTem:ERRor?

Function	GSM	Queries the contents of the Error/Event Queue. The Error/Event Queue may contain one or more messages with an error or event description.
	GPRS	Manual users may view the Message Log from the SYSTEM CONFIG screen. The contents of the Error/Event Queue and the Message log may not match. Example, manual user errors are not displayed with SYSTem:ERRor? they are viewed from the Message Log. See “Error Messages” on page 834.
Query		Error/Event Queue <ul style="list-style-type: none"> • Range: 0 to 100 messages up to 255 characters in length

SYSTem:FTRigger



These commands are not applicable to GPRS.

“Diagram Conventions” on page 313

SYSTem:FTRigger:BIT

Function	GSM	Selects/queries which bit, after zero, will be used for frame trigger pulse positioning. See “Setting Frame Trigger Parameters” on page 758
	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 OUTPUT 714;“SYSTEM:FRTIGGER:BIT 14” !Would cause external frame trigger pulses to occur 14 bits after bit 0 of the selected !timeslot.		

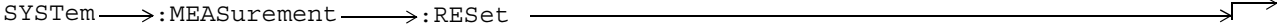
SYSTem:FTRigger:STATE

Function	GSM	Sets/queries the frame trigger state. See “Setting Frame Trigger Parameters” on page 758
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 OFF 1 ON
Query		Range: 0 1
*RST Setting		0 (off)
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:FRTIGGER:STATE ON" !Set frame trigger state to on.</pre>		

SYSTem:FTRigger:TSLot

Function	GSM	Selects/queries the timeslot for frame trigger pulse positioning. See “Setting Frame Trigger Parameters” on page 758
	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
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:FRTIGGER:TSLot 5" !Sets the frame trigger timeslot to 5.</pre>		

SYSTem:MEASurement



“Diagram Conventions” on page 313

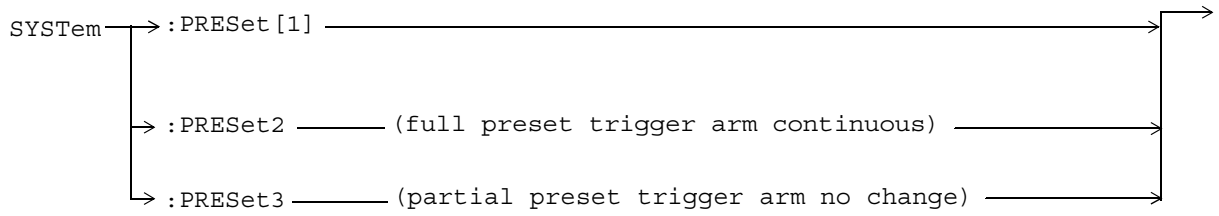
SYSTem:MEASurement:RESet

Function	GSM	Sets all measurements to abort, if the trigger arm is set to continuous the measurements will begin a new measurement cycle. See “Trigger Arm (Single or Continuous) Description” on page 216.
	GPRS	Any measurement results are cleared and the Integrity Indicator is set to 1 (No_Result_Available). See “Integrity Indicator” on page 183.
Setting	GSM	<p>These results are set to their default values:</p> <ul style="list-style-type: none"> • RACH Count • Page Count • Missing Burst Count • Corrupted Burst Count • Channel Decoder Error Count • MS TX Level Reported • TCH Timing Advance Reported • RX Level • RX Qual
	GPRS	<p>These results are set to their default values:</p> <ul style="list-style-type: none"> • Block Error Rate (BLER) • Blocks Tested

Programming Example

```
OUTPUT 714; "SYSTem:MEASurement:RESet" !Resets current measurements.
```


SYSTem:PRESet



“Diagram Conventions” on page 313

SYSTEM:PRESet

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 “Trigger Arm (Single or Continuous) Description” on page 216.
Related Topics	See “Partial Preset” on page 772 for more details	
Programming Example		
OUTPUT 714;“SYSTEM:PRESET” !Partial preset when changing from remote to manual operation.		

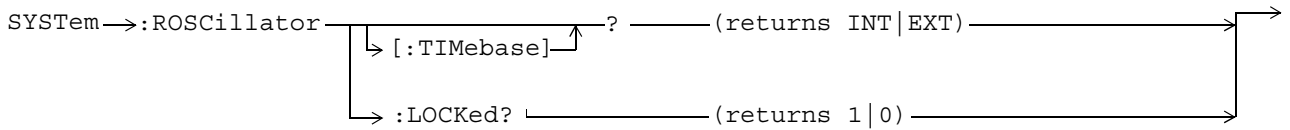
SYSTEM:PRESet2

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 “Trigger Arm (Single or Continuous) Description” on page 216. The *RST command will set the trigger arm to single.
Related Topics	See “Full Preset” on page 772 for more details.	
Programming Example		
OUTPUT 714;“SYSTEM:PRESET2” !Full preset.		

SYSTEM:PRESet3

Function	GSM	Performs a partial preset. This is the recommended command when a partial preset is needed during remote operation of the test set.
	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 “Trigger Arm (Single or Continuous) Description” on page 216.
Related Topics	See “Partial Preset” on page 772 for more details.	
Programming Example		
OUTPUT 714;“SYSTEM:PRESET3” !Partial preset when in remote operation.		

SYSTEM:ROSCillator



“Diagram Conventions” on page 313

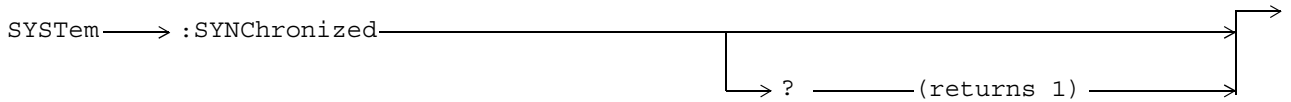
SYSTEM:ROSCillator[:TIMEbase]?

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"> • an output level of 0 to +13DBM • frequency of 10 MHZ
Query		Range: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 0 = unlocked • 1 = locked

SYSTem:SYNChronized



“Diagram Conventions” on page 313

SYSTem:SYNChronized

Function	GSM	Sets/queries the test set that all prior sequential commands have completed and all prior overlapped commands have started indicating that the input buffer is synchronized. (See “Call Processing Event Synchronization” on page 40 or “Data Connection Processing Event Synchronization” on page 57.)
	GPRS	
Setting	Bit 12 of the status operation condition register is pulsed. See “STATus:OPERation:CALL Condition Register Bit Assignment” on page 655.	
Query	1	
Related Topics	See “Status Subsystem Overview” on page 196. See “Call Processing Event Synchronization” on page 40 or “Data Connection Processing Event Synchronization” on page 57.	
Programming Example <pre> OUTPUT 714;"SYSTEM:SYNCHRONIZED" !Pulses bit 12 of the status operation !condition register. OUTPUT 714;"SYSTEM:SYNCHRONIZED?" !Returns a 1 indicating all prior sequential !commands have completed and all overlapped !commands have started. </pre>		

IEEE 488.2 Common Commands

Description

***CLS**

The *CLS, clear status command, is defined in “IEEE Std 488.2-1992”, 10.3. This command will also clear and close the error message screen on the test set’s display.

***ESE**

The *ESE, standard event status enable command, is defined in “IEEE Std 488.2-1992”, 10.10.

***ESE?**

The *ESE?, standard event status enable query, is defined in “IEEE Std 488.2-1992”, 10.11.

***ESR?**

The *ESR?, standard event status register query, is defined in “IEEE Std 488.2-1992 “,10.12.

***IDN?**

The *IDN?, identification query, is defined in “IEEE Std 488.2-1992”, 10.14. *IDN? is used to retrieve information about the test set in ASCII format.

*IDN?, returns ASCII codes 32 through 126 excluding comma and semicolon in four comma separated fields. Field 1 returns the manufacturer, field 2 returns the instrument model number, field 3 returns the serial number, field 4 returns 0.

***OPC**

The *OPC, operation complete command, is defined in “IEEE 488.2-1992”, 10.18. *OPC causes the test set to continuously sense the No Operation Pending flag. When the No Operation Pending flag becomes TRUE, the OPC event bit in the standard event status register (ESR) is set to indicate that the state of all pending operations is completed. The *OPC common command is not recommended for use as an overlapped command.

***OPC?**

The *OPC?, operation complete query, is defined in “IEEE Std 488.2-1992”, 10.19. The *OPC? query allows synchronization between the controller and the test set using either the message available (MAV) bit in the status byte, or a read of the output OPC?. The *OPC? query does not effect the OPC event bit in the Standard Event Status Register (ESR). The *OPC? common command is not recommended for use as an overlapped command.

***OPT?**

The *OPT?, option identification query, is defined in “IEEE Std 488.2-1992”, 10.20. Each option will have a unique name, that name will be returned with the query.

***RST**

The *RST, full preset command, is defined in “IEEE Std 488.2-1992”, 10.32. *RST is the recommended command when performing a full preset on the test set. A *RST restores the majority of settings to their default values.

- *RST sets trigger arm to single
- PRESet2 sets trigger arm to continuous

***SRE**

The *SRE, service request enable command, is defined in “IEEE Std 488.2-1992”, 10.34. The parameter range for this command is 0 through 255.

***SRE?**

The *SRE?, service request enable query, is defined in “IEEE Std 488.2-1992”, 10.35. Values returned by this query range from 0 through 255.

***STB?**

The *STB?, read status byte query, is defined in “IEEE Std 488.2-1992”, 10.36. Values returned by this query range from 0 through 255.

***WAI**

The *WAI, wait-to-continue command, is defined in “IEEE Std 488.2-1992”, 10.39. The *WAI command prevents the test set from executing any further commands or queries until all pending operation flags are false. The *WAI common command is not recommended for use as an overlapped command.

Related Topics

“Call Processing Event Synchronization” on page 40

“Preset Descriptions” on page 772

“Obtaining Identification Information *IDN?” on page 820

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 726).

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 176) 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 724
- “GPRS Frequency Banded Parameters” on page 725

GSM Frequency Banded Parameters

There are eight frequency banded parameters for GSM.

Parameter	GPIB Command
Broadcast Channel (ARFCN)	“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341
BA Table	“CALL[:CELL]:BA:TABLE[:SElected]” on page 332
BA Table Points	“CALL[:CELL]:BA:TABLE:POINts[:SElected]?” on page 337
Traffic Channel (ARFCN)	“CALL:TCHannel[:ARFCn][:SElected]” on page 435
MS TX Level	“CALL:MS:TXLevel[:SElected]” on page 379
Manual Channel	“RFANalyzer:MANual:CHANnel[:SElected]” on page 551
Expected Power	“RFANalyzer:EXPected:POWer[:SElected]” on page 548
RF Generator Channel	“CALL[:CELL]:RFGenerator:CHANnel[:SElected]” on page 409

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.

Parameter	GPIO Command
Packet Data Traffic Channel (ARFCN)	"CALL:PDTCH PDTChannel[:ARFCn][:SElected]" on page 391
Uplink Burst TX Level	"CALL:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]" on page 394

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 726

“How the Test Set Performs a Dualband Handover” on page 176

“Configuring the Broadcast Channel (BCH)” on page 746

“Configuring the Traffic Channel (TCH)” on page 749

“Configuring the Packet Data Traffic Channel (PDTCH)” on page 753

“Receiver Control” on page 760

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 726
- “GPRS Band Selection Parameters” on page 727

GSM Band Selection Parameters

Parameter	GPIO Command
Cell Band	“CALL[:CELL]:BAND” on page 339
Traffic Band	“CALL:TCHannel:BAND” on page 438
Manual Band	“RFANalyzer:MANual:BAND” on page 551
RF Generator Band	“CALL[:CELL]:RFGenerator:BAND” on page 408

Operating Considerations for GSM

Cell Band Parameter

- When the operating mode is active cell and the call connected state is idle, changes to the cell band parameter will be reflected in the traffic band and manual band parameters as well.
- When the operating mode is active cell and the call connected state is connected, changes to the cell band parameter will disconnect any call in progress.
- When the operating mode is test mode and the test function is set to BCH, the cell band parameter should be used. See “CALL:FUNCTion:DOWNlink” on page 359.
- When the operating mode is test mode and the test function is set to CW, the cell band parameter should be used.

Traffic Band Parameter

- When the operating mode is active cell and the call connected state is connected, changes to the traffic band parameter cause an inter-band channel assignment. See “How the Test Set Performs a Dualband Handover” on page 176.
- 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 359.

Manual Band Parameter

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

RF Generator Band Parameter

- When the operating mode is test mode and the downlink function is set to CW, the test set operates like a signal generator with level and frequency controls. See “CW Test Function Behavior” on page 743.

GPRS Band Selection Parameters

Parameter	GPiB Command
Cell Band	“CALL[:CELL]:BAND” on page 339
Packet Data Traffic Channel Band	“CALL:PDTCH PDTChannel:BAND” on page 393

Operating Considerations for GPRS

Cell Band Parameter

- When the data connection status is *not* transferring (see “Data Connection Processing State Synchronization” on page 60), 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 60), changing the cell band parameter will disconnect any data connection in progress.

Packet Data Traffic Channel Band Parameter

- When the data connection status is transferring (see “Data Connection Processing State Synchronization” on page 60), changing the packet data traffic band parameter selects the PDTCH ARFCN and uplink burst TX level parameters. However, the setting will not be applied until you re-start the data connection using “CALL:FUNCTION:DATA:START” on page 358.

Related Topics

GSM:

“Configuring the Broadcast Channel (BCH)” on page 746

“Configuring the Traffic Channel (TCH)” on page 749

“Receiver Control” on page 760

“CALL:CONNeCTed[:STATe]?” on page 345

“Programming: Getting Started Guide for GSM Mobile Test” on page 221

GPRS:

“Configuring the Broadcast Channel (BCH)” on page 746

“Configuring the Packet Data Traffic Channel (PDTCH)” on page 753

“CALL:STATus[:STATe]:DATA?” on page 430

“Programming: Getting Started Guide for GPRS Mobile Test” on page 266

Bursted Parameters

This section is *not* applicable to GSM.

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

Bursted parameters use the concept of an active burst. An active burst is a timeslot that is expected to contain RF power relating to a traffic channel based on the multislot configuration. 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 bursted parameter lets you specify one of the allowable bursts. If you do not specify a burst number, then burst one is assumed. The burst numbers you specify are relative from the first active uplink or downlink burst.

GPRS Bursting Parameters

Parameter	GPIB Command
Downlink Burst Absolute Power Level	"CALL:PDTCH PDTChannel:POWer[:AMPLitude]:BURSt[1 2 3 4]" on page 398
Downlink Burst Power Reduction Selection	"CALL:PDTCH PDTChannel:PREduction:BURSt[1 2 3 4]" on page 398
Manual Receiver Power Level	"RFANalyzer:MANual:POWer[:SElected][:SElected]:BURSt[1 2]" on page 556
Uplink Burst TX Level	"CALL:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]" on page 394

Operating Considerations

The following bursted parameters are also frequency banded parameters (see "Frequency Banded Parameters" on page 724):

- Uplink Burst TX Level
- Manual Receiver Power Level

Related Topics

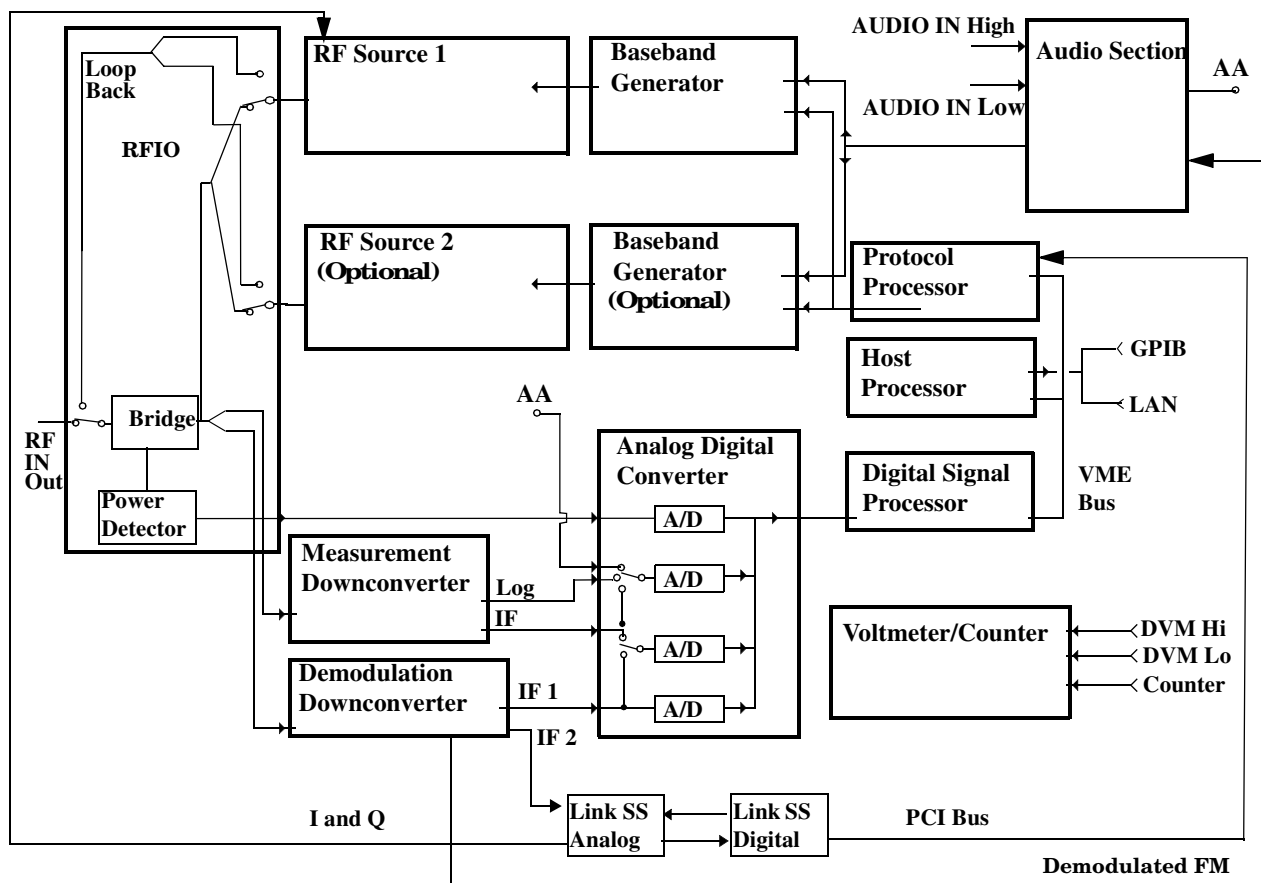
"Configuring the Packet Data Traffic Channel (PDTCH)" on page 753

"CALL:PDTCH | PDTChannel" on page 389

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 179.

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 source signals can be looped back through the input switch to cross calibrate the Measurement Downconverter and the Power Detector. The directional bridge couples power to the Power Detector.

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.

Demodulation Downconverter Module The Demodulation Downconverter module is used as part of the demodulation receiver that maintains the radio link. There are 2 output paths from the Demodulation Downconverter.

- The GSM, AMPS/136 signals are sent out the IF 1 path to the Analog to Digital Converter, the digital data then goes to the protocol subsystem.
- CDMA signals are sent out the IF 2 path where the (flexible) Link Subsystem maintains the link.

Measurement Downconverter Module The Measurement Downconverter module provides high quality (wide dynamic range, spurious free) signals to the Analog To Digital Converter module's measurement sampler input. These signals are:

- detected envelope of the Intermediate Frequency signal
- 10 kHz - 6 kHz 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.

Block Diagram

Link Subsystem The Link Subsystem maintains the radio link for all CDMA formats. The Link Subsystem has three parts:

- Link Subsystem Analog
- Link Subsystem Digital
- Protocol Processor

The Link Subsystem Analog board processes the signal from the Demodulation Downconverter through a 12 bit DAC. The digital data is sent to the Link Subsystem Digital board and processed into I/Q digital data. The I/Q digital data is returned to the Link Subsystem Analog board and converted into I/Q analog baseband signals. The I/Q baseband signals are sent to the I/Q modulator in the RF Source.

The Link Subsystem Digital board provide Layer 1 digital signal processing. There are several Field Programmable Logic Arrays, which are programmed for different CDMA formats.

Analog To Digital Converter Module

Following the Measurement Downconverter and Demodulation Downconverter IF 1 is the Analog to Digital Converter module. The purpose of the Analog to Digital Converter module is to convert the downconverted analog signals into digital data streams which can be processed by the Digital Signal Processing module.

In order to maintain the radio link of non-CDMA formats, the downconversion path through the Demodulation Downconverter module has a dedicated A/D conversion path.

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 hard disk access
- control of all RF and audio hardware modules
- routing measurement results received from the Digital Signal Processing and Protocol Processor modules to the appropriate output device (display, GPIB, LAN, serial, etc.)

Voltmeter/Counter

Voltmeter The voltmeter is 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 V peak. 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/Low connectors. The signal is then routed to the Analog To Digital Converter module's measurement sampler for analysis by the DSP module.

The Audio In connector accepts signals from 20 Hz to 15 KHz, at input levels from 10 mV to 20 V peak.

Audio 1 Path The Audio 1 path provides analog baseband signals used for frequency modulation of the test set's RF sources. Up to four separate audio sources may be summed together in any combination to provide the composite Audio 1 output. These include the external FM input, internal direct digital synthesis (DDS,) regenerated SAT, and audio echo input.

The external FM input accepts an externally supplied audio signal with a peak voltage between 0.25 and 2 V peak.

The internal DDS generates low distortion audio signals from DC to 20 KHz with 0.1 Hz resolution. One to four signals may be generated and internally summed, with independent level control of each waveform.

The SAT regeneration circuit outputs a signal which is phase-locked to a received SAT signal. This is useful for testing situations where the test set needs to emulate a mobile station.

The audio echo input is used for retransmitting the received audio after a selectable time delay, to check both radio transmit and receive paths simultaneously.

For most applications, only one or two of these Audio 1 path sources are enabled at any given time.

Audio 2 Path The Audio 2 path provides a secondary means for sending analog baseband signals to the FM modulator. Audio 2 contains only one source, a DDS similar to that used for Audio 1.

Typically, the Audio 2 path DDS is used for cases where multiple signals must be summed together with the lowest possible distortion. Another potential use of Audio 2 would be to obtain higher output levels than Audio 1 is capable of (up to twice as much), assuming the two outputs are set to the same frequency and phase, and then summed together at the Baseband Generator module.

Audio 2 is rarely used in practice because the DDS used for Audio 2 is the same DDS that is used for the front panel audio output.

Audio Out Path Any one of four inputs may be coupled to the front panel audio output connector. These include a 4 channel DDS (shared with Audio 2), receiver discriminator audio from the Demodulation Downconverter module, audio echo from the Analog To Digital Converter module, and audio vocoder.

The front panel output is capable of providing signal levels up to 9 V peak into > 600 ohm loads, and up to 0.8 V peak into an 8 ohm load (e.g. speaker). The output level is calibrated for all modes except discriminator audio,

The discriminator audio has an uncalibrated volume control provided due to the high tolerances involved.

Typically the DDS mode is used to feed the MIC input of a radio, or it may simply be used as a general purpose low distortion function generator.

Audio echo can be selected to route the received audio to the front panel audio output connector.

RF Sources

The test set 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 292 MHz to 2.7 GHz and an amplitude range of -10 dBm to -127 dBm.

The RF sources consist of a Synthesized Signal Generator module followed by a Vector Output module and an RF Attenuator module. Baseband modulation information is supplied to the RF sources from a Baseband Generator module preceded by an Audio Section module. 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 “GSM Test Mode Operation” on page 738).

For GPRS, the test set can operate in four different operating modes, active cell mode, test mode BCH, test mode BCH+PDTCH, or cell off (see “GPRS Test Mode Operation” on page 744).

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 736
- “Active Cell For GPRS” on page 737

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 Modes” on page 738.

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

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

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

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

The test set’s operating mode is set using the command, “CALL:OPERating:MODE” on page 384.

Setting the Cell Activated State Parameter

The cell activated state parameter is set using “CALL[:CELL]:ACTivated[:STATE]” on page 329.

Active Cell For GPRS

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

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

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

- Output RF Spectrum (ORFS) - see "Output RF Spectrum Measurement Description" on page 117.
- Transmit Power (TXP) - see "Transmit Power Measurement Description" on page 160
- Phase and Frequency (PFER) - see "Phase and Frequency Error Measurement Description" on page 125
- Power versus Time (PVT) - see "GPRS Power versus Time Measurement" on page 138
- Bit Error Rate - see "GPRS Bit Error Measurement" on page 81.

For a typical scenario detailing the steps you might take to test a GPRS mobile station, see "Testing a GPRS Mobile Station" on page 767.

Related Topics

For GSM:

"Configuring the Broadcast Channel (BCH)" on page 746

"CALL:OPERating" on page 383

"Configuring the Traffic Channel (TCH)" on page 749

For GPRS:

"Configuring the Broadcast Channel (BCH)" on page 746

"Configuring the Packet Data Traffic Channel (PDTCH)" on page 753

"Testing a GPRS Mobile Station" on page 767

"Programming: Getting Started Guide for GPRS Mobile Test" on page 266

Test Mode Operating Modes

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

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

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

You use Test mode (see “CALL:OPERating” on page 383 for GPIB syntax) when it is not possible, or not desired, to communicate via over-the-air signalling with the mobile station, but downlink stimulus and uplink measurements are still needed:

- “GSM Test Mode Operation” on page 738
- “GPRS Test Mode Operation” on page 744

If you require details on active cell operating mode for GSM or GPRS, see “Active Cell Operating Mode” on page 736.

GSM Test Mode Operation

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

- BCH (broadcast channel) (see “BCH Test Function Behavior” on page 740)
- BCH + TCH (broadcast channel + traffic channel) (see “BCH + TCH Test Function Behavior” on page 741)
- CW (continuous wave) (see “CW Test Function Behavior” on page 743)

See “CALL:FUNCtion” on page 357 for test function GPIB syntax.

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

- No over-the-air signaling is available.
- No capability to demodulate and decode uplink RACH bursts is available.
- Test mode features are determined by the test function: BCH, BCH + TCH, or CW.
- When the operating mode is set to test mode, auto triggering sets the trigger source to RF Rise. See “RF Rise Trigger Source:” on page 214.

The test set’s receiver remains on the uplink frequency determined by the broadcast channel see “CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341 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 760.

NOTE “Setting the Cell Activated State Parameter” on page 736 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 548), the test set’s receiver frequency is set according to the fields or GPIB commands in the following table.

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

Test Function	Receiver Frequency Fields	GPIB Command
BCH	Broadcast Chan (1)	“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341
BCH + TCH	Traffic Channel (2)	“CALL:TCHannel[:ARFCn][:SElected]” on page 435
CW	RF Gen Channel	“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341

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 548), the test set’s receiver frequency is set according to the fields or GPIB commands in the following table.

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

Test Function	Receiver Frequency Fields	GPIB Command
Don’t Care	Manual Channel (1)	“RFANalyzer:MANual:CHANnel[:SElected]” on page 551
	Manual Frequency	“RFANalyzer:MANual:FREQuency” on page 554

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 344. (If you are using the test set manually, the Expected Burst field is in the Call Params 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 402 command.
- By default, the test set expects the mobile station to transmit on the uplink BCH. The test set’s receiver frequency can be set manually, which de-couples the automatic setting.
- Changes to the mobile station TX level will couple to the expected power, and the mobile station TX Level parameter will be transmitted on the downlink BCCH.
- All measurements are available to you as if the operating mode was set to active mode.

Example 38. BCH Test Function Using Auto Receiver Control

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

1. Select test mode.

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

2. Select PGSM as the broadcast band.

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

3. Select BCH as the test function.

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

4. Configure the receiver control to auto.

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

5. Set the BCH to channel 21.

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

6. Set the mobile station TX level to 12.

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

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

Example 39. 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 551

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

Example 40. BCH + TCH Test Function Using Auto Receiver Control

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

1. Select test mode.

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

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

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

3. Select BCH as the test function.

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

4. Configure the receiver control to auto.

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

5. Set the BCH to channel 21.

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

6. Set the TCH to channel 31.

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

7. Set the mobile station TX Level to 12.

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

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

Example 41. 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 551

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 Parm's 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 413 command.
- The RF generator's band is set using the "CALL[:CELL]:RFGenerator:BAND" on page 408 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 409 command.
- The RF generator's frequency is set using the "CALL[:CELL]:RFGenerator:FREQUENCY[:SElected]" on page 412 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.

Test Mode Operating Modes

Example 42. CW Test Function Using RF Generator Frequency

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

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

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

2. Select test mode.

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

3. Select PGSM as the RF generator band.

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

4. Select CW as the test function.

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

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

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

GPRS Test Mode Operation

GPRS Test Mode BCH Behavior

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

GPRS Test Mode BCH + PDTCH Behavior

When Cell Operating Mode is set to "GPRS Test Mode BCH + PDTCH" (PBPTest), the base station emulator produces the BCH and PDTCH. To specify the positions of the PDTCH use "CALL:PDTCH | PDTChannel[:ARFCn][:SElected]" on page 391 and "CALL:PDTCH | PDTChannel:MSLot:CONFIguration" on page 397. The locations of the specified uplink are demodulated but no signaling for control of a data connection is performed and PRACH bursts are not demodulated.

In this mode the following features are available:

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

Manually synchronizing the mobile station to the BCH is usually initiated from the mobile station keypad, or over a special mobile station test bus. This is not under the direct control of the base station emulator and is your responsibility.

- When a "forced" call is in progress (as defined above), BER measurements can be made.

- Changes to the Multislot Configuration or PDTCH ARFCN [PDTCH Band] reconfigure the downlink (although no channel assignment signalling takes place). The BS Emulator's receiver is configured to receive at the modified frequency, timeslot and timing advance in the same way as when Cell Operating Mode is set to "Active Cell" (CELL).

OFF Behavior

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

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

Expected Burst

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

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

For details on the GPIB command, see "CALL:BURSt" on page 344. (If you are using the test set manually, the Expected Burst field is in the Call Params window, screen 2 of 3, F12.)

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

Related Topics

"Configuring the Broadcast Channel (BCH)" on page 746

"Configuring the Traffic Channel (TCH)" on page 749

"CALL:OPERating" on page 383

"Receiver Control" on page 760

"Configuring the Packet Data Traffic Channel (PDTCH)" on page 753

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 328.

GSM Broadcast Channel Parameters

Parameter	GPIB Command
Cell Band	“CALL[:CELL]:BAND” on page 339
Cell Power	“CALL[:CELL]:POWer[:SAMPlitude][:SElected]” on page 403
Cell Power State	“CALL[:CELL]:POWer:STATe[:SElected]” on page 406
Broadcast Channel (ARFCN)	“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341
Mobile Country Code	“CALL:MCCode” on page 364
Mobile Network Code	“CALL:MNCCode” on page 365
Location Area Code	“CALL:LACode” on page 363
Network Color Code	“CALL:NCCode” on page 382
Base Station Color Code	“CALL:BCCode” on page 340
Paging IMSI	“CALL:PAGing:IMSI” on page 386
Repeat Paging	“CALL:PAGing:REPeat[:STATe][:SElected]” on page 388
Paging Mode	“CALL:PAGing:MODE” on page 387
Paging Multiframe	“CALL:PAGing:MFRames” on page 387
Auto IMEI Request	“CALL:IMEI” on page 362
TX Level FACCH Signaling	“CALL:SIGNaling” on page 428
BA Table	“CALL[:CELL]:BA:TABLE[:SElected]” on page 332
3 Digit MNC for PCS	“CALL:PMNCCode” on page 400

GPRS Broadcast Channel Parameters

Parameter	GPIO Command
Cell Band	“CALL[:CELL]:BAND” on page 339
Cell Power	“CALL[:CELL]:POWer[:SAMPlitude][:SELEcted]” on page 403
Broadcast Channel (ARFCN) - Selected band	“CALL[:CELL]:BCHannel[:ARFCn][:SELEcted]” on page 341
Broadcast Channel (ARFCN) - DCS band	“CALL[:CELL]:BCHannel[:ARFCn]:DCS” on page 342
Broadcast Channel (ARFCN) - EGSM band	“CALL[:CELL]:BCHannel[:ARFCn]:EGSM” on page 342
Broadcast Channel (ARFCN) - PCS band	“CALL[:CELL]:BCHannel[:ARFCn]:PCS” on page 343
Broadcast Channel (ARFCN) - PGSM band	“CALL[:CELL]:BCHannel[:ARFCn]:PGSM” on page 343
Set PCS 3 digit MNC state	“CALL[:CELL]:PMNCODE:STATE” on page 401

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 749) 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 329.

If the test set is in test mode (see “Test Mode Operating Modes” on page 738) 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 183.

GPRS

For GPRS, there are a number of BCH parameters which are currently set to fixed values. See “Fixed Parameters” on page 771.

Related Topics

“Frequency Banded Parameters” on page 724

“Band Selection Parameters” on page 726

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 434.

TCH Parameters

Parameter	GPIB Command
Traffic Channel Band	“CALL:TCHannel:BAND” on page 438
Traffic Channel (ARFCN) - Selected band	“CALL:TCHannel[:ARFCn][:SElected]” on page 435
Traffic Channel (ARFCN) - DCS band	“CALL:TCHannel[:ARFCn]:DCS” on page 436
Traffic Channel (ARFCN) - EGSM band	“CALL:TCHannel[:ARFCn]:EGSM” on page 436
Traffic Channel (ARFCN) - PCS band	“CALL:TCHannel[ARFCN]:PCS” on page 437
Traffic Channel (ARFCN) - PGSM band	“CALL:TCHannel[:ARFCn]:PGSM” on page 437
Timeslot	“CALL:TCHannel:TSLot” on page 440
Mobile Loopback	“CALL:TCHannel:LOOPback” on page 439
Speech	“CALL:TCHannel:DOWNlink:SPEech” on page 439
Max Frames Allowed for Assignment	“CALL:COUNT:TDMA:FRAMES” on page 351
Channel Mode	“CALL:TCHannel:CMODE” on page 438

Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see “CALL:BCHannel” on page 341) 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 176. 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 359) = 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 45), or when in test mode with downlink function set to BCH+TCH.

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

There are 5 different settings for the downlink speech source. See “CALL:TCHannel:DOWNlink:SPEech” on page 439.

- 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[:STATel]” on page 369), 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 746
- “Configuring Mobile Station Operating Parameters” on page 756
- “Receiver Control” on page 760
- “Traffic Band Parameter” on page 726
- “CALL:TCHannel” on page 434
- “Fast Bit Error Measurement Description” on page 111

Configuring the Traffic Channel (TCH)

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 328.

Packet Data Traffic Channel Parameters

Parameter	GPIB Command
Packet Data Traffic Channel Band	“CALL:PDTCH PDTChannel:BAND” on page 393
Packet Data Traffic Channel (ARFCN)	“CALL:PDTCH PDTChannel[:ARFCn][:SElected]” on page 391
Packet Data Traffic Channel (ARFCN) DCS band	“CALL:PDTCH PDTChannel[:ARFCn]:DCS” on page 391
Packet Data Traffic Channel (ARFCN) EGSM band	“CALL:PDTCH PDTChannel[:ARFCn]:EGSM” on page 392
Packet Data Traffic Channel (ARFCN) PCS band	“CALL:PDTCH PDTChannel[ARFCN]:PCS” on page 392
Packet Data Traffic Channel (ARFCN) PGSM band	“CALL:PDTCH PDTChannel[:ARFCn]:PGSM” on page 393
Downlink Burst Power Reduction Selection	“CALL:PDTCH PDTChannel:PREduction:BURSt[1 2 3 4]” on page 398
Downlink Power Reduction Level (dB)	“CALL:PDTCH PDTChannel:PREduction:LEVel[1 2]” on page 399
Data Connection Type	“CALL:FUNCTion:DATA:TYPE” on page 358
Downlink PDTCH burst absolute power level	“CALL:PDTCH PDTChannel:POWer[:AMPLitude]:BURSt[1 2 3 4]?” on page 398
PDTCH Coding Scheme	“CALL:PDTCH PDTChannel:CSCHEME” on page 393
Multislot Configuration	“CALL:PDTCH PDTChannel:MSLot:CONFiguration” on page 397
P0 for downlink PDTCH	“CALL:PDTCH PDTChannel:PZERo:LEVel” on page 399
Query burst level	“CALL:PDTCH PDTChannel:POWer[:AMPLitude]:BURSt[1 2 3 4]?” on page 398
Deferred Parameters	
Deferred Packet Data Traffic Channel Band	“CALL:SETup:PDTCH PDTChannel:BAND” on page 420
Deferred Packet Data Traffic Channel (ARFCN)	“CALL:SETup:PDTCH PDTChannel[:ARFCn][:SElected]” on page 416
Deferred Packet Data Traffic Channel (ARFCN) EGSM band	“CALL:SETup:PDTCH PDTChannel[:ARFCn]:DCS” on page 417
Deferred Packet Data Traffic Channel (ARFCN) EGSM band	“CALL:SETup:PDTCH PDTChannel[:ARFCn]:EGSM” on page 418
Deferred Packet Data Traffic Channel (ARFCN) PCS band	“CALL:SETup:PDTCH PDTChannel[:ARFCn]:PCS” on page 419

Parameter	GPIB Command
Deferred Packet Data Traffic Channel (ARFCN) PGSM band	“CALL:SETup:PDTCH PDTChannel[:ARFCn]:PGSM” on page 420
Deferred PDTCH Coding Scheme	“CALL:SETup:PDTCH PDTChannel:CSCHEME” on page 421
Deferred Multislot Configuration	“CALL:SETup:PDTCH PDTChannel:MSLot:CONFIguration” on page 426
Deferred P0 for downlink PDTCH	“CALL:SETup:PDTCH PDTChannel:PZERo:LEVel” on page 427

Using Deferred Parameters

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

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

Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see “CALL:BCHEannel” on page 341) and the packet data traffic channel (PDTCH). There are a number of parameters for the BCH and the PDTCH that can be configured; however, the test set’s default parameters should allow a properly functioning GPRS mobile station to successfully establish a data connection under most circumstances.

PDTCH (ARFCN) is a frequency banded parameter (see “Frequency Banded Parameters” on page 724).

Related Topics

“Configuring the Broadcast Channel (BCH)” on page 746

“Configuring Mobile Station Operating Parameters” on page 756

“Packet Data Traffic Channel Band Parameter” on page 727

“CALL:PDTCH | PDTChannel” on page 389

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 328.

GSM Mobile Station Operating Parameters

Parameter	GPIB Command
Mobile station TX Level	“CALL:MS:TXLevel[:SElected]” on page 379
Timing Advance	“CALL:MS:TADVance” on page 378
Mobile DTX State	“CALL:MS:DTX[:STATe]” on page 369

GPRS Mobile Station Operating Parameters

Parameter	GPIB Command
Uplink Burst TX Level for selected PDTCH band	“CALL:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 394
Uplink Burst TX Level for DCS band	“CALL:PDTCH PDTChannel:MS:TXLevel:DCS:BURSt[1 2]” on page 394
Uplink Burst TX Level for EGSM band	“CALL:PDTCH PDTChannel:MS:TXLevel:EGSM:BURSt[1 2]” on page 395
Uplink Burst TX Level for PCS band	“CALL:PDTCH PDTChannel:MS:TXLevel:PCS:BURSt[1 2]” on page 395
Uplink Burst TX Level for selected PGSM band	“CALL:PDTCH PDTChannel:MS:TXLevel:PGSM:BURSt[1 2]” on page 396
Deferred Uplink Burst TX Level for selected band	“CALL:SETup:PDTCH PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 421
Guard Band Period Length	“CALL:MS:TX:BURSt:GPLength” on page 379

Operating Considerations

GSM

There are a number of parameters for the broadcast channel (see “Configuring the Broadcast Channel (BCH)” on page 746) and the traffic channel (see “Configuring the Traffic Channel (TCH)” on page 749) that can be configured, however the test set’s default parameters should allow a properly functioning mobile station to successfully camp on the cell and make a call under most circumstances.

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

The mobile station TX Level parameter, besides informing the mobile station what uplink power to transmit to the test set, also updates the Expected Power parameter. See “RFAnalyzer:EXPEcted:POWEr[:SELEcted]” on page 548.

GPRS

For details on the parameters you can use to configure the PDTCH, see “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753.

Setting Frame Trigger Parameters

This section is *not* applicable to GPRS.

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 714.

- “External Trigger State (on or off)” on page 758
- “External Trigger Timeslot (0 to 7)” on page 758
- “External Trigger Bit (0 to 1250)” on page 758

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

“SYSTem:FTRigger” on page 714

Receiver Control

Receiver Control is applicable to both GSM and GPRS. This topic contains the following sections:

- “GSM Receiver Control” on page 760
- “GPRS Receiver Control” on page 762

GSM Receiver Control

You may want to control the internal receiver parameters rather than allow the test set to control them. You can do this by using the receiver control parameters.

Selecting Manual or Automatic Receiver Control

Receiver control defines whether the test set (auto) or you (manual) are in control of the receiver’s band, channel, frequency and power.

- Setting a manual band, manual frequency, or manual channel causes receiver control to be set to manual control mode.
- Setting the broadcast band, or any reset operation causes the receiver control to be set to auto control mode.
- Setting the RFANALYZER:CONTROL:AUTO to ON or OFF.

Example OUTPUT 714;“RFANALYZER:CONTROL:AUTO OFF” !Allows manual control of
!receiver parameters.

Operating Mode and Receiver Control

The test set’s receiver control parameter is set using, “RFANalyzer:CONTRol:AUTO” on page 548.

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 724 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 760 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 760 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 551 for manual band or manual frequency details.

Table 3. Test Set Receiver Frequencies (Manual)

Operating Mode	Cell Activated State	Measurement Band	Measurement Frequency	Measurement Channel
Active Cell	ON or OFF	Manual Band	Manual Frequency	Manual Channel
Test Mode	ON or OFF	Manual Band	Manual Frequency	Manual Channel

Auto Receiver Control If the receiver control parameter is set to auto, the test set's receiver frequency is set using the parameters in the following table. See "CALL:TCHannel[:ARFCn][:SElected]" on page 435 traffic channel details and "CALL:TCHannel:BAND" on page 438 for traffic band details. See "CALL[:CELL]:BAND" on page 339 for cell band details. See "CALL:BCHannel" on page 341 for broadcast channel details.

Table 4. Test Set Receiver Frequencies (Auto)

Operating Mode	Cell Activated State	Measurement Band	Measurement Frequency
Active Cell	ON	Traffic Band	Traffic Channel
Active Cell	OFF	Cell Band	Broadcast Channel

Table 5. Test Set Receiver Frequencies (Auto)

Operating Mode	Test Function	Measurement Band	Measurement Frequency
Test Mode	BCH (1)	Cell Band	Broadcast Channel
Test Mode	BCH +TCH (2)	Traffic Band	Traffic Channel
Test Mode	CW	Cell Band	Broadcast Channel

Table Footnotes

- 1 Actual frequency depends on current broadcast band (PGSM, EGSM, 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 823 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 550 or "CALL:MS:TXLevel[:SElected]" on page 379.

Related Topics

"Active Cell Operating Mode" on page 736

"Test Mode Operating Modes" on page 738

"Frequency Banded Parameters" on page 724

GPRS Receiver Control

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

Selecting Manual or Automatic Receiver Control

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

GPIB Examples The following program examples use simple commands to perform a single function. Complex commands that enable manual receiver control and set a specified parameter at the same time are also available. See "RFANalyzer" on page 545 for a listing of all receiver control syntax. (Note that some of the commands described in "RFANalyzer" on page 545 are GSM only.)

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

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

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

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

Operating Mode and Receiver Control

Manual Receiver Control Parameters The following parameters can be used to control the receiver manually:

- Expected Power Control
- Measurement Frequency
- Uplink Frequency
- Measurement Burst

Expected Power Control The expected power from the mobile is set manually using the following settings (see "Expected Power" on page 762):

- To set the test set receiver's expected power setting to manual use "RFANalyzer:CONTRol:POWer:AUTO" on page 555.

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

- To set the power level that the test set's receiver is expecting the mobile station uplink burst to transmit at for the GPRS system type, use "RFANalyzer:MANual:POWer:GSM[:SELEcted]:BURSt[1|2]" on page 557. Each burst is set individually.

```
OUTPUT 714;"RFANalyzer:MANual:POWer:GSM:BURSt1 15 DBM"
```

```
OUTPUT 714;"RFANalyzer:MANual:POWer:GSM:BURSt2 19 DBM"
```

NOTE During manual receiver control, make sure you are using the correct operating mode for the type of measurement you are making. Trying to measure a CW signal while in active cell mode will likely result in an error. This error occurs because the test set uses the expected power setting for the operating mode you are using, and uses different methods to measure analog and digital signals.

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

Measurement Frequency Measurement frequency is used to tune the test set's measuring receiver for all bands:

- To set the receiver to manual mode and change the measurement frequency use "RFANalyzer:MANual:MEASurement[:MFRequency]" on page 555.

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

Receiver Control

Uplink Frequency Uplink Frequency sets the test set's demodulation receiver frequency, used to demodulate information from the mobile's uplink transmission:

- To set the receiver to manual mode and set the demodulation receiver frequency use "RFANalyzer:MANual:UPLink[:MFRequency]" on page 557.

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

NOTE Manual control of the demodulation receiver frequency is rarely needed. Use the measurement receiver when manual receiver frequency control is required. Automatic control is always used when the cell operating mode is active cell.

Measurement Burst Measurement Burst sets the mobile uplink burst number on which the measurement is performed (not the absolute timeslot number, but the burst number relative to the first uplink burst in the TDMA frame):

- To set the measurement burst use "RFANalyzer:MSLot:MEASurement:BURSt" on page 558.

```
OUTPUT 714;"RFANalyzer:MSLot:MEASurement:BURSt 2" !Sets the receiver to measure the second uplink
!burst.
```

The Measurement Burst parameter is always controlled manually. The choice of bursts available is based on the selection table shown under the multislot selection command, "CALL:PDTCH | PDTChannel:MSLot:CONFIguration" on page 397.

Auto Receiver Control

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

- Expected Power - derived from the MS TX Level setting for the specified system type, queried/set using the following commands:
 - "CALL:PDTCH | PDTChannel:MS:TXLevel[:SELEcted]:BURSt[1 | 2]" on page 394
 - "CALL:PDTCH | PDTChannel:MS:TXLevel:DCS:BURSt[1 | 2]" on page 394
 - "CALL:PDTCH | PDTChannel:MS:TXLevel:EGSM:BURSt[1 | 2]" on page 395
 - "CALL:PDTCH | PDTChannel:MS:TXLevel:PCS:BURSt[1 | 2]" on page 395
 - "CALL:PDTCH | PDTChannel:MS:TXLevel:PGSM:BURSt[1 | 2]" on page 396
- Measurement Frequency and Link Frequency - derived from the PDTCH Band and PDTCH (ARFCN) settings, queried/set using the following commands:
 - "CALL:PDTCH | PDTChannel[:ARFCn][:SELEcted]" on page 391
 - "CALL:PDTCH | PDTChannel[:ARFCn]:DCS" on page 391
 - "CALL:PDTCH | PDTChannel[:ARFCn]:EGSM" on page 392
 - "CALL:PDTCH | PDTChannel[ARFCN]:PCS" on page 392
 - "CALL:PDTCH | PDTChannel[:ARFCn]:PGSM" on page 393

Expected Power

To make accurate measurements, the test set needs to know how much power to expect at the test set's RF IN/OUT port; referred to as the Expected Power. It gets this value from the call control MS TX Level setting during automatic receiver control, or by the user specifying the expected power with the receiver power control set to manual. See "Expected Power Control" on page 763 for more information.

You can set the expected power level beyond the capability of the test set's hardware because expected power is intended to reflect the potential range of RF power at the DUT. This range of RF power is meant to accommodate the use of a gain or loss network between the DUT and the test set. See "Measurement Related Configuration" on page 823 for details about amplitude offset.

The upper and lower limits of expected power provide boundaries for the combination of amplitude offset and expected power. If you set expected power to +52 dBm and the amplitude offset to -3 dB, the calculated receiver power will be 49 dBm, but the test set shall be set to +43 dBm, the upper limit of the hardware. If the calculated value of receiver power goes below -25 dB, the lower limit of the hardware, the test set shall be set to -25 dB.

Effects on Receiver Control When Changing Operating Mode

After selecting the operating mode to use and setting one or more receiver controls to manual, the receiver control settings remain as you set them until you change operating mode. Changing operating mode causes all receiver parameters to return to automatic control.

Related Topics

"Test Mode Operating Modes" on page 738

"Active Cell Operating Mode" on page 736

"RFANalyzer" on page 545

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 95).

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 439), you may hear momentary unpleasant audio bursts from the mobile.

Related Topics

“Programming a Channel Mode Change” on page 174

Testing a GPRS Mobile Station

This section is *not* applicable to GSM.

This section provides a description of how you may want to use the test set to test a GPRS mobile station which supports a single uplink timeslot or two adjacent uplink timeslots. The section contains:

- “Test Overview” on page 767
- “Procedure” on page 767
- “Operating Considerations” on page 770

If you want a detailed description of how to write a basic control program that performs fundamental manufacturing tests on a GPRS mobile station, see “Programming: Getting Started Guide for GPRS Mobile Test” on page 266.

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 767
- “2. Switch on the GPRS mobile station, perform an attach and establish a data connection” on page 768
- “3. Make measurements and obtain results” on page 769
- “4. Reconfigure the data connection and make more measurements (if required)” on page 769
- “5. Disconnect the Mobile Station from the base station emulator” on page 769

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 339)
 - Broadcast Channel (ARFCN) (see “CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 341)
 - Cell Power (see “CALL[:CELL]:POWer:AMPLitude[:SElected]” on page 405)
- Packet data traffic channel (PDTCH) parameters:
 - Packet Data Traffic Channel Band (see “CALL:PDTCH | PDTChannel:BAND” on page 393)
 - Packet Data Traffic Channel (ARFCN) (see “CALL:PDTCH | PDTChannel[:ARFCn][:SElected]” on page 391)
 - Packet Data Traffic Channel Coding Scheme (see “CALL:PDTCH | PDTChannel:CSCHEME” on page 393)

- Downlink Packet Data Traffic Channel Power Control:
 - Downlink Power Reference Level (dB) (see “CALL:PDTCH | PDTChannel:PZERo:LEVel” on page 399)
 - Downlink Power Reduction Level (dB) (see “CALL:PDTCH | PDTChannel:PREduction:LEVel[1 | 2]” on page 399)
 - Downlink Burst Power Reduction Selection (see “CALL:PDTCH | PDTChannel:PREduction:BURSt[1 | 2 | 3 | 4]” on page 398)

Note: In order to make use of power reduction levels, you must set the downlink PDTCHs to be on a different ARFCN from the broadcast channel. This is because the power level across all timeslots on the BCH must remain constant. Therefore, power reduction levels are ignored.

- Data Connection Type (see “CALL:FUNcTION:DATA:TYPE” on page 358)
- Multislot Configuration (see “CALL:PDTCH | PDTChannel:MSLot:CONFIguration” on page 397)

Note that some BCH and PDTCH parameters are fixed parameters. This means that their values cannot be changed (see “Fixed Parameters” on page 771).

- Mobile station operating parameters:
 - PDTCH MS TX Level (see “CALL:PDTCH | PDTChannel:MS:TXLevel[:SElected]:BURSt[1 | 2]” on page 394)
 - Guard Band Period Length (see “CALL:MS:TX:BURSt:GPLength” on page 379)
- 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 559. For a more detailed description of measurement execution parameters along with programming examples, see “Step 3: Set Measurement Parameters” on page 274.
- Deferred parameters (if required):
 - Deferred parameters allow you to set up a new data connection ahead of time. This is useful if you plan to reconfigure the data connection after your first set of measurements to make more measurements on the new channel. The settings you make are only applied when a channel change is executed using the “CALL:HANdOver | HANdoff[:IMMediate]” on page 361. For a list of the deferred parameters see “Configuring the Packet Data Traffic Channel (PDTCH)” on page 753. For more details on using deferred parameters see “Using Deferred Parameters” on page 755.

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 358 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 60).

3. Make measurements and obtain results

Now that the data connection is successfully established, you can start making concurrent transmitter measurements and gathering results. Output RF Spectrum, Transmit Power, Phase and Frequency Error, and Power versus Time are all available for GPRS. In addition, you can make Receiver Bit Error Rate measurements in parallel with your transmitter measurements.

A receiver BLock Error Rate (BLER) result is also available when you set the Data Connection Type to BLER. 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 and receiver measurement results. For a description of this subsystem along with links to the GPIB commands, see “FETCh? Subsystem” on page 446.

The query “CALL:STATus:PDTCH | PDTChannel:BLERror?” on page 431 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 770). If you require more details on BLER, see “Block Error Rate (BLER) Report Measurement Description” on page 88.

When you want to use the Transmit Power, and Phase and Frequency Error measurements to measure each burst in a multislot configuration featuring two adjacent uplink timeslots, you have to select only one burst at a time to measure (using “RFANalyzer:MSLot:MEASurement:BURSt” on page 558). In order to optimize your test code, the recommended method is to select the first burst you want to measure, perform the first set of Transmit Power, and Phase and Frequency Error measurements and then repeat these measurements after you’ve selected the second burst. To select a multislot configuration with two adjacent uplink timeslots (that is, D2U2 or D3U2) use “CALL:PDTCH | PDTChannel:MSLot:CONFIguration” on page 397.

For more details on the process of making measurements and gathering results, see “Step 5: INITiate and FETCh Measurements” on page 277.

4. Reconfigure the data connection and make more measurements (if required)

In order to test the mobile station using different parameters, such as channel number, channel band, or mobile station transmit level, you have to reconfigure the data connection. To do this, you can execute a channel change using the “CALL:HANDOver | HANDoff[:IMMediate]” on page 361. This applies the deferred parameters that you set earlier (see Deferred Parameters above). If you require more details on the process of reconfiguring the data connection, see “Step 6: Reconfigure Test Set and Mobile Station Connection Parameters” on page 281.

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 358) and then initiate the GPRS detach procedure from the mobile station. If you require more details, see “Step 7: End the Connection” on page 283. You should note that the GPRS detach procedure is optional in a testing environment. The test set can be left in the Attached data connection state and will recognize if a different mobile station performs a GPRS attach.

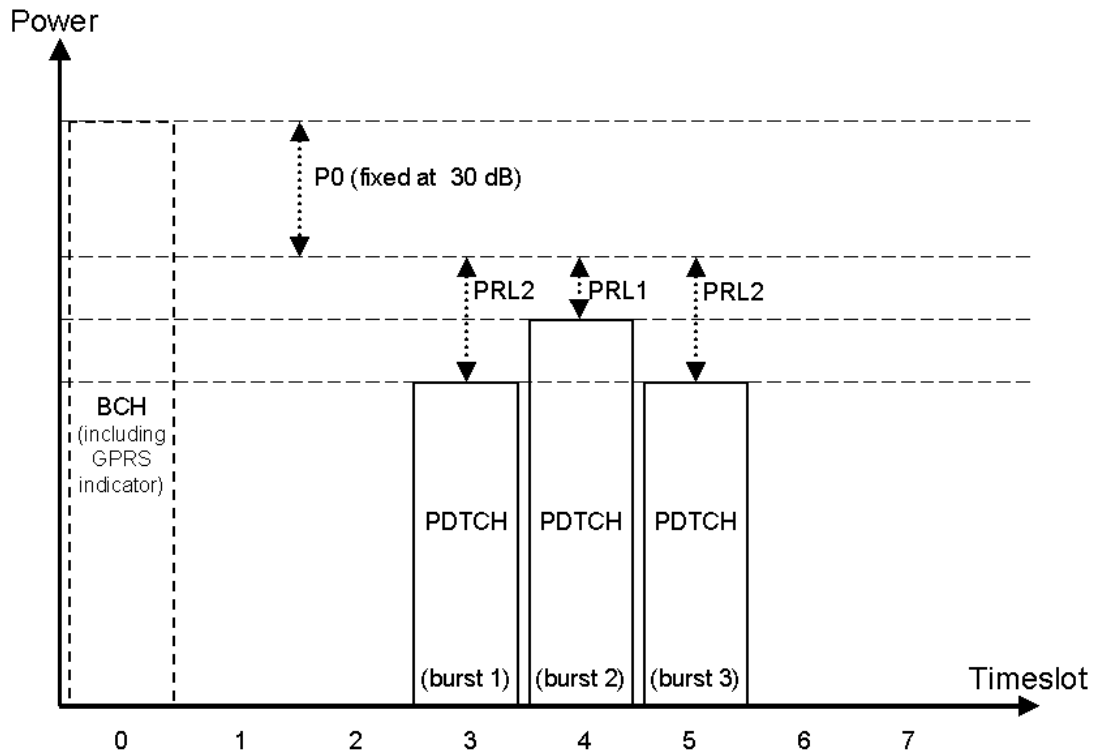
Operating Considerations

Downlink PDTCH Power Control

For GPRS-specific testing of mobile stations, you must take into consideration the multislot mode of operation (where a single packet data connection uses multiple timeslots on the same ARFCN possibly at different power levels). In GPRS, downlink power levels are referenced to the power reduction reference level (which in turn is referenced to the BCCH). ETSI refers to these power reduction levels as PR values, and the reference level is known as P0. In the test set, the power reduction levels are implemented as two values (PRL1 and PRL2) which can be mapped to any downlink burst.

P0, PRL1, and PRL2 are shown in the figure below. Note that the BCH (including GPRS indicator) is shown on the same ARFCN in the figure only to illustrate the BCH level. To make use of power reduction levels, you must set the downlink PDTCHs to be on a different ARFCN from the BCH.

Figure 14. GPRS Power Reduction Levels



Use the following commands to set the BCH power, P0 reference level, and PDTCH power reduction levels:

- To set the Cell Power (BCH power level), use “CALL[:CELL]:POWer:AMPLitude[:SElected]” on page 405.
- To set the P0 Reference Level, use “CALL:PDTCH | PDTChannel:PZERo:LEVel” on page 399.
- To set the Downlink Power Reduction Level (dB) for PRL1 and PRL2, use “CALL:PDTCH | PDTChannel:PREduction:LEVel[1 | 2]” on page 399.
- To make the Downlink Burst Power Reduction Selection (either PRL1 or PRL2) for each PDTCH burst, use “CALL:PDTCH | PDTChannel:PREduction:BURSt[1 | 2 | 3 | 4]” on page 398.

Fixed Parameters

A number of GPRS parameters currently have fixed values. These fixed parameters are shown in the following table.

Table 8. GPRS Fixed Parameters

Fixed Parameter	Value
Base Station Colour Code (BCC)	5
Location Area Code (LAC)	1
Mobile Country Code (MCC)	1
Mobile Network Code (MNC)	1
Network Colour Code (NCC)	1
Routing Area Code (RAC)	1

Related Topics

“Programming: Getting Started Guide for GPRS Mobile Test” on page 266

“Active Cell For GPRS” on page 737

“GPRS Broadcast Channel Parameters” on page 747

“Configuring the Packet Data Traffic Channel (PDTCH)” on page 753

Preset Descriptions

Description

The test set is capable of accepting several different preset commands.

At no time during a preset operation, does transmit power exceed the last user setting of the transmit power. The input power is not set to any value lower than the last user setting of the input power. This is to avoid power spikes on the output and possible receiver damage on the input during transitions associated with preset operations.

Partial Preset

behaves

```
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 select new measurements and configure their parameters. If measurement parameters do not need to be changed, use a partial preset to save time.

Example

```
OUTPUT 714;"*RST" !Recommended command for a full preset, sets trigger arm to single.
```

```
OUTPUT 714;"SYSTEM:PRESET2" !Command for a full preset, sets trigger arm to continuous.
```

The *RST common command is the recommended command for a full preset operation.

*RST gives the same results as partial preset with the exception of Trigger Arm and the measurement parameters.

NOTE Transmit power is not set to OFF during a full preset, transmit power is set to the default value.

Table 9. Full Preset Behavior

Function	Full Preset Result
Trigger Arm	Continuous (manual operation full preset or SYSTEM:PRESET2 command)
Trigger Arm	Single (remote operation full preset, *RST command)
Measurement Parameters	all set to defaults
Maskable Message Display State	On (manual operation full preset)
Maskable Message Display State	Off (remote operation full preset)

Status Preset

The STATUS:PRESET command sets the status system as defined in “SCPI 1995 Volume 2: Command Reference” section 20.7. All of the enable registers are set to 0, all PTR registers are set to 1, and all NTR registers are set to 0.

Example

```
OUTPUT 714; "STATUS:PRESET" !Presets the STATus subsystem.
```

Related Topics

“SYSTem:PRESet” on page 717

“*RST” on page 722

Instrument Status Area

Description

The Instrument status area is found on the bottom center of the test set's display.

Figure 15. 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

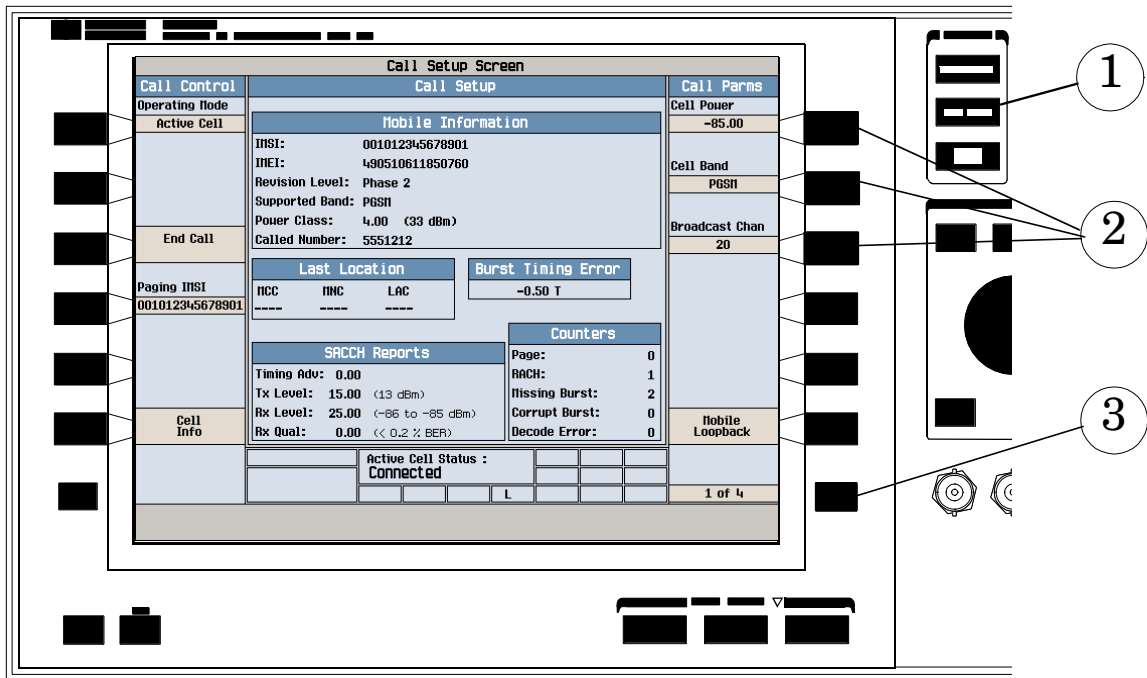
This annunciator indicates the state of four different conditions of the test set:

- 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.

GSM Manual Operation

How Do I Change Call Parameters?

This section is *not* applicable to GPRS.



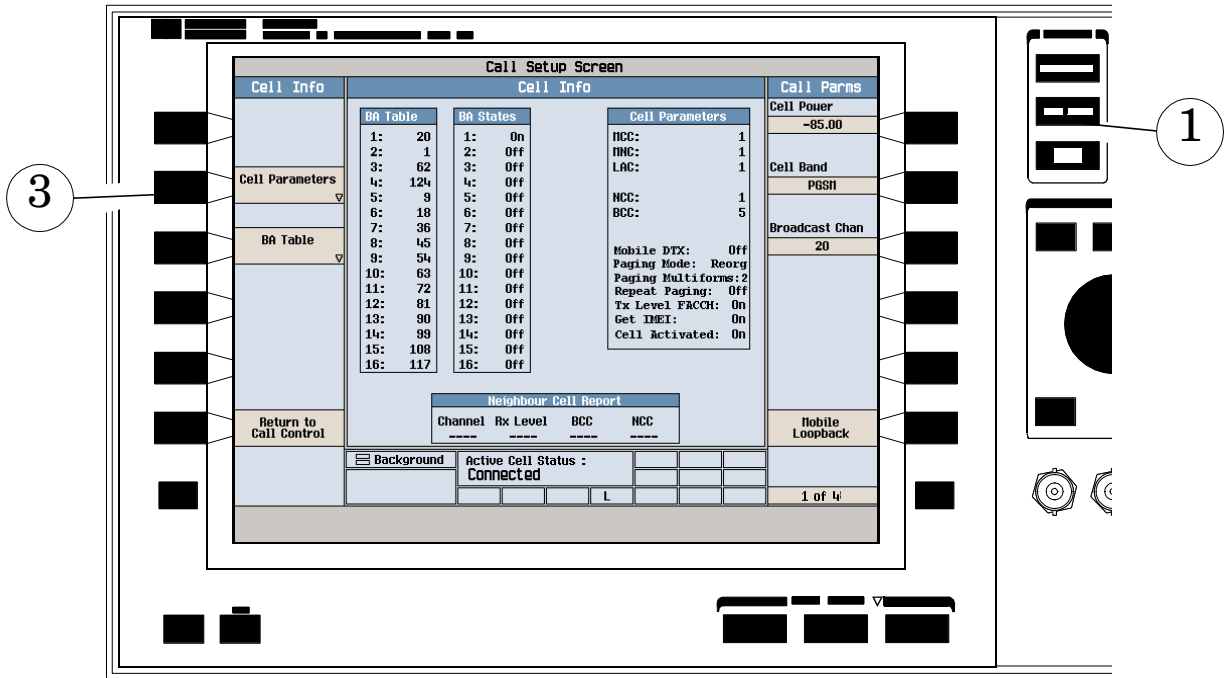
1. Press the **CALL SETUP** key
2. Press **F7**, **F8**, or **F9**.
3. Enter a value or highlight a selection and press the knob.
4. Press the **MORE** key for additional call parameters.

NOTE For dual-band handover, change the Traffic Band selection (Call Params (**F7**) on menu 2 of 4).

How Do I Change Cell Parameters?

This section is *not* applicable to GPRS.

A. Select the Cell Parameters menu.



1. Press the **CALL SETUP** key.
2. Press the Cell Info (**F5**) key.
3. Press the Cell Parameters (**F2**) key.

B. Set a cell parameter.

Cell Parameters	Value
Cell Activated State	Off
MCC (Mobile Country Code)	2
MNC (Mobile Network Code)	1
LAC (Location Area Code)	1
MCC (Network Colour Code)	1
BCC (Base Station Colour Code)	5
Mobile DTX State	Off
Repeat Paging	Off

To change “network” cell parameters:

1. Highlight Cell Activated State and press the knob.
2. Set Cell Activated State to Off. (Highlight Off and press the knob.)
3. Set network cell parameter to the desired value. (Highlight the parameter, press the knob, enter a value, and press the knob.)
4. Set Cell Activated State to On.

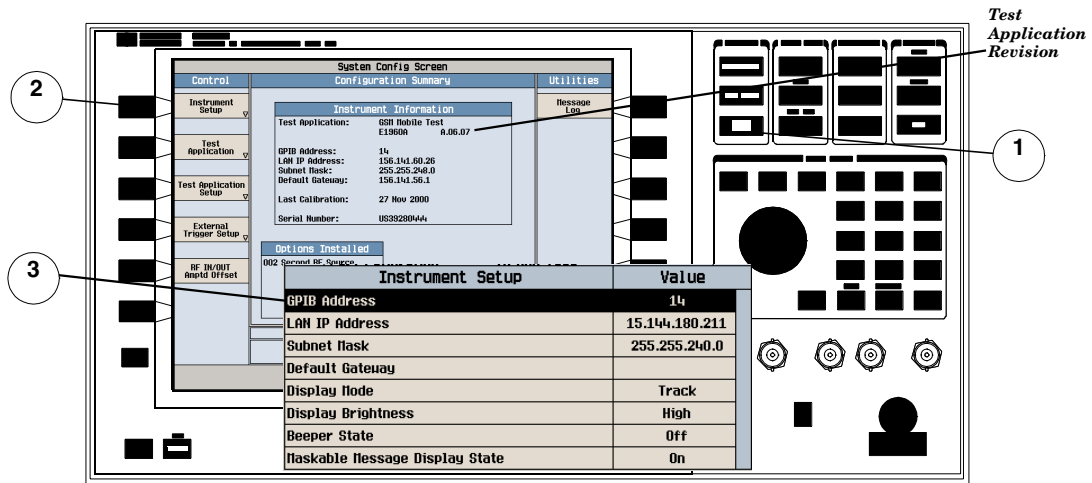
To change all other cell parameters:

1. Highlight the parameter, press the knob, enter a value, and press the knob.

How Do I Configure the Test Set for my Test System?

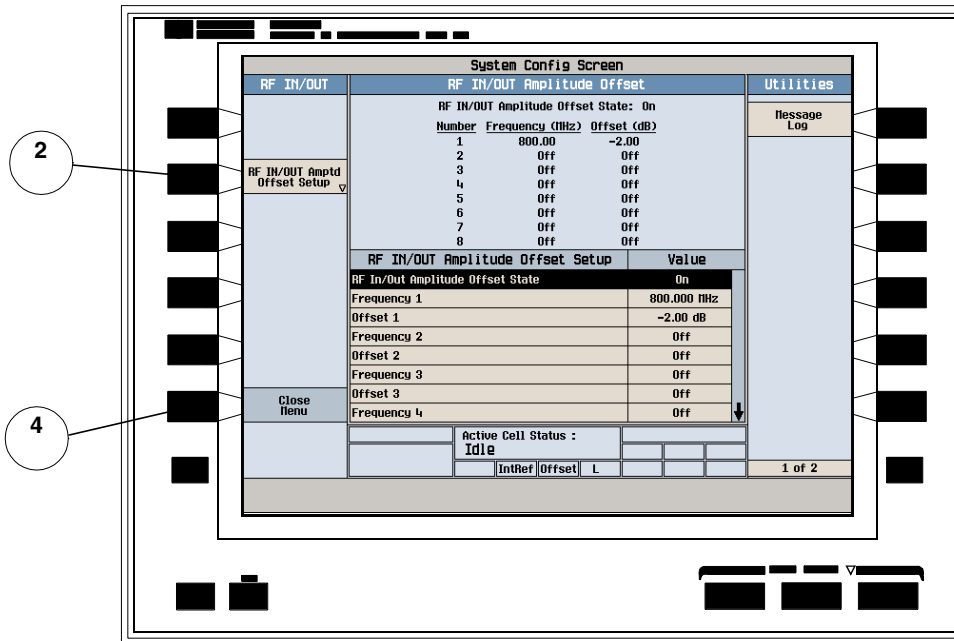
This section is *not* applicable to GSM.

A. Configure instrument information and setup.



1. Press the **SYSTEM CONFIG** key.
2. Press the Instrument Setup (**F1**) key.
3. Adjust an instrument setting and then press the Close Menu (**F6**).

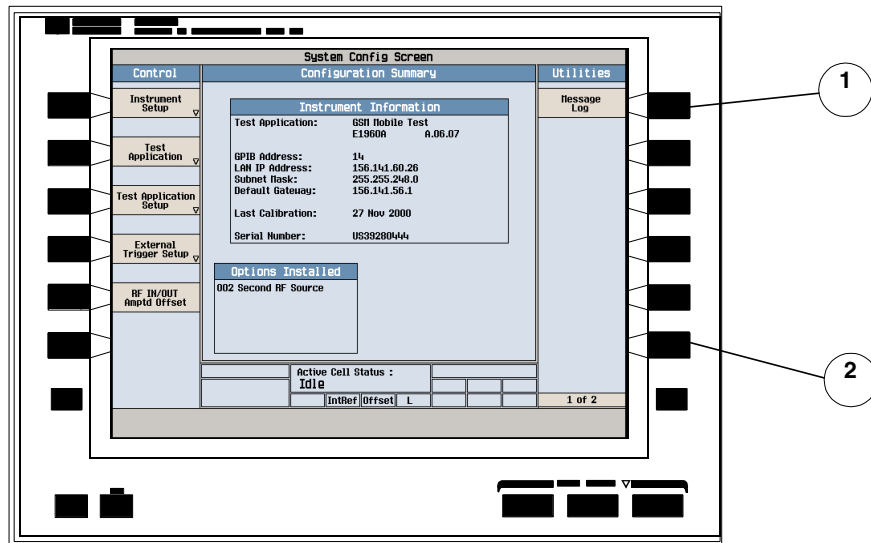
B. Set amplitude offsets.



1. On the Configuration Summary screen, press the RF IN/OUT Amptd OFFset (F5) key.
2. On the RF IN/OUT Amplitude Offset screen, press the RF IN/OUT Amptd Offset Setup (F2) key.
3. Enter the amplitude offsets for the test frequencies you use.
4. Press the Close Menu (F6) key.
5. Press the Return (F6) key to return to the Cofiguration Summary screen.

How Do I Configure the Test Set for my Test System?

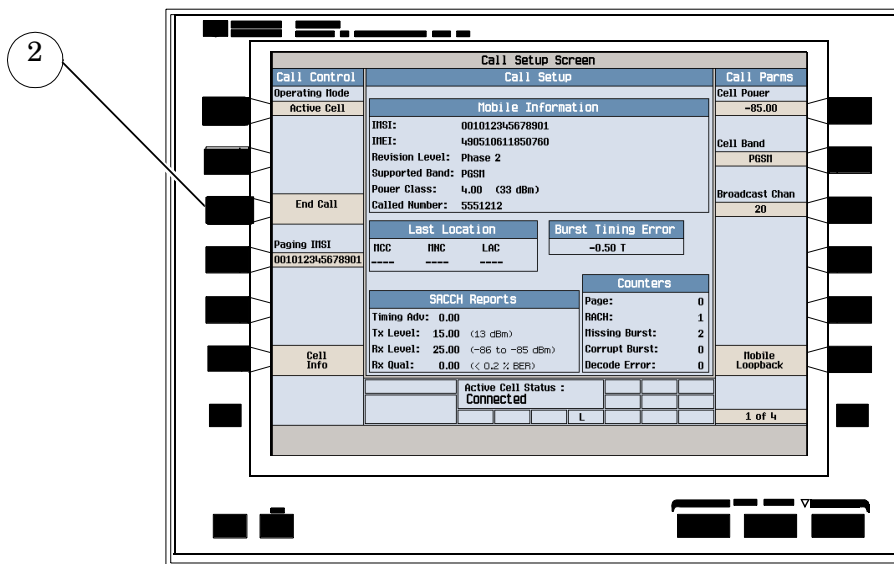
C. Check the message log.



1. Press the Message Log (F7) key and view the message log.
2. Press the Return (F12) key.

How do I End a Call?

This section is *not* applicable to GPRS.

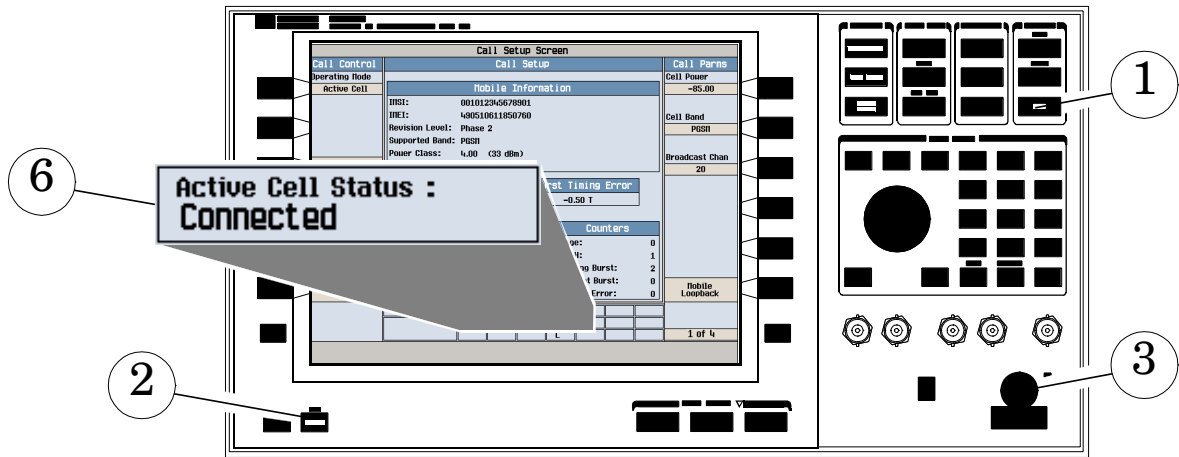


1. Press the **CALL SETUP** key
2. Press the End Call (**F3**) key, or end the call from the mobile.
3. Check for Idle in the Active Cell Status: field.

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.
4. Turn on the mobile and wait for it to camp.

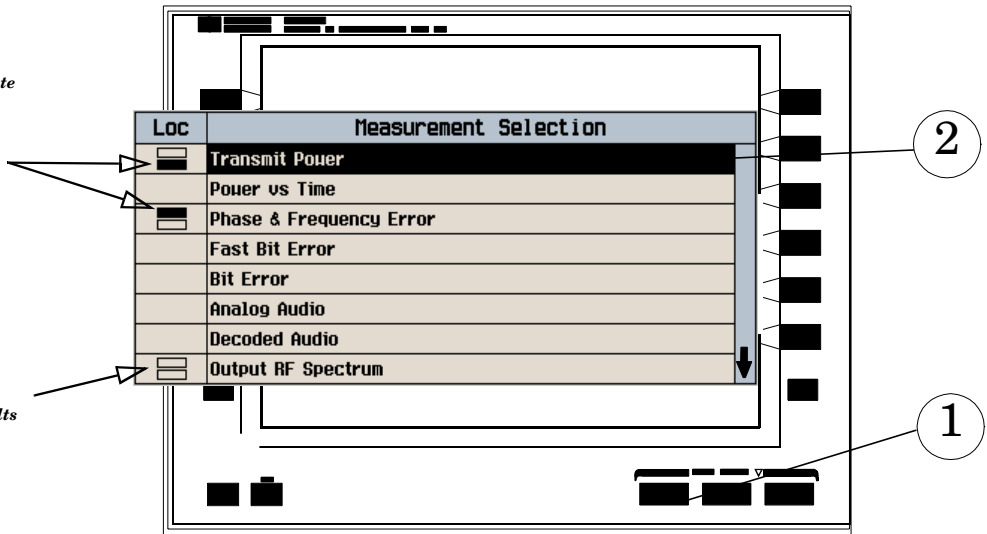
NOTE Is the mobile camped? PGSM is default cell band setting.

5. On the mobile press **1, 2, 3**, and then press send.
6. Check for Connected in the Active Cell Status: field.

B. Select measurements.

These black boxes indicate that transmit power measurement results are being displayed in the lower measurement window, and phase and frequency error measurement results are being displayed in the upper measurement window.

The grey boxes indicate that the measurement is being made, but the results are not being displayed.

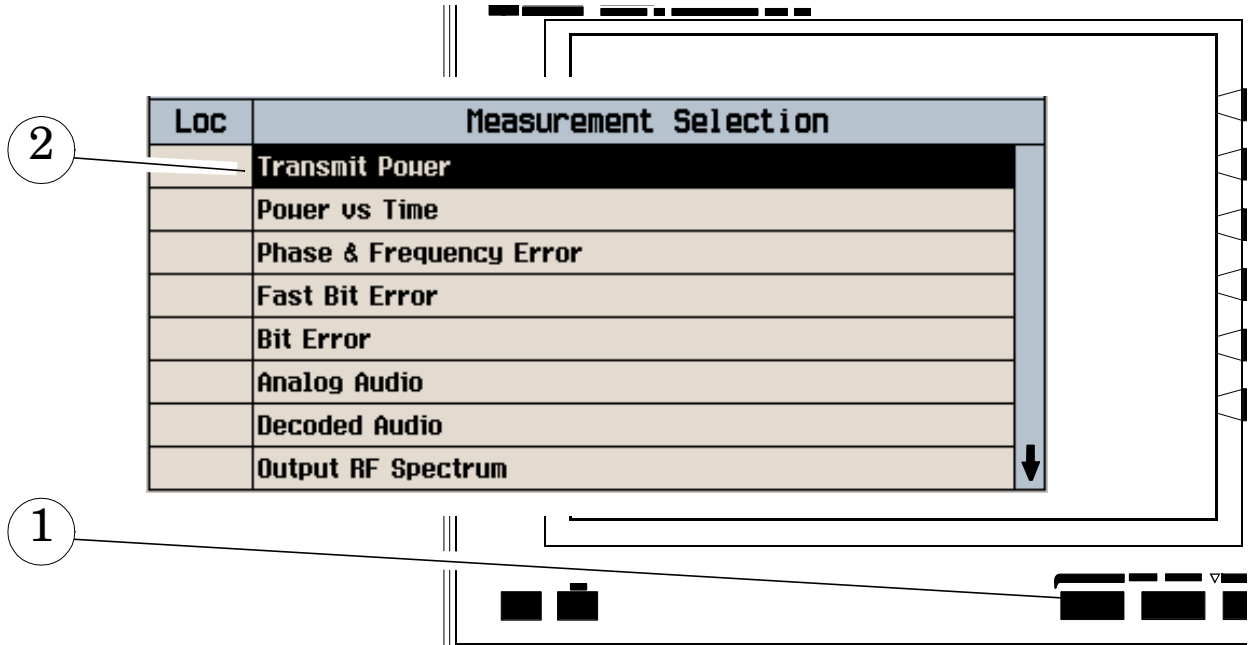


1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

How Do I Change a Measurement's Setup?

This section is *not* applicable to GPRS.

A. Select a measurement.



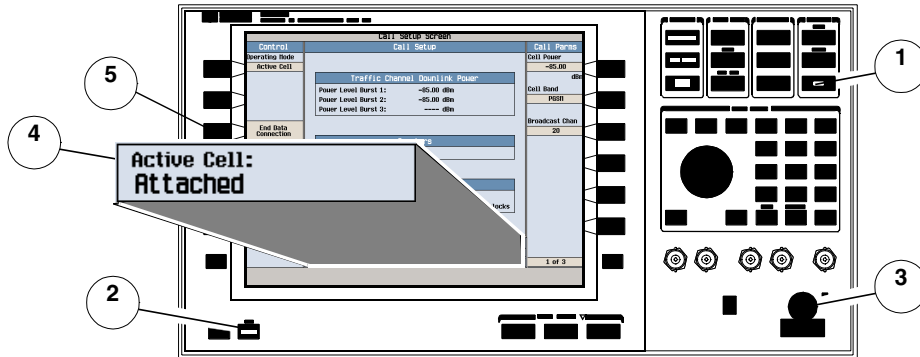
1. Press the **Measurement selection** key.
2. Highlight a measurement to setup and press the knob.

GPRS Manual Operation

How Do I Make Measurements on a Mobile?

This section is *not* applicable to GSM.

A. Establish a data connection.



1. Press the blue **SHIFT** key.
2. Press the green **Preset** key.
3. Connect the mobile.
4. Turn the mobile on and wait for Attached in the Active Cell: field.

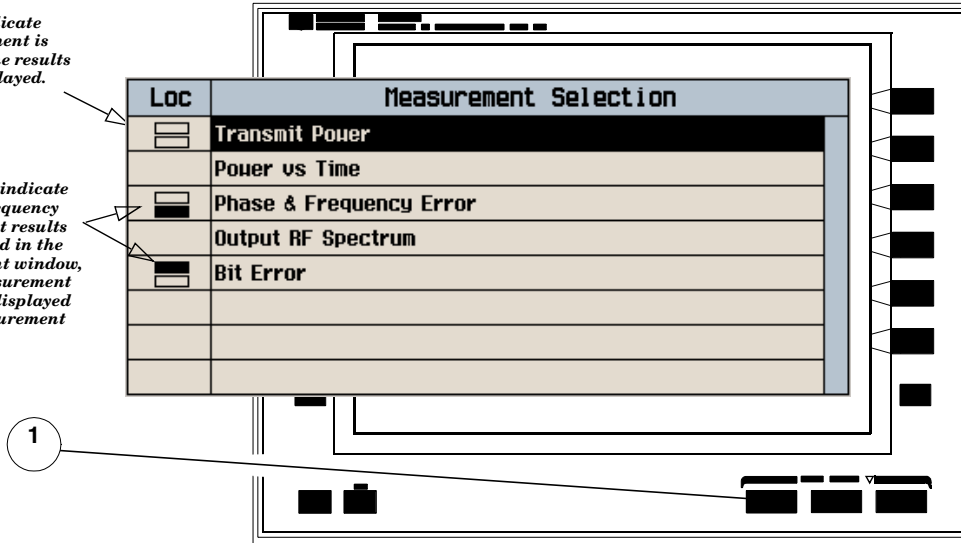
NOTE For mobiles that don't perform GPRS attach automatically, set the mobile to data mode.

5. Press the Start Data Connection (**F3**) key and watch for the Active Cell: field changing to Transferring.

B. Select measurements.

The grey boxes indicate that the measurement is being made, but the results are not being displayed.

These black boxes indicate that phase and frequency error measurement results are being displayed in the lower measurement window, and bit error measurement results are being displayed in the upper measurement window.

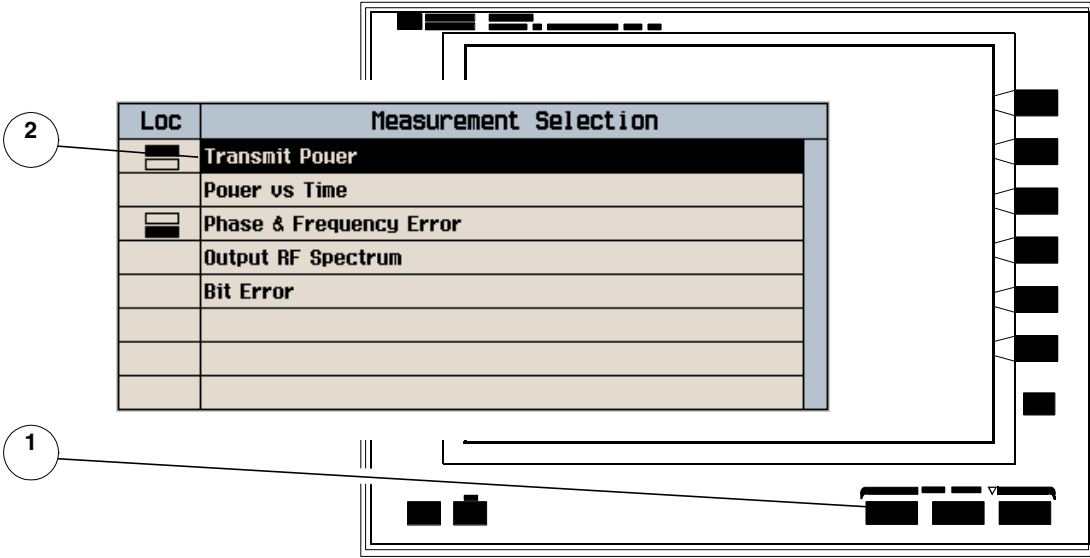


1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

How Do I Change Measurement Setup?

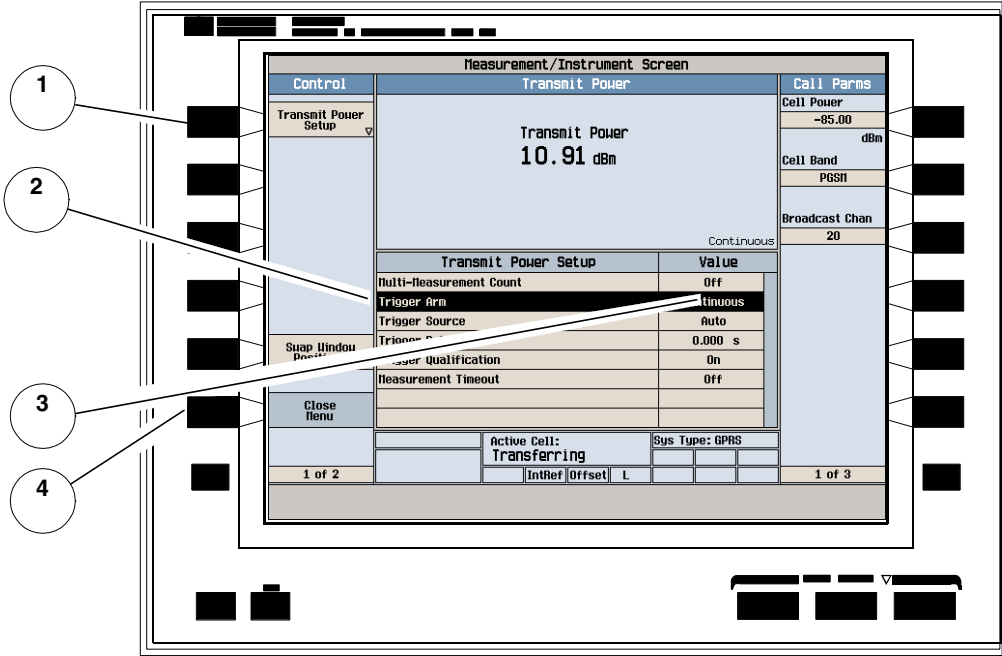
This section is *not* applicable to GSM.

A. Select a measurement.



1. Press the **Measurement selection** key.
2. Highlight a measurement to set up and press the knob.

B. Set up the measurement.



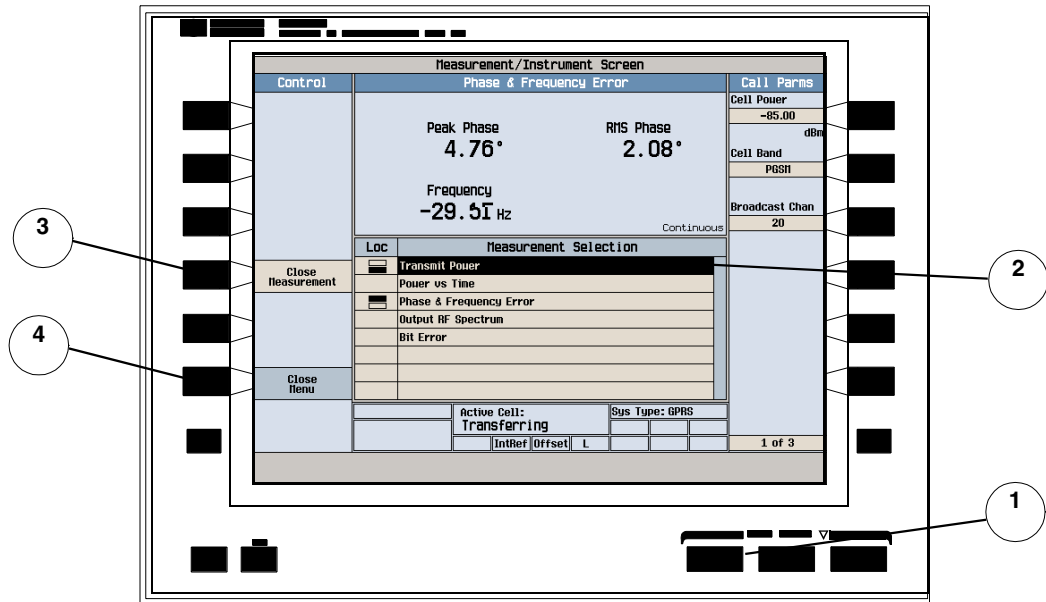
1. Press the measurement's setup (**F1**) key.
2. Highlight a parameter and press the knob.
3. Enter a value or make a selection and press the knob.

NOTE For Statistical measurement results, change the Multi-Measurement Count parameter from Off to a number >1.

4. Press Close Menu (**F6**) key.

How Do I Turn Off a Measurement?

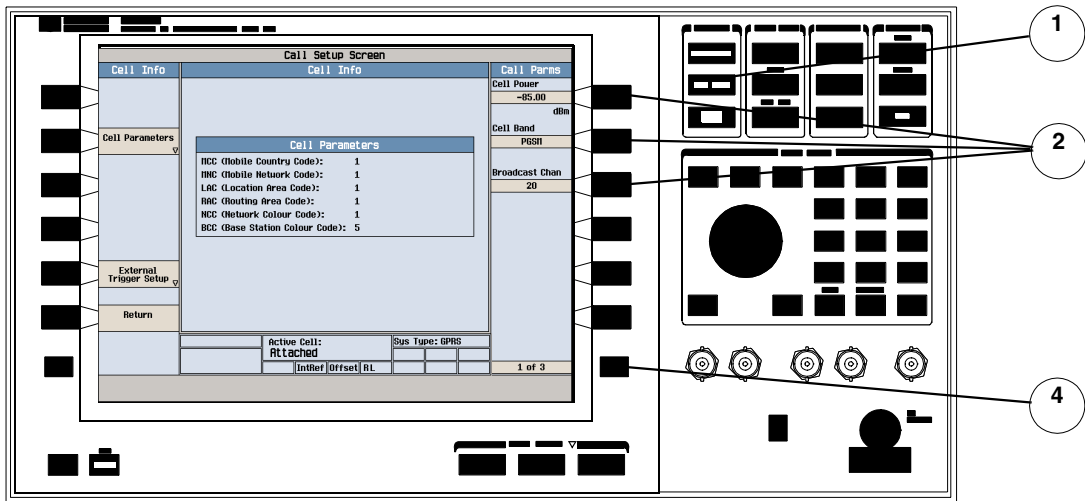
This section is *not* applicable to GSM.



1. Press the **Measurement selection** key.
2. Highlight the measurement you want to turn off.
3. Press the **Close Measurement (F4)** key.
4. Press the **Close Menu (F6)** key.

How Do I Change Call Parameters?

This section is *not* applicable to GSM.



1. Press the **CALL SETUP** key.

NOTE When the mobile is transferring data (Active Cell: field is Transferring) some call parameters cannot be changed.

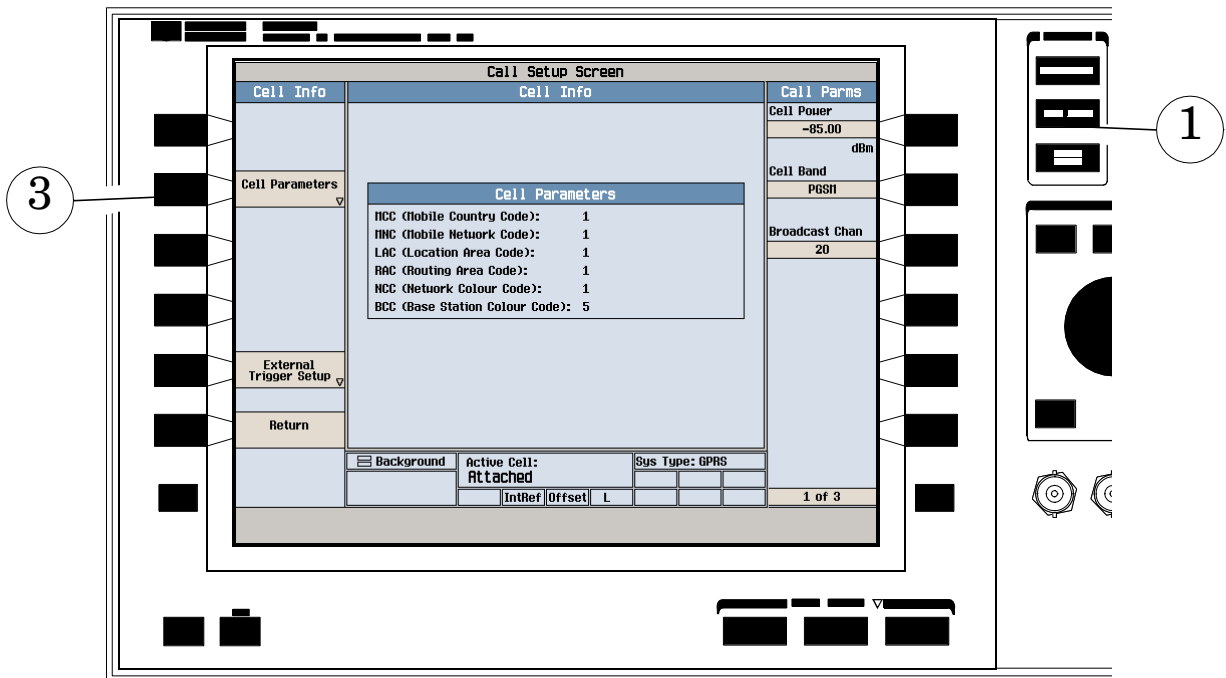
2. On the Call Params menu (1 of 3) press **F7**, **F8** or **F9**.
3. Enter a value or highlight a selection and press the knob.
4. Press the **More** key for additional call parameters.

How Do I Change Cell Parameters?

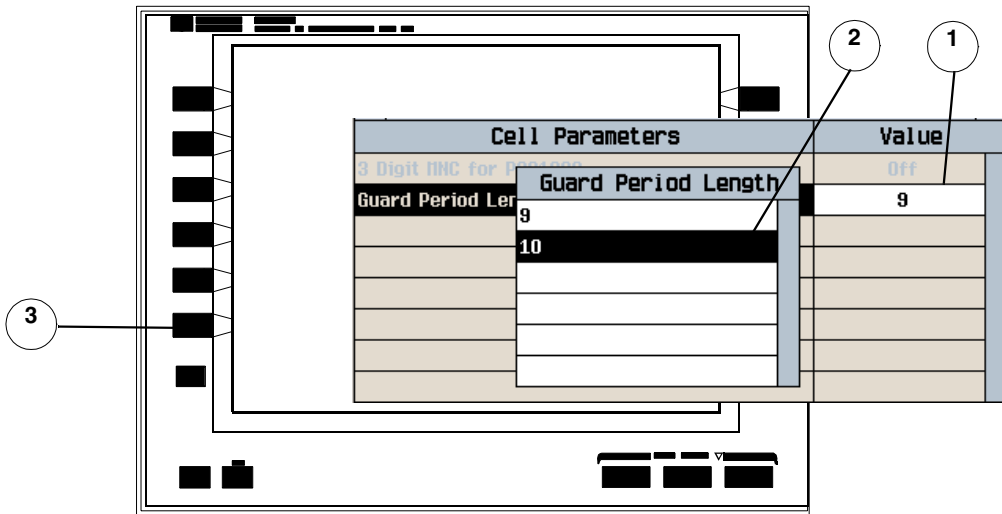
This section is *not* applicable to GSM.

NOTE You can only change two Cell Parameters - 3 Digit MNC for PCS1900 and Guard Period Length. Other Cell Parameters such as MCC, MNC, and LAC are fixed. To change the 3 digit MNC for PCS1900 the cell must be set to off by pressing the **CALL SETUP** key, then Operating Mode (**F1**) and then selecting Cell Off.

A. Select the Cell Parameters menu.



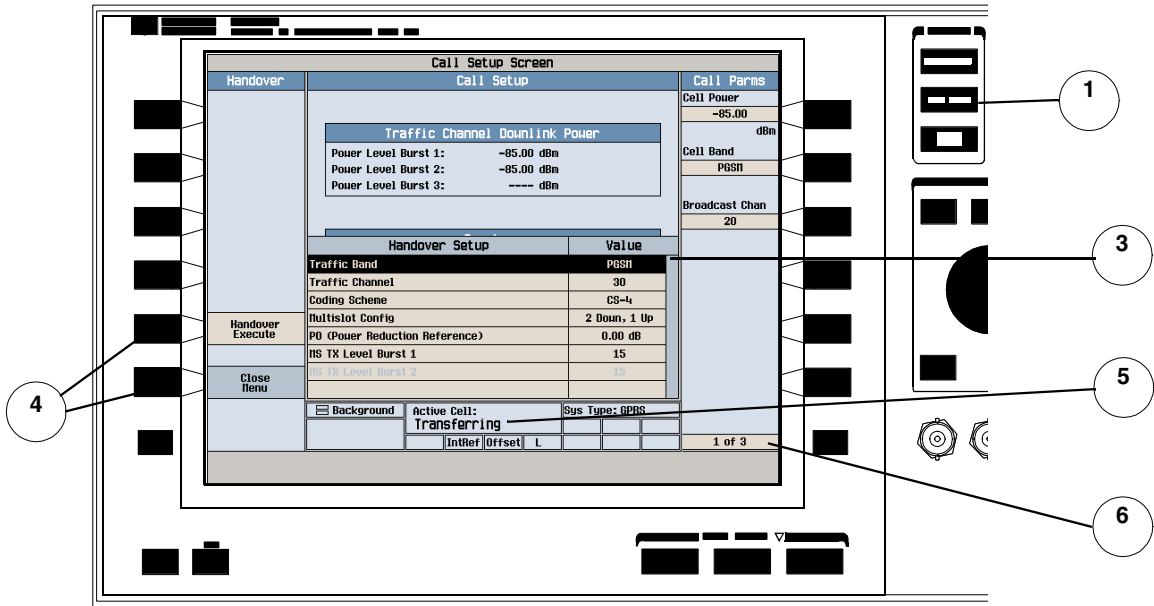
1. Press the **CALL SETUP** key.
2. Press the Cell Info (**F6**) key.
3. Press the Cell Parameters (**F2**) key.

B. Set a Cell parameter.

1. Highlight a parameter and press the knob.
2. Enter a value or selection and press the knob.
3. Press the Close Menu (**F6**) key.

How Do I Perform a Handover?

This section is *not* applicable to GSM.



1. Press the **CALL SETUP** key.
2. Press the Handover Setup (**F5**) key.
3. Change the various parameters, for example Traffic Band.
4. Press the Handover Execute (**F5**) key to complete the handover, or press the Close Menu (**F6**) key to abort the handover.
5. Check for Transferring in the Active Cell: field.
6. Press the **More** key to check that the changes have been implemented on the Call Params menus (2 of 3) and (3 of 3).

How Do I Change the MS TX Level?

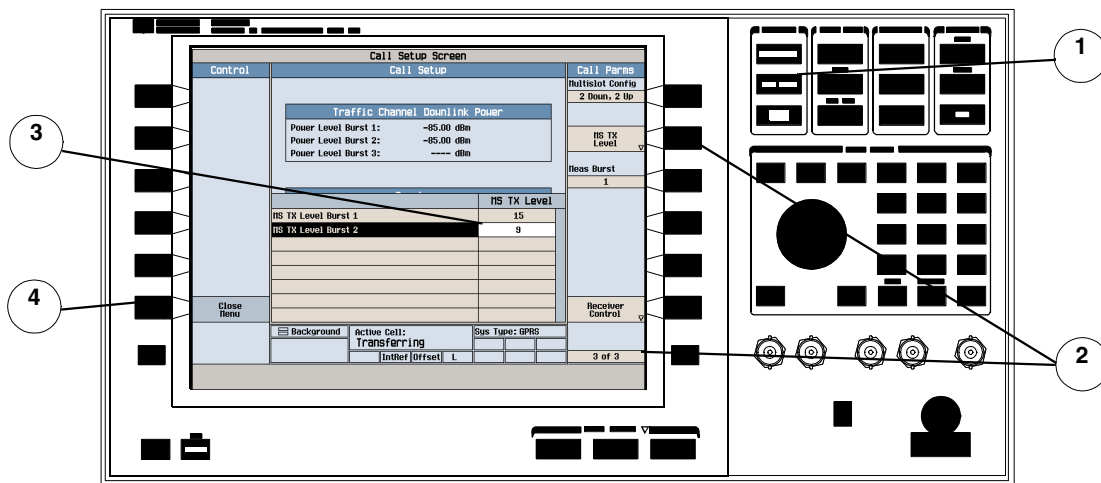
This section is *not* applicable to GSM.

There are two ways to change the MS TX Level:

1. Change the level immediately
2. Change the level during a handover

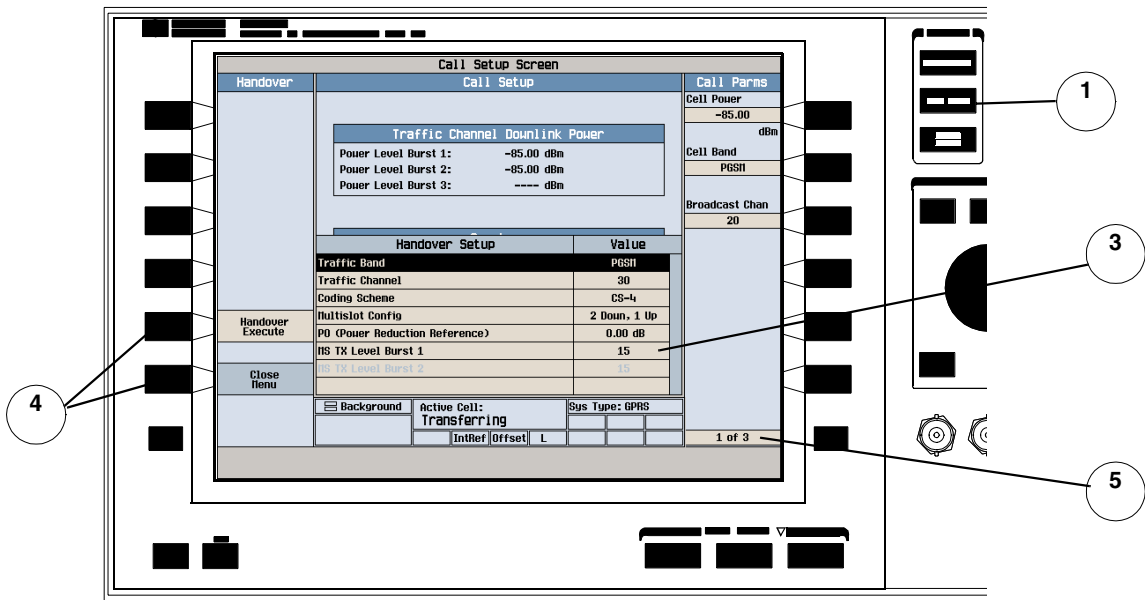
Both are explained below.

1. Change the MS TX level immediately.



1. Press the **CALL SETUP** key.
2. On the Call Params menu (3 of 3) press the MS TX Level (**F8**) key.
3. Select a new MS TX level and press the knob.
4. Press the Close Menu (**F6**) key.

2. Change the MS TX level during a handover.

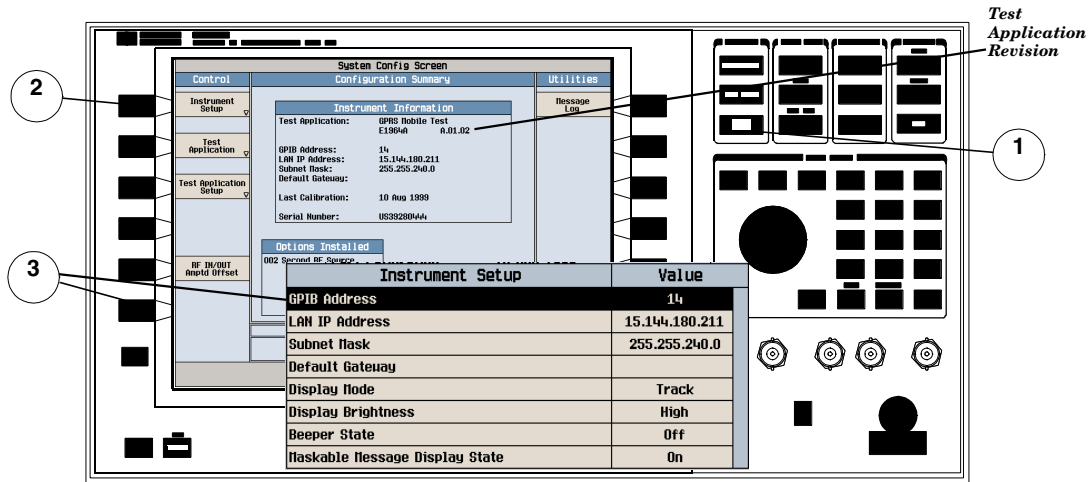


1. Press the **CALL SETUP** key.
2. On Control menu, press the Handover Setup (**F5**) key.
3. Select and change the MS TX Level.
4. Press the Handover Execute (**F5**) key, to change the MS TX level, or press the Close Menu (**F6**) key to leave the level unchanged.
5. Use the **More** key to check that the MS TX level has been changed on the Call Params menu (3 of 3).

How Do I Configure the Test Set for my Test System?

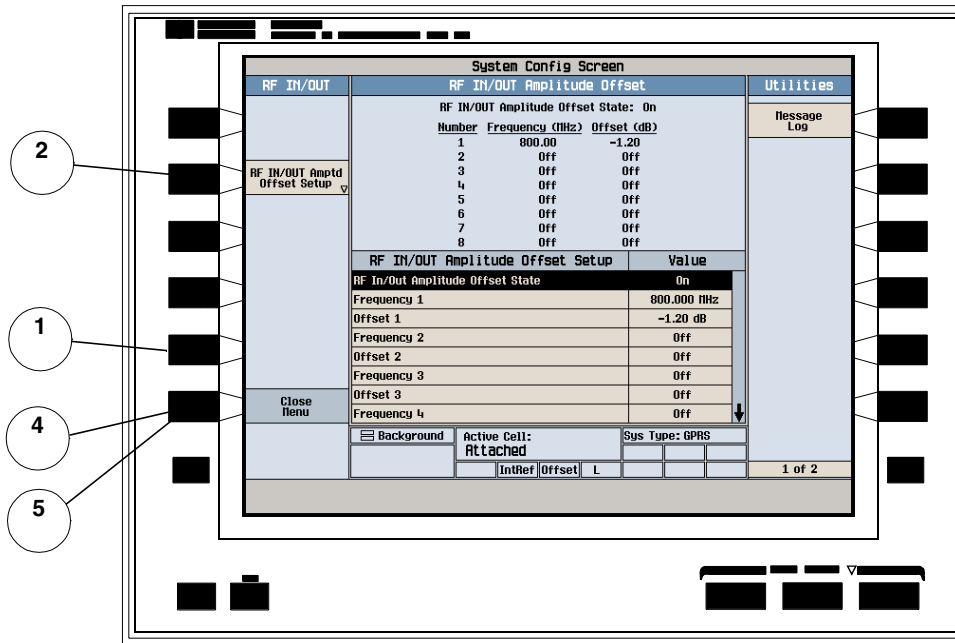
This section is *not* applicable to GSM.

A. Configure instrument information and setup.



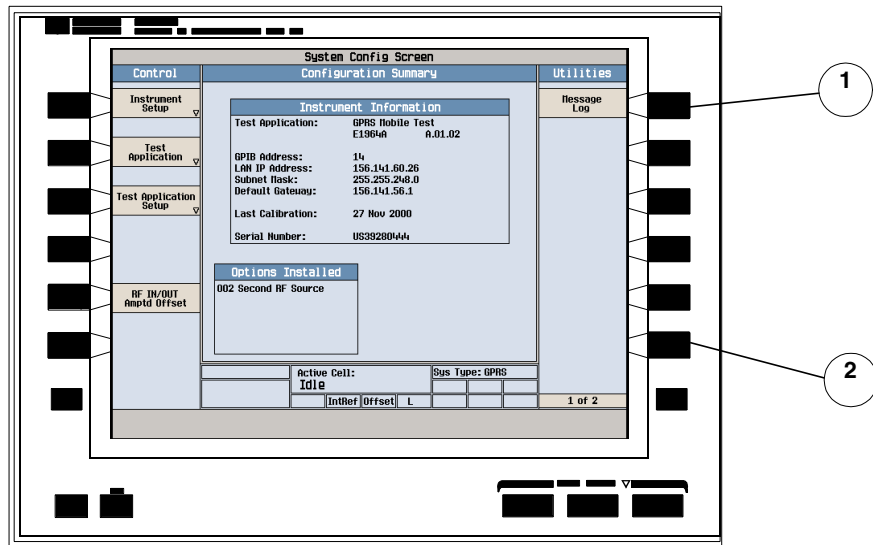
1. Press the **SYSTEM CONFIG** key.
2. Press the Instrument Setup (**F1**) key.
3. Adjust an instrument setting and then press the Close Menu (**F6**).

B. Set amplitude offsets.



1. On the Configuration Summary screen, press the RF IN/OUT Amptd OFFset (F5).
2. On the RF IN/OUT Amplitude Offset screen, press the RF IN/OUT Amptd Offset Setup (F2) key.
3. Enter the amplitude offsets for the test frequencies you use.
4. Press the Close Menu (F6) key.
5. Press the Return (F6) key to return to the Configuration Summary screen.

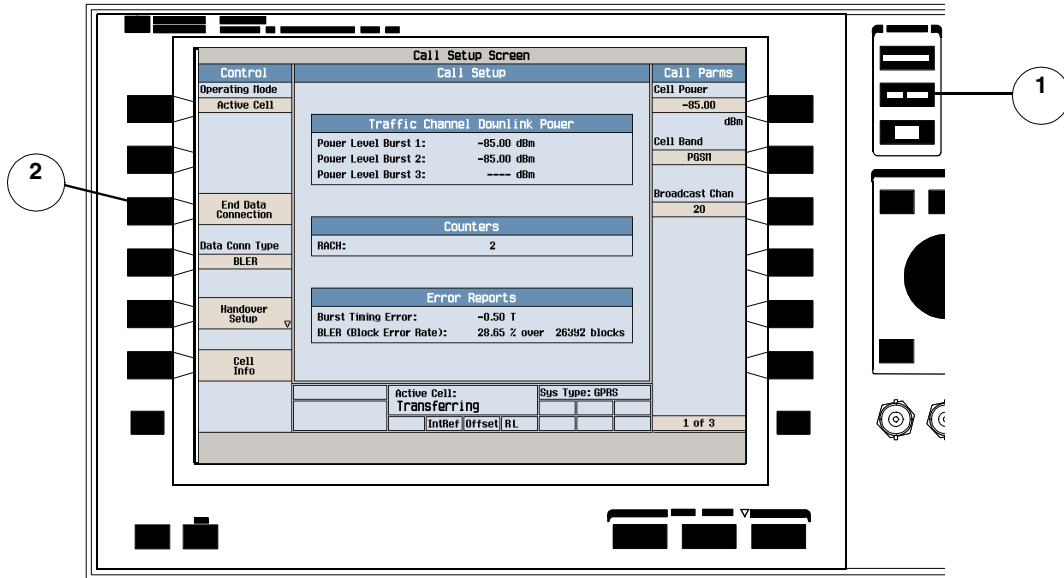
C. Check the message log.



1. Press the Message Log (F7) key and view the message log.
2. Press the Return (F12) key.

How Do I End the Data Connection?

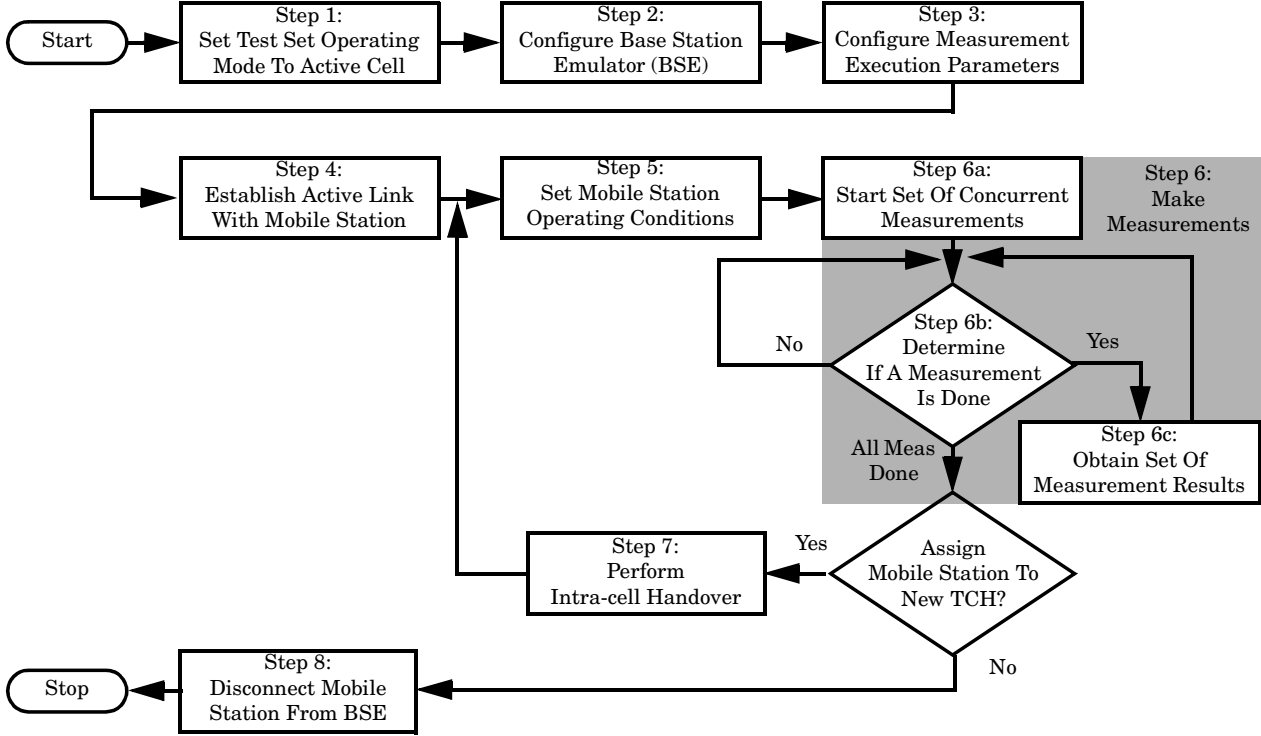
This section is *not* applicable to GSM.



1. Press the **CALL SETUP** key.
2. Press the End Data Connection (**F3**) key, or end the data connection from the mobile.
3. To ensure the data connection has ended check for Attached in the Active Cell: field.

Programming Overview

Figure 16. Typical Flow Of Tasks Performed By Control Program

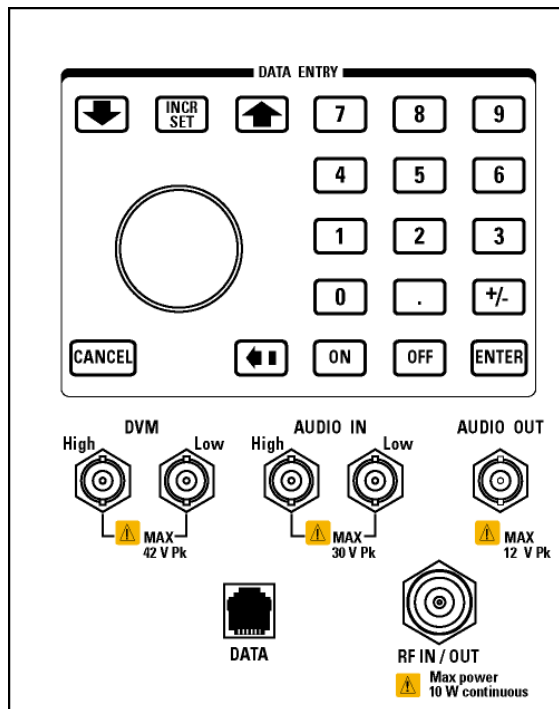


Related Topics

- “Programming a Phase and Frequency Error Measurement” on page 128
- “Programming a Transmit Power Measurement” on page 163
- “Programming an Output RF Spectrum Measurement” on page 120
- “Programming a Power versus Time Measurement” on page 143
- “Programming a Fast Bit Error Measurement” on page 114
- “Establishing an Active GSM Link with the Mobile Station” on page 38

Front Panel Connectors

Description



AUDIO IN

The input to the audio analyzer is a floating input differential amplifier. Both the AUDIO IN High and AUDIO IN Low BNC connectors should be connected to provide noise immunity. Refer to the technical specifications for more information.

AUDIO OUT

This BNC connector accesses to the test set's audio generator. Refer to the technical specifications for more information.

DATA

This RJ-45 connector provides front panel access to the rear panel LAN connection. This connector is used for downloading firmware upgrades, or new test applications into the test set. No other types of communication are possible with the LAN port.

The the DATA connector on the front panel is connected internally to the ETHERNET TO FRONT PANEL connector on the rear panel. In order to use the front panel DATA connector, connect the rear panel LAN PORT, to the rear panel ETHERNET TO FRONT PANEL connector with the LAN jumper cable.

The LAN jumper cable, part number E5515-61160, is supplied with the test set.

DVM

Not functional for this release.

RF IN/OUT

This Type-N connector is the path for all RF signals in or out of the test set. Refer to the technical specifications for more information.

Related Topics

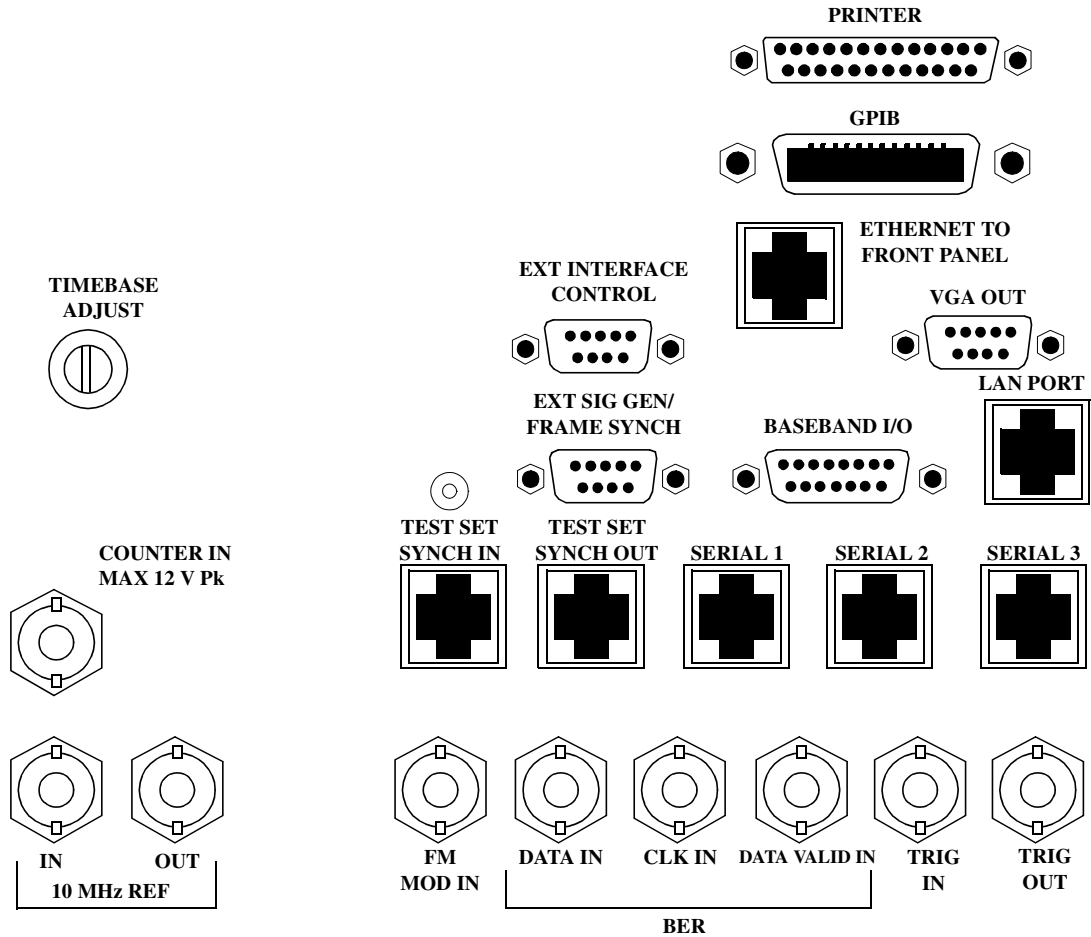
“Analog Audio Measurement Description” on page 68

“AFGenerator” on page 320

“Configuring the Test Set’s LAN” on page 821

Rear Panel Connectors

Description



BASEBAND I/O

Not functional for this release.

CLK IN

Not functional for this release.

COUNTER IN

Not functional for this release.

DATA IN

Not functional for this release.

DATA VALID IN

Not functional for this release.

ETHERNET TO FRONT PANEL

This RJ-45 connector is used with a separate LAN jumper cable to connect the front panel DATA connector to the rear panel LAN PORT.

The the DATA connector on the front panel is connected internally to the ETHERNET TO FRONT PANEL connector on the rear panel. In order to use the front panel DATA connector the user must connect the rear panel LAN PORT, to the rear panel ETHERNET TO FRONT PANEL connector with the LAN jumper cable.

The LAN jumper cable, part number E5515-61160, is supplied with the test set.

EXT INTERFACE CONTROL

Not functional for this release.

EXT SIG GEN/FRAME SYNCH

Not functional for this release.

FM MOD IN

This BNC connector let's you use an external signal to frequency modulate the test set's RF generator. It has a fixed sensitivity of 20 KHz/volt, and a frequency range of 100Hz to 20 KHz.

GPIB

The GPIB connector allows test set control with compatible devices.

LAN PORT

This RJ-45 connector provides connection for down loading firmware upgrades, or new test applications into the test set. No other types of communication are possible with the LAN port.

PRINTER

Not functional for this release.

SERIAL 1

Not functional for this release.

SERIAL 2

Not functional for this release.

SERIAL 3

Not functional for this release.

TEST SET SYNCH IN

Not functional for this release.

TEST SET SYNCH OUT

Not functional for this release.

TIMEBASE ADJUST

This is the timebase adjust cover, removing this screw allows access for timebase adjustment.

TRIG IN

Not functional for this release.

TRIG OUT

This BNC connector allows for synchronization of the test set to other equipment and is configured by setting Frame Trigger Parameters.

VGA OUT

This DB-15 connector allows the user to simultaneously route the test set's display to another monitor.

10 MHZ REF IN

This BNC connector accepts an external 10 MHz timebase signal. The nominal input impedance is 50 ohm. This version of test set can only accept a 10 MHz timebase signal.

10 MHZ REF OUT

This BNC connector provides a 10 MHz timebase signal to external test equipment. The accuracy of this signal is determined by the timebase used. The nominal output impedance is 50 ohm with a typical level of 0.5 V rms.

Related Topics

“Setting Frame Trigger Parameters” on page 758

“Timebase Description/Configuration” on page 832

“SYSTem:ROSCillator” on page 719

“Configuring the Test Set’s GPIB Address” on page 819

“Configuring the Test Set’s LAN” on page 821

Remote/Local Mode

Description

Remote Mode

When the test set is operated remotely, all of the keys on the front panel of the test set are disabled (except the LOCAL key and the power switch). During remote operation the test set is controlled by the Remote User Interface, (RUI).

Any open menus are be closed, and any manual entries are be aborted when the test set transitions from local mode to remote mode.

The remote annunciator (R) will appear in the Instrument Status Area of the test set's display indicating that the test set is in remote mode.

When the test set is in remote mode press the LOCAL key on the front panel in order to gain manual control.

Local Mode

During local mode all front panel keys and the knob are enabled. During local operation the test set is controlled by the Manual User Interface, (MUI).

The remote annunciator (R) is turned off when the test set is operated in local mode.

Related Topics

“Configuring the Test Set's GPIB Address” on page 819

9 Installation/Configuration

Display Brightness

Description

This parameter allows you to adjust the brightness of the test set's display. The test set's display screen has two brightness settings:

- medium brightness
- high brightness

Example

```
OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" ! sets screen brightness to medium.
```

Related Topics

"DISPlay:BRIGhtness" on page 444

Test Set Beeper

Description

This parameter allows you to change the beeper state to on or off. A beep will indicate error conditions caused during manual or remote operation of the test set.

A 100 ms, 1.24 kHz audible tone (beep) is generated when an error message is logged and the beeper state is set to on. If two errors are generated in quick succession, two beeps are generated to indicate that more than one error has been logged.

The beeper state can be manually set in the Instrument Setup window found in the SYSTEM CONFIG screen.

Example

```
OUTPUT 714;"SYSTEM:BEEPER:STATE OFF"
```

Related Topics

“SYSTem:BEEPer” on page 700

“Error Messages” on page 834

Display Mode (Track/Fast)

Description

There are two display modes to select from when operating the test set remotely.

- Display mode fast
- Display mode track

Fast Mode

When operating remotely, there is often no need for the display to be updated as measurements are made. Using the fast display mode will increase the speed of the test set when it is operated remotely.

Fast mode is designed for remote use only. The test set returns to track mode if you change to manual operation.

- No screen or menu items are visible (except error messages).
- Error messages will be displayed in their normal location.
- “This instrument is being operated remotely” will be displayed at the bottom of the screen.

Example

```
OUTPUT 714;"DISPLAY:MODE FAST" !Selects fast mode
```

Track Mode

The track display mode is used to allow users to see what the test set is doing while it is being controlled remotely. Track mode is the default mode of the test set.

- Any changes made remotely will be updated on the screen if that screen is displayed.
- The error message window will be displayed as required when an error occurs.

Example

```
OUTPUT 714;"DISPLAY:MODE TRACK" !Selects track mode
```

Related Topics

“DISPlay:MODE” on page 444

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

Hardware Configuration Report

GPIB Query

Use the following Basic example as a model to store the test set's configuration as an HTML file.

GPIB Example:

```
10 DIM Buf1$[20000],Buf2$[20000] ! This is the minimum space for the arrays
20 OUTPUT 714;"SYSTEM:CONFIGURE:INFORMATION:HARDWARE:VERBOSE?"
30 ENTER 714;Buf1$,Buf2$
40 CREATE "HW.htm",1 ! Create an HTML file
50 ASSIGN @File TO "HW.htm"
60 OUTPUT @File;Buf1$,Buf2$
70 END
```

In the future, the hardware configuration report may increase in length. More space would then need to be allocated for the arrays.

Display the HTML file using a web browser or HTML text editor.

Related Topics

“SYSTem:CONFigure” on page 705

“SYSTem:CURRent:TA” on page 712

“SYSTem:APPLication” on page 694

“Obtaining Identification Information *IDN?” on page 820

“Rear Panel Connectors” on page 808

Configuring the Test Set's GPIB Address

Description

The GPIB address is an integer between 0 and 30. The test set comes with a default address of 14 and may be set/queried using the SYSTem subsystem or manually through the system configuration screen by selecting the parameter and changing the number with the knob or the keypad.

The GPIB address is a non-volatile parameter. The GPIB address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

Related Topics

“SYSTem:COMMunicate:GPIB:[:SELF]:ADDRess” on page 702

Obtaining Identification Information *IDN?

Description

Test set information is returned from a *IDN? query. The *IDN? query provides information about the Manufacturer, Model Number, Serial Number, and Firmware Revision. *IDN? is defined in IEEE Std. 488.2-1992, 10.14.

Test Set Information

*IDN? query returns identification information as a comma separated string.

```
DIM A$[100]
OUTPUT 714;"*IDN?" !returns manufacturer,model number, serial number and "0"
                    !separated by commas
ENTER 714;A$
PRINT A$           !prints, for example "Agilent Technologies, 8960 Series 10 E5515B,
                    !US38020105,0"
```

- Agilent Technologies is the manufacturer.
- Printable ASCII characters excluding comma and semicolon up to a 25-character string.
Model number example: 8960 Series 10 E5515B
- Printable ASCII characters excluding comma and semicolon up to a 10-character string.
Serial number example: US00000123
- Printable ASCII characters excluding comma and semicolon up to a 20-character string.
Firmware revision example: 0

NOTE The *IDN? query will always indicate that the firmware revision is zero. SYSTEM:APPLICATION[:CURRENT]:REVISION? is the recommended way to query the firmware revision.

Related Topics

“*IDN?” on page 721

“CALibration:DATE” on page 326

“SYSTem:CURRent:TA” on page 712

“SYSTem:COMMunicate” on page 701

Configuring the Test Set's LAN

Description

LAN IP Address

The LAN address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223, and B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN address can be set/queried using the SYSTem subsystem.

The LAN address is a non-volatile parameter. The LAN address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

NOTE If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

For convenience the DATA port on the front panel may be configured as a LAN port. When a RJ45 jumper cable, (part number E5515-61160) is connected from the LAN PORT on the rear panel, to the ETHERNET TO FRONT PANEL port also on the rear panel, the user has LAN access from the front panel of the test set. Without the RJ45 jumper cable, the test set connection to a LAN is the rear-panel, LAN PORT connector.

LAN Default Gateway

The LAN router, (default gateway), is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223, and B, C, and D are between 0 and 255, no embedded spaces are allowed. If the default gateway is set to a format not allowed with the LAN address or the subnet mask that have been selected, the default gateway will be set to a null string, indicated by a blank field on the test set display. The address may be manually set/viewed in the system configuration screen. The LAN default gateway can be set/queried using the SYSTem subsystem.

The LAN default gateway is the address of a router that routes messages between networks and or subnets. If this value is not specified, LAN communications will be limited to the network and subnet specified by the LAN IP address and the subnet mask. Your network administrator will know if a default gateway is needed and if so, the address of the router. If the default gateway address is not needed by your network, it may be disabled by entering any of the following values: "0" (zero), "" (null string), "0.0.0.0"

The LAN default gateway is a non-volatile parameter. The LAN default gateway is not affected by any reset operation and can only be changed by direct access to the parameter itself.

LAN Subnet Mask

The LAN subnet mask address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A, B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN subnet mask address can be set/queried using the SYSTem subsystem.

The subnet mask number combined with the IP address identifies which network and subnet your computer is on. Contact your system administrator for the correct subnet mask for your network.

The subnet mask determines the boundaries between the subnet ID and the host ID.

Configuring the Test Set's LAN

The LAN subnet mask is a non-volatile parameter. The LAN subnet mask is not affected by any reset operation and can only be changed by direct access to the parameter itself.

NOTE If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

The subnet mask number is obtained from your network administrator.

Related Topics

“SYSTem:COMMunicate:LAN[:SELF]:ADDRes” on page 703

“SYSTem:COMMunicate:LAN[:SELF]:DGATeway” on page 703

“SYSTem:COMMunicate:LAN[:SELF]:SMASK” on page 704

Measurement Related 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.

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 closest 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
```

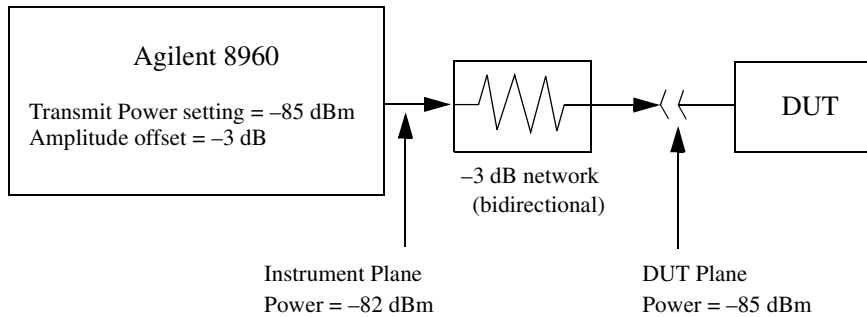
RF IN/OUT Amplitude Offset

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 be see -85 dBm.

Figure 17. Amplitude Offset Transmitter Example

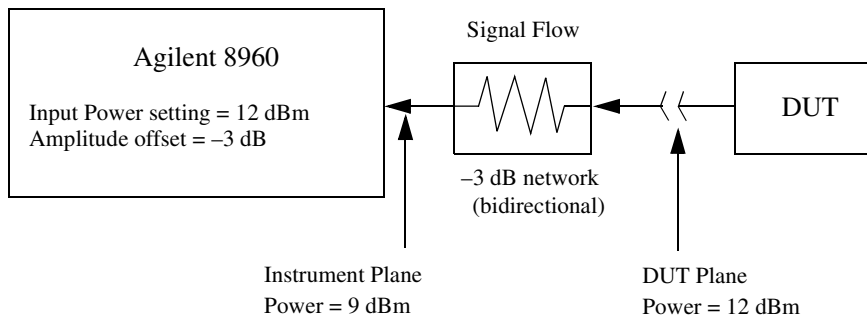


The transmit power setting reflects the power at the DUT plane.

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 18. Amplitude Offset Receiver Example



The input power setting reflects the power at the DUT plane.

Related Topics

“SYSTem:CORRection” on page 706

Test Application Name

Description

The following queries give you details about the test application name. To query or switch test applications you must use the test application name as it appears in the catalog (without regard to case).

- To query the name of the all test applications installed in the test set use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"
```

- To query the name of the selected test application (running or not) use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME?"
```

- To query the name of the currently running test application use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:NAME?"
```

- To query the number of test applications installed in the test set use this GPIB query.

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"
```

The test application names can also be displayed in the Test Application Setup menu on the test set's display.

Related Topics

“SYSTem:APPLication” on page 694

“Test Application Switching” on page 830

Test Application Revisions and Licenses

Description

Different revisions of the test applications in your test set provide different capabilities. The selected test application revision is loaded after the next test application switch or power cycle of the test set. Once you select a revision, the revision does not change unless you select another revision.

You can query the selected revision, all available revisions, and the total count of available revisions for a selected test application. These queries are helpful when selecting revisions but are not usually necessary when switching test applications.

NOTE The Agilent E1960A GSM mobile test application revisions prior to A.04.00 do not support test application switching. If you select a revision prior to A.04.00, you will not have a path to switch back to later revisions.

If you accidentally switch to a non-supported revision, use the firmware upgrade process to load firmware with the correct revision.

Test Application Revision Queries and Commands

These are commands to query revision information or select a revision.

- To query a **selected** test application revision (running or not) use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? 'AMPS/136 MOBILE TEST' "
```
- To query the revision of the test application **currently running** use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CURRENT:REVISION?"
```
- To query **all** of the revisions available for a test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'AMPS/136 MOBILE TEST' "
```
- To **select** a revision of a test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM mobile test','A.04.01' "
```
- To query the number of revisions for a specified test application:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? 'GSM MOBILE TEST' "
```


Test Application License Status Query

The test application license status can be queried for a particular test application and revision using the following GPIB query:

```
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.01'"
```

This query returns one of the following:

- “LIC” - This revision of test application appears to have a LICense. The test application may have been developed before licensing and therefore needs no license.
- “NLIC” - This test application does not appear to have a license. Selecting a Not LICensed revision will result in an error +130.
- “PART” - Some PART of the test application does not appear to have a license.
- “UNKN” - This test application has UNKNown license status.

NOTE If you switch to a not licensed revision the test set will reboot to the SYSTEM CONFIG screen. You will be unable to select any other screen or make any measurements. Query or view the Test Application Setup menu to determine the licensed versions of test applications available.

Revision and license information can be viewed and selected from the SYSTEM CONFIG screen, by selecting the Test Application Setup menu. Revisions are shown with their license status. After the revision number is a letter. That letter indicates the revision license status; Licensed “L”, Not Licensed “N”, or Unknown “U”.

- “L”- This revision of test application appears to have a License. The test application may have been developed before licensing and therefore needs no license.
- “N” - This test application does not appear to have a license. Selecting a Not licensed revision will result in an error +130.
- “P” - Some Part of the test application does not appear to have a license.
- “U” - This test application has Unknown license status.

Related Topics

“Test Application Switching” on page 830

“SYSTem:APPLication” on page 694

Test Application Switching

Description

Different radio formats (such as GSM, AMPS, CDMA 2000 or TIA/EIA 136) can be tested when the optional test applications are purchased from Agilent Technologies. The test set allows you to select a different test application and switch to it, a reboot makes the test application functional. The reboot will happen automatically when the you tell the test set to switch test applications. Switching to another test application takes about one minute.

Some radio formats are combined as fast switching test applications. Switching formats in a fast switching test application takes less than 2 seconds.

Test Application Switching GPIB Command

In order to switch to another test application use this GPIB command:

```
OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME `GSM MOBILE TEST`"
```

Sending this command causes the test set to reboot.

Test Application Revision and Licensing

Each test application must have a valid license and revision to function. Licensed revisions of test applications are available from Agilent Technologies.

It may take several seconds before revision, model, and name information is returned.

Test Application Switching Programming Example

This program example shows you how to switch to the GSM test application.

1. Query the list of test application names to get exact spelling of the GSM test application. This is not necessary if you already know the exact name.
2. Query the test set to get a list of all revisions for "GSM Mobile Test." This is not necessary if you are not changing revisions.
3. Select a revision of "GSM Mobile Test." This is required if you are changing revisions.
4. Select the GSM test application. This will switch test applications and cause the test set to reboot.

```
10  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"
20  !Queries all of the test application names
30  ENTER 714;N$
40  PRINT "The CATALOG names that are loaded are ";N$
50  OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? `GSM MOBILE TEST`"
60  !Queries all revisions of GSM MOBILE TEST
70  ENTER 714;Cat_rev$
80  PRINT "The revisions for the GSM Mobile Test Application are ";Cat_rev$
90  OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION `GSM MOBILE TEST`,`A.04.01`"
100 !Selects a revision
110 OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME `GSM MOBILE TEST`"
```

```
120  !Switches the test application to GSM MOBILE TEST
130  END
```

Related Topics

“Test Application Revisions and Licenses” on page 828

“SYSTEM:APPLICATION” on page 694

“SYSTEM:CURRENT:TA” on page 712

“Test Application Name” on page 827

Timebase Description/Configuration

Description

The time base source is selected by the test set, either an internal time base or an external source (if a suitable signal is detected) is used as the reference oscillator. If a 10 MHz +/- 100 ppm signal, that has an input level from 0 to +13 dBm is connected to the 10 MHz REF IN connector on the rear panel, the test set will automatically select the external timebase.

You can read the status window at the bottom of the test set display for the EXT REF indicator, or query the test set to verify if it is using an external time base or an internal time base. You may also query the test set to verify if the time base is locked. The reference oscillator functionality is controlled through the SYSTEM subsystem.

Example:

```
OUTPUT 714;"SYSTEM:ROSCILLATOR[:TIMEBASE]?" !returns INT or EXT
                                                !(internal or external) timebase.
OUTPUT 714;"SYSTEM:ROSCILLATOR:LOCKED?" !returns 1 or 0 (locked or unlocked)
                                                !condition for timebase
```

Related Topics

“SYSTem:ROSCillator” on page 719

“Rear Panel Connectors” on page 808

10 Error Messages

Error Messages

Error Message Descriptions

“Fixed Timer Messages” on page 837

“Manual User Error Messages” on page 840

“-400 to -499 Query Errors” on page 851

“-300 to -399 SCPI Specified Device-Specific Errors” on page 849

“-200 to -299 Execution Errors” on page 846

“-100 to -199 Command Errors” on page 842

“+100 to +199 Core Device-Specific Error” on page 852

“+200 to +299 Call Processing Device-Specific Error” on page 855

“+300 to +399 Link Control Device-Specific Error” on page 858

“+400 to +499 Core Hardware Device-Specific Error” on page 859

“+500 to +599 Test Application Hardware Device-Specific Error” on page 862

“+600 to +699 Instrument Device-Specific Error” on page 863

“+700 to +799 Test Application Measurement Device-Specific Error” on page 864

“+800 to +899 Core Measurement Device-Specific Error” on page 865

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.

Error Messages

Maskable Message Display State The Maskable Messages Display State found in the Instrument Setup menu gives users a way to block these messages and the associated beep from ever happening. When the state is Off these messages and their associated beep will be blocked. The Maskable Message Display State can be set manually or with the following GPIB command:

```
OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.
```

Instrument Maskable Messages

- Instrument warning: Audio Generator instrument has been closed.
- Instrument warning: Audio Analyzer instrument has been closed.
- Instrument warning: Analog Audio instrument has been closed.

GSM Mobile Test Maskable Messages

- GSM measurement warning; TX Power measurement has been closed.
- GSM measurement warning; Power vs Time measurement has been closed.
- GSM measurement warning; Phase Frequency Error measurement has been closed.
- GSM measurement warning; Output RF Spectrum measurement has been closed.
- GSM measurement warning; Fast Bit Error measurement has been closed.
- GSM measurement warning; Decoded Audio measurement has been closed.
- GSM measurement warning; IQ Tuning measurement has been closed.

Related Topics

“SYSTem:COMMunicate:GPIB:DEBUg[:STATe]” on page 702

“Test Set Beeper” on page 815

“SYSTem:ERRor?” on page 713

“DISPlay:WINDow:ERRor:CLEar”

“DISPlay:MESSage:MASKable:STATe” on page 444

“Integrity Indicator” on page 183

“FETCh? Subsystem” on page 446

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 multiframe. 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 HANDOVER COMMAND message until receiving HANDOVER COMPLETE or HANDOVER FAILURE or the MS re-establishes the call before the old channels are released. If the timer expires and the network has not received a correctly decoded L2 (format A or B) or TCH frame, then the newly allocated channels are released.	2 seconds
T3105 Physical information repetition timer	Time the network waits after sending the PHYSICAL INFORMATION message until receiving a correctly decoded L2 (format A or B) or TCH frame. This occur before re-transmitting the PHYSICAL INFORMATION message or releasing the newly allocated channels.	50 ms
T3107 Channel assignment timer	Time the network waits after transmitting an ASSIGNMENT COMMAND message until receiving the ASSESSMENT FAILURE message or the MS re-establishes the call before releasing the old and the new channels.	3 seconds
T3109 Signalling disconnection timer	Time the network waits after sending the CHANNEL RELEASE message before disconnecting the signalling link.	5 seconds
T3111 Channel deactivation after disconnection timer	Time the network waits after disconnecting the signalling link before deactivating the channel.	500 ms

Timer Name	Description	Value
T3113 Paging timer	Time the network waits after transmitting the PAGING REQUEST message until receiving the PAGING RESPONSE message. This occurs before re-transmitting the PAGING REQUEST (if the maximum number of re-transmissions have not been exceeded).	5 seconds
T3212 Location update timer	The location update timer is set to zero, periodic location update by the MS are disabled. If the MS camps to the BCH and decodes a new MCC or MNC from the one it last camped on, it should perform a location update.	zero = infinite time
T3250 TMSI reallocation timer	Time the network waits after sending the TMSI REALLOCATION COMMAND until receiving TMSI REALLOCATION COMPLETE. This occurs before aborting the procedure and releasing the Radio Resource connection.	5 seconds
T3260 Authentication response timer	Time the network waits after an AUTHENTICATION REQUEST until receiving AUTHENTICATION RESPONSE. This occurs before aborting the procedure and releasing the Radio Resource connection.	5 seconds

Manual User Error Messages

Description

These messages are intended to be displayed on the manual user interface only, and are not entered into the Error/Event Queue.

Error Message	Description
The function you requested is not yet available.	The test set does not have this capability.
IQ Calibration completed successfully for modulator <N>	<N> is the IQ modulator number that you are attempting to calibrate, <N> is 1 or 2.
IQ Calibration failed for modulator <N>	<N> is the IQ modulator number that you are attempting to calibrate, <N> is 1 or 2.
The function you requested is not available in this TA.	This function is used in another Test Application.
IQ Calibration for modulator 1 in progress (10 minutes). Call processing disabled.	This error is cleared by either the; IQ Calibration completed successfully for modulator <N>, or IQ Calibration failed for modulator <N>.
IQ Calibration for modulator 2 in progress (6 minutes). Call processing disabled.	This error is cleared by either the; IQ Calibration completed successfully for modulator <N>, or IQ Calibration failed for modulator <N>.
Instrument warning: Audio generator instrument has been closed.	The audio generator instrument was closed automatically by the test set.
Measurement warning: Audio Analyzer instrument has been closed.	The audio analyzer instrument was closed automatically by the test set.
Measurement warning: Analog audio measurement has been closed.	Analog audio measurements have been closed by the test set.
Protocol warning: Setting change has terminated the link with the DUT	Some setting change has caused the call to disconnect.
Warning; Call processing disabled	The call processing functions are not active because the test set is performing calibration operations.
IQ first modulator calibration X%	IQ modulator calibration in progress, X represents the percent complete.
IQ second modulator calibration X%	IQ modulator calibration in progress, X represents the percent complete.

GSM and GPRS Mobile Test Manual User Messages

These messages are maskable so that they can be blocked from appearing on the display. See “Error Messages” on page 834.

Table 10.

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 that twelve characters, see IEEE 488.2, 7.6.1.4.1.

Error Message	Description
-113 Undefined header	Indicates the header is syntactically correct, but it is undefined for this specific device. For example, *XYZ is not defined for any device.
-114 Header suffix out of range	Indicates the value of a header suffix attached to a program mnemonic makes the header invalid.
-120 Numeric data error	This error, as well as errors -121 through -129, are generated when parsing a data element which appears to be numeric, including non-decimal numeric types. This particular error is used if the device cannot detect a more specific error.
-121 Invalid character in number	Indicates an invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a “9” in octal data.
-123 Exponent too large	Indicates the magnitude of an exponent was greater than 32000, see IEEE 488.2, 7.7.2.4.1.
-124 Too many digits	Indicates the mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros, see IEEE 488.2, 7.7.2.4.1.
-128 Numeric data not allowed	Indicates that a legal numeric data element was received, but the device does not accept one in this position for the header.
-130 Suffix error	This error, as well as errors -131 through -139, are generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error.
-131 Invalid suffix	Indicates the suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.
-134 Suffix too long	Indicates the suffix contain more than 12 characters, see IEEE 488.2, 7.7.3.4.
-138 Suffix not allowed	Indicates that a suffix was encountered after a numeric element that does not allow suffixes.
-140 Character data error	This error, as well as errors -141 through -149, are generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error.
-141 Invalid character data	Indicates that the character data element contains an invalid character or the particular element received is not valid for the header.
-144 Character data too long	Indicates the character data element contains more than twelve characters, see IEEE 488.2, 7.7.1.4.

-100 to -199 Command Errors

Error Message	Description
-148 Character not allowed	Indicates a legal character data element was encountered where prohibited by the device.
-150 String data error	This error, as well as errors -151 through -159, are generated when parsing a string data element. This particular error message is used if the device cannot detect a more specific error.
-151 Invalid string data	Indicates that a string data element was expected, but was invalid, see IEEE 488.2, 7.7.5.2. For example, an END message was received before the terminal quote character.
-158 String data not allowed	Indicates that a string data element was encountered but was not allowed by the device at this point in parsing.
-160 Block data error	This error, as well as errors -161 through -169, are generated when parsing a block data element. This particular error message is used if the device cannot detect a more specific error.
-161 Invalid block data	Indicates a block data element was expected, but was invalid, see IEEE 488.2, 7.7.6.2. For example, an END message was received before the end length was satisfied.
-168 Block data not allowed	Indicates a legal block data element was encountered, but not allowed by the device at this point in parsing.
-170 Expression error	This error, as well as errors -171 through -179, are generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error.
-171 Invalid expression	Indicates the expression data element was invalid, see IEEE 488.2, 7.7.7.2. For example, unmatched parentheses or an illegal character.
-178 Expression data not allowed	Indicates a legal expression data was encountered, but was not allowed by the device at this point in parsing.
-180 Macro error	This error, as well as error -181 through -189, are generated when defining a macro or execution a macro. This particular error message is used if the device cannot detect a more specific error.
-181 Invalid output macro definition	Indicates that a macro parameter place holder was encountered outside of a macro definition.
-183 Invalid inside macro definition	Indicates that the program message unit sequence, sent with a *DDT or a *DMC command, is syntactically invalid, see IEEE 488.2, 10.7.6.3.

Error Message	Description
-184 Macro parameter error	Indicates that a command inside the macro definition had the wrong number or type of parameters.

Related Topics

“Standard Event Status Register” on page 690

-200 to -299 Execution Errors

Description

These errors are generated when something occurs that is incorrect in the current state of the instrument. These errors may be generated by a user action from either the remote or the manual user interface.

Error Message	Description
-200 Execution error	This event bit (Bit 4) indicates a PROGRAM DATA element following a header was outside the legal input range or otherwise inconsistent with the device's capabilities, see IEEE 488.2, 11.5.1.1.5.
-203 Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-220 Parameter error	Indicates that a program data element related error occurred.
-221 Setting conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state.
-222 Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range defined by the devices
-223 Too much data	Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.
-224 Illegal parameter value	Indicates that the value selected was not part of the list of values given.
-225 Out of memory	The device has insufficient memory to perform the requested operation.
-226 Lists not the same length	Attempted to use LIST structure having individual LIST's of unequal lengths.
-230 Data corrupt or stale	Indicates invalid data, a new reading started but not completed since the last access.
-231 Data questionable	Indicates that measurement accuracy is suspect.

Error Message	Description
-233 Invalid version	Indicates that a legal program data element was parsed but could not be executed because the version of the data is incorrect to the device. For example, a not supported file version, a not supported instrument version.
-240 Hardware error	Indicates that a legal program command or query could not be executed because of a hardware problem in the device.
-241 Hardware missing	Indicates that a legal program command or query could not be executed because of missing device hardware. For example, an option was not installed.
-250 Mass storage error	Indicates that a mass storage error occurred. The device cannot detect the more specific errors described for errors -251 through -259.
-251 Missing mass storage	Indicates that a legal program command or query could not be executed because of missing mass storage.
-252 Missing media	Indicates that a legal program command or query could not be executed because of missing media. For example, no disk.
-253 Corrupt media	Indicates that a legal program command or query could not be executed because of corrupt media. For example, bad disk or wrong format.
-254 Media full	Indicates that a legal program command or query could not be executed because the media is full. For example, there is no room left on the disk.
-255 Directory full	Indicates that a legal program command or query could not be executed because the media directory was full.
-256 File name not found	Indicates that a legal program command or query could not be executed because the file name was not found on the media.
-257 File name error	Indicates that a legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to read or copy a nonexistent file.
-258 Media protected	Indicates that a legal program command or query could not be executed because the media was protected. For example, the write-protect switch on a memory card was set.
-270 Macro error	Indicates that a macro related execution error occurred.

-200 to -299 Execution Errors

Error Message	Description
-271 Macro syntax error	Indicates that a syntactically legal macro program data sequence, according to IEEE 488.2, 10.7.2, could not be executed due to a syntax error within the macro definition.
-272 Macro execution error	Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition, see IEEE 488.2, 10.7.6.3.
-273 Illegal macro label	Indicates that the macro label was not accepted, it did not agree with the definition in IEEE 488.2, 10.7.3
-274 Macro parameter error	Indicates that the macro definition improperly used a macro parameter placeholder, see IEEE 488.2, 10.7.3.
-275 Macro definition too long	Indicates that a syntactically legal macro program data sequence could not be executed because the string of block contents were too long for the device to handle, IEEE 488.2, 10.7.6.1.
-276 Macro recursion error	Indicates that a syntactically legal macro program data sequence could not be executed because it would be recursive, see IEEE 488.2, 10.7.6.6.
-277 Macro redefinition not allowed	Indicates that redefining an existing macro label, see IEEE 488.2, 10.7.6.4.
-278 Macro header not found	Indicates that a legal macro label in the *GMS?, see IEEE 488.2, 10.13, could not be executed because the header was not previously defined.

-300 to -399 SCPI Specified Device-Specific Errors

Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. When one of these errors is generated, the device specific error bit in the event status register is set.

Error Message	Description
-300 Device specific error	This event bit (Bit 3) indicates that a device operation did not properly complete due to some condition, such as overrange see IEEE 488.2, 11.5.1.1.6.
-311 Memory error	Indicates some physical fault in the devices memory, such as a parity error.
-312 PUD memory lost	Indicates protected user data saved by the *PUD command has been lost, see IEEE 488.2, 10.27.
-313 Calibration memory lost	Indicates that nonvolatile calibration data used by the *CAL? command has been lost, see IEEE 488.2, 10.2.
-314 Save/recall memory lost	Indicates that the nonvolatile data saved by the *SAV command has been lost, see IEEE 488.2, 10.33.
-315 Configuration memory lost	Indicates that nonvolatile configuration data saved by the device has been lost.
-320 Storage fault	Indicates that the firmware detected a fault when using data storage. This is not an indication of physical damage or failure of any mass storage element.
-321 Out of memory	An internal operation needed more memory than was available
-330 Self test failed	Indicates a problem with the device that is not covered by a specific error message. The device may require service.
-340 Calibration failed	Indicates a problem during calibration of the device that is not covered by a specific error.
-350 Queue overflow	Indicates that there is no room in the queue and an error occurred but was not recorded. This code is entered into the queue in lieu of the code that caused the error.
-360 Communication error	This is the generic communication error for devices that cannot detect the more specific errors described for error -361 through -363.

-300 to -399 SCPI Specified Device-Specific Errors

Error Message	Description
-361 Parity error in program message	Parity bit not correct when data received for example, on a serial port.
-362 Framing error in program message	A stop bit was not detected when data was received for example, on a serial port (for example, a baud rate mismatch).
-363 Input buffer overrun	Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing.

Related Topics

“Standard Event Status Register” on page 690

-400 to -499 Query Errors

Description

A Query error is generated either when data in the instrument's GPIB output queue has been lost, or when an attempt is being made to read data from the output queue when no output is present or pending.

Error Message	Description
-400 Query error	This event bit (Bit 2) indicates that an attempt to read data from the Output Queues when no output is present or pending, to data in the Output Queue has been lost see IEEE488.2, 11.5.1.1.7.
-410 Query INTERRUPTED	Indicates the test set has been interrupted by a new program message before it finishes sending a RESPONSE MESSAGE see IEEE 488.2, 6.3.2.3.
-420 Query UNTERMINATED	Indicates an incomplete Query in the program see IEEE 488.2, 6.3.2.2.
-430 Query DEADLOCKED	Indicates that the Input Buffer and Output Queue are full see IEEE 488.2, 6.3.1.7.
-440 Query UNTERMINATED after indefinite response	Indicates that a query was received in the same program message after a query requesting an indefinite response was executed see IEEE 488.2, 6.5.7.5.

+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><message1> will appear as:</p> <p>If the DSP generated the assert:</p> <p style="padding-left: 40px;">;P:DSP T:<task ID> E:<error code> C:<error classif.> F1:<flag 1> F2:<flag 2></p> <p>If the Protocol processor generated the assert:</p> <p style="padding-left: 40px;">;P:Protocol T:<task ID> L:<line number> F:<file name></p> <p>If the Host processor generated the assert:</p> <p style="padding-left: 40px;">;P:Host T:<task ID> L:<line number> F:<file name></p>
+102 Exception; Cycle power. Exception message<message2>	<p><message2> will appear as: T:<task ID> or V:<vector number> or PC:<program counter> or DA:<data adrs reg value>.</p> <p>Vector number, program counter and data address register values are hexadecimal format.</p>
+103 Failure; No measurements or settings can be made	Indicates none of the VI's are operational because a serious problem exists.
+104 Failure; No settling operations will take place	Indicates none of the VI's are operational because a serious problem exists.
+105 Failure; No measurements or setting can be made for the function selected	Indicates none of the VI's are operational because a serious problem exists.
+110 Input pacing; Internal communication queue overflow likely	Indicates that GPIB commands are too fast for the device input queue and should be slowed.
+111 Input pacing; Internal communication queue overflow imminent. Pacing increased	Indicates that GPIB commands were too fast and the device input queue has not kept pace.
+112 Internal error; Protocol error <message3>	<message3> is an eight digit hexadecimal number that is the error code reported by protocol.

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”, “RfHwAccessVI”.
+115 Internal error; <VI NAME> inactive	Indicates that a VI has been made inactive. <VI NAME> includes : “IntVmVI”, “GSMFixedVI”, “MiscVI”, “GSMSacchMriVI”, “IQSelfCalVI1”, “IQSelfCalVI2”, “TA RevisionVI”.
+120 Warning; Receiver over range due to requested settings	Indicates the total received power (a combination of received power and amplitude offset) is above the range of the test set.
+121 Warning; Receiver under range due to requested settings	Indicates the total received power (a combination of received power and amplitude offset) is below the range of the test set.
+122 Warning; Reference out of lock	Indicates the test set’s internal reference is out of lock.
+123 Warning; Duplicate RF IN/OUT Amplitude Offset Frequency entry. First frequency entry in RF IN/OUT Amplitude Offset table will be used.	Indicates that an amplitude offset value for that frequency has already been entered. The test set will use the amplitude offset value entered first.
+124 Warning; Source over range due to requested settings	The setting selected for total transmit power (a combination of cell power, awgn power, amplitude offset) is above the test set’s range.
+125 Warning; Source under range due to requested settings	The setting selected for total transmit power (a combination of cell power, awgn power, amplitude offset) is below the test set’s range.
+130 Configuration error; Unable to switch to indicated Test Application	The test application selected is not available for this test set.
+131 Configuration error; Current Test Application is not licensed (License = N). Select another Test Application	The test application selected is not licensed. Select another revision or test application that is licensed (License = L).
+132 Configuration error; Selected Test Application Format is not available.	Indicates that the fast switching operation will not activate a particular radio format. Check the revision number of the test application associated with the radio format, does the revision correspond with what the fast switching test application needs?

+100 to +199 Core Device-Specific Error

Error Message	Description
+133 Configuration error; Selected Test Application Format is not licensed, (License = N).	The radio format selected is not licensed. Select another revision or obtain a licensed revision of the test application test application that is licensed (License = L).
+134 Configuration error; Unable to switch to selected Test Application Format	The Test Application Format name used is correct but for some reason the test set can not switch to that format.
+150 Calibration operation; Recalibrating due to present temperature	Indicates that the test set is recalibrating due to hardware inaccuracies based on temperature changes. Any measurements that are running will be temporarily aborted and then restarted after the recalibration is complete.

+200 to +299 Call Processing Device-Specific Error

These errors are generated when a problem occurs maintaining the link between the test set and the DUT. These errors generally occur as a result of a problem on the link such as if the DUT did not respond to a message, or the user attempted to perform an invalid operation in the current instrument state.

Errors with a description beginning with “GSM call disconnected” mean that the call is dropped when the error occurs. Errors beginning with “GSM protocol failure” mean that the call is not necessarily dropped, these are informational messages.

Error Message	Description
+201 GSM call disconnected; Radio link failure (Timer T100 expiry)	“Fixed Timer Messages” on page 837
+202 GSM call disconnected; Immediate assignment failure (Timer T3101 expiry)	“Fixed Timer Messages” on page 837
+203 GSM call disconnected; Handover failure (Timer T3103 expiry)	“Fixed Timer Messages” on page 837
+204 GSM call disconnected; Channel assignment failure (Timer T3107 expiry)	“Fixed Timer Messages” on page 837
+205 GSM call disconnected; No response to page (Timer T3113 expiry)	“Fixed Timer Messages” on page 837
+206 GSM call disconnected; No answer (Timer T301 expiry)	“Fixed Timer Messages” on page 837
+207 GSM call disconnected; No response to setup (Timer T303 expiry)	“Fixed Timer Messages” on page 837
+210 GSM call disconnected; No response to release 2 times (Timer T308 expiry)	“Fixed Timer Messages” on page 837
+211 GSM call disconnected; No alert from mobile (Timer T310 expiry)	“Fixed Timer Messages” on page 837
+212 GSM call disconnected; No response to connect (Timer T313 expiry)	“Fixed Timer Messages” on page 837
+213 GSM call disconnected; Data link failure (Timer T200 expiry)	“Fixed Timer Messages” on page 837
+214 GSM call disconnected; Physical information repetition failed (Timer T3105 expiry)	“Fixed Timer Messages” on page 837
+217 GSM call disconnected; TMSI (Temporary Mobile Subscriber Identity) reallocation failed (Timer T3250 expiry)	“Fixed Timer Messages” on page 837
+218 GSM call disconnected; Authentication failed (Timer T3260 expiry)	“Fixed Timer Messages” on page 837

+200 to +299 Call Processing Device-Specific Error

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)	“Fixed Timer Messages” on page 837
+251 GSM protocol failure; No response to release (Timer T308 expiry)	“Fixed Timer Messages” on page 837
+252 GSM protocol failure; Channel release failed (Timer T3109 expiry)	“Fixed Timer Messages” on page 837
+253 GSM protocol failure; (Timer T3270 expiry)	“Fixed Timer Messages” on page 837
+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 “CALL:MS:REPorted:IMEI?” on page 369.
+256 GSM protocol failure; Channel assignment exceeded specified number of frames	Indicates that the max frames allowed for assignment parameter should be increased.

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).
+258 GSM protocol failure; Out-of-range for timing advance	Indicates that there is a likely issue with the mobile's protocol board which is causing its timing advance to be out of the expected range.
+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 690 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	

+400 to +499 Core Hardware Device-Specific Error

Error Message	Description
+414 Hardware failure; Fixed external reference output is not responding	
+415 Hardware failure; Instrument reference is not responding	
+416 Hardware failure; Bit clock A is not responding	
+417 Hardware failure; RF source 2 frequency hardware is not responding	
+418 Hardware failure; RF source 2 digital modulation hardware is not responding	
+419 Hardware failure; RF source 2 level hardware is not responding	
+420 Hardware failure; RF source hopping hardware is not responding	
+421 Hardware failure; Digital demod hopping hardware is not responding	
+422 Hardware failure; Misc VI hardware is not responding	
+423 Hardware failure; Unable to access networking information	
+424 Hardware failure; Bit clock B is not responding	
+425 Hardware failure; Invalid EEPROM checksum <EEPROM board ID>	See the list of EEPROM board ID names below.
+426 Hardware failure; Unable to write to EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+427 Hardware failure; Unable to read from EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+428 Hardware failure; Board not identified <board ID>	See the list of board ID names below.
+429 Hardware failure; Could not create board identification <board ID>	See the list of board ID names below.
+430 Hardware failure; Control version not compatible with FW <board ID>	See the list of board ID names below.
+431 Hardware failure; RF IO DAC cannot be calibrated due to present temperature	
+432 Hardware failure; RF hardware is not responding	
+433 Hardware failure; RF source FM hardware is not responding	
+434 Hardware failure; Audio source FM hardware is not responding	

Error Message	Description
+460 Hardware failure; Hardware doesn't support requested operation	This error occurs when a setting is attempted that is not possible with the test set's hardware. The current firmware needs new hardware in order to work.

<board ID> names

3 GHZ ATTENUATOR 1 | ;3GHZ ATTENUATOR 2 | ;AUDIO BD | ;ROM BASEBAND GENERATOR 1 | ;ROM BASEBAND GENERATOR 2 | ;DEMODO DOWNCONVERTER | ;VECTOR OUTPUT BOARD 1 | ;VECTOR OUTPUT BOARD 2 | ;IVF MEASUREMENT | ;MEASUREMENT DOWCONVERTER | ;RF POWER DETECTORS | ;REFERENCE MODULE | ;SYNTH DOUBLER 1 | ;SYNTH DOUBLER 2 | ;TIMING REF | ;MOMENTUM INSTRUMENT | ;RF MOTHER BOARD | ;JUMPER BOARD | ;DIGITAL MOTHER BOARD | ;FLAT PANEL ADAPTER | ;REAR PANEL BOARD

<EEPROM board ID> names

Instrument Eeprom ID State | ;Atten 1 Eeprom ID State | ;Atten 2 Eeprom ID State | ;Audio Eeprom ID State | ;BaseBandGen 1 Eeprom ID State | ;BaseBandGen 2 Eeprom ID State | ;Demod DC Eeprom ID State | ;Digital Mother Board Eeprom ID State | ;IQ Output 1 Eeprom ID State | ;IQ Output 2 Eeprom ID State | ;IVF Meas Eeprom ID State | ;Jumper Board Eeprom ID State | ;Meas DC Eeprom ID State | ;RF Mother Board Eeprom ID State | ;RF Interface Eeprom ID State | ;Ref Mod Eeprom ID State | ;Sig Gen 1 Eeprom ID State | ;Sig Gen 2 Eeprom ID State | ;Time Ref Eeprom ID State | ;Display Interface Eeprom ID State | ;Rear Panel Eeprom ID State

Related Topics

“Standard Event Status Register” on page 690

+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 11. Test Application Hardware Device Specific Errors

Error Message
+500 to +599 No errors currently defined

Related Topics

“Standard Event Status Register” on page 690

+600 to +699 Instrument Device-Specific Error

Description

These errors are generated when a problem occurs that is specific to one of the test set's instruments. These errors are part of the test set's core. Note that these measurements may not be present in every test application and therefore, these errors may not be present in every test application. There is no plan at present to support test application specific instruments.

An instrument in this context refers to the measurement-like functionality such as the audio generator and not to the test set as a whole.

When one of these errors is generated, the '+600 errors' bit in the questionable error status register is set.

Error Message	Description
+601 Instrument failure; Audio generator hardware is not responding	Indicates a problem occurs when attempting to control the test set's audio generator.

Related Topics

“Standard Event Status Register” on page 690

+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 690 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 690

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

“Error Messages” on page 834

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.07 Release February 2001” on page 867
- “A.06 Release February 2001” on page 869
- “A.05 Release May 2000” on page 869
- “A.04 Release - March 2000” on page 870
- “A.03 Release - December 1999” on page 871
- “A.02 Release - July 1999” on page 872
- “A.01 Release - March 1999” on page 873
- “A.00 Initial Release - January 1999” on page 873

A.07 Release February 2001

Call Processing

No new features in this release.

Measurements

No new measurements in this release.

Other

This release gives you the first revision of GSM which can be used for the E1985A GSM_AMPS/136 fast switching test application. To allow the GSM test application to operate in the fast switching environment with AMPS/136 two existing GSM commands had to be changed. These commands were:

- `SETUP:IQTUNING:REFERENCE:FREQUENCY`
- `CALL:MS:REPORTED:REVISION?`

If you previously used either of these commands you must change them to the new commands to allow your code to run.

Table 12. Command Changes in the A.07 Release

Previous Commands	New Commands
SETUP:IQTUNING:REFERENCE:FREQUENCY	<p>“SETup:IQTuning:REfERENCE[:MANual][:FREQUency]:CHARacter:GSM” on page 610. This command allows you to use the same settings as with the previous command, that is NEG67KHZ, ZEROKHZ, POS67KHZ, and AUTO. You can use this command for the GSM I/Q Tuning measurement whether or not the GSM test application is the currently active format.</p> <p>Alternatively you can use the following commands which are consistent with the format of the commands and settings in AMPS/136:</p> <p>“SETup:IQTuning:REfERENCE[:MANual][:FREQUency]:GSM” on page 609. This command allows you to use the settings -67000, 0, and + 67000. You can use this command for the GSM I/Q Tuning measurement whether or not the GSM test application is the currently active format.</p> <p>“SETup:IQTuning:REfERENCE[:MANual][:FREQUency][:SElected]” on page 609. This command allows you to use the settings -67000, 0, and + 67000. You can only use this command for the GSM I/Q Tuning measurement if GSM is the currently active format.</p> <p>“SETup:IQTuning:REfERENCE:AUTO” on page 608.</p>
CALL:MS:REPORTED:REVISION?	<p>“CALL:MS:REPorted:REVIsion:CHARacter:GSM?” on page 373. This command returns the same values as with the previous command, that is, UNKNown, PHASe1, and PHASe2. You can use this command for the mobile’s revision whether or not the GSM test application is the currently active format.</p> <p>Alternatively you can use the following commands which are consistent with the format of the command and setting in AMPS/136:</p> <p>“CALL:MS:REPorted:REVIsion[:DIGital]:GSM?” on page 374. This command returns the values; +1.00000000E+000 for phase 1, +2.00000000E+000 for phase 2, and NAN for unknown. You can use this command for the mobile’s revision whether or not the GSM test application is the currently active format.</p> <p>“CALL:MS:REPorted:REVIsion[:DIGital][:SElected]?” on page 373. This command returns the values; +1.00000000E+000 for phase 1, +2.00000000E+000 for phase 2, and NAN for unknown. You can only use this command for the GSM revision if GSM is the currently active format.</p>

A.06 Release February 2001

Call Processing

No new features in this release.

Measurements

- Analog Audio measurement
In the previous revisions of this test application it was possible to make Analog Audio Level measurements. In this release we have increased the number of Analog Audio measurements to include Audio Frequency and Distortion. Although not typically a GSM mobile measurement we have also included SINAD measurements. For more information refer to “Analog Audio Measurement Description” on page 68.

Other

- RF Source Analyzer Level Compensation
Amplitude offset is provided over a range of frequencies, in order to compensate for loss or gain of the external network between the test set and the DUT (device under test). For more information refer to “Measurement Related Configuration” on page 823.
- Dynamic Power measurement enhanced
The number of bursts over which you can make this measurements has increased from 100 to 999. For more information on this measurement refer to “Dynamic Power Measurement Description” on page 99.
- Selectable AC or DC coupling between the Audio Generator and the front panel AUDIO OUT port.

A.05 Release May 2000

Call Processing

No new features in this release.

Measurements

No new measurements in this release.

Other

- Test Application Security
A licensed version of each test application is required in order for the test application to operate. If you switch test applications to an unlicensed test application, the test set will reboot to the SYSTEM CONFIG screen. You will be unable to switch to any other screen, or make any measurements.

A.04 Release - March 2000

Call Processing

No new features in this release.

Measurements

No new measurements in this release.

Other

- Test Application selection for multi-format operation
Menus have been added to the System Configuration screen which allow you to select between different Test Applications that are installed in the test set. This feature can also be accessed remotely within the SYSTem subsystem using the command “SYSTem:APPLication:SElect[:NAME] ‘<test application name>” on page 698.

NOTE It is not recommended that you switch to a GSM Test Application that has a revision earlier than A.04. Earlier revisions did not have the capability to select Test Applications.

There may be up to a three second delay between the time the Test Application is selected and it being implemented in the test set.

- Options installed display is now active
The Options Installed display on the System Configuration screen has been activated to allow for the optional second source. Although the second source has been optional since the A.03 release, the Options Installed display has remained blank until this current release.
- Usability enhanced through gray fields
Non-enabled menu items are now denoted as gray text, versus enabled menu items that are a standard black text. Currently there are no GSM Test Application menu items that use this feature.
- Measurement time-out resolution increased
The measurement time-out resolution has been increased from 1 second to 0.1 seconds. The minimum time-out has also been reduced from 1 second to 0.1 seconds.
- Warning messages can be masked from the display
A new command is available in the DISPlay subsystem which allows you to set whether or not the test set displays and beeps warning messages. For further information on this command refer to “DISPlay:MESSAge:MASKable:STATe” on page 444. 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 445.
- **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

GSM Revision Information

- 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 817.
- Enhanced instrument information on the Configuration Screen
The Instrument Information display on the Configuration Screen, now includes Subnet Mask and Gateway Default information in a new, improved information display.
- *IDN? returns “Agilent Technologies” in the manufacturer’s field where previously it returned “Hewlett-Packard”.
- RF Generator frequency range is now matched to the RF Receiver frequency range
Previously the RF Generator had a low end limit of 45 MHz, while the RF Receiver has always had a low end limit of 292.5 MHz. The RF Generator is now limited to 292.5 MHz to enhance testability and supportability of the test set.

A.02 Release - July 1999

Call Processing

- Paging Mode selectable between “Reorganisation” or “Normal”

Measurements

- Automatic closed loop settings as part of Normal BER and Fast BER measurements
- 3 kHz speech selection for Downlink Speech Source

Other

- LAN subnet mask and LAN Default Gateway settable
- Status Subsystem for GPIB queries of instrument status
- Display Brightness
- Display Automatic Backlight Dimming

A.01 Release - March 1999

Call Processing

No new features in this release.

Measurements

- Normal BER
- Pulsed Audio Source (For uplink speech measurement)

Other

Measurement Integrity on Manual User Interface

A.00 Initial Release - January 1999

Call Processing

- GSM 900 (Includes PGSM/EGSM), DCS1800, PCS1900
- MS and BS Originated Calls
- TCH, Timeslot, Timing Advance, MS Tx Level Assignments
- Dual-Band Handover
- Downlink Speech Source
- Test Mode - CW, BCH Only, BCH + TCH

Measurements

- Tx Power
- Output RF Spectrum
- Power versus Time
- Phase / Frequency Error
- Burst Timing
- Analog Audio
- Uplink Speech Measurement (requires pulsed audio source)
- Burst by Burst BER (Fast BER)

Other

- Audio Source
- User settable amplitude offset

GPRS Revision Information

This document describes features and functionality that are part of the E1964A GPRS Mobile Test Application releases. This document contains the enhancements that have been added over time.

Select the appropriate link below to view the required release.

- “A.01 Release February 2001” on page 874

A.01 Release February 2001

Call Processing

- ETSI Test mode A and B
In the initial GPRS release the only type of data connection available was the Agilent proprietary BLER method. This enhancement gives you two additional options for data connection, namely the ETSI defined Type A and Type B. For more information refer to the command “CALL:FUNCTION:DATA:TYPE” on page 358.
- Additional Timeslot Configurations
A new command is available that allows you to select from a list of multiple timeslot configurations. These configurations are:
 - one downlink and one uplink
 - two downlinks and one uplink
 - two downlinks and two uplinks
 - three downlinks and one uplink
 - three downlinks and two uplinks
 - four downlinks and one uplinkFor more information refer to the command “CALL:PDTCH | PDTChannel:MSLot:CONFIguration” on page 397.
- Coding Scheme Options for Data
A new command is available that allows you to set the PDTCH coding scheme in ETSI test mode to either CS1, CS2, CS3 or CS4. For more information on this command refer to “CALL:PDTCH | PDTChannel:CSCHEME” on page 393.
- Deferred Settings
A new feature allows you to set-up all your PDTCH parameters but defers their implementation until you send one handover command. This has the advantage of increasing the speed of the PDTCH change as the signalling happens only once, at the handover command, and not at the change of each individual PDTCH parameter. For more information refer to the command “CALL:HANDOver | HANDoff[:IMMEDIATE]” on page 361.
- Operating Modes
An additional two operating modes are available, namely, GPRS Test Mode BCH and GPRS Test Mode BCH + PDTCH. For more information refer to the command “CALL:OPERating” on page 383.

Measurements

- Output RF Spectrum due to modulation (using ETSI Test mode A or B)
For more information on this measurement refer to “Output RF Spectrum Measurement Description” on page 117.
- Power versus Time multi-uplink mask
For more information on this measurement refer to “GPRS Power versus Time Measurement” on page 138.
- Multislot BER (using ETSI Test mode B only)
For more information on this measurement refer to “GPRS Bit Error Measurement” on page 81.
- Multislot tolerant Transmit Power
For more information on this measurement refer to “Transmit Power Measurement Description” on page 160.
- Multislot tolerant Phase and Frequency Error
For more information on this measurement refer to “Phase and Frequency Error Measurement Description” on page 125.

Other

- Manual User Interface
The initial GPRS release only had remote user access. This release provides you with access to the measurements and configuration via the test set’s front panel. For more information on using the test set manually refer to your GPRS Quick Guide which was delivered with your test set.

Note, due to the lack of commercially available GPRS mobile stations some of the features added to this release have not been fully verified.

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