

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

# **Reference Manual**

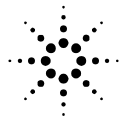
GSM Test Application Revision A.06  
GPRS Test Application Revision A.01

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



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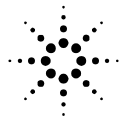
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## Edition/Print Date

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

October 2000 - Test Application Revision A.00

January 2001 - Test Application Revision A.01

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## Safety Summary

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

### GENERAL

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

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

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

### ENVIRONMENTAL CONDITIONS

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

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

### BEFORE APPLYING POWER

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

## **GROUND THE INSTRUMENT**

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

## **FUSES**

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

## **DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE**

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

## **DO NOT REMOVE THE INSTRUMENT COVER**

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

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

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







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

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## Safety Symbols

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

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## Product Markings

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

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

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## CERTIFICATION

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

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# 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.

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## **ASSISTANCE**

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

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## Service and Support

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

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

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

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

(Toll free in US)

(800) 452-4844

### **Europe**

(31 20) 547 9900

### **Canada**

(905) 206-4725

### **Japan Measurement Assistance Center**

(81) 426 56 7832

(81) 426 56 7840 (FAX)

### **Latin America**

(305) 267 4288 (FAX)

### **Australia/New Zealand**

1 800 629 485 (Australia)

0800 738 378 (New Zealand)

### **Asia-Pacific**

(852) 2599 7777

(852) 2506 9285 (FAX)



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## Regional Sales Offices

### **United States of America:**

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

### **Canada:**

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

### **Europe:**

Agilent Technologies(tel) (3120) 547 9999  
European Marketing Organization  
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The Netherlands

### **Japan:**

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Tokyo 192-8510, Japan

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Forest Hill, Victoria 3131(fax) (61 3) 9272 0749(fax) (64 4) 802 6881

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

# DECLARATION OF CONFORMITY

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

**Manufacturer's Name:** Agilent Technologies UK Ltd. Agilent Technologies, Inc.  
**Manufacturer's Address:** Electronic Products & Solutions 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:** E5515 B  
**Product Options:** This declaration covers all options of the above product.

## EMC:

Conforms with the following product specifications:

### Standard:

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

### Limit:

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

## Safety:

The product conforms to the following safety standards:

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

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

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



R.M. Evans / Quality Manager

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



W.V. Roland / Reliability & Regulatory Engineering Manager

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

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## Manufacturer's Declaration

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

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

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

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## Herstellerbescheinigung

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

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



---

# Contents

Establishing an Active GSM Link with the Mobile Station .....	36
Making a Base Station Originated Call .....	36
Making a Mobile Station Originated Call .....	37
Operating Considerations .....	37
Call Processing Event Synchronization .....	38
Description .....	38
Call Processing Subsystem Overlapped Commands .....	41
Related Topics .....	43
Call Processing State Synchronization .....	44
Call Processing State Query .....	44
Description .....	44
STATus:OPERation:CALL:GSM Status Register .....	46
Call State STATus:OPERation:CALL:GSM Program Example .....	46
Related Topics .....	47
Test System Synchronization Overview .....	48
Description .....	48
Commands used for synchronization: .....	51
Related Topics .....	52
Establishing a Data Connection with the Mobile Station .....	54
Related Topics .....	54
Data Connection Processing Event Synchronization .....	55
Description .....	55
Pending Operation Flags .....	55
Call Processing Subsystem Overlapped Command Synchronization Commands .....	56
Data Connection Processing Subsystem Overlapped Commands .....	56
Related Topics .....	57
Data Connection Processing State Synchronization .....	58
Description .....	58
Related Topics .....	60
Test System Synchronization Overview .....	61
Description .....	61
Commands used for synchronization: .....	64
Related Topics .....	65
Analog Audio Measurement Description .....	68

---

## Contents

How is an analog audio measurement made? .....	68
Related Topics .....	69
Analog Audio Measurement Block Diagram .....	70
Related Topics .....	70
Analog Audio Troubleshooting .....	71
Possible Setup Issues .....	71
Interpreting Integrity Indicator Values .....	71
Audio Frequency Measurement Description .....	72
Related Topics .....	72
Programming an Audio Frequency Measurement .....	73
Programming Example .....	73
Returned Values .....	74
Related Topics .....	74
Audio Level Measurement Description .....	75
How is an Audio Level measurement made? .....	75
Related Topics .....	75
Programming an Audio Level Measurement .....	76
Programming Example .....	76
Returned Values .....	77
Related Topics .....	77
Bit Error Measurement Description .....	78
GSM Bit Error Measurement .....	78
GPRS Bit Error Measurement .....	81
Programming a Bit Error Measurement .....	83
Programming a Bit Error Measurement for GSM .....	83
Programming a Bit Error Measurement for GPRS .....	85
BERR Troubleshooting .....	88
Possible Setup Issues .....	88
Interpreting Integrity Indicator values .....	88
BLER Report Measurement Description .....	89
When are BLER Report Measurements Made? .....	89
How are BLER Reports Affected When Using Different Power Levels on Downlink Timeslots .....	

---

# Contents

89	
Programming a BLER Report Measurement .....	90
Related Topics .....	91
Decoded Audio Measurement Description .....	92
How is a decoded audio (DAUDIO) measurement made? .....	92
Trigger Source .....	93
Related Topics .....	93
Programming a Decoded Audio Measurement .....	94
Programming Example .....	94
Returned Values .....	95
Related Topics .....	95
Decoded Audio (DAUDio) Troubleshooting .....	96
Possible Setup Issues .....	96
Interpreting Integrity Indicator values .....	96
Distortion Measurement Description .....	97
How is a Distortion measurement made? .....	97
Related Topics .....	97
Programming a Distortion Measurement .....	98
Programming Example .....	98
Returned Values .....	99
Related Topics .....	99
Dynamic Power Measurement Description .....	101
How is a Dynamic Power Measurement Made? .....	101
Single or Multi Measurements .....	101
Types of Signals Dynamic Power can Measure .....	101
Input Signal Requirements .....	101
Trigger Source .....	102
Related Topics .....	102
Programming a Dynamic Power Measurement .....	103
Programming Example .....	103
Returned Values .....	105
Related Topics .....	105
Dynamic Power Troubleshooting .....	106
Possible Setup Issues .....	106

---

## Contents

Interpreting Integrity Indicator Values .....	106
I/Q Tuning Measurement Description .....	107
How is an I/Q Tuning Measurement Made? .....	107
Single or Multi Measurements .....	108
Types of Signals I/Q Tuning can Measure .....	108
I/Q Tuning Input Signal Requirements .....	108
Trigger Source .....	108
Related Topics .....	108
Programming an I/Q Tuning Measurement .....	109
Programming Example .....	109
Returned Values .....	110
Related Topics .....	111
I/Q Tuning Troubleshooting .....	112
Possible Setup Issues .....	112
Interpreting Integrity Indicator Values .....	112
Fast Bit Error Measurement Description .....	113
Bit Error Measurements vs. Fast Bit Error Measurements .....	113
How is a fast bit error (FBER) measurement made? .....	113
FBER measurement results .....	114
Related Topics .....	115
Programming a Fast Bit Error Measurement .....	116
Programming Example .....	117
Returned values .....	118
Related Topics .....	118
FBER Troubleshooting .....	119
Possible Setup Issues .....	119
Interpreting Integrity Indicator values .....	119
Output RF Spectrum Measurement Description .....	120
How is an output RF spectrum (ORFS) measurement made? .....	120
Making an ORFS measurement on GPRS mobiles while using the BLER data connection type. 121	
Types of Signals ORFS can Measure .....	121
Input Signal Requirements .....	122
Trigger Source .....	122
Related Topics .....	122



---

## Contents

Programming an Output RF Spectrum Measurement .....	123
Programming an Output RF Spectrum Measurement for GSM .....	123
Programming an Output RF Spectrum Measurement for GPRS .....	125
ORFS Troubleshooting .....	127
Possible Setup Issues .....	127
Interpreting Integrity Indicator values .....	127
Phase and Frequency Error Measurement Description .....	128
How is a phase and frequency error (PFER) measurement made? .....	128
Burst Synchronization .....	131
Related Topics .....	131
Programming a Phase and Frequency Error Measurement .....	132
Programming a Phase and Frequency Error Measurement for GSM .....	132
Programming a Phase and Frequency Error Measurement for GPRS .....	134
PFER Troubleshooting .....	136
Possible Setup Issues .....	136
Interpreting Integrity Indicator values .....	136
Power versus Time Measurement Description .....	137
GSM Power versus Time Measurement .....	137
GPRS Power versus Time Measurement .....	142
Programming a Power versus Time Measurement .....	148
Programming a Power versus Time Measurement for GSM .....	148
Programming a Power versus Time Measurement for GPRS .....	149
PVT Troubleshooting .....	152
Possible Setup Issues .....	152
Time Offset Range Restrictions for GPRS Mobiles Which Support Two Uplink Timeslots 152	
Interpreting Integrity Indicator values .....	153
RACH Measurement Description .....	154
What is a RACH? .....	154
Measurements that can be performed on a RACH .....	154
Triggering .....	154
Overview of Measurement Procedure in Active Cell Mode .....	154
Overview of Measurement Procedure in Test Mode .....	155
Example Procedure .....	155

---

# Contents

Related Topics .....	155
Programming a RACH Measurement .....	156
Overview of Measurement Procedure .....	156
Programming Example .....	157
Related Topics .....	158
RACH Troubleshooting.....	159
Possible Setup Issues .....	159
Interpreting Integrity Indicator values .....	159
SACCH Report Measurement Descriptions .....	160
When are SACCH Report Measurements Made? .....	160
SACCH Report Measurement Results .....	161
Neighbour Report Measurement Results .....	162
Related Topics .....	162
SINAD Measurement Description.....	163
How is a SINAD measurement made? .....	163
Related Topics .....	163
Programming a SINAD Measurement.....	164
Programming Example .....	164
Returned Values .....	165
Related Topics .....	165
Transmit Power Measurement Description .....	166
How is a transmit power (TXP) measurement made? .....	166
Types of Signals TX Power can Measure .....	167
Input Signal Requirements .....	167
Trigger Source .....	167
Related Topics .....	168
Programming a Transmit Power Measurement .....	169
Programming a Transmit Power Measurement for GSM .....	169
Programming a Transmit Power Measurement for GPRS .....	170
Transmit Power Troubleshooting.....	172
Possible Setup Issues .....	172
Interpreting Integrity Indicator values .....	172
Test Adherence to Standards.....	173

---

## Contents

Frequency Error and Phase Error - 3GPP 51.010 sections 13.1 and 13.16.1 .....	173
Transmitter Output Power and Burst Timing Error - .....	173
Output RF Spectrum - 3GPP 51.010sections 13.4 and 13.16.3 .....	175
Reference Sensitivity - 3GPP 51.010 section 14.2 .....	176
I/Q Tuning Measurement .....	176
Dynamic Power Measurement .....	177
Analog Audio Measurements .....	177
Burst Synchronization of Measurements .....	180
Measurement Synchronization .....	180
Related Topics .....	181
Programming a Channel Mode Change .....	182
Programming Example .....	182
Returned Values .....	183
Related Topics .....	183
How the Test Set Performs a Dualband Handover .....	184
Related Topics .....	184
Dealing With Semicolon Separated Response Data Lists .....	185
Description .....	185
Concurrent Measurements .....	187
Description .....	187
Concurrent Measurements for the GSM and GPRS Test Applications .....	188
Table Key .....	189
Related Topics .....	190
Integrity Indicator .....	191
Description .....	191
Programming Example .....	194
Related Topics .....	194
Measurement Timeouts .....	195
Description .....	195
Timeout Default Values .....	195
Programming Example .....	196
Related Topics .....	196
Invalid Measurement Results .....	197
Description .....	197

---

# Contents

Measurement Progress Report	198
Description	198
Programming Example	198
Related Topics	198
Measurement Event Synchronization	199
Description	199
INITiate:DONE?	199
Programming Example	200
STATUS:OPERATION:NMRREADY:GSM	201
Operating Considerations	202
Related Topics	202
Statistical Measurement Results	203
Description	203
Programming Example	203
Related Topics	203
Status Subsystem Overview	204
Description	204
Related Topics	218
Triggering of Measurements	219
GSM and GPRS Operating Considerations	219
Description	219
Trigger Qualifier Description	222
Related Topics	222
Introduction	225
Conventions used in this Programming Guide	225
Purpose of this Programming Guide	225
How this Programming Guide is Organized	225
How to use this Programming Guide	227
About the Programming Examples Presented in This Programming Guide	227
Go to Links	227
Step 1: Set the Test Set's Operating Mode to Active Cell	228
Background	228
Overview of Active Cell Operating Mode	228
Setting the Test Set's Operating Mode to Active Cell	229
Step 2: Configure the Base Station Emulator	230

---

# Contents

Background .....	230
Configuring the Broadcast Channel Parameters .....	231
Configuring the Traffic Channel Parameters .....	233
Things That Can Go Wrong .....	234
Step 3: Configure the Measurement Execution Parameters.....	235
Measurement Execution Parameters .....	235
Overview of the SETup subsystem .....	236
Configuring Measurement Averaging Parameters .....	236
Configuring Measurement Triggering Parameters .....	237
Configuring the Burst Synchronization Parameter .....	238
Configuring Measurement Timeout Parameters .....	239
Configuring Measurement Specific Parameters .....	240
Step 4: Establish an Active Link with Mobile Station .....	242
Call Connect Synchronization .....	242
Overview .....	246
Process for Making a Base Station Originated Call .....	246
Process for Making a Mobile Station Originated Call .....	248
Step 5: Set the Mobile Station's Operating Conditions .....	251
Mobile Station Transmit Power Level .....	251
Overview .....	251
Step 6: Make Measurements.....	252
Measurement Concurrency .....	252
Things That Can Go Wrong .....	255
Step 6a: Start Set Of Concurrent Measurements .....	256
Starting Measurements .....	256
Using Compound Commands to Start Multiple Measurements .....	256
Step 6b: Determine if a Measurement Is Done .....	257
Background .....	257
Overview .....	257
Step 6c: Obtain a Set of Measurement Results .....	258
Background .....	258
Overview .....	259
Step 7: Perform an Intra-Cell Handover .....	260
Background .....	260

---

## Contents

Performing an Intra-Cell Handover .....	260
Performing a Dual-Band Handover .....	262
Step 8: Disconnect the Mobile Station from the Base Station Emulator.....	264
Call Disconnect Synchronization .....	264
Disconnecting an Active Call .....	265
Disconnecting an Active Call from the Base Station Emulator .....	265
Disconnecting an Active Call from the Mobile Station .....	267
Comprehensive Program Example.....	269
Example Program With Comments .....	270
Example Program Without Comments .....	276
Introduction.....	283
How to use this programming example. ....	283
On-line information useful for developing a control program. ....	283
Conventions used in this programming example. ....	284
Programming Language used for examples. ....	284
Step 1: Set up the Test Set.....	285
Fully Preset the Test Set .....	285
Turn on the GPIB Debugger .....	285
Set Test Set's Operating Mode .....	285
Step 2: Configure Test Set and Mobile Station Parameters.....	286
Configure the Broadcast Channel Parameters .....	286
Configure the Packet Data Traffic Channel Parameters .....	286
Configure the Mobile Station Operating Conditions .....	287
Step 3: Set Measurement Parameters.....	288
Step 4: Make a connection .....	289
Mobile Station performs a GPRS Attach .....	289
Start a Data Connection .....	290
Step 5: INITiate and FETCh Measurements .....	291
INITiate a set of measurements .....	291
FETCh measurement results .....	291
Step 6: Reconfigure Test Set and Mobile Station Connection Parameters.....	294
Reconfigure the Mobile Station Parameters .....	294
Reconfigure the connection to a new PDTCH ARFCN .....	294
Reconfigure the connection to a new PDTCH ARFCN in a different band .....	295

Step 7: End Connection	296
<a href="#">End the Data Connection</a>	<a href="#">296</a>
<a href="#">GPRS Detach</a>	<a href="#">297</a>
Introduction	301
<a href="#">Related Topics</a>	<a href="#">304</a>
Step 1: Set Up the Test Set	305
<a href="#">Description</a>	<a href="#">305</a>
<a href="#">Related Topics</a>	<a href="#">307</a>
Step 2: Configure Test Set and Mobile Station Parameters	308
<a href="#">Description</a>	<a href="#">308</a>
<a href="#">Related Topics</a>	<a href="#">313</a>
Step 3: Set Measurement Parameters	314
<a href="#">Description</a>	<a href="#">314</a>
<a href="#">Related Topics</a>	<a href="#">319</a>
Step 4: Make Connection	320
<a href="#">Description</a>	<a href="#">320</a>
<a href="#">Related Topics</a>	<a href="#">326</a>
Step 5: INITiate and FETCh Measurements	327
<a href="#">Description</a>	<a href="#">327</a>
<a href="#">Related Topics</a>	<a href="#">333</a>
Step 6: Reconfigure Test Set and Mobile Station Connection Parameters	334
<a href="#">Description</a>	<a href="#">334</a>
<a href="#">Related Topics</a>	<a href="#">336</a>
Step 7: End Connection	337
<a href="#">Description</a>	<a href="#">337</a>
<a href="#">Related Topics</a>	<a href="#">340</a>
Diagram Conventions	343
<a href="#">Description</a>	<a href="#">343</a>
ABORt Subsystem	345
<a href="#">Description</a>	<a href="#">345</a>
<a href="#">Syntax Diagram and Command Descriptions</a>	<a href="#">345</a>
ABORt	346

---

## Contents

AFGenerator Subsystem.....	349
Description .....	349
AFGenerator .....	350
CALibration Subsystem .....	354
Description .....	354
Syntax Diagram and Command Descriptions .....	354
CALibration.....	355
CALL:ATTached .....	357
CALL Subsystem.....	358
Description .....	358
Syntax Diagrams and Command Descriptions .....	358
CALL:ACTivated.....	359
CALL:BA .....	360
CALL:BAND .....	368
CALL:BCCode .....	369
CALL:BCHannel .....	370
CALL:BURSt.....	373
CALL:CONNected.....	374
CALL:COUNt .....	377
CALL:DCONNected.....	381
CALL:END .....	384
CALL:FUNcTion.....	387
CALL:HANDover   HANDoff.....	390
CALL:IMEI .....	392
CALL:LACode .....	393
CALL:MCCCode .....	394
CALL:MNCCode .....	395
CALL:MS.....	396
CALL:NCCCode.....	409



---

## Contents

CALL:OPERating	410
CALL:ORIGinate	412
CALL:PAGing	413
CALL:PDTCH   PDTChannel	416
CALL:PMNCode	427
CALL:POWer	429
CALL:RFGenerator	435
CALL:SETup	442
CALL:SIGNaling	455
<a href="#">Related Topics</a>	<a href="#">455</a>
CALL:STATus	456
CALL:TCHannel	461
CALL:TRANsferring	468
DISPlay Subsystem	469
<a href="#">Description</a>	<a href="#">469</a>
<a href="#">Syntax Diagram and Command Descriptions</a>	<a href="#">469</a>
DISPlay	470
FETCh? Subsystem	473
<a href="#">Description</a>	<a href="#">473</a>
<a href="#">Syntax Diagrams and Command Descriptions</a>	<a href="#">473</a>
FETCh:AAUDio	474
FETCh:BErRor	482
FETCh:DAUDio	490
FETCh:DPOWer	494
FETCh:FBError	497
FETCh:GBError	501
FETCh:IQTuning	504
FETCh:ORFSpectrum	508
FETCh:PFError	516

---

## Contents

FETCh:PVTime . . . . .	523
FETCh:TXPower . . . . .	550
INITiate Subsystem . . . . .	553
Syntax Diagrams and Command Descriptions . . . . .	553
Description . . . . .	553
INITiate Programming Examples (how INIT commands are used) . . . . .	553
INITiate . . . . .	555
READ? Subsystem . . . . .	559
Syntax Diagram and Command Descriptions . . . . .	559
Description . . . . .	559
Programming Example . . . . .	559
READ . . . . .	560
RFANalyzer Subsystem . . . . .	573
Description . . . . .	573
RFANalyzer . . . . .	574
SETup Subsystem . . . . .	588
Description . . . . .	588
Syntax Diagrams and Command Descriptions . . . . .	588
SETup:AAUDio . . . . .	589
SETup:BERRor . . . . .	598
SETup:FBERror . . . . .	605
SETup:CONTinuous . . . . .	612
SETup:DAUDio . . . . .	613
SETup:DPOWer . . . . .	618
SETup:GBERror . . . . .	622
SETup:IQTuning . . . . .	627
SETup:ORFSpectrum . . . . .	633
SETup:PFERror . . . . .	642
SETup:PVTime . . . . .	647
SETup:TXPower . . . . .	657

---

# Contents

STATus Subsystem Description .....	662
Description .....	662
Syntax Diagrams and Command Descriptions .....	662
STATus:OPERation .....	663
Related Topics .....	681
STATus:PRESet .....	682
STATus:QUEStionable .....	683
Status Byte Register .....	700
Standard Event Status Register .....	701
SYSTem Subsystem .....	704
Description .....	704
Syntax Diagrams and Command Descriptions .....	704
SYSTem:APPLication .....	705
Related Topics .....	710
SYSTem:BEEPer .....	711
SYSTem:COMMunicate .....	712
SYSTem:CONFigure .....	715
Related Topics .....	715
SYSTem:CORRection .....	716
SYSTem:CURRent:TA .....	722
SYSTem:ERRor? .....	724
SYSTem:FTRigger .....	725
SYSTem:MEASurement .....	728
SYSTem:PRESet .....	729
SYSTem:ROSCillator .....	731
SYSTem:SYNChronized .....	732
IEEE 488.2 Common Commands .....	733
Description .....	733
Related Topics .....	734

---

# Contents

Frequency Banded Parameters .....	736
GSM Frequency Banded Parameters .....	736
GPRS Frequency Banded Parameters .....	738
Related Topics .....	739
Band Selection Parameters .....	740
GSM Band Selection Parameters .....	740
Operating Considerations for GSM .....	740
GPRS Band Selection Parameters .....	741
Operating Considerations for GPRS .....	741
Related Topics .....	742
Burst Parameters .....	744
Operating Considerations .....	745
Related Topics .....	745
Block Diagram .....	746
Description .....	746
Active Cell Operating Mode .....	751
Active Cell For GSM .....	751
Active Cell For GPRS .....	752
Related Topics .....	752
Test Mode Operating Modes .....	753
GSM Test Mode Operation .....	753
GPRS Test Mode Operation .....	761
Related Topics .....	762
Configuring the Broadcast Channel (BCH) .....	763
GSM Broadcast Channel Parameters .....	763
GPRS Broadcast Channel Parameters .....	764
Operating Considerations .....	764
Related Topics .....	765
Configuring the Traffic Channel (TCH) .....	766
TCH Parameters .....	766
Operating Considerations .....	767
Related Topics .....	768
Configuring the Packet Data Traffic Channel (PDTCH) .....	769
Packet Data Traffic Channel Parameters .....	770

---

## Contents

Operating Considerations .....	771
Related Topics .....	771
Configuring Mobile Station Operating Parameters.....	772
GSM Mobile Station Operating Parameters .....	772
GPRS Mobile Station Operating Parameters .....	772
Operating Considerations .....	773
Setting Frame Trigger Parameters .....	774
Frame Trigger Parameters .....	774
Programming Examples .....	774
Operating Considerations .....	774
Related Topics .....	774
Receiver Control.....	776
GSM Receiver Control .....	776
GPRS Receiver Control .....	779
Testing a Mobile for Enhanced Full Rate Speech Channel Mode.....	783
Related Topics .....	784
Testing a GPRS Mobile Station .....	785
Test Overview .....	785
Procedure .....	785
Operating Considerations .....	788
Related Topics .....	790
Preset Descriptions .....	791
Description .....	791
Related Topics .....	792
Instrument Status Area .....	793
Description .....	793
GSM Manual Operation .....	795
How Do I Change Call Parameters?.....	796
How Do I Change Cell Parameters?.....	797
A. Select the cell parameters menu.....	797
B. Set a cell parameter.....	798
How Do I Make Measurements on a Mobile?.....	799

---

## Contents

A. Establish a call. . . . .	799
B. Select measurements. . . . .	800
How Do I Change Measurement Setup? . . . . .	801
A. Select a measurement. . . . .	801
B. Set up the measurement. . . . .	802
How Do I Turn Off a Measurement? . . . . .	803
GPRS Manual Operation . . . . .	804
How Do I Make Measurements on a Mobile? . . . . .	805
A. Establish a Data Connection. . . . .	805
B. Select Measurements. . . . .	806
How Do I Change Measurement Setup? . . . . .	807
A. Select a Measurement. . . . .	807
B. Set Up a Measurement. . . . .	808
How Do I Turn Off a Measurement? . . . . .	809
How Do I Change Call Parameters? . . . . .	810
How Do I Change Cell Parameters? . . . . .	811
A. Select the Cell Parameters Menu. . . . .	811
B. Set a Cell Parameter. . . . .	812
How Do I Perform a Handover? . . . . .	813
How Do I Change the MS TX Level? . . . . .	814
1. Change the MS TX Level Immediately. . . . .	814
2. Change the MS TX Level During a Handover. . . . .	815
How Do I Configure the Test Set for my test system? . . . . .	816
A. Instrument Information and Setup. . . . .	816
B. Amplitude Offset. . . . .	817
How Do I End the Data Connection? . . . . .	818
Programming Overview . . . . .	819
Related Topics . . . . .	819
Front Panel Connectors . . . . .	820
Description . . . . .	820
Related Topics . . . . .	821

---

# Contents

Rear Panel Connectors .....	822
Description .....	822
Related Topics .....	825
Remote/Local Mode .....	826
Description .....	826
Display Brightness .....	828
Description .....	828
Related Topics .....	828
Test Set Beeper .....	829
Description .....	829
Related Topics .....	829
Description .....	830
Related Topics .....	830
Obtaining Identification Information *IDN? .....	831
Description .....	831
Related Topics .....	831
Configuring the Test Set's LAN .....	832
Description .....	832
Related Topics .....	833
Hardware Configuration Report .....	834
Description .....	834
Related Topics .....	835
Measurement Related Configuration .....	836
Description .....	836
Related Topics .....	839
Display Mode (Track/Fast) .....	840
Description .....	840
Related Topics .....	840
Timebase Description/Configuration .....	841
Description .....	841
Related Topics .....	841
Error Messages .....	844

---

## Contents

Description .....	845
GSM Mobile Test Maskable Messages .....	846
Related Topics .....	846
Fixed Timer Messages .....	847
Description .....	847
Manual User Error Messages.....	850
Description .....	850
GSM and GPRS Mobile Test Manual User Messages .....	851
-100 to -199 Command Errors .....	852
Description .....	852
Related Topics .....	855
-200 to -299 Execution Errors.....	856
Description .....	856
-300 to -399 SCPI Specified Device-Specific Errors .....	859
Description .....	859
Related Topics .....	860
-400 to -499 Query Errors.....	861
Description .....	861
+100 to +199 Core Device-Specific Error.....	862
Description .....	862
+200 to +299 Call Processing Device-Specific Error.....	865
+300 to +399 Link Control Device-Specific Error .....	868
+400 to +499 Core Hardware Device-Specific Error.....	869
Description .....	869
Related Topics .....	871
+500 to +599 Test Application Hardware Device-Specific Error .....	872
Description .....	872
Related Topics .....	872
+600 to +699 Instrument Device-Specific Error .....	873
Description .....	873
Related Topics .....	873



---

## Contents

+700 to +799 Test Application Measurement Device-Specific Error .....	874
+800 to +899 Core Measurement Device-Specific Error .....	875
Description .....	875
Related Topics .....	875
Error Message Log.....	876
Description .....	876
Related Topics .....	876
GSM Revision Information .....	877
A.06 Release February 2001 .....	878
A.05 Release May 2000 .....	879
A.04 Release - March 2000 .....	880
A.03 Release - December 1999 .....	881
A.02 Release - July 1999 .....	882
A.01 Release - March 1999 .....	882
A.00 Initial Release - January 1999 .....	883
GPRS Revision Information .....	884
A.01 Release February 2001 .....	884



# 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 461](#).
2. If necessary, set the IMSI state. See [“CALL:PAGing:IMSI” on page 413](#).

#### Example 1.

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

would set the paging IMSI to 01012345678901.

3. If necessary, set the repeat paging state. See [“CALL:PAGing:REPeat\[:STATe\]” on page 414](#).

#### 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 44](#).
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 44](#).

---

## 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 461](#).
2. Configure the necessary call processing connect/disconnect synchronization conditions. See [“Call Processing State Synchronization” on page 44](#).
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 44](#).

---

## Operating Considerations

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

---

## Call Processing Event Synchronization

### Description

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

### Pending Operation Flags

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

---

**NOTE** In addition to the call processing subsystem overlapped commands, the test set also provides the measurement-related INITiate <measurement> overlapped commands.

---

## Call Processing Subsystem Overlapped Command Synchronization Commands

**Table 1. Overlapped Commands**

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

**Table 1. Overlapped Commands**

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

**Operating Considerations**

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



## Call Processing Subsystem Overlapped Commands

Call Processing Command	Purpose Of Command	Pending Operation Flag (POF) is false when
CALL:ORIGinate See <a href="#">“CALL:ORIGinate” on page 412.</a>	Performs a base station call origination.	The call processing state leaves the Idle state (when the operating mode is active cell), or  The test set has noted this parameter change (when the operating mode is test mode).
CALL:END See <a href="#">“CALL:END” on page 385.</a>	Performs a base station call termination.	The call processing state reaches the Idle state (when the operating mode is active cell), or  The test set has noted this parameter change (when the operating mode is test mode).
CALL[:CELL[1]]:BCHannel[:ARFCn][:SElected] See <a href="#">“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370.</a>	Sets the BCH ARFCN for currently selected broadcast band.	The downlink signal is transmitting on the new broadcast channel.
CALL[:CELL[1]]:BCHannel[:ARFCn]:<broadcast band> See <a href="#">“CALL:BCHannel” on page 370.</a>	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 <a href="#">“CALL:TCHannel[:ARFCn][:SElected]” on page 462.</a>	Sets the TCH ARFCN for currently selected traffic band.	At least one of the following conditions has been met for all occurrences of these call processing commands that have begun execution:  The channel assignment has been successfully completed (when a call is established), or  The test set has noted this parameter change (no call established), or  The test set has noted this parameter change (not currently selected band), or  An error message was generated.
CALL:TCHannel[:ARFCn]:<traffic band> See <a href="#">“CALL:TCHannel” on page 461.</a>	Sets the TCH ARFCN for a traffic band not currently selected.	
CALL:TCHannel:TSLot See <a href="#">“CALL:TCHannel:TSLot” on page 467.</a>	Sets the TCH timeslot.	
CALL:MS:TADVance See <a href="#">“CALL:MS:TADVance” on page 405.</a>	Sets the mobile station timing advance.	
CALL:MS:TXLevel[:SElected] See <a href="#">“CALL:MS:TXLevel[:SElected]” on page 406.</a>	Sets the mobile station transmit level for currently selected band.	
CALL:MS:TXLevel:<traffic band>.	Sets the mobile station transmit level for a traffic band not currently selected.	
CALL:CONNected:ARM[:IMMediate] See <a href="#">“CALL:CONNected:ARM[:IMMediate]” on page 375.</a>	Arms the call control status change detector.	The call control status change detector has been disarmed.  See <a href="#">“Connected/Idle Query” on page 44.</a>

## Related Topics

\*\*\*\*\*

[“Call Processing State Synchronization” on page 44](#)

[“Measurement Event Synchronization” on page 199](#)

[“Test System Synchronization Overview” on page 48](#)

\*\*\*\*\*

---

## 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.

## Call Processing State Synchronization

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

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

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

## STATUS:OPERation:CALL:GSM Status Register

The STATUS subsystem provides a status register group that allows the user to query call processing states. Call processing state synchronization can be performed using the bit transitions of STATUS:OPERATION:CALL:GSM to generate interrupts to the external controller. Refer to [“STATUS:OPERation:CALL:GSM Condition Register Bit Assignment” on page 673](#) for status bit definitions and GPIB command syntax. See [“Call State STATUS:OPERation:CALL:GSM Program Example” on page 46](#).

## 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 38](#)

["CALL:STATus\[:STATe\]\[:VOICe\]?" on page 457](#)

["CALL:CONNected:ARM\[:IMMEDIATE\]" on page 375](#)

["CALL:CONNected:TIMEout" on page 376](#)

["Instrument Status Area" on page 793](#)

\*\*\*\*\*

## Test System Synchronization Overview

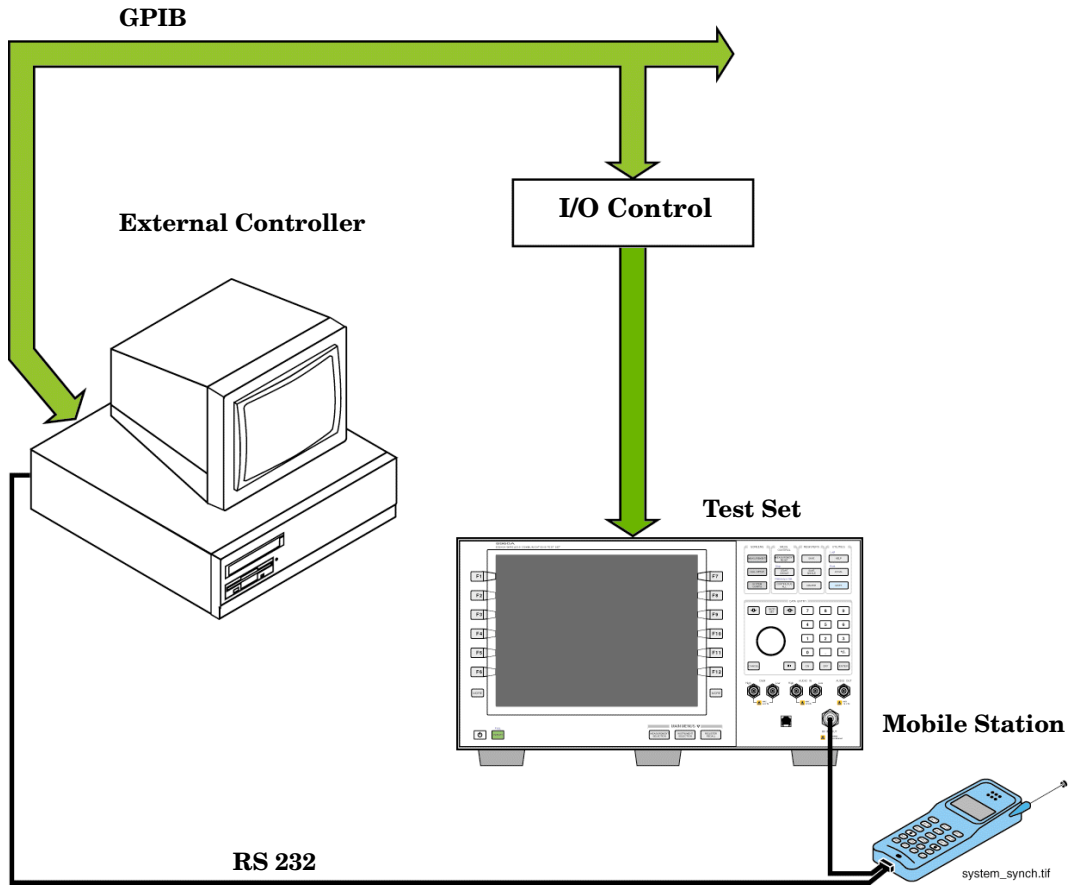
### Description

Typical test systems include an external controller with a GPIB connection to the test set, an RF (and possible AF) connection between the test set and a mobile station under test, and a serial connection between the mobile station and the external controller.

Synchronizing an external controller with the test set and a mobile station under test ensures that no device does something before it is supposed to, which can cause errors, or does something well after it could have, which wastes time.



Figure 1. Test System



## Sequential versus overlapped commands

The test set uses both sequential and overlapped commands:

- Sequential commands must finish executing before the next command starts to execute.
- Overlapped commands do not finish executing before the next command starts to execute.

Overlapped commands are more difficult to synchronize because an overlapped operation that started several commands earlier may still be executing as subsequent commands are being parsed out from the input buffer and executed. This can present a problem unless the external controller is properly synchronized to the test set's execution of commands. Overlapped commands allow the test set to use its internal resources as efficiently as possible.

### Methods for synchronization

The test set's GPIB command set supports the following methods to achieve synchronization for overlapped commands. In some cases, combinations of these methods will provide the best results:

Methods one and two do not require the external controller to query the test set, nor to perform any branching or decision-making associated with information acquired from the test set.

Methods three through six rely on responses from the test set to an external controller, indicating that some event has occurred. The external controller can then make decisions based on these responses to control the flow of commands to the test set and other devices in the test system.

1. Force the test set to execute overlapped commands sequentially.
2. Force the test set to wait until an overlapped command is done executing before executing any more commands.
3. Query the test set to determine when a command has finished executing.
4. Query the test set to determine when all commands sent to it have at least begun executing.
5. Query the test set to determine the current call or data connection processing state.
6. Program the test set to generate a service request when an operation has completed or the test set is in a certain state.

## Commands used for synchronization:

- [“CALL:STATus\[:STATe\]\[:VOICe\]?” on page 457](#)

This command queries the test set’s current call processing state. This command supports synchronization method five. (See [“Call Processing State Query” on page 44](#)).

- [“CALL:CONNected\[:STATe\]?” on page 374](#)

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 44](#)). 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 39](#).)

- :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 39](#).)

- :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 39](#).)

- [“INITiate:DONE?” on page 557](#)

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 199](#).)

- STATUS:<register>

Status bits in the [“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 673](#) 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 679](#) 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 662](#).

## Test System Synchronization Overview

- [“SYSTem:SYNChronized” on page 732](#)  
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 668](#)). This command supports synchronization method four and six.
- [“\\*OPC” on page 733](#), [“\\*OPC?” on page 733](#), and [“\\*WAI” on page 734](#) (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 44](#)

[“Measurement Event Synchronization” on page 199](#)

[“Call Processing Event Synchronization” on page 38](#)

[“SYSTem:SYNChronized” on page 732](#)

\*\*\*\*\*

## **2 GPRS Data Connection**

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## 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 289.

### Related Topics

\*\*\*\*\*

[“CALL:PDTCH|PDTChannel”](#) on page 416

[“CALL:FUNCTION:DATA:START”](#) on page 387

[“Data Connection Processing State Synchronization”](#) on page 58

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## Data Connection Processing Event Synchronization

### Description

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

### Pending Operation Flags

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

---

**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 555](#).

---

## 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 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 <a href="#">"CALL:FUNCTION:DATA:START"</a> on page 387.	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 <a href="#">"CALL:DCONNECTED:ARM[:IMMEDIATE]"</a> on page 382.	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 58](#)

[“Measurement Event Synchronization” on page 199](#)

[“Test System Synchronization Overview” on page 61](#)

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# Data Connection Processing State Synchronization

## Description

### Data Connection Processing State Query

The `CALL:STATus[:STATE]:DATA?` query returns a string indicating the current data connection processing state.

There are seven possible data connection processing states.

The query returns one of the following strings:

- “IDLE”  
Idle is returned when the mobile station is not GPRS attached.
- “ATTG”  
Attaching is returned when the mobile station has sent an attach request. This is a transitory state (which means that the mobile station can only remain in this state until the protocol timer expires). At the end of the signalling exchange, the new state will either be Attached or Idle, depending on whether or not the attach procedure completes without error.
- “DET”  
Detaching is returned when the attached mobile station has sent a detach request. This is a transitory state (which means that the mobile station can only remain in this state until it successfully moves to another state, or the protocol timer expires). At the end of the signalling exchange, the new state will be Idle, even if the procedure encounters an error.
- “ATT”  
Attached is returned when the mobile station has performed a successful GPRS attach.
- “STAR”  
Starting is returned when you have performed the “Start Data Connection” action (using [“CALL:FUNCTION:DATA:START” on page 387](#)). 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 388](#)). 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 383](#).

## Related Topics

\*\*\*\*\*

[“Test System Synchronization Overview” on page 61](#)

[“Data Connection Processing Event Synchronization” on page 55](#)

[“CALL:STATus\[:STATe\]:DATA?” on page 457](#)

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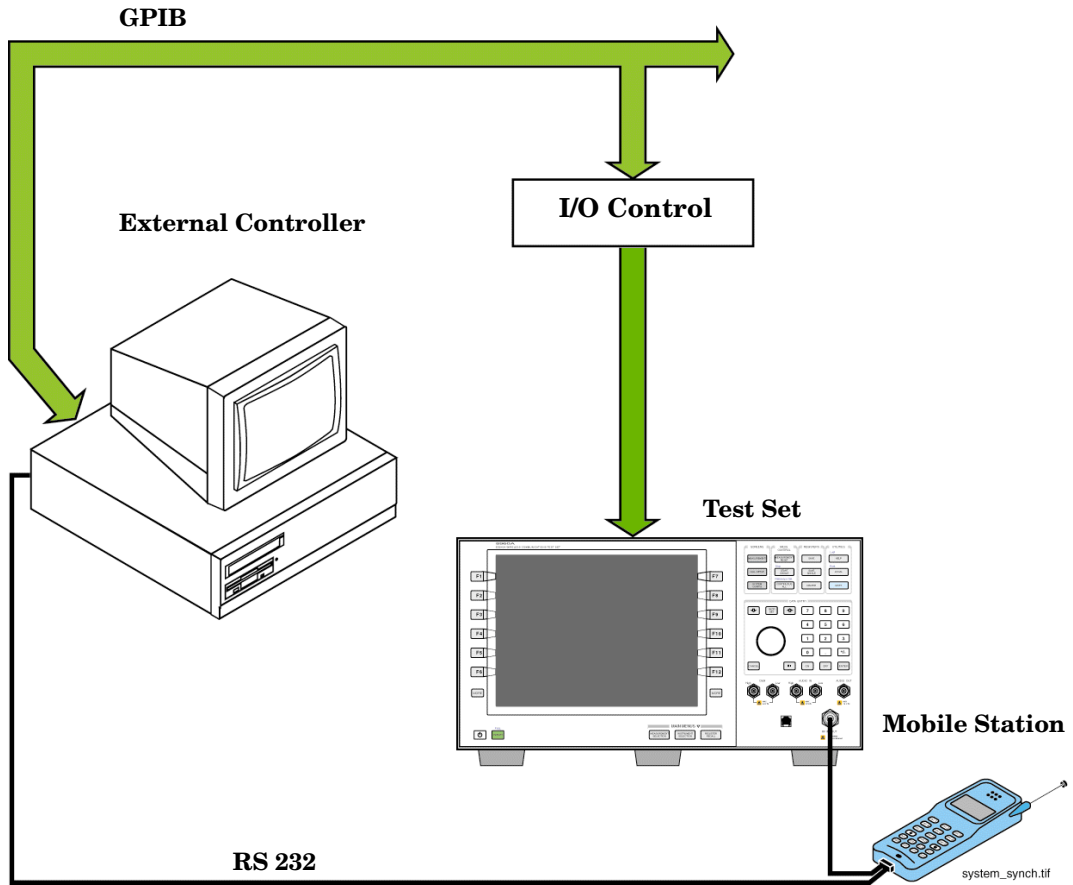
## Test System Synchronization Overview

### Description

Typical test systems include an external controller with a GPIB connection to the test set, an RF (and possible AF) connection between the test set and a mobile station under test, and a serial connection between the mobile station and the external controller.

Synchronizing an external controller with the test set and a mobile station under test ensures that no device does something before it is supposed to, which can cause errors, or does something well after it could have, which wastes time.

Figure 2. Test System



## Sequential versus overlapped commands

The test set uses both sequential and overlapped commands:

- Sequential commands must finish executing before the next command starts to execute.
- Overlapped commands do not finish executing before the next command starts to execute.

Overlapped commands are more difficult to synchronize because an overlapped operation that started several commands earlier may still be executing as subsequent commands are being parsed out from the input buffer and executed. This can present a problem unless the external controller is properly synchronized to the test set's execution of commands. Overlapped commands allow the test set to use its internal resources as efficiently as possible.

### Methods for synchronization

The test set's GPIB command set supports the following methods to achieve synchronization for overlapped commands. In some cases, combinations of these methods will provide the best results:

Methods one and two do not require the external controller to query the test set, nor to perform any branching or decision-making associated with information acquired from the test set.

Methods three through six rely on responses from the test set to an external controller, indicating that some event has occurred. The external controller can then make decisions based on these responses to control the flow of commands to the test set and other devices in the test system.

1. Force the test set to execute overlapped commands sequentially.
2. Force the test set to wait until an overlapped command is done executing before executing any more commands.
3. Query the test set to determine when a command has finished executing.
4. Query the test set to determine when all commands sent to it have at least begun executing.
5. Query the test set to determine the current call or data connection processing state.
6. Program the test set to generate a service request when an operation has completed or the test set is in a certain state.

## Commands used for synchronization:

- [“CALL:STATus\[:STATe\]:DATA?” on page 457](#)  
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 58](#).
- [“CALL:ATTached\[:STATe\]?” on page 357](#)  
This command determines if the current data connection is in the attached state. This command supports synchronization method 5.
- [“CALL:TRANSferring\[:STATe\]?” on page 468](#)  
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 56](#).
- [: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 56](#).
- [: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 56](#).
- [“INITiate:DONE?” on page 557](#)  
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 199](#).
- [“SYSTem:SYNChronized” on page 732](#)  
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 668](#)). This command supports synchronization method four and six.
- [“\\*OPC” on page 733](#), [“\\*OPC?” on page 733](#), and [“\\*WAI” on page 734](#) (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 58](#)

[“Measurement Event Synchronization” on page 199](#)

[“Data Connection Processing Event Synchronization” on page 55](#)

[“SYSTem:SYNChronized” on page 732](#)

\*\*\*\*\*

## Test System Synchronization Overview

## 3 Measurements

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## 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:SDISTortion:STATE” on page 596](#). 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  $10 \text{ mV/kHz}$  to  $10 \text{ V/kHz}$ , 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 163](#)

[“Distortion Measurement Description” on page 97](#)

[“Programming an Audio Frequency Measurement” on page 73](#)

[“Programming an Audio Level Measurement” on page 76](#)

[“Programming a SINAD Measurement” on page 164](#)

[“Programming a Distortion Measurement” on page 98](#)

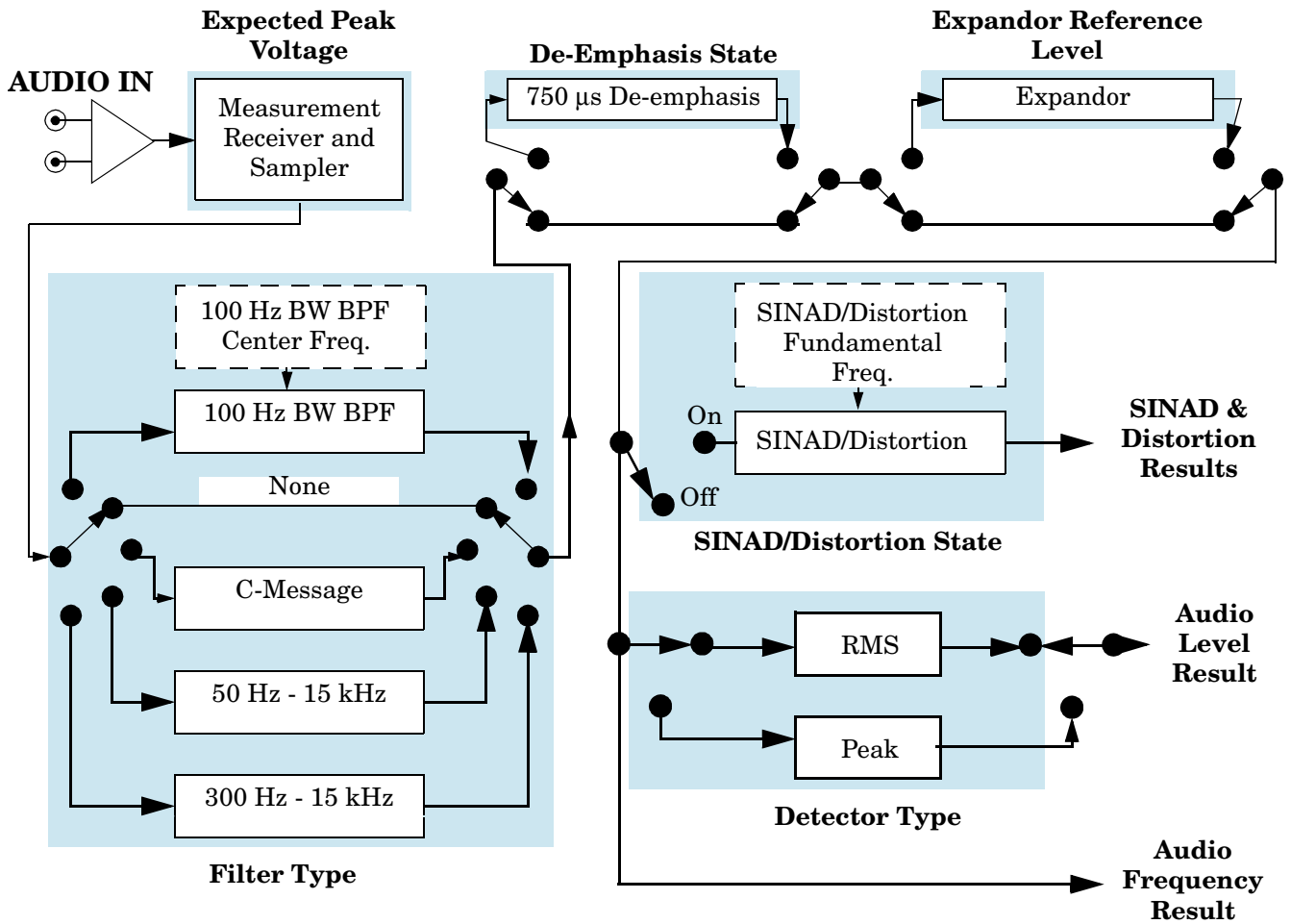
[“Statistical Measurement Results” on page 203 \(Multi-measurements\)](#)

[“Triggering of Measurements” on page 219](#)

[“Measurement Timeouts” on page 195](#)

\*\*\*\*\*

# Analog Audio Measurement Block Diagram



## Related Topics

\*\*\*\*\*

[“Analog Audio Measurement Description” on page 68](#)

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## 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 557 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  $V_{\text{peak}}$ , regardless of the Detector Type selected, and cannot exceed  $20 V_{\text{peak}}$  ( $14.1 V_{\text{rms}}$ ).

For accurate measurements, always set all 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 191.

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 191](#).
- `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 555](#)

[“SETup:AAUDio” on page 589](#)

[“FETCh:AAUDio” on page 474](#)

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## 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<sub>peak</sub> to 20V<sub>peak</sub>. The measurement is made after any filtering is applied, and can be made using an RMS or Peak detector. The type of detector being used for the measurement is displayed next to the measurement value.

When measuring very low voltages, it may be helpful to use the 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 191](#).
- `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 555](#)

[“SETup:AAUDio” on page 589](#)

[“FETCh:AAUDio” on page 474](#)

\*\*\*\*\*

## 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 113](#).

---

<b>NOTE</b>	<p>If the test set has codeware version A.02.00 or above, unnecessary loopback commands and delays can be eliminated by taking advantage of enhancements available.</p> <p>Previous versions of the test set required you to set the loopback type, and did not have a feature that allowed time for the loop to close.</p>
-------------	---

---

#### How is a 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 600](#)). 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 599](#) 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 602](#)).

---

**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 203](#)

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 485](#) or [“FETCh:BERRor:RATio\[:BITS\]?” on page 488](#). Alternatively the [“FETCh:BERRor\[:ALL\]?” on page 484](#) or [“FETCh:BERRor:FULL?” on page 487](#) can also be used to return the results.

## Bit Error Measurement Description

### 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 173](#)

[“Fast Bit Error Measurement Description” on page 113](#)

[“Programming a Fast Bit Error Measurement” on page 116](#)

[“CALL:TCHannel:LOOPback” on page 466](#)

[“BERR Troubleshooting” on page 88](#)

\*\*\*\*\*



## 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 388](#). 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 411](#)).

The recommended channel coding scheme for BER measurements is CS-4. You use the command [“CALL:PDTCH | PDTChannel:CSCHEME” on page 421](#) 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 503](#).

If necessary, you can manually set the delay using [“SETup:GBERror:LDControl:AUTO” on page 624](#).

---

**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 203](#).

### 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 411](#) for details on setting the cell operating mode). Note that you have to manually set your mobile station to synchronize its internal frequency and timing reference with the test set. You also have to command the mobile station to loop back the PDTCH data.

## BER Measurement Results

The results of a BER measurement can be displayed in two ways; the number of errors counted or the ratio of bad bits (errors) to total bits counted. If you are using the test set manually, both Count and Bit Error Ratio are displayed on the Bit Error measurement screen. If you are using the test set remotely, these results are available using the FETCh command, see [“FETCh:GBERror:COUnT?” on page 502](#) or [“FETCh:GBERror:RATio?” on page 503](#). Alternatively the command [“FETCh:GBERror\[:ALL\]?” on page 502](#) 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 503](#) and the Block Delay can be queried using [“FETCh:GBERror:DELAy?” on page 503](#).

## Related Topics for GPRS

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[“Programming a Bit Error Measurement” on page 83](#)

[“Test Adherence to Standards” on page 173](#)

[“BERR Troubleshooting” on page 88](#)

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## 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 36](#).

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 191](#) (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

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[“Bit Error Measurement Description” on page 78](#)

[“SETup:BERror” on page 598](#)

[“INITiate” on page 555](#)

[“FETCh:BERror” on page 482](#)

[“Comprehensive Program Example” on page 269](#)

[“BERR Troubleshooting” on page 88](#)

\*\*\*\*\*

## 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 411](#)) and the data connection type has been set to ETSI Type B (using [“CALL:FUNcTION:DATA:TYPE” on page 388](#)). 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 289](#). 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 411](#)).

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 191](#) (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

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[“Bit Error Measurement Description” on page 78](#)

[“SETup:GBERror” on page 622](#)

[“INITiate” on page 555](#)

[“FETCh:GBERror” on page 501](#)

[“BERR Troubleshooting” on page 88](#)

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# 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 601](#).

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 221](#).

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 603](#) 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 421](#) 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 622](#).

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 388](#). For details on setting the cell operating mode, see [“CALL:OPERating:MODE” on page 411](#).

## Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 191](#).



---

## 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 388).

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 458. This query returns the percentage of blocks tested that were in error and the total number of blocks used to generate the BLER result. The BLER results are reset using [“SYSTEM:MEASUREMENT:RESet”](#) on page 728.

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 58.

### 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.

---

<b>NOTE</b>	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 289](#).

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

### Programming Example

```

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

```

```

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

```

## Returned Values

The measurement reports returned by this program are:

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

## Related Topics

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[“Testing a GPRS Mobile Station” on page 785](#)

[“CALL:STATus:PDTCH | PDTChannel:BLERror?” on page 458](#)

[“Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

\*\*\*\*\*

## 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 350](#) 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:PULSeI;STATEI” on page 351](#).

---

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 94](#)

[“Test Adherence to Standards” on page 173](#)

\*\*\*\*\*

## 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 36](#).

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 191](#) (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 92](#)

[“SETup:DAUDio” on page 613](#)

[“INITiate” on page 555](#)

[“FETCh:DAUDio” on page 490](#)

[“Comprehensive Program Example” on page 269](#)

\*\*\*\*\*

---

## 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 614](#).

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 221](#).

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 191](#).

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 465](#)), 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 98](#)

[“Test Adherence to Standards” on page 173](#)

\*\*\*\*\*

## Programming a Distortion Measurement

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 191](#).
- `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 97](#)

[“INITiate” on page 555](#)

[“SETup:AAUDio” on page 589](#)

[“FETCh:AAUDio” on page 474](#)

\*\*\*\*\*



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## Dynamic Power Measurement Description

This measurement is *not* applicable to GPRS.

### How is a Dynamic Power Measurement Made?

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

Dynamic Power is not an ETSI specified measurement.

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

### Single or Multi Measurements

The Dynamic Power measurement does not use the multi-measurement state parameter, and so does not return minimum, maximum, and standard deviation values. Instead, you specify the number of bursts that you want to measure using the Number of Bursts parameter (see “[SETup:DPOWer:COUNt:NUMBer](#)” on page 619). 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 103](#)

[“SETup:DPOWer” on page 618](#)

[“FETCh:DPOWer” on page 494](#)

[“Test Adherence to Standards” on page 173](#)

\*\*\*\*\*

## 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 36](#).

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 191](#).
- `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 101](#)

[“SETup:DPOWer” on page 618](#)

[“INITiate” on page 555](#)

[“FETCh:DPOWer” on page 494](#)

\*\*\*\*\*

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## Dynamic Power Troubleshooting

### Possible Setup Issues

The Dynamic Power measurement closes all other currently active measurements when it is initiated. When this happens, the test set beeps and a measurement specific closure warning is reported via GPIB for each measurement that has been closed (see [“+700 to +799 Test Application Measurement Device-Specific Error” on page 874](#)).

### Interpreting Integrity Indicator Values

See [“Integrity Indicator” on page 191](#).

## I/Q Tuning Measurement Description

This measurement is *not* applicable to GPRS.

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

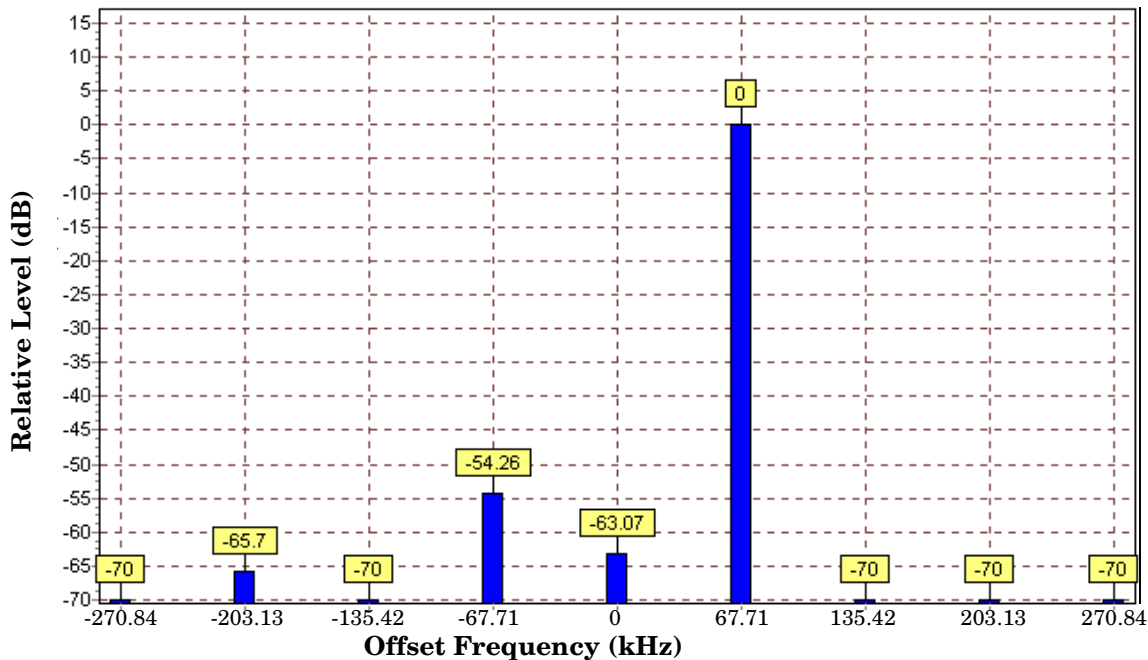
The I/Q Tuning measurement is used in the production process (normally at mobile pre-test) where the I/Q modulator of the mobile is being calibrated. The measurement is normally performed with the mobile station in test mode and transmitting a GMSK modulated sequence of all 0s or all 1s. The mobile can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

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

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

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

**Figure 3. Spectrum of a mobile transmitting a sequence of all 0s**



## Single or Multi Measurements

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

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

## Types of Signals I/Q Tuning can Measure

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

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

## I/Q Tuning Input Signal Requirements

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

- Input signal level is between -15 dBm and +43 dBm.
- Input signal level is within +3 dB and -10 dB of the expected input level.
- Signal must be within 500 kHz of expected frequency for RF Rise triggering to function.

## Trigger Source

The trigger source depends on the type of input signal.

### Recommended Trigger Source Settings

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

## Related Topics

\*\*\*\*\*

[“Programming an I/Q Tuning Measurement” on page 109](#)

[“Test Adherence to Standards” on page 173](#)

\*\*\*\*\*

## 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 191](#) (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 107](#)

[“SETup:IQTuning” on page 627](#)

[“INITiate” on page 555](#)

[“FETCh:IQTuning” on page 504](#)

\*\*\*\*\*

## I/Q Tuning Troubleshooting

### Possible Setup Issues

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

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

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

### Interpreting Integrity Indicator Values

See “Integrity Indicator” on page 191.



## 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 461](#)

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 610](#). If you set signal loopback control to off, the loopback type is controlled using [“CALL:TCHannel:LOOPback” on page 466](#). If you are using the test set manually, the loopback type is controlled using **Mobile Loopback (F12)** on **Call Parm**s 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 606](#) for more details.

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

If necessary, you can manually set the delay. See [“SETup:FBERror:LDControl:AUTO” on page 608](#) or [“SETup:FBERror:MANual:DELAy” on page 609](#)

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

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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 92](#)

FBER measurement trigger source is always set to immediate. The FBER measurement does not offer multi-measurement results. see [“Statistical Measurement Results” on page 203](#)

### 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 498](#) or [“FETCh:FBERror:RATio?” on page 500](#). 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

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[“Programming a Fast Bit Error Measurement” on page 116](#)

[“Test Adherence to Standards” on page 173](#)

[“Bit Error Measurement Description” on page 78](#)

[“Programming a Bit Error Measurement” on page 83](#)

[“CALL:TChannel:LOOPback” on page 466](#)

\*\*\*\*\*

## 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 36](#).

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 191](#) (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 113](#)

[“SETup:FBError” on page 605](#)

[“INITiate” on page 555](#)

[“FETCh:FBError” on page 497](#)

[“Comprehensive Program Example” on page 269](#)

\*\*\*\*\*

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## FBER Troubleshooting

### Possible Setup Issues

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

During remote operation of the Fast BER measurement you should configure the trigger arm to single, see [“SETup:FBERror” on page 605](#).

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 221](#).

Set signalling loopback control to on; if signalling loopback control is off, set loopback to Type C, see [“CALL:TCHannel:LOOPback” on page 466](#).

The test set may never correlate the uplink and downlink, see [“SETup:FBERror:LDControl:AUTO” on page 608](#) 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 610](#).

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 191](#).

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 634](#)).

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 166](#), which synchronizes the measurement with the burst amplitude).

### ORFS due to modulation

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

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



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

### ORFS due to switching

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

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

### Single or Multi-Measurements

To obtain statistical measurement results, the multi-measurement count must be set for both switching and modulation measurements. (See [“Statistical Measurement Results” on page 203](#) 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  $\pm 3$  dB of the expected input level.
- Frequency is within  $\pm 200$  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 123](#)

[“Test Adherence to Standards” on page 173](#)

[“ORFS Troubleshooting” on page 127](#)

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## Programming an Output RF Spectrum Measurement

This section contains two programming examples:

- [“Programming an Output RF Spectrum Measurement for GSM” on page 123](#)
- [“Programming an Output RF Spectrum Measurement for GPRS” on page 125](#)

### 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 36](#).

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 191](#) (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 120](#)

[“SETup:ORFSpectrum” on page 633](#)

[“INITiate” on page 555](#)

[“FETCh:ORFSpectrum” on page 508](#)

[“Comprehensive Program Example” on page 269](#)

\*\*\*\*\*

## 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 289](#).

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 191](#) (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 120](#)

[“SETup:ORFSpectrum” on page 633](#)

[“INITiate” on page 555](#)

[“FETCh:ORFSpectrum” on page 508](#)

[“Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

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## 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 633](#).

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 221](#).

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 510](#) or [“FETCh:ORFSpectrum:SWITChing:FREQuency\[:OFFSet\]\[:MAXimum\]?” on page 513](#) for GPIB commands.

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 191](#).

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 839](#).

If 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 587](#). If you want to measure the first of the two uplink bursts, there are no limits on the relative powers of the two uplink bursts in the multislot configuration. However, if you want to measure the second burst, the level of the first burst must not exceed the level of the second burst.

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

### Single or Multi-Measurements

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

A single burst for a PFER measurement calculates the following:

- peak phase error
- rms phase error
- frequency error

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

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



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

### Types of Signals PFER can Measure

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

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

### Input Signal Requirements

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

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

under these conditions:

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

### Trigger Source

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

**Table 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
Bursting signal with GMSK modulation but no valid midamble	RF Rise
Non-bursting (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 180](#)). 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:CONFiguration” on page 424](#).

**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 132](#)

[“Test Adherence to Standards” on page 173](#)

[“PFER Troubleshooting” on page 136](#)

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## Programming a Phase and Frequency Error Measurement

This section contains two programming examples:

- [“Programming a Phase and Frequency Error Measurement for GSM” on page 132](#)
- [“Programming a Phase and Frequency Error Measurement for GPRS” on page 134](#)

### 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 36](#).

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 191](#) (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 128](#)

[“SETup:PFERror” on page 642](#)

[“INITiate” on page 555](#)

[“FETCh:PFERror” on page 516](#)

[“Comprehensive Program Example” on page 269](#)

\*\*\*\*\*

## 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 289](#).

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 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 191](#) (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 128](#)

[“SETup:PFERror” on page 642](#)

[“INITiate” on page 555](#)

[“FETCh:PFERror” on page 516](#)

[“Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

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## PFER Troubleshooting

### Possible Setup Issues

During remote operation of the Phase and Frequency Error measurement you should configure the trigger arm to single, see [“SETup:PFERror:CONTinuous” on page 643](#).

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 221](#).

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 778](#) 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 191](#).

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 373](#).



---

## 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 137](#)
- [“GPRS Power versus Time Measurement” on page 142](#)

### 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 140](#).

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 166](#)).

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 530](#).

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 651](#). 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 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 191](#).
- 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  $\pm 3$  dB of expected input level.
3. Input signal frequency is within  $\pm 10$  kHz of expected input frequency.

### Trigger Source

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

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

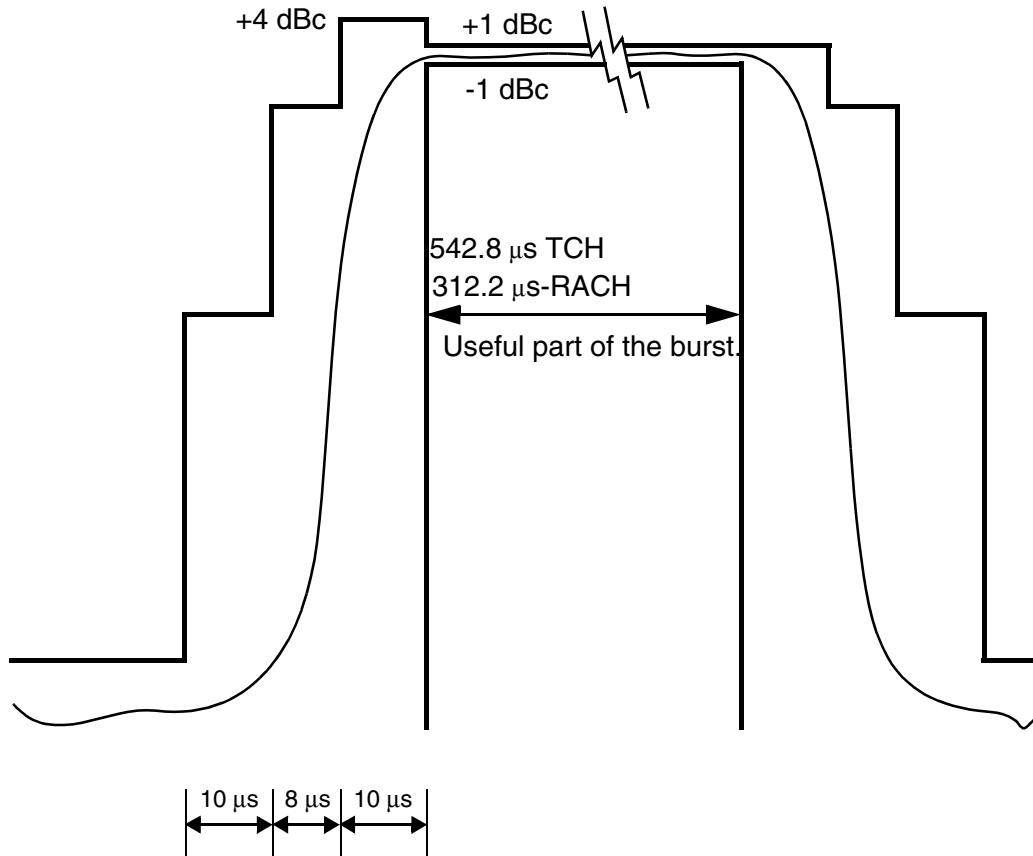
In situations where no protocol trigger is available, the test set will choose RF rise triggering for the PvT measurement. An example of this situation might be when the test set is in test mode operating mode.

**Table 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
Burst 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 219](#).

Figure 4. Typical GSM PvT Measurement



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

## Burst Synchronization

The P<sub>v</sub>T measurement provides you with a choice for the time reference setting (burst synchronization). (See [“Burst Synchronization of Measurements” on page 180](#)).

**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 148](#)

[“Test Adherence to Standards” on page 173](#)

[“PVT Troubleshooting” on page 152](#)

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## 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 146](#).

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 191](#).

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 166](#)).

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 406](#).

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 542](#) 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 652](#). 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 531](#).
  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 191](#).

## Power versus Time Measurement Description

- 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 424](#).

## 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  $\pm 3$  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.

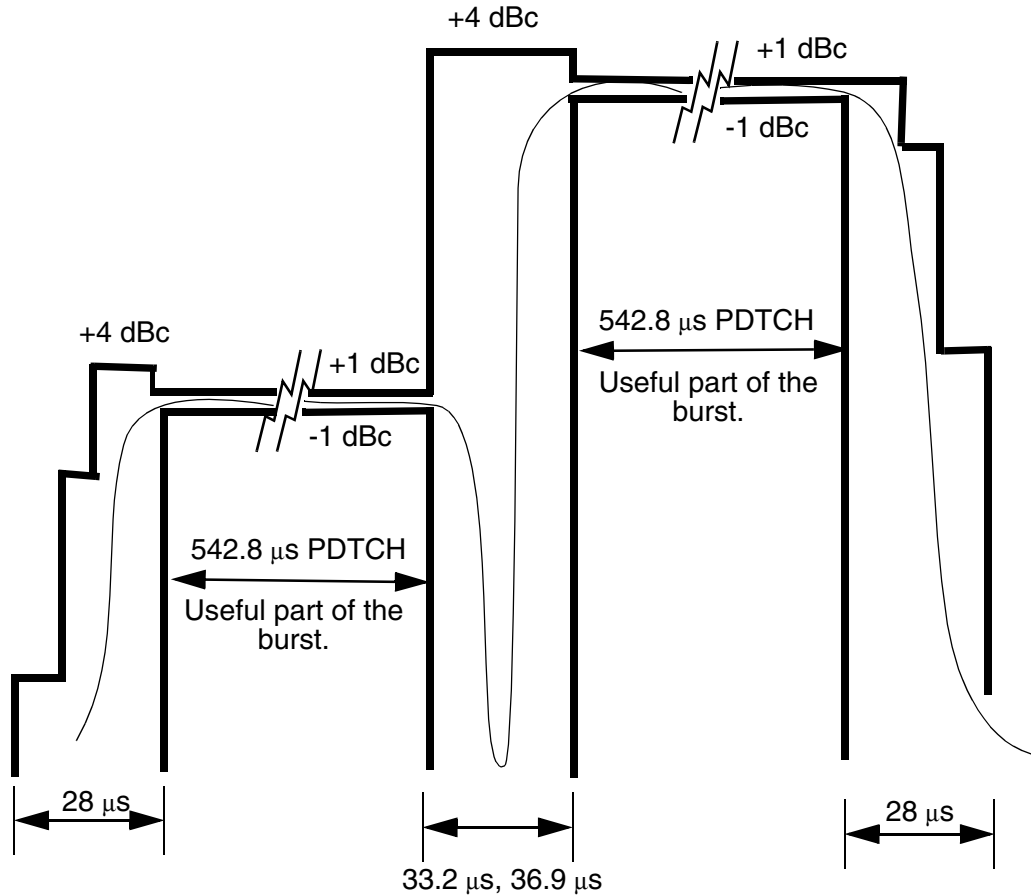
In situations where no protocol trigger is available, the test set chooses RF rise triggering for the PvT measurement. An example of this situation is when the test set is in one of the test mode operating modes.

**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
Burst 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 219](#).

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



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

## Burst Synchronization

The P<sub>v</sub>T 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 180](#).

**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

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[“Programming a Power versus Time Measurement” on page 148](#)

[“Test Adherence to Standards” on page 173](#)

[“PVT Troubleshooting” on page 152](#)

\*\*\*\*\*

## Programming a Power versus Time Measurement

This section contains two programming examples:

- [“Programming a Power versus Time Measurement for GSM” on page 148](#)
- [“Programming a Power versus Time Measurement for GPRS” on page 149](#)

### 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 36](#).

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 191](#) (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 137](#)

[“SETup:PVTime” on page 647](#)

[“INITiate” on page 555](#)

[“FETCh:PVTime” on page 523](#)

[“Comprehensive Program Example” on page 269](#)

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## 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 411](#)) and the data connection type has been set to ETSI Type B (using [“CALL:FUNCTION:DATA:TYPE” on page 388](#)). 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 289](#).

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 388](#)). 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 411](#)).

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 191](#).
- `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 531](#).
- `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 142](#)

[“SETup:PVTime” on page 647](#)

[“INITiate” on page 555](#)

[“FETCh:PVTime” on page 523](#)

[“Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

\*\*\*\*\*

## 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 649](#).

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 221](#).

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 778](#) 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 multislots 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 multislots 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 Multislots 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 191](#).

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 839](#).

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 839](#).

### 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 373](#).

### 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 180](#).

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 152](#).

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.

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## RACH Measurement Description

This measurement is *not* applicable to GPRS.

### What is a RACH?

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

### Measurements that can be performed on a RACH

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

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

---

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

---

### Triggering

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

Active Cell mode:

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

Test mode:

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

### Overview of Measurement Procedure in Active Cell Mode

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

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

## Overview of Measurement Procedure in Test Mode

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

## Example Procedure

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

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

## Related Topics

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[“Programming a RACH Measurement” on page 156](#)

[“RACH Troubleshooting” on page 159](#)

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## Programming a RACH Measurement

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

### Overview of Measurement Procedure

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

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

---

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

---

## Programming Example

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

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

```

10  INTEGER Int
20  DIM Results(11)
30  REAL Mask,Power
40  OUTPUT 714;"*RST"
50  OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:SELECTED 20" !Configures the
60          !test set to expect a transmission on ARFCN 20.
70  OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10 DBM" !Configures
80          !the test set to expect a power level of 10 dBm.
90  OUTPUT 714;"SETUP:PVTIME:CONTINUOUS OFF" !Configures trigger
100         !mode to single for a pvt measurement.
110 OUTPUT 714;"SETUP:PVTIME:COUNT:STATE OFF" !Configures the
120 !multi_measurement state to OFF.
130 OUTPUT 714;"SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Configures the
140         !trigger source to AUTO.
150 OUTPUT 714;"INITIATE:PVTIME" !Start a pvt measurement.
160 PRINT "Connect your mobile to the Test Set and initiate a call"
170 PRINT "from the mobile."
180 OUTPUT 714;"FETCH:PVTIME:ALL?"!Fetches the measurement integrity
190 !value, mask indicator, tx power, and pvt offsets.
200 ENTER 714;Int,Mask,Power,Results(*)
210 PRINT "*****"
220 PRINT "*Power vs Time RACH Measurement Results*"
230 PRINT "*****"
240 PRINT "Integrity = ";Integrity
250 PRINT "Mask = ";Mask
260 PRINT "Carrier Power =";Power
270 PRINT "Offset          Level (dB)"
280 PRINT "(micro sec)    (dB)"
290 PRINT "-----"
300 PRINT "-28           ";Results(0)
310 PRINT "-18           ";Results(1)
320 PRINT "-10           ";Results(2)
330 PRINT "0             ";Results(3)
340 PRINT "321.2         ";Results(4)
350 PRINT "331.2         ";Results(5)
360 PRINT "339.2         ";Results(6)
370 PRINT "349.2         ";Results(7)
380 PRINT "542.8         ";Results(8)
390 PRINT "552.8         ";Results(9)
400 PRINT "560.8         ";Results(10)
410 PRINT "570.8         ";Results(11)
420  EN

```

## Related Topics

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[“RACH Measurement Description” on page 154](#)

[“RACH Troubleshooting” on page 159](#)

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## RACH Troubleshooting

### Possible Setup Issues

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

If required refer to the appropriate command:

- [“SETup:PVTime:COUNT:STATE” on page 650](#)
- [“SETup:TXPower:COUNT:STATE” on page 659](#)
- [“SETup:PFError:COUNT:STATE” on page 644](#)

### Interpreting Integrity Indicator values

See [“Integrity Indicator” on page 191](#).

## 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

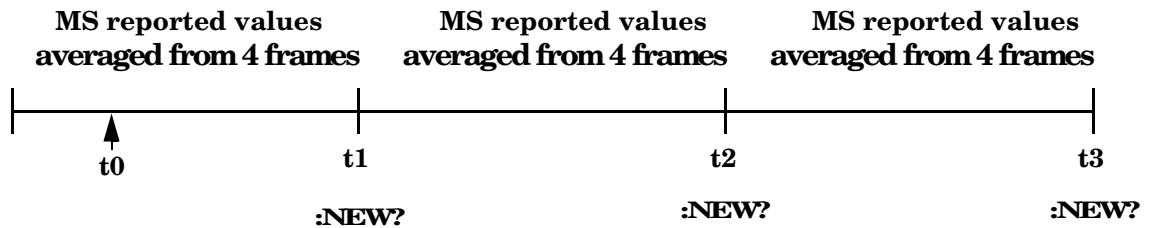
:NEW? queries hang until a new SACCH message is received by the test set. The mobile station issues data updates on the SACCH every 480 ms, (4 frames).

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

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[“Configuring Mobile Station Operating Parameters” on page 772](#)

[“CALL:MS:REPorted:TXLevel\[:LAST\]?” on page 404](#)

[“CALL:MS:REPORTED:TXLEVEL:NEW?;NEW?;NEW?” on page 405](#)

[“CALL:MS:REPorted:TADVance\[:LAST\]?” on page 403](#)

[“CALL:MS:REPorted:TADVance:NEW?;NEW?;NEW?” on page 404](#)

[“CALL:MS:REPorted:RXLevel\[:LAST\]?” on page 401](#)

[“CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?” on page 402](#)

[“CALL:MS:REPorted:RXQuality\[:LAST\]?” on page 402](#)

[“CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?” on page 403](#)

[“CALL:MS:REPorted:NEIGHbour\[1\]?” on page 400](#)

\*\*\*\*\*

# 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  $\geq 12$  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 164](#)

[“Analog Audio Troubleshooting” on page 71](#)

[“Analog Audio Measurement Description” on page 68](#)

[“Test Adherence to Standards” on page 173](#)

\*\*\*\*\*

## 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  $\pm 8$  kHz peak deviation. It is also assumed that the Cell Power from the test set is set to a minimum usable level (typically about -116 dBm).

1. Configure 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 191](#).
- `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 555](#)

[“SETup:AAUDio” on page 589](#)

[“FETCh:AAUDio” on page 474](#)

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## 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 587 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 180). 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 137 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  $\pm 0.32$  dB for 810 MHz to 960 MHz and  $\pm 0.42$  dB for 1.7 GHz to 1.99 GHz when.

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

## Trigger Source

Auto triggering is the recommended trigger source for each measurement. 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 167

**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 169](#)

[“Test Adherence to Standards” on page 173](#)

[“Transmit Power Troubleshooting” on page 172](#)

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## Programming a Transmit Power Measurement

This section contains two programming examples:

- [“Programming a Transmit Power Measurement for GSM” on page 169](#)
- [“Programming a Transmit Power Measurement for GPRS” on page 170](#)

### 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 36](#).

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 191](#) (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 166](#)

[“SETup:TXPower” on page 657](#)

[“INITiate” on page 555](#)

[“FETCh:TXPower” on page 550](#)

[“Comprehensive Program Example” on page 269](#)

\*\*\*\*\*

## 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 289](#).

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 191](#) (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 166](#)
- [“SETup:TXPower” on page 657](#)
- [“INITiate” on page 555](#)
- [“FETCh:TXPower” on page 550](#)
- [“Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

\*\*\*\*\*

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## 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 657](#).

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 221](#).

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 191](#).

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 839](#).

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 839](#).

## 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 sections 13.1 and 13.16.1 (formerly ETSI GSM 11.10)

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 128](#)

[“Programming a Phase and Frequency Error Measurement for GSM” on page 132](#)

[“Programming a Phase and Frequency Error Measurement for GPRS” on page 134](#)

\*\*\*\*\*

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

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 460 for GSM, “CALL:STATus:PDTCH | PDTChannel:TERRor?” on page 458 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 191](#).

### **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 166](#)

[“Programming a Transmit Power Measurement for GSM” on page 169](#)

[“Programming a Transmit Power Measurement for GPRS” on page 170](#)

[“GSM Power versus Time Measurement” on page 137](#)

[“GPRS Power versus Time Measurement” on page 142](#)

[“Programming a Power versus Time Measurement for GSM” on page 148](#)

[“Programming a Power versus Time Measurement for GPRS” on page 149](#)

\*\*\*\*\*

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

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 634).

### 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 120

[“Programming an Output RF Spectrum Measurement for GSM”](#) on page 123

[“Programming an Output RF Spectrum Measurement for GPRS”](#) on page 125

\*\*\*\*\*

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

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 113](#)

["Programming a Fast Bit Error Measurement" on page 116](#)

\*\*\*\*\*

## 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 107](#)

["Programming an I/Q Tuning Measurement" on page 109](#)

\*\*\*\*\*



## 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 101](#)

[“Programming a Dynamic Power Measurement” on page 103](#)

\*\*\*\*\*

## 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

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# 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 128](#) and [“Power versus Time Measurement Description” on page 137.](#)) 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 755.](#)

---

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 191](#) 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 191](#)

[“INITiate” on page 555](#)

[“SETup Subsystem” on page 588](#)

\*\*\*\*\*

## 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 36](#).

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 191](#) (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 783](#)

[“CALL:TCHannel:CMODE” on page 465](#)

\*\*\*\*\*

## 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 36](#) or for GPRS see, [“Step 4: Make a connection” on page 289](#).

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

### Related Topics

\*\*\*\*\*

For GSM:

- [“Performing a Dual-Band Handover” on page 262](#)
- [“CALL:TCHannel” on page 461](#)

For GPRS:

- [“Step 6: Reconfigure Test Set and Mobile Station Connection Parameters” on page 294](#)

\*\*\*\*\*



---

## 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
```

## Dealing With Semicolon Separated Response Data Lists

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

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

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

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

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

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

---

## Concurrent Measurements

### Description

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

### Operating Considerations

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

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

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

## Concurrent Measurements for the GSM and GPRS Test Applications

This table shows the concurrency considerations for the GSM Mobile Test Application. Refer to the [“Table Key” on page 189](#) 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	Bite Error Rate
Uplink Path Demodulation															
Transmit Power		B													
Power vs. Time			B												
Phase & Frequency Error				B											
Output RF Spectrum					B										
I/Q Tuning										B					
Fast Bit Error Rate	A						A	A							
Decoded Audio	A														
Downlink Speech Source	A														
Audio Source															
Analog Audio Meas															
Mobile SACCH info															
Transmit Power Level change	C														
TCH assignment/handover	C														
Dynamic Power	D														

**Table 2. GPRS Concurrency Considerations**

	Transmit Power	Power vs. Time	Phase & Frequency Error	Output RF Spectrum	Bit Error Rate	Transmit Power Level Change	PDTCCH Reconfigure
Uplink Path Demodulation							
Transmit Power	C		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 199](#)

[“Block Diagram” on page 746](#)

\*\*\*\*\*

# 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"> <li>• an input signal that is corrupted</li> <li>• the input signal is extremely distorted</li> <li>• the input signal is off by more than 10 ms.</li> <li>• the frequency of the input signal deviates more than allowed</li> <li>• something is wrong with the long-code mask coming from the mobile ID</li> </ul>
18	<p>Frequency Out Of Range: Indicates that a Channel Power Measurement was attempted at a frequency for which there is no calibration data. The test set display will indicate 4 dashes.</p>
19	<p>Uncalibrated Due To Temperature: Indicates that the current temperature of the test set is different than the calibration data temperature by more than <math>\pm 10</math> degrees C, when attempting a Channel Power Measurement.</p>
20	<p>Potential Receiver Saturation: Indicates that an input signal immediately prior to the measured input was high enough to potentially saturate the receiver hardware.</p>
21	<p>Parameter Error: Indicates that a measurement setup parameter has been set in a way that gives invalid measurement results.</p>
22	<p>Unsupported Configuration: Indicates that some parameter, other than a measurement setup parameter has been set so that it causes an invalid measurement result. Typically this would be a base station emulator parameter.</p>
23	<p>Call Processing Operation Failed: Indicates that a call processing operation, (base station emulator) needed in the course of making the measurement could not complete.</p>

## 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 845](#)

\*\*\*\*\*

## Measurement Timeouts

### Description

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

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

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

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

### Timeout Default Values

**Table 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 191](#)

["SETup Subsystem" on page 588](#)

\*\*\*\*\*

---

## 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.

- $9.9\text{E}+37$  = INFinity (Infinity)
- $-9.9\text{E}+37$  = NINF (Negative Infinity)
- $9.91\text{E}+37$  = NAN (Not A Number)

#### **$9.9\text{E}+37$ (INFinity)**

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

#### **$-9.9\text{E}+37$ (NINFinity)**

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

#### **$9.91\text{E}+37$ (NAN)**

$9.91\text{E}+37$  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,  $9.91\text{E}+37$  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 203](#)

\*\*\*\*\*

# 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 557](#) for more details about this query.

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

- "AAUD" - The analog audio measurement results are available.\*
- "BERR" - The GSM bit error measurement results are available.
- "DAUD" - The decoded audio measurement results are available.\*
- "DPOW" - The dynamic power measurement results are available.
- "FBER" - The fast bit error measurement results are available.
- "GBER" - The GPRS bit error measurement results are available.
- "IQT" - The I/Q Tuning measurement results are available.
- "ORFS" - The output RF spectrum measurement results are available.
- "PFER" - The phase and frequency error measurement results are available.
- "PVT" - The power versus time measurement results are available.
- "TXP" - The transmit power 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 558](#). 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 558](#). 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 36](#) and [“Triggering Process Description” on page 220](#).

```

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 679](#) 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 215](#).
- 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 662](#) or [“Status Subsystem Overview” on page 204](#).
- STATUS:OPERation bit (512 for NMRReady).
- Service Request Enabling (\*SRE 128 for NMRReady).

The [“STATUS:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 679](#) 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 553](#)

["What Happens When a Measurement is INITiated?" on page 553](#)

["Concurrent Measurements" on page 187](#)

\*\*\*\*\*

---

## 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

\*\*\*\*\*

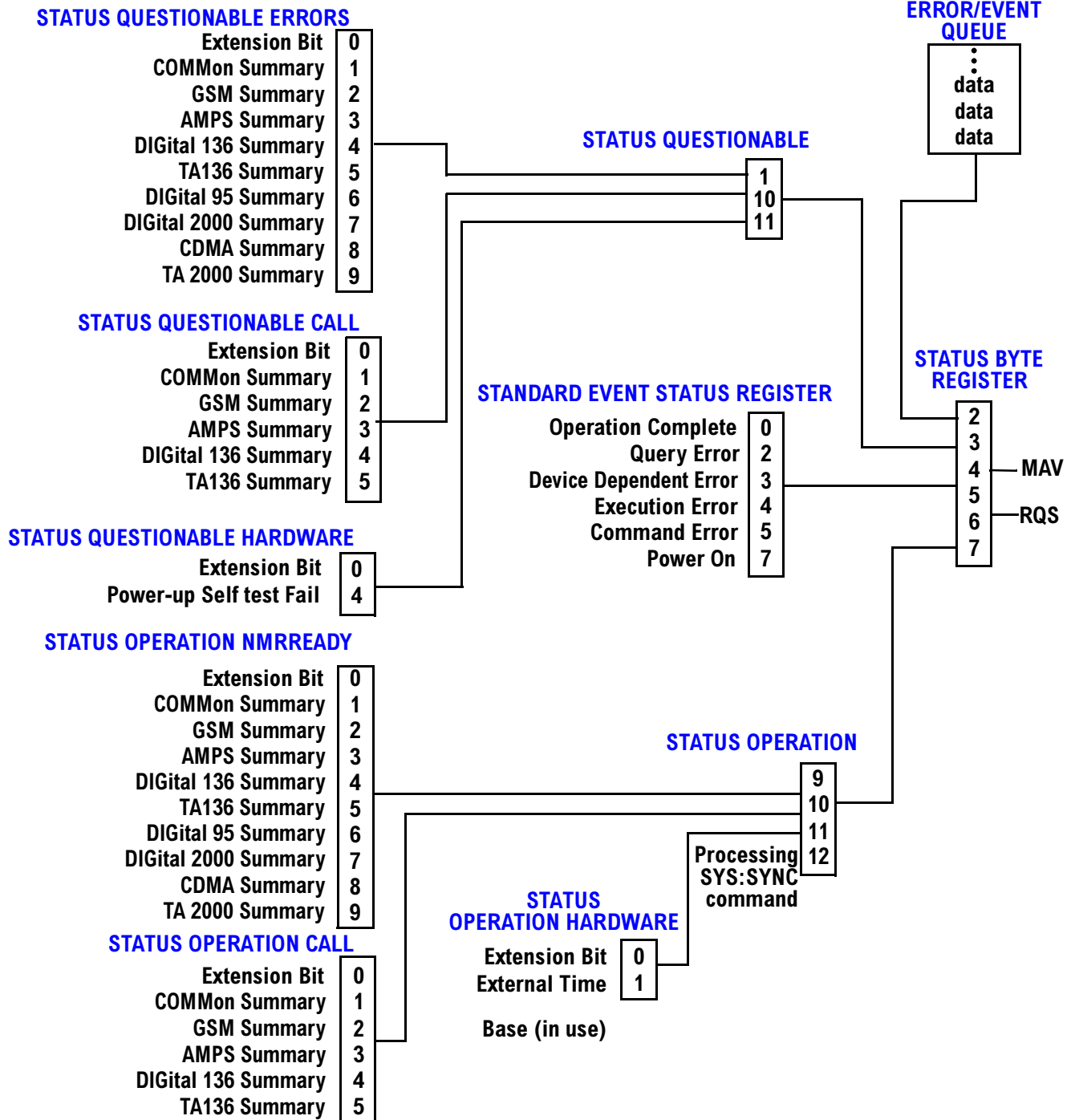
["Measurement Progress Report" on page 198](#)

\*\*\*\*\*

## Status Subsystem Overview

### Description

Overview of STATus Reporting Structure



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	7
Identification	8
Channel Mode Not Supported	9

Bit 2  
STATUS  
QUESTIONABLE

**STATUS QUESTIONABLE ERRORS GSM**

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

Bit 2  
STATUS  
QUESTIONABLE  
ERRORS

**STATUS OPERATION NMRREADY GSM**

Extension Bit	0
Tx Power	1
Power vs. Time	2
Phase/Freq Error	3
Output RF Spectrum	4
Analog Audio	5
Decoded Audio	6
Fast Bit Error Rate	7
Bit Error	8
I/Q Tuning	9
Dynamic Power	10
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 The DIGital136 Registers

**STATUS QUESTIONABLE ERRORS DIGITAL 136**

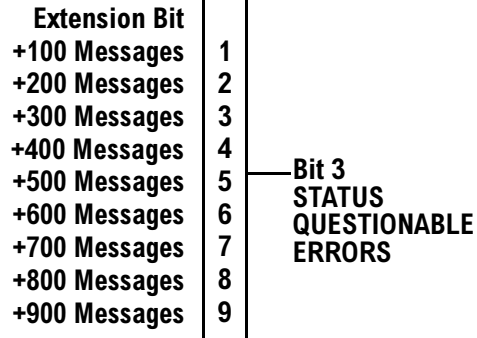
Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 4 STATUS QUESTIONABLE ERRORS
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	

**STATUS OPERATION NMRREADY DIGITAL 136**

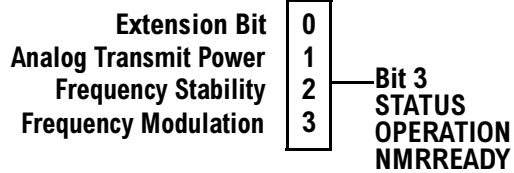
Extension Bit	0	
Digital Transmit Power	1	
Modulation Accuracy	2	
Adjacent Channel Power	3	
Loopback BER	4	Bit 4 STATUS OPERATION NMRREADY
Digital IQ Adjust	5	
Digital Dynamic Power	6	

Status Reporting Structure For The AMPS Registers

**STATUS QUESTIONABLE ERRORS AMPS**



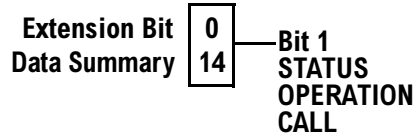
**STATUS OPERATION NMRREADY AMPS**



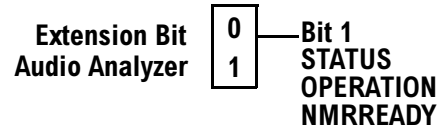


Status Reporting Structures For The COMMON Registers

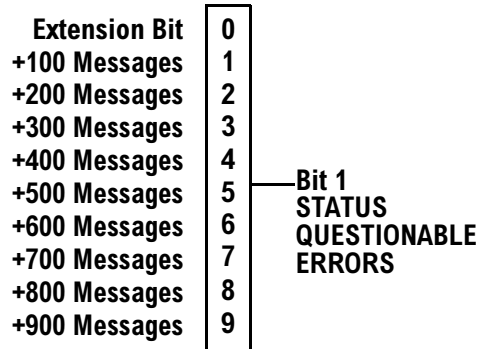
**STATUS OPERATION CALL COMMON**



**STATUS OPERATION NMRREADY COMMON**



**STATUS QUESTIONABLE ERRORS COMMON**



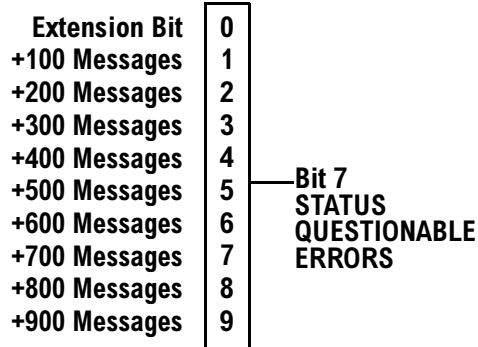
Status Reporting Structures For The TA136 Registers

**STATUS QUESTIONABLE ERRORS TA136**

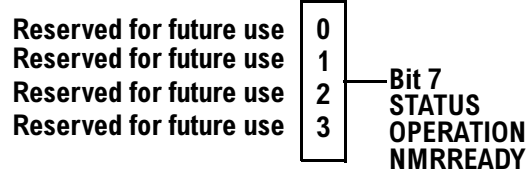
Extension Bit	0	
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	Bit 5
+600 Messages	6	STATUS
+700 Messages	7	QUESTIONABLE
+800 Messages	8	ERRORS
+900 Messages	9	

Status Reporting Structure For The DIGital 2000 Registers

**STATUS QUESTIONABLE ERRORS DIGITAL 2000**



**STATUS OPERATION NMRREADY DIGITAL 2000**



## Status Reporting Structure For The CDMA Registers

### STATUS QUESTIONABLE ERRORS CDMA

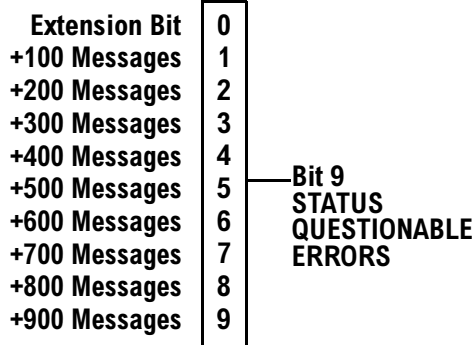
Extension Bit	0	Bit 8 STATUS QUESTIONABLE ERRORS
+100 Messages	1	
+200 Messages	2	
+300 Messages	3	
+400 Messages	4	
+500 Messages	5	
+600 Messages	6	
+700 Messages	7	
+800 Messages	8	
+900 Messages	9	

### STATUS OPERATION NMRREADY CDMA

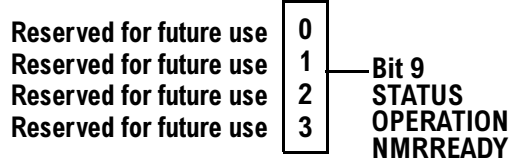
Extension Bit	0	Bit 8 STATUS OPERATION NMRREADY
DA Power	1	
WQuality	2	
C Power	3	

Status Reporting Structure For The TA 2000 Registers

**STATUS QUESTIONABLE ERRORS TA 2000**



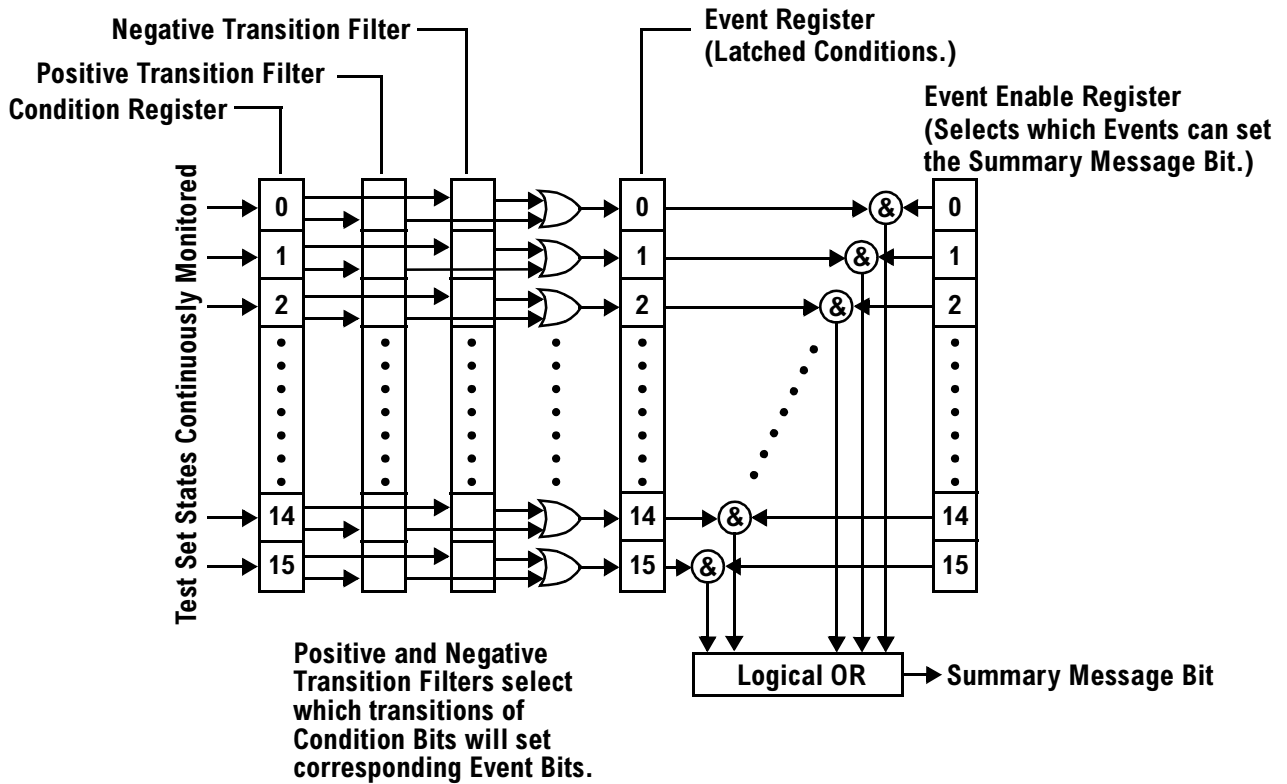
**STATUS OPERATION NMRREADY TA 2000**



**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.

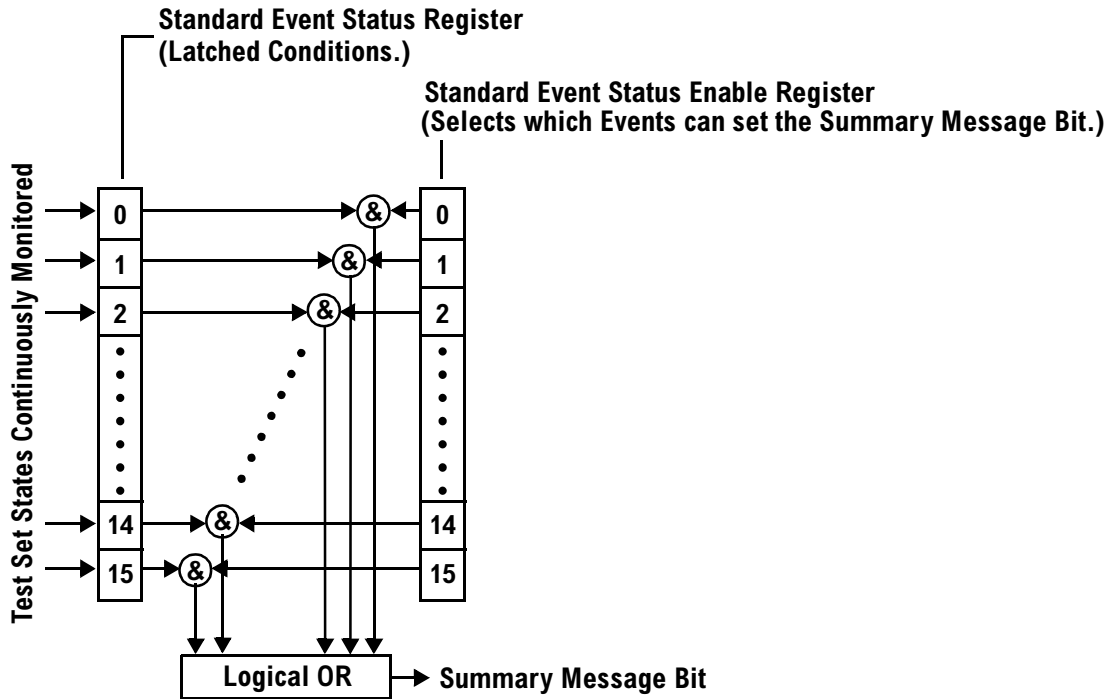
Transition Filters are unaffected by a \*CLS (clear status) command.

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



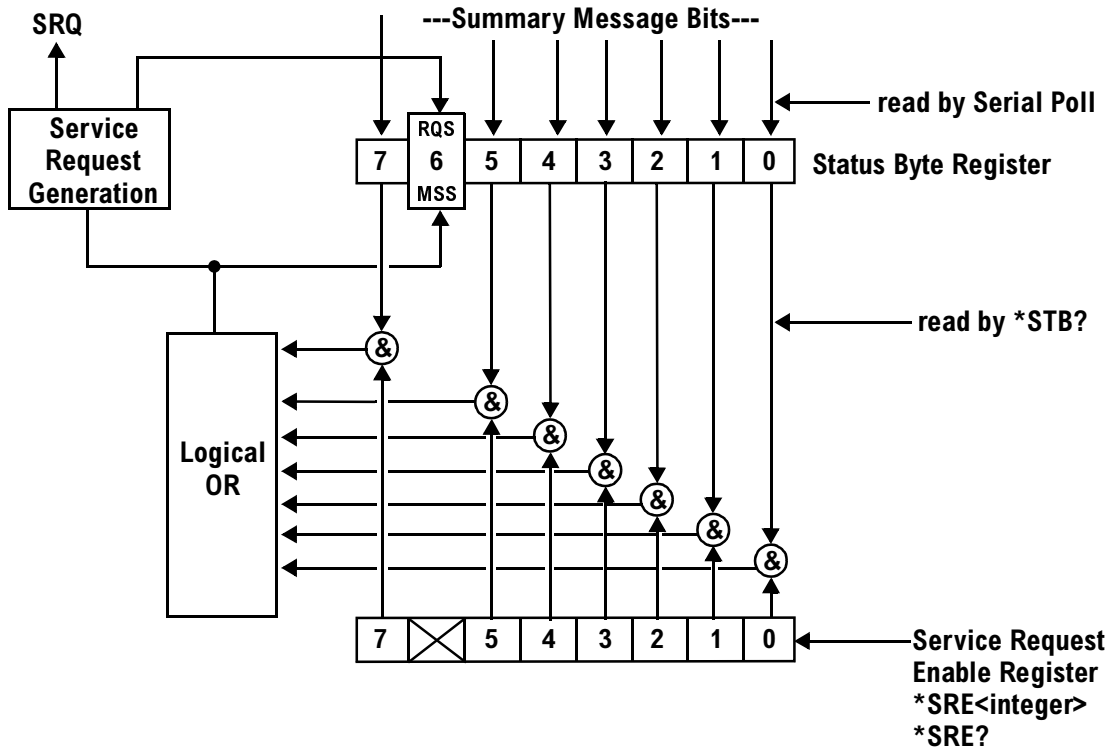
**Summary Message Bit** The Summary Message is a single-bit message which indicates whether or not one or more of the enabled events have occurred since the last reading or clearing of the Event Register. The test set logically ANDs corresponding bits in the Event and Enable registers and then performs 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 Bute Register can be read with either a serial poll or the \*STB? common query. The value for bit 6 is dependant on which method used.

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

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

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

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

## Status Subsystem Overview

queue.

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

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

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

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

## Related Topics

\*\*\*\*\*

[“STATus Subsystem Description” on page 662](#)

[“Standard Event Status Register” on page 701](#)

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# 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.

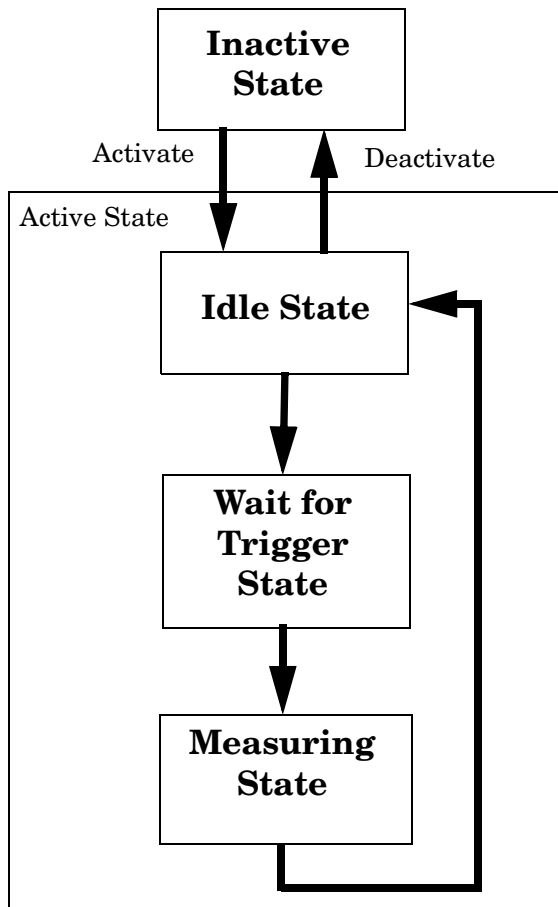
**Auto Trigger Source:** When auto triggering is selected, the test set automatically chooses the best trigger source for that measurement. This trigger source setting is convenient because the measurement trigger doesn't need to be changed when switching parameters. Auto trigger source is the best choice 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 220.

### 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

**Table 5. Trigger Arm Default Settings**

Action	Trigger Arm Default Setting
*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 191](#)

[“SETup:ORFSpectrum:TRIGger:SOURce” on page 641](#)

[“SETup:PFERror:TRIGger:SOURce” on page 646](#)

[“SETup:PVTime:TRIGger:SOURce” on page 656](#)

[“SETup:IQTuning:TRIGger:SOURce” on page 632](#)

[“SETup:TXPower:TRIGger:SOURce” on page 660](#)

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# 5 GSM Programming Guide

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



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## Introduction

- [“Conventions used in this Programming Guide” on page 225](#)
- [“Purpose of this Programming Guide” on page 225](#)
- [“How this Programming Guide is Organized” on page 225](#)
- [“How to use this Programming Guide” on page 227](#)
- [“About the Programming Examples Presented in This Programming Guide” on page 227](#)

## Conventions used in this Programming Guide

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

## Purpose of this Programming Guide

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

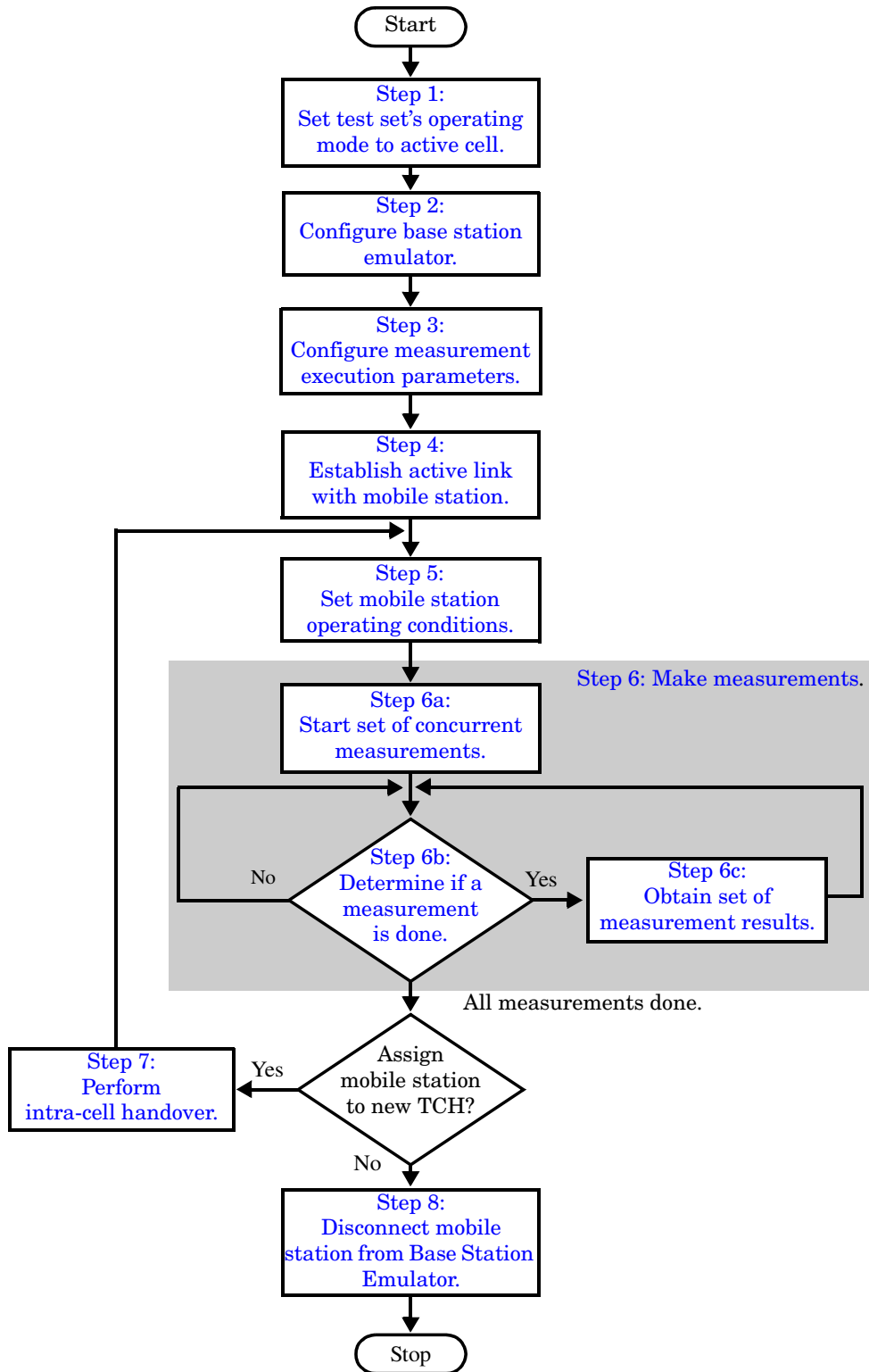
## How this Programming Guide is Organized

The Programming Guide is organized around a typical set of tasks a control program would normally perform when testing a mobile station in a manufacturing environment. The set of tasks is shown in [“Figure 1. Typical Flow of Tasks Performed by a Control Program” on page 226](#).

Typically in a manufacturing environment:

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

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



## How to use this Programming Guide

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

The last section of the Programming Guide presents a [“Comprehensive Program Example” on page 269](#) which uses all of the topics discussed in sections 1 through 8 together in one program to give you a sense of how to tie everything together.

## About the Programming Examples Presented in This Programming Guide

### Programming Language:

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

### Syntax Used in Programming Examples:

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

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

the shortened form would be:

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

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

```
CALL[:CELL[1]]:POWer[:SAMPlitude] <numeric value>[<suffix>]
```

appears in the programming examples as:

```
CALL:POW <numeric value>
```

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

## Go to Links



[Step 1](#)

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

### Background

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

An important characteristic of the test set's base station emulator is its operating mode. The operating mode sets the way in which the base station emulator interacts with the mobile station. The base station emulator has two operating modes; active cell mode and test mode.

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

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

### Overview of Active Cell Operating Mode

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

### Active Cell Features

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

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

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

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

### Example 1. Command Syntax:

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

### Example 2. Programming Example:

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

## Step 2: Configure the Base Station Emulator

### Background

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

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

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

---

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

---

To configure the base station emulator you must configure the BCH and the TCH as described in the following sections. There are numerous parameters that can be configured for both the BCH and the TCH. It may not be necessary to configure all the parameters all the time. The test set's default settings will allow a properly functioning mobile station to successfully camp on the cell under most circumstances.

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

## Configuring the Broadcast Channel Parameters

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

### Broadcast Channel Settable Parameters

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

## Step 2: Configure the Base Station Emulator

### Table Footnotes

1. The broadcast band setting becomes the selected (:SElected) band (see note 3).
2. Sets amplitude to <numeric value> and state to ON in one command.
3. Sets the BCH channel for the broadcast band selected with the broadcast band command (see note 1).
4. Can only be set when Cell Activated State = OFF. See ["Things That Can Go Wrong" on page 234](#).
5. Sets PCS mobile country code to <numeric value> and state to ON in one command.
6. Sets the BA table entries for the broadcast band selected with the broadcast band command (see note 1).
7. Setting Paging Mode to Normal causes the mobile station to use discontinuous reception (that is, DRX = ON).

**Programming Example** The following program example illustrates the use of the base station emulator BCH configuration commands. Note the use of the cell activated state command to set the network configuration parameters.

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



## Configuring the Traffic Channel Parameters

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

### Traffic Channel Settable Parameters

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

### Table Footnotes

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

**Programming Example** The following program example illustrates the use of the base station emulator TCH configuration commands.

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

## Things That Can Go Wrong

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

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

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

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

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

#### Example 1. Command Syntax:

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

#### Example 2. Programming Example:

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

## Effects of Activating and Deactivating the Cell

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

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

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

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

## Step 3: Configure the Measurement Execution Parameters

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

### Measurement Execution Parameters

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

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

### Step 3: Configure the Measurement Execution Parameters

## Overview of the SETup subsystem

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

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

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

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

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

### Measurement Mnemonics Used In The SETup Subsystem

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

## Configuring Measurement Averaging Parameters

### Measurement Averaging Parameters

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

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

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

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

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

### Multi-Measurement Count State Parameter

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

### Multi-Measurement Count Number Parameter

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

## Configuring Measurement Triggering Parameters

### Measurement Triggering Parameters

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

### Trigger Arm Parameter

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

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

For example,

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

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

---

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

---

### Step 3: Configure the Measurement Execution Parameters

#### Trigger Source Parameter

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

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

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

#### Trigger Delay Parameter

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

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

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

#### Trigger Qualifier Parameter

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

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

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

### Configuring the Burst Synchronization Parameter

#### Burst Synchronization Parameter

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

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

The command syntax for setting the burst synchronization parameter is:

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

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

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

## Configuring Measurement Timeout Parameters

### Measurement Timeout Parameters

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

### Configuring Measurement Timeout State and Timeout Time Simultaneously

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

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

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

### Measurement Timeout State Parameter

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

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

would enable measurement timeouts for the power versus time measurement.

### Measurement Timeout Time Parameter

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

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

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

## Configuring Measurement Specific Parameters

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

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

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

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

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

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

- Using a string variable:

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

- Using numeric arrays:

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



## Programming Example

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

```

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

```

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

### Call Connect Synchronization

#### Why is Call Connect Synchronization Important?

When the control program requires that an active link be established between the mobile station and the test set, it must also be able to obtain knowledge about the status of the link. The control program issues the commands necessary to initiate the call connect/disconnect process, either to the test set (for a base station emulator originated call) or to the mobile station (for a mobile station originated call). The control program must then be able to determine when the call has been successfully connected so that the control program can proceed. It must also be able to determine if the call has not been successfully connected so appropriate action can be taken.

#### Call States

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

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

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

---

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

---

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

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

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

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

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

The test set implements a set of commands designed specifically for call connect/disconnect synchronization. (see [“Step 8: Disconnect the Mobile Station from the Base Station Emulator” on page 264](#) for call disconnect synchronization). These commands directly address many of the inherent problems discussed above. When properly used these commands eliminate the need for rapid polling of the instrument, and relieve the programmer of many of the tasks associated with error handling.

## Call Connect/Disconnect Synchronization Commands

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

The basic operation of this query is:

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

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

---

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

---

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

### Example 1. Command Syntax:

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

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

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

### Example 2. Command Syntax:

```
CALL:CONNECTed:ARM[:IMMediate]
```

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

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

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

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

### Example 3. Command Syntax:

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

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

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

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

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

#### Example 4. Command Syntax:

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

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

The time-out timer is started whenever the call-state-change-detector is armed or gets rearmed when already armed. The duration of the time-out is set using the call-connected-time-out command and should be set to the maximum amount of time the control program should wait between arming and the connect process to begin. Once the process starts and the call state has moved into one of the transitory states the GSM defined protocol timers take over and prevent the call state from staying in a transitory state forever.

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

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

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

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

## Overview

You can establish an active link with the mobile station when the test set is in active cell operating mode in two ways:

- Base station originated call
- Mobile station originated call

## Process for Making a Base Station Originated Call

The process for making a base station originated call is shown in [“Figure 1. Process for Making a Base Station Originated Call” on page 247.](#)

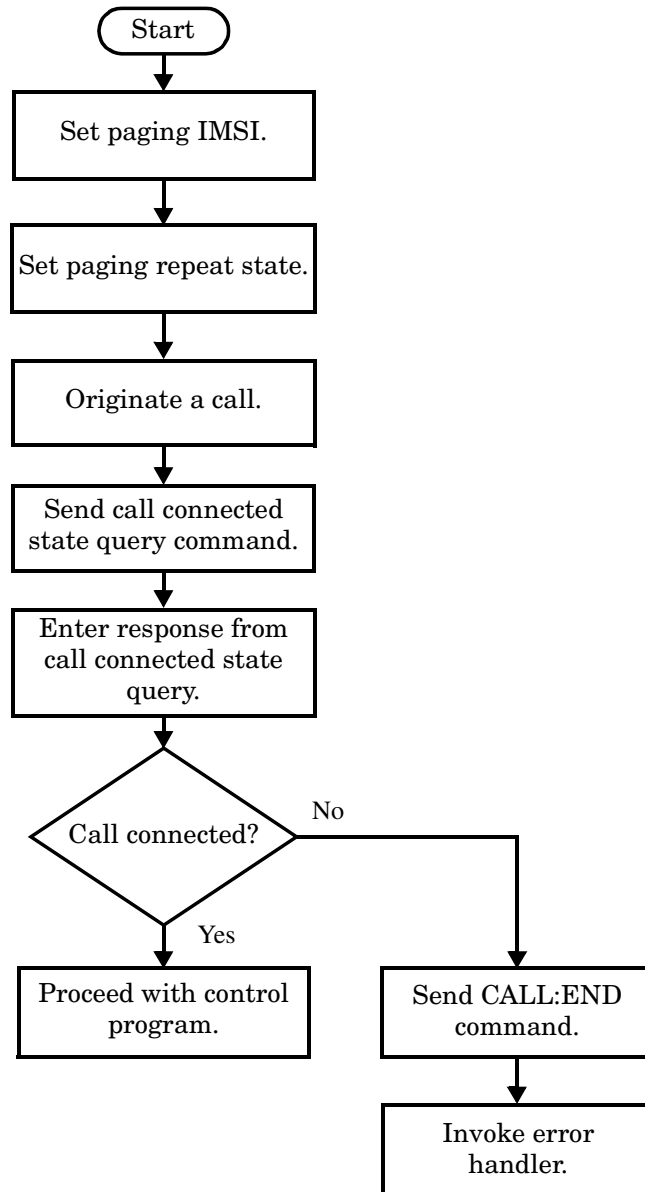
You will use the CALL:ORIGinate command to initiate a base station originated call.

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

### Call Origination Process Commands

Process Step	Command Syntax
Paging the Mobile Station	CALL:ORIGinate
Setting the Paging IMSI	CALL:PAGing:IMSI <string>
Setting the Paging Repeat Sate	CALL:PAGing:REPeat[:STATe] <ON   1   OFF   0>

Figure 1. Process for Making a Base Station Originated Call



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

### Programming Example

```
OUTPUT Test_set;"CALL:PAG:IMSI `001012345678901`" ! Set paging IMSI
OUTPUT Test_set;"CALL:PAG:REP OFF" ! Set paging repeat state to off
OUTPUT Test_set;"CALL:ORIG" ! Start a base station originated call
OUTPUT Test_set;"CALL:CONN:STAT?" ! Hanging HP-IB query
ENTER Test_set;Call_connected ! Program will hang here until
                                ! origination passes or fails
IF NOT Call_connected THEN ! Check if connection successful
    OUTPUT Test_set;"CALL:END"
    ! <put error handler here>
END IF
! Call is connected so proceed with control program
```

### Process for Making a Mobile Station Originated Call

The process for making a mobile station originated call is shown in [“Figure 2. Process For Making A Mobile Station Originated Call”](#) on page 249.

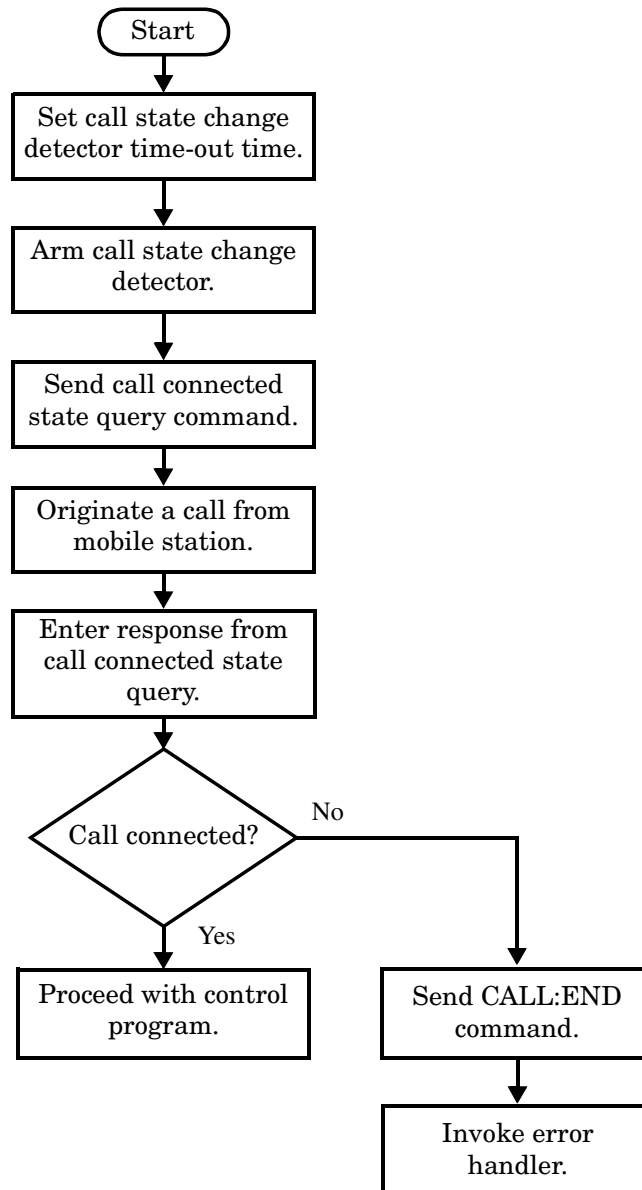
There is no facility in the test set to initiate a call connect from the mobile station. This must be accomplished manually or through a test bus built into the mobile station.

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

For mobile station originated calls where the call is originated by physically dialing a number (as opposed to using a test bus) ensure that the call-state-change-detector time-out time is long enough to allow a human to dial the number.



Figure 2. Process For Making A Mobile Station Originated Call



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

##### Example 1. Programming Example:

```
OUTPUT Test_set;"CALL:CONN:TIM 5"      ! Set timeout time to 5 seconds
OUTPUT Test_set;"CALL:CONN:ARM"        ! Arm the change detector
OUTPUT Test_set;"CALL:CONN:STAT?"      ! Initiate call connect state query
DISP "Originate call from mobile station."
ENTER Test_set;Call_connected          ! Program will hang here until
                                        ! origination passes or fails
IF NOT Call_connected THEN             ! Check if connection successful
    OUTPUT Test_set;"CALL:END"
! <put error handler here>
END IF
! Call is connected so proceed with control program
```

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

### Mobile Station Transmit Power Level

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

### Overview

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

**Settable Mobile Station Operating Conditions**

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

### Table Footnotes

1. The TCH band setting becomes the selected band.

**Programming Example** The following example illustrates how to set the mobile station's operating conditions.

```
OUTPUT Test_set;"CALL:MS:DTX OFF"  
OUTPUT Test_set;"CALL:MS:TXL 14"
```

The first line sets mobile station discontinuous transmission off. Then, the mobile's transmit level is set to 14.

## Step 6: Make Measurements

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

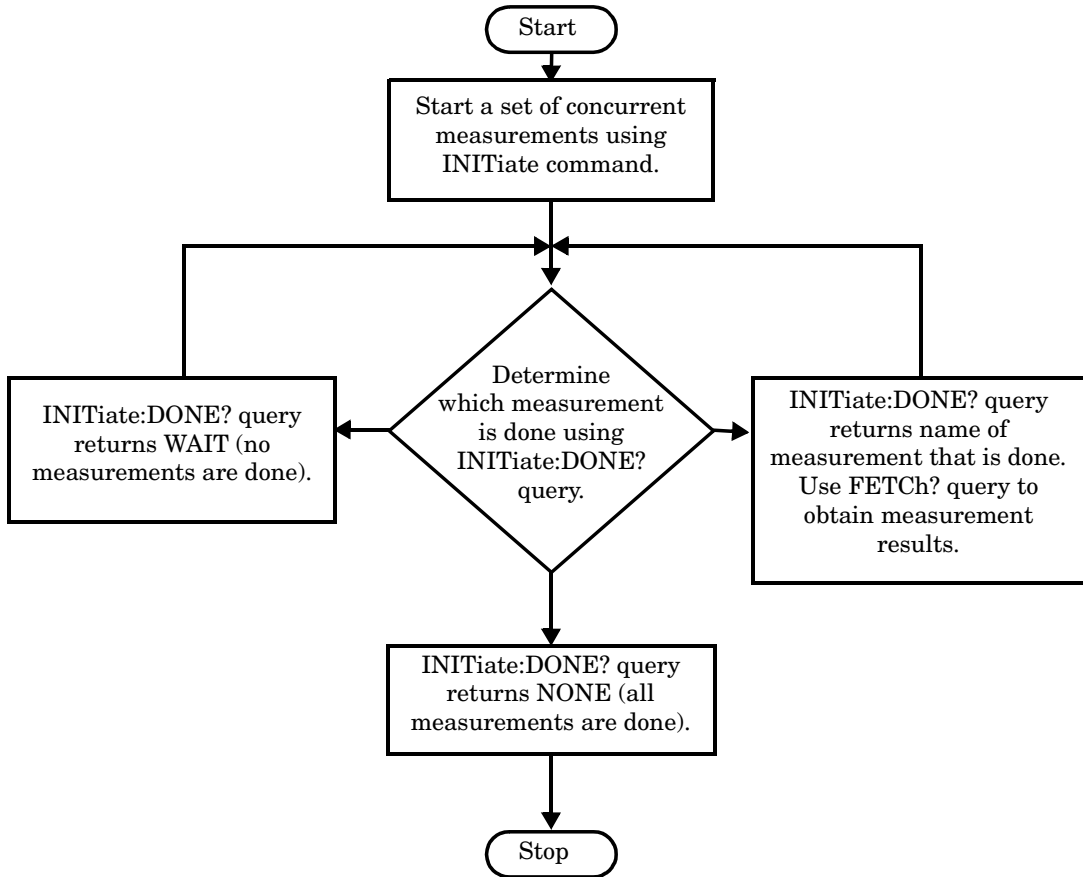
### Measurement Concurrency

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

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

[“Figure 1. Process for Making Measurements” on page 253](#) shows the recommended process for making concurrent measurements using the test set’s command set.

Figure 1. Process for Making Measurements



## Step 6: Make Measurements

### Programming Example

The following programming example shows you how to make a transmit power measurement and a phase and frequency error measurement concurrently using the process shown in [“Figure 1. Process for Making Measurements” on page 253](#).

```
! Step 6a: Start Set of Concurrent Measurements:
!
OUTPUT Test_set;"INIT:TXP;PFER"
!
! Step 6b: Determine If A Measurement Is Done:
!
LOOP
  OUTPUT Test_set;"INIT:DONE?"
  ENTER Test_set;Meas_done$
!
! Step 6c: Obtain Measurement Results
!
  SELECT Meas_done$
    CASE "TXP"
      OUTPUT Test_set;"FETC:TXP:POW?"
      ENTER Test_set;Avg_tx_power
    CASE "PFER"
      OUTPUT Test_set;"FETC:PFER:RMS?"
      ENTER Test_set;Max_rms_phas_er
  END SELECT
EXIT IF Meas_done$="NONE"
END LOOP
```

## Things That Can Go Wrong

### Measurement Integrity Always Returns a Value of 6

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

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

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

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

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

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

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

## Step 6a: Start Set Of Concurrent Measurements

### Starting Measurements

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

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

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

**Measurement Mnemonics Used In The INITiate Subsystem**

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

### Programming Example

The following command starts the transmitter power measurement.

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

### Using Compound Commands to Start Multiple Measurements

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

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

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



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

### Background

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

### Overview

Use the INITiate:DONE? query command to determine which measurement has completed.

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

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

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

Response	Meaning
TXP	The transmit power measurement is done.
PVT	The power versus time measurement is done.
PFER	The phase and frequency error measurement is done.
ORFS	The output RF spectrum measurement is done.
AAUD	The analog audio measurement is done.
DAUD	The decoded audio measurement is done.
BERR	The bit error measurement is done.
FBER	The fast bit error measurement is done.
DPOW	The dynamic power measurement is done.
IQT	The I/Q Tuning measurement is done.
DAUD	The decoded audio measurement is done.
WAIT	There are one or more measurements that are in progress, but none of those measurements are done yet.
NONE	No measurements are in progress.

For an example of how the INIT:DONE? query is used, see [“Programming Example” on page 254](#).

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

### Background

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

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

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

The test set can return the measurement results in a variety of formats to suit your needs. For example, the transmitter power measurement results can be returned as:

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

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

## Overview

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

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

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

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

**Measurement Mnemonics Used In The FETCh Subsystem**

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

## Programming Example

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

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

---

## Step 7: Perform an Intra-Cell Handover

### Background

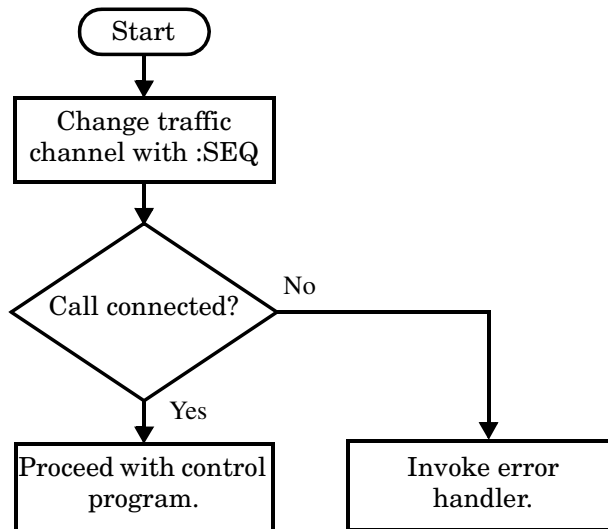
A handover is defined as assigning the mobile station to a new traffic channel. The test set is capable of performing two types of handovers:

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

### Performing an Intra-Cell Handover

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

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



**Example 1. Command Syntax:**

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

OR

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

**Example 2. Programming Example:**

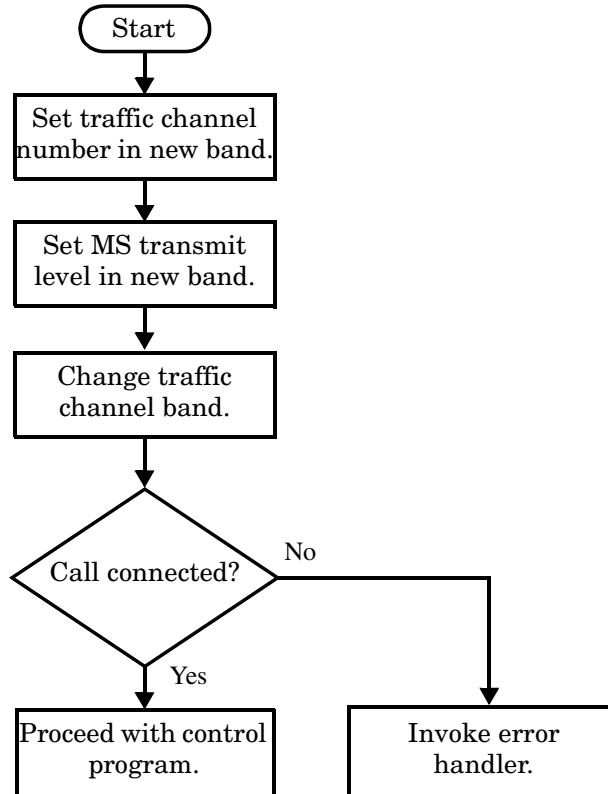
The following example illustrates how to use these commands to perform an intra-cell handover.

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

## Performing a Dual-Band Handover

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

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



**Example 3. Programming Example:**

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

```

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

```

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

- [“Call Disconnect Synchronization”](#)
- [“Disconnecting an Active Call”](#)
- [“Disconnecting an Active Call from the Base Station Emulator”](#)
- [“Disconnecting an Active Call from the Mobile Station”](#)

### Call Disconnect Synchronization

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

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

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

The call-state-change-detector arm command is used by the control program to tell the test set that it is expecting a change to the state of a call prior to initiating the state change. By first arming the call-state-change-detector, then querying the call connected state, and then attempting a base station or mobile station call termination, the call-connected-state query will hang until the disconnection operation begins and then reaches a final (Idle or Connected) state.

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

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



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

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

The time-out timer is started whenever the call-state-change-detector is armed or gets rearmed when already armed. The duration of the time-out is set using the call-connected-time-out command and should be set to the maximum amount of time the control program should wait between arming and the disconnect process to begin. Once the process starts and the call state has moved into one of the transitory states the GSM defined protocol timers take over and prevent the call state from staying in a transitory state forever.

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

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

### **Disconnecting an Active Call**

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

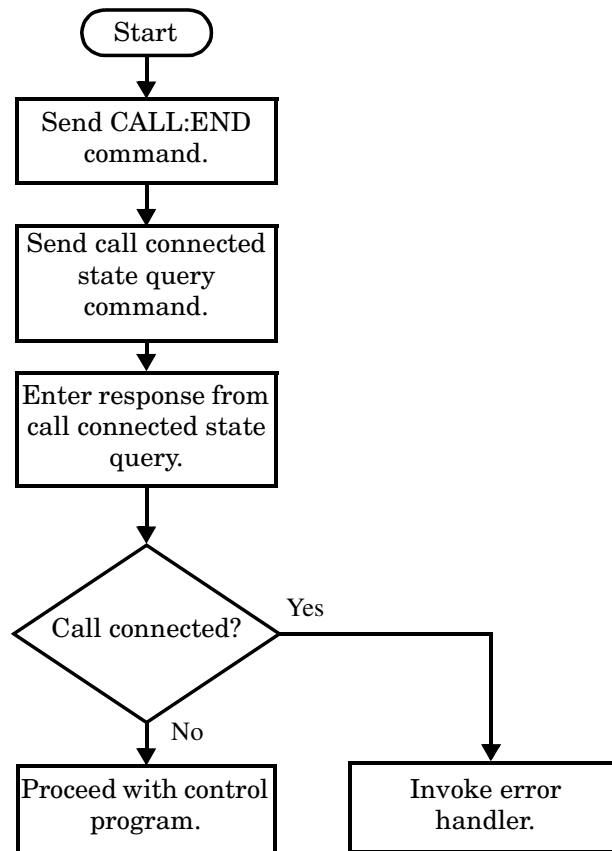
- Disconnect the active call from the base station emulator.
- Disconnect the active call from the mobile station.

### **Disconnecting an Active Call from the Base Station Emulator**

The process for disconnecting an active call from the base station emulator is shown in the following figure. You will use the CALL:END command to initiate a base station disconnect. It is unnecessary for you to arm the change detector or set a change detector timeout when using the base station emulator to terminate a call. The test set automatically arms the change detector and uses a default timeout in this situation.

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

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



### Programming Example

The programming example below illustrates initiating a call disconnect from the base station emulator and how the call disconnect synchronization commands are used.

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

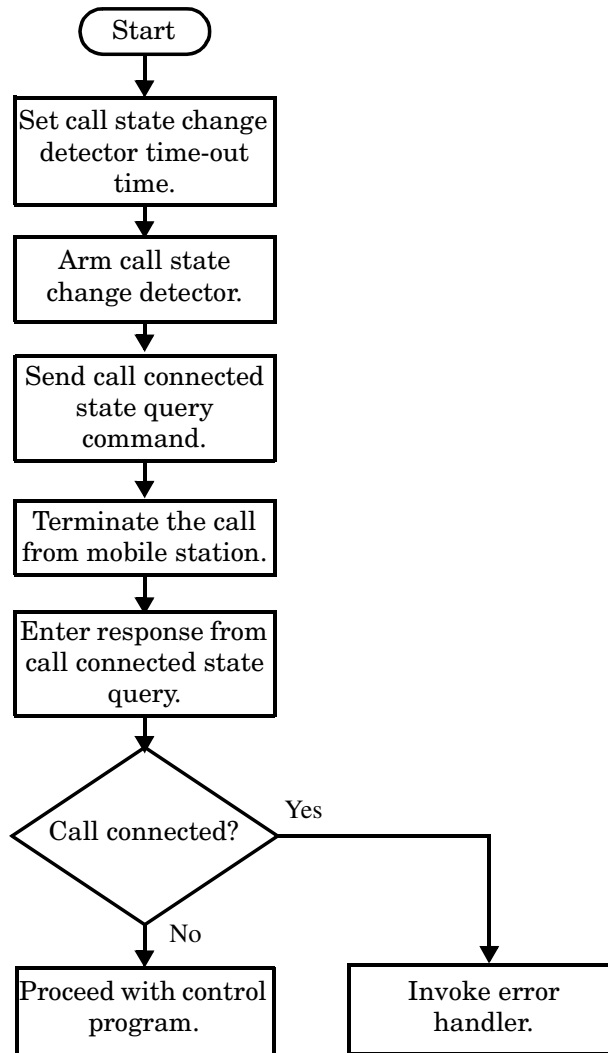
## Disconnecting an Active Call from the Mobile Station

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

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

For mobile station disconnected calls where the call is terminated by physically pushing a button on the phone (as opposed to using a test bus) ensure that the call-state-change-detector time-out time is long enough to allow a human to push the button.

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



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

### Example 1. Programming Example:

```
OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
OUTPUT Test_set;"CALL:CONN:ARM"   !Arm the change detector.
OUTPUT Test_set;"CALL:CONN:STAT?" !Initiate call connect state query.
DISP "Terminate the call from the mobile station."
ENTER Test_set;Call_connected     !Program will hang here until state
                                   !change or timer expires.
IF Call_connected THEN             !Check if disconnect successful.
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

---

## Comprehensive Program Example

This section contains two example programs for making measurements using the test set. The first program follows the task flow shown in [“Figure 1. Typical Flow of Tasks Performed by a Control Program” on page 226](#). The second program, [“Example Program Without Comments” on page 276](#), is basically the same as the first but comments have been removed and the coding reflects the use of compound commands and complex commands to achieve coding efficiency.

## Example Program With Comments

```
10 ! Prog Name: com_man_ex.txt      Rev: A.0.3      Date Code: 27 Nov 2000
20 !
30 ! Configure the BASIC environment, dimension and initialize variables.
40 ! These actions are unrelated to programming the 8960.
50 !
60 OPTION BASE 1
70 COM /Address/ Test_set
80 ! Allocate arrays to hold ORFS switching & modulation frequency offsets.
90 DIM Swit_offs$(255),Mod_offs$(255)
100 ! Allocate arrays to hold measurement results.
110 REAL Txpower(4)
120 Test_set=714 ! Test set's GPIB address.
130 PRINTER IS CRT
140 CLEAR SCREEN
150 !
160 ! Reset test set to start from a known state. Not always necessary to do full
170 ! preset in a manufacturing environment but desireable in programming example.
180 !
190 OUTPUT Test_set;"*RST"
200 !
210 ! Turn on the GPIB debugger. This is optional but very helpful for debugging
220 ! GPIB commands when developing new code.
230 !
240 OUTPUT Test_set;"SYST:COMM:GPIB:DEB:STAT ON"
250 !
260 ! Check error message queue and STOP if any errors present. This ensures that
270 ! the example program starts with no error conditions present in the test set.
280 !
290 CALL Chk_err_msg_que
300 !
310 !*****
320 ! Step 1: Set Test Set's Operating Mode to Active Cell
330 !*****
340 !
350 OUTPUT Test_set;"CALL:OPER:MODE CELL"
360 !
370 !*****
380 ! Step 2: Configure the Base Station Emulator
390 !*****
400 !
410 ! Set RF IN/OUT port's amplitude offset to compensate for fixture loss of MS.
420 ! After setting offset, cell power settings reflect RF power at the MS antenna
430 ! input.
440 !
450 OUTPUT Test_set;"SYST:CORR -5.98,-6,-5.98,-6" ! Set amplitude offsets in dB
455 OUTPUT TEST_SET;"SYST:CORR:FREQ 914 MHZ,914.8 MHZ,959 MHZ,959.8 MHZ"
460 !
470 OUTPUT Test_set;"CALL:CELL:BAND PGSM" ! Set active broadcast band to PGSM.
480 OUTPUT Test_set;"CALL:ACT OFF" ! Deactivate cell to set network parms.
490 OUTPUT Test_set;"CALL:CELL:MCC 1;LAC 1;MNC 1;NCC 1;BCC 5" ! Set network parms.
500 OUTPUT Test_set;"CALL:ACT ON" ! Reactivate the cell.
```

```

510 OUTPUT Test_set;"CALL:BCH 20"           ! Set broadcast channel to 20.
520 OUTPUT Test_set;"CALL:POW -85"        ! Set cell power to -85 dBm and cell
530                                     ! power state to ON with complex command.
540 OUTPUT Test_set;"CALL:TCH 45"        ! Set traffic channel to 45.
550 OUTPUT Test_set;"CALL:TCH:TSL 4"     ! Set timeslot to 4.
560 !
570 !*****
580 ! Step 3: Configure the Measurement Execution Parameters
590 !*****
600 !
610 ! Configure ORFS Measurement:
620 !
630 OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5" ! Examples of using complex commands to
640 OUTPUT Test_set;"SET:ORFS:MOD:COUN 10" ! set multi-meas state and count at
650                                     ! same time.
660 OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO" ! Set trig source to AUTO.
670 OUTPUT Test_set;"SET:ORFS:CONT OFF"    ! Set trig mode to single.
680 OUTPUT Test_set;"SET:ORFS:TIM 60"     ! Set timeout time to 60 seconds.
690 ! Put switching and modulation offsets to be tested into string variables.
700 Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
710 Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
720 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
730 OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
740 !
750 ! Configure TX Power Measurement:
760 !
770 OUTPUT Test_set;"SET:TXP:COUN 3"
780 OUTPUT Test_set;"SET:TXP:TRIG:SOUR RISE;QUAL ON"
790 OUTPUT Test_set;"SET:TXP:CONT OFF"
800 OUTPUT Test_set;"SET:TXP:TIM 20"
810 !
820 ! Configure Phase & Frequency Error Measurement:
830 !
840 OUTPUT Test_set;"SET:PFER:COUN 8"
850 OUTPUT Test_set;"SET:PFER:TRIG:SOUR PROT;QUAL ON"
860 OUTPUT Test_set;"SET:PFER:CONT OFF"
870 OUTPUT Test_set;"SET:PFER:TIM 30"
880 OUTPUT Test_set;"SET:PFER:BSYN MID"
890 !
900 !*****
910 ! Step 4: Establish an Active Link with the Mobile Station
920 !*****
930 !
940 OUTPUT Test_set;"CALL:PAG:IMSI `001012345678901`" ! Set paging IMSI.
950 OUTPUT Test_set;"CALL:PAG:REP OFF" ! Set paging repeat state to off.
960 !
970 ! This example uses a BSE originated call. The MS must be camped to the BSE
980 ! in order for the BSE to originate a call. The following code will try to
990 ! originate a call 50 times and then STOP the program. This should give
1000 ! adequate time for the MS to camp to the BSE.
1010 !
1020 ! NOTE: This technique will cause the following error to be displayed on the
1030 ! test set's display and be put in the error message queue each time

```

## Comprehensive Program Example

```
1040 !           that the call fails to connect.  This is normal for this technique.
1050 ! 'GSM call disconnected; No response to page (Timer T3113 expiry)'
1060 !
1070 Tries=1
1080 LOOP
1090   OUTPUT Test_set;"CALL:ORIG"           ! Originate a call.
1100   OUTPUT Test_set;"CALL:CONN:STAT?"    ! CALL:CONNECTed hanging HP-IB query.
1110   ENTER Test_set;Call_connected        ! Program will hang here until origination
1120                                       ! process completes.  If successful and
1130                                       ! the call is connected the query will
1140                                       ! return a 1.  If unsuccessful and the call
1150                                       ! is not connected the query returns 0.
1160 EXIT IF Call_connected
1170   OUTPUT Test_set;"CALL:END"
1180   IF Tries=50 THEN
1190     BEEP
1200     DISP ""
1210     PRINT "Call did not connect after";Tries;". Program terminated."
1220     STOP
1230   END IF
1240   DISP "Call has not connected after";Tries;"attempts. Trying again."
1250   Tries=Tries+1
1260 END LOOP
1270 DISP ""
1280 !
1290 !*****
1300 ! Step 5: Set the Mobile Station's Operating Conditions
1310 !*****
1320 !
1330 OUTPUT Test_set;"CALL:MS:DTX OFF"       ! Turn DTX off for all MS tests.
1340 !
1350 FOR Traf_chan=120 TO 124 STEP 2         ! Test channels 120, 122 & 124.
1360   OUTPUT Test_set;"CALL:TCH:SEQ ";Traf_chan ! Use :SEQ to force sequential
1370                                       ! execution of the TCH command.
1380   OUTPUT Test_set;"CALL:STAT:STAT?"    ! Verify that the call is still in
1390   ENTER Test_set;Call_status$          ! the connected state after handover.
1400   IF Call_status$<>"CONN" THEN
1410     PRINT "Call handover failed. New channel assignment =";Traf_chan
1420     PRINT "Program terminated."
1430     STOP
1440   END IF
1450   FOR Ms_pwr_lvl=5 TO 15 STEP 5         ! Test power levels 5, 10 & 15.
1460     OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Ms_pwr_lvl ! Use :SEQ to force
1470                                       ! sequential execution of
1480                                       ! the TXLevel command.
1490   !
1500 !*****
1510 ! Step 6: Make Measurements
1520 !*****
1530 !
1540 ! Step 6a: Start a set of concurrent measurements:
1550 !
1560   OUTPUT Test_set;"INIT:TXP;PFER;ORFS"
```



```

1570 !
1580 ! Step 6b: Determine if a measurement is done:
1590 !
1600     LOOP
1610         OUTPUT Test_set;"INIT:DONE?"
1620         ENTER Test_set;Meas_done$
1630 !
1640 ! Step 6c: Obtain measurement results: Each measurement illustrates a
1650 !         different way of reading in results. There is no one right way. The
1660 !         method used is application dependent. Note that the examples do not
1670 !         show all possible ways.
1680 !
1690     SELECT Meas_done$
1700 !
1710     CASE "TXP" ! TX Power measurement done.
1720         OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
1730         ENTER Test_set;Integrity,Txpower(*)
1740         IF (Integrity=0) THEN ! Always check integrity value.
1750             PRINT "TX Power results: TCH =" ;Traf_chan;"and TXL =" ;Ms_pwr_lvl
1760             PRINT USING "5X, ""Minimum: "" ,M2D.2D, "" dBm""";Txpower(1)
1770             PRINT USING "5X, ""Maximum: "" ,M2D.2D, "" dBm""";Txpower(2)
1780             PRINT USING "5X, ""Average: "" ,M2D.2D, "" dBm""";Txpower(3)
1790             PRINT USING "5X, ""Std Dev: "" ,M2D.2D, "" dB""";Txpower(4)
1800         ELSE
1810             GOSUB Bad_measurement
1820         END IF
1830 !
1840     CASE "PFER" ! Phase & Frequency Error measurement done.
1850         OUTPUT Test_set;"FETC:PFER:ALL?"
1860         ENTER Test_set;Integrity,Rms_phas_err,Peak_phas_err,Worst_freq_err
1870         IF (Integrity=0) THEN
1880             PRINT "PFERerror results: TCH =" ;Traf_chan;"and TXL =" ;Ms_pwr_lvl
1890             PRINT USING "5X, ""RMS Phase Error: "" ,M2D.2D, "" deg""";Rms_phas_err
1900             PRINT USING "5X, ""Peak Phase Error: "" ,M2D.2D, "" deg""";Peak_phas_err
1910             PRINT USING "5X, ""Worst Freq Error: "" ,M3D.2D, "" Hz""";Worst_freq_err
1920         ELSE
1930             GOSUB Bad_measurement
1940         END IF
1950 !
1960     CASE "ORFS" ! ORFS measurement done.
1970     !
1980     ! This code illustrates a more 'generic' approach to reading measurement
1990     ! results. By using the capabilities designed into high-level
2000     ! measurements, routines that access measurement results do not have to
2010     ! explicitly know what the measurement execution conditions were. That
2020     ! information can be determined at the time the measurement results are
2030     ! queried.
2040     !
2050     OUTPUT Test_set;"FETC:ORFS:INT?" ! Check measurement integrity.
2060     ENTER Test_set;Integrity
2070     IF (Integrity=0) THEN
2080         OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?" ! Get number of offsets
2090         ! tested.

```

## Comprehensive Program Example

```
2100         ENTER Test_set;Points
2110         IF Points THEN ! Only query if one or more offsets tested.
2120             ALLOCATE Orfs_swit_res(Points),Orfs_swit_offs(Points)
2130             OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?" ! Get measurement offsets.
2140             ENTER Test_set;Orfs_swit_offs(*)
2150             OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:SWIT?" ! Get results.
2160             ENTER Test_set;Tx_power,Orfs_swit_res(*)
2170             PRINT "ORFS Swit Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
2180             PRINT USING "19X,""TX Power ="" ,M2D.2D,"" dBm""";Tx_power
2190             PRINT "      Offset (kHz)          Level (dBm)"
2200             PRINT "      -----          -----"
2210 Orfs_image: IMAGE 6X,M4D.2D,12X,M4D.2D
2220             FOR J=1 TO Points
2230                 PRINT USING Orfs_image;(Orfs_swit_offs(J)/1.E+3),Orfs_swit_res(J)
2240             NEXT J
2250             DEALLOCATE Orfs_swit_res(*),Orfs_swit_offs(*)
2260         END IF
2270         OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?" ! Get number of offsets
2280                                     ! tested.
2290         ENTER Test_set;Points
2300         IF Points THEN ! Only query if one or more offsets tested.
2310             ALLOCATE Orfs_mod_res(Points),Orfs_mod_offs(Points)
2320             OUTPUT Test_set;"SET:ORFS:MOD:FREQ?" ! Get measurement offsets.
2330             ENTER Test_set;Orfs_mod_offs(*)
2340             OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:MOD?" ! Get results.
2350             ENTER Test_set;Tx_power,Pwr_30khz,Orfs_mod_res(*)
2360             PRINT "ORFS Mod Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
2370             PRINT USING "18X,""30 KHz BW Power ="" ,M2D.2D,"" dBm""";Pwr_30khz
2380             PRINT "      Offset (kHz)          Level (dB)"
2390             PRINT "      -----          -----"
2400             FOR J=1 TO Points
2410                 PRINT USING Orfs_image;(Orfs_mod_offs(J)/1.E+3),Orfs_mod_res(J)
2420             NEXT J
2430             DEALLOCATE Orfs_mod_res(*),Orfs_mod_offs(*)
2440         END IF
2450     ELSE
2460         GOSUB Bad_measurement
2470     END IF
2480 END SELECT
2490 EXIT IF Meas_done$="NONE"
2500 END LOOP ! If 'WAIT' is returned from 'INIT:DONE?' query, it just falls
2510         ! through the loop.
2520 NEXT Ms_pwr_lvl
2530 !
2540 !*****
2550 ! Step 7: Perform an Intra-cell Handover
2560 !*****
2570 !
2580 NEXT Traf_chan ! The handover is performed at the top of the FOR loop at line
2590                 ! 1300
2600 !
2610 !*****
2620 ! Step 8: Disconnect the Mobile Station From the Base Station Emulator
```

```

2630 !*****
2640 !
2650 OUTPUT Test_set;"CALL:END"
2660 OUTPUT Test_set;"CALL:CONN:STAT?"
2670 ENTER Test_set;Call_connected
2680 IF Call_connected THEN
2690     BEEP
2700     PRINT "Unable to complete BS termination. Program terminated."
2710     STOP
2720 END IF
2730 PRINT "Program completed."
2740 STOP
2750 !
2760 Bad_measurement: !
2770 PRINT "Measurement error: "&Meas_done$
2780 PRINT "Measurement Integrity value =" ;Integrity
2790 RETURN
2800 !
2810 END ! End of program
2820 !
2830 SUB Chk_err_msg_que
2840     COM /Address/ Test_set
2850     DIM Error_message$(255)
2860     Error_flag=0
2870     LOOP
2880         OUTPUT Test_set;"SYST:ERR?"
2890         ENTER Test_set;Error_number,Error_message$
2900         EXIT IF Error_number=0
2910         IF Error_number=-350 THEN
2920             Error_flag=1
2930             PRINT "Error Message Queue overflow. Error messages have been lost."
2940         ELSE
2950             Error_flag=1
2960             PRINT Error_number,Error_message$
2970         END IF
2980     END LOOP
2990     IF NOT Error_flag THEN
3000         PRINT "No errors in Error Message Queue."
3010         SUBEXIT
3020     END IF
3030     STOP
3040 SUBEND

```

## Example Program Without Comments

The following program is basically the same as the example program presented in ["Example Program With Comments" on page 270](#) but comments have been removed and the coding reflects the use of compound commands and complex commands to achieve coding efficiency.

```

10    ! Prog Name: sim_man_ex.txt      Rev: A.0.3      Date Code: 27 Nov 2000
20    OPTION BASE 1
30    COM /Address/ Test_set
40    DIM Swit_offs$(255),Mod_offs$(255)
50    REAL Txpower(4)
60    Test_set=714
70    PRINTER IS CRT
80    CLEAR SCREEN
90    OUTPUT Test_set;"*RST;SYST:COMM:GPIB:DEB:STAT ON"
100   CALL Chk_err_msg_que
110   OUTPUT Test_set;"CALL:OPER:MODE CELL"
111   OUTPUT Test_set;"SYST:CORR -5.98,-6,-5.98,-6"      ! Set amplitude offsets in dB
112   OUTPUT TEST_SET;"SYST:CORR:FREQ 914 MHZ,914.8 MHZ,959 MHZ,959.8 MHZ"
120   OUTPUT Test_set;"CALL:CELL:BAND PGSM;BCH 20;POW:SAMP -85;:CALL:TCH:ARFC 45;TSL 4"
130   OUTPUT Test_set;"CALL:CELL:ACT OFF;MCC 1;LAC 1;MNC 1;NCC 1;BCC 5;ACT ON"
140   OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5;:SET:ORFS:MOD:COUN 10"
150   OUTPUT Test_set;"SET:ORFS:CONT OFF;TIM 60;TRIG:SOUR AUTO"
160   Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
170   Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
180   OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$&";:SET:ORFS:MOD:FREQ "&Mod_offs$
190   OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20;TRIG:SOUR RISE;QUAL ON"
200   OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;BSYN MID;TRIG:SOUR PROT;QUAL ON"
210   OUTPUT Test_set;"CALL:PAG:REP OFF;IMSI `001012345678901`"
220   Tries=1
230   LOOP
240     OUTPUT Test_set;"CALL:ORIG;CONN:STAT?"
250     ENTER Test_set;Call_connected
260     EXIT IF Call_connected
270     OUTPUT Test_set;"CALL:END"
280     IF Tries=50 THEN
290       BEEP
300       DISP ""
310       PRINT "Call did not connect after";Tries;". Program terminated."
320       STOP
330     END IF
340     DISP "Call has not connected after";Tries;"attempts. Trying again."
350     Tries=Tries+1
360   END LOOP
370   DISP ""
380   OUTPUT Test_set;"CALL:MS:DTX OFF"
390   FOR Traf_chan=120 TO 124 STEP 2
400     OUTPUT Test_set;"CALL:TCH:SEQ ";Traf_chan;";:CALL:STAT:STAT?"
410     ENTER Test_set;Call_status$
420     IF Call_status$<>"CONN" THEN
430       PRINT "Call handover failed. New channel assignment ="&Traf_chan
440       PRINT "Program terminated."
450     STOP

```

```

460 END IF
470 FOR Ms_pwr_lvl=5 TO 15 STEP 5
480     OUTPUT Test_set;"CALL:MS:TXL:SEQ ";Ms_pwr_lvl;" :INIT:TXP;PFER;ORFS"
490     LOOP
500         OUTPUT Test_set;"INIT:DONE?"
510         ENTER Test_set;Meas_done$
520         SELECT Meas_done$
530         CASE "TXP"
540             OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
550             ENTER Test_set;Integrity,Txpower(*)
560             IF (Integrity=0) THEN
570                 PRINT "TX Power results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
580                 PRINT USING "5X, ""Minimum: """,M2D.2D, "" dBm""";Txpower(1)
590                 PRINT USING "5X, ""Maximum: """,M2D.2D, "" dBm""";Txpower(2)
600                 PRINT USING "5X, ""Average: """,M2D.2D, "" dBm""";Txpower(3)
610                 PRINT USING "5X, ""Std Dev: """,M2D.2D, "" dB""";Txpower(4)
620             ELSE
630                 GOSUB Bad_measurement
640             END IF
650         CASE "PFER"
660             OUTPUT Test_set;"FETC:PFER:ALL?"
670             ENTER Test_set;Integrity,Rms_phas_err,Peak_phas_err,Worst_freq_err
680             IF (Integrity=0) THEN
690                 PRINT "PFERror results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
700                 PRINT USING "5X, ""RMS Phase Error: """,M2D.2D, "" deg""";Rms_phas_err
710                 PRINT USING "5X, ""Peak Phase Error: """,M2D.2D, "" deg""";Peak_phas_err
720                 PRINT USING "5X, ""Worst Freq Error: """,M3D.2D, "" Hz""";Worst_freq_err
730             ELSE
740                 GOSUB Bad_measurement
750             END IF
760         CASE "ORFS"
770             OUTPUT Test_set;"FETC:ORFS:INT?"
780             ENTER Test_set;Integrity
790             IF (Integrity=0) THEN
800                 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?"
810                 ENTER Test_set;Points
820                 IF Points THEN
830                     ALLOCATE Orfs_swit_res(Points),Orfs_swit_offs(Points)
840                     OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?;:FETC:ORFS:POW?;:FETC:ORFS:SWIT?"
850                     ENTER Test_set;Orfs_swit_offs(*),Tx_power,Orfs_swit_res(*)
860                     PRINT "ORFS Swit Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
870                     PRINT USING "19X, ""TX Power = """,M2D.2D, "" dBm""";Tx_power
880                     PRINT "      Offset (kHz)          Level (dBm)"
890                     PRINT "      -----          -----"
900 Orfs_image:  IMAGE 6X,M4D.2D,12X,M4D.2D
910                     FOR J=1 TO Points
920                         PRINT USING Orfs_image;(Orfs_swit_offs(J)/1.E+3),Orfs_swit_res(J)
930                     NEXT J
940                     DEALLOCATE Orfs_swit_res(*),Orfs_swit_offs(*)
950                 END IF
960             OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?"
970             ENTER Test_set;Points
980             IF Points THEN

```

## Comprehensive Program Example

```
990         ALLOCATE Orfs_mod_res(Points),Orfs_mod_offs(Points)
1000        OUTPUT Test_set;"SET:ORFS:MOD:FREQ?;:FETC:ORFS:POW?;:FETC:ORFS:MOD?"
1010        ENTER Test_set;Orfs_mod_offs(*),Tx_power,Pwr_30khz,Orfs_mod_res(*)
1020        PRINT "ORFS Mod Results: TCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
1030        PRINT USING "18X,""30 KHz BW Power ="" ,M2D.2D,"" dBm""";Pwr_30khz
1040        PRINT "      Offset(kHz)          Level(dB)"
1050        PRINT "      -----          -----"
1060        FOR J=1 TO Points
1070            PRINT USING Orfs_image;(Orfs_mod_offs(J)/1.E+3),Orfs_mod_res(J)
1080        NEXT J
1090        DEALLOCATE Orfs_mod_res(*),Orfs_mod_offs(*)
1100        END IF
1110        ELSE
1120            GOSUB Bad_measurement
1130        END IF
1140        END SELECT
1150        EXIT IF Meas_done$="NONE"
1160        END LOOP
1170    NEXT Ms_pwr_lvl
1180 NEXT Traf_chan
1190 OUTPUT Test_set;"CALL:END;CONN:STAT?"
1200 ENTER Test_set;Call_connected
1210 IF Call_connected THEN
1220     BEEP
1230     PRINT "Unable to complete BS termination. Program terminated."
1240     STOP
1250 END IF
1260 PRINT "Program completed."
1270 STOP
1280 !
1290 Bad_measurement: !
1300 PRINT "Measurement error: "&Meas_done$
1310 PRINT "Measurement Integrity value =";Integrity
1320 RETURN
1330 !
1340 END
1350 !
1360 SUB Chk_err_msg_que
1370     COM /Address/ Test_set
1380     DIM Error_message$(255)
1390     Error_flag=0
1400     LOOP
1410         OUTPUT Test_set;"SYST:ERR?"
1420         ENTER Test_set;Error_number,Error_message$
1430         EXIT IF Error_number=0
1440         IF Error_number=-350 THEN
1450             Error_flag=1
1460             PRINT "Error Message Queue overflow. Error messages have been lost."
1470         ELSE
1480             Error_flag=1
1490             PRINT Error_number,Error_message$
1500         END IF
1510     END LOOP
```

```
1520 IF NOT Error_flag THEN
1530     PRINT "No errors in Error Message Queue."
1540     SUBEXIT
1550 END IF
1560 STOP
1570 SUBEND
```





## **6 GPRS Programming Example**

# Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960

## Introduction

### How to use this programming example.

The most effective way to use this programming example is in conjunction with the Programming Flowchart job aid shipped to you with each test set's test application (also available on the WWW) and either:

- the 8960 Family Support Site (updated frequently), or
- the User Documentation CD-ROM shipped with your E1964A Test Application.

The steps in this example follow the steps on the Programming Flowchart job aid. Using this programming example, the Programming Flowchart, and the on-line introduction to 8960 programming, you will be able to generate a control program for testing GPRS enabled mobile stations.

### On-line information useful for developing a control program.

Go to the 8960 Family Support home page on either the CD-ROM or the WWW. 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 GSM/GPRS Programming section by first selecting the GSM/GPRS Reference Section from the top navigation bar as shown below:

**Agilent Technologies**  
8960 Family Support Site

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Quick Search:  GO

Home || Support || **Reference** || Sales

8960 WIRELESS COMMUNICATIONS

GSM / GPRS  
AMPS / 136  
CDMA 2000

In high-volume mobile manufacturing, test throughput and test yield are key to meeting production output goals. The proven **Agilent Technologies 8960 Series 10** wireless communications test set offers mobile manufacturers immediate competitive advantages. Developed for high-volume, automated mobile phone manufacturing test, Agilent Technologies 8960 Series 10 test set

**Highlights**

- [GSM/GPRS Reference](#)
- [AMPS/136 Reference](#)
- [CDMA 2000 Reference](#)
- [Sales](#)
- [Service Information](#)

Then, click on **Programming** in the navigation menu on the left.



The following links are under the heading “Programming Procedures and Examples”:

- Introduction to Programming the Agilent Technologies 8960 (This also appears as a Adobe Acrobat document for you to easily print if that is your preference.)
- Programming Flowchart job aid
- Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960
- Comprehensive Programming Examples (These are for you to download to use as templates or to execute.)

### **Conventions used in this programming example.**

Throughout this programming example 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 programming example refers to the test set’s GPIB address.

### **Programming Language used for examples.**

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

---

## 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.

```
190 OUTPUT Test_set;"*RST"
```

### 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.

```
320 OUTPUT Test_set;"SYST:COMM:GPIB:DEB:STAT ON"
```

---

**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 command below can be 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.

```
340 OUTPUT Test_set;"CALL:OPER:MODE CELL"
```

There are also two test mode operating modes available. It is appropriate for you to use these modes when you are using 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 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.

```
400 OUTPUT Test_set;"CALL:BAND PGSM"      ! Set active broadcast band to PGSM
410 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.

```
420 OUTPUT Test_set;"CALL:PDTCH 45"      ! Set packet data traffic channel to 45
430 OUTPUT Test_set;"CALL:FUNC:DATA:TYPE BLER"! Set Data Connection Type to BLER
440 OUTPUT Test_set;"CALL:PDTCH:MSL:CONF D2U1"! Set Multi-slot Configuration to
450                                     ! two downlinks and one uplink.
460 OUTPUT Test_set;"CALL:PDTCH:CSCH CS4"! Set Coding Scheme to CS4
470 !
480 ! Assign values to the power reduction levels
490 OUTPUT Test_set;"CALL:PDTCH:PZER:LEV 10"      ! Assign a value to P0
500 OUTPUT Test_set;"CALL:PDTCH:PRED:LEV1 11.5" ! Assign 11.5 dB to PRL1
510 OUTPUT Test_set;"CALL:PDTCH:PRED:LEV2 3"     ! Assign 3 dB to PRL2
520 !
530 ! Assign power levels to the downlink bursts
540 OUTPUT Test_set;"CALL:PDTCH:PRED:BURS1 PRL2"  ! Burst 1 has PRL of 3dB
550 OUTPUT Test_set;"CALL:PDTCH:PRED:BURS2 PRL1"  ! Burst 2 has PRL of 11.5dB
```

## Configure the Mobile Station Operating Conditions

The example below illustrates how to assign the mobile station's transmit level for burst 1 to level 5. The default burst for this command is burst 1.

```
580 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS 5"
```

## Configuring Mobile Station Parameters when using the D2U2 Multislot Configuration

When the multislot configuration uses two uplink timeslots, it is necessary to specify the transmit level for both. The example below illustrates how to specify the mobile station TX level for both bursts.

```
OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS1 10"  
OUTPUT Test_set;"CALL:PDTCH:MS:TXL:BURS2 8"
```

---

## 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 *Introduction to Programming the Agilent Technologies 8960*, Step 3.

```
640 ! Configure ORFS Measurement:
650 !
660 OUTPUT Test_set;"SET:ORFS:SWIT:COUN 5" ! Examples of using complex commands to
670 OUTPUT Test_set;"SET:ORFS:MOD:COUN 10" ! set multi-meas state and count at
680                                     ! same time.
690 OUTPUT Test_set;"SET:ORFS:TRIG:SOUR AUTO" ! Set trig source to AUTO.
700 OUTPUT Test_set;"SET:ORFS:CONT OFF"      ! Set trig mode to single.
710 OUTPUT Test_set;"SET:ORFS:TIM 20"       ! Set timeout time to 20 seconds.
720 ! Put switching and modulation offsets to be tested into string variables.
730 Swit_offs$="400KHZ,-400KHZ,600KHZ,-600KHZ,1200KHZ,-1200KHZ,1800KHZ,-1800KHZ"
740 Mod_offs$=".2MHZ,-.2MHZ,.4MHZ,-.4MHZ,.6MHZ,-.6MHZ,.8MHZ,-.8MHZ,1MHZ,-1MHZ"
750 OUTPUT Test_set;"SET:ORFS:SWIT:FREQ "&Swit_offs$
760 OUTPUT Test_set;"SET:ORFS:MOD:FREQ "&Mod_offs$
770 !
780 ! Configure TX Power Measurement:
790 !
800 OUTPUT Test_set;"SET:TXP:COUN 3;CONT OFF;TIM 20"
810 OUTPUT Test_set;"SET:TXP:TRIG:SOUR AUTO;QUAL ON"
820 !
830 ! Configure Phase & Frequency Error Measurement:
840 !
850 OUTPUT Test_set;"SET:PFER:COUN 8;CONT OFF;TIM 30;SYNC MID"
860 OUTPUT Test_set;"SET:PFER:TRIG:SOUR AUTO;QUAL ON"
```



## 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”.

```

970  DISP "Turn the phone on now.  Make sure the phone performs a GPRS attach."
980  Start_time=TIMEDATE
990  LOOP
1000  OUTPUT Test_set;"CALL:DCON:TIM 10"
1010  OUTPUT Test_set;"CALL:DCON:ARM"
1020  OUTPUT Test_set;"CALL:ATT?"
1030  ENTER Test_set;Att_state
1040  EXIT IF Att_state
1050  Current_time=TIMEDATE-Start_time
1060  IF Current_time>=Timer THEN          ! Timer value is 1 minute
1070    BEEP
1080    DISP ""
1090    PRINT "GPRS attach did not complete.  Program terminated."
1100    STOP
1110  END IF
1120  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.

```
1140 OUTPUT Test_set;"CALL:FUNC:DATA:STAR"  
1150 OUTPUT Test_set;"CALL:TRAN?"  
1160 ENTER Test_set;Tran_state  
1170 IF NOT Tran_state THEN  
1180     BEEP  
1190     DISP ""  
1200     PRINT "Data connection failed.  Program terminated."  
1210     STOP  
1220 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.

```
1280 ! Start a set of concurrent measurements:
1290 !
1300 OUTPUT Test_set;"INIT:TXP;PFER;ORFS"
```

### 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 `Traf_chan` contains the ARFCN the measurement is being made on. The variable `Ms_pwr_lev` refers to the current power level assigned to the phone. Refer to the *Introduction to Programming the Agilent Technologies 8960* for more information about the different measurement results that are available and how to fetch them.

```
2400 SUB Global_fetch
2410   COM /Address/Test_set
2420   !
2430   ! Determine if a measurement is done:
2440   !
2450   LOOP
2460     OUTPUT Test_set;"INIT:DONE?"
2470     ENTER Test_set;Meas_done$
2480   !
2490   ! Obtain measurement results: Each measurement illustrates a
2500   ! different way of reading in results. There is no one right way. The
2510   ! method used is application dependent. Note that the examples do not
2520   ! show all possible ways.
2530   !
2540     SELECT Meas_done$
2550   !
2560   CASE "TXP" ! TX Power measurement done.
2570     OUTPUT Test_set;"FETC:TXP:INT?;POW:ALL?"
2580     ENTER Test_set;Integrity,Txpower(*)
2590     IF (Integrity=0) THEN ! Always check integrity value.
2600       PRINT "TX Power results: PDTCH =" ;Traf_chan;"and TXL =" ;Ms_pwr_lvl
2610       PRINT USING "5X,""Minimum:"" ,M2D.2D,"" dBm"" ;Txpower(1)
2620       PRINT USING "5X,""Maximum:"" ,M2D.2D,"" dBm"" ;Txpower(2)
2630       PRINT USING "5X,""Average:"" ,M2D.2D,"" dBm"" ;Txpower(3)
2640       PRINT USING "5X,""Std Dev:"" ,M2D.2D,"" dB"" ;Txpower(4)
2650     ELSE
2660       CALL Bad_measurement
```

## Step 5: INITiate and FETCh Measurements

```
2670         END IF
2680 !
2690     CASE "PFER" ! Phase & Frequency Error measurement done.
2700         OUTPUT Test_set;"FETC:PFER:ALL?"
2710         ENTER Test_set;Integrity,Rms_phas_err,Peak_phas_err,Worst_freq_err
2720         IF (Integrity=0) THEN
2730             PRINT "PFERror results: PDTCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
2740             PRINT USING "5X,""RMS Phase Error:""",M2D.2D,"" deg""";Rms_phas_err
2750             PRINT USING "5X,""Peak Phase Error:""",M2D.2D,"" deg""";Peak_phas_err
2760             PRINT USING "5X,""Worst Freq Error:""",M3D.2D,"" Hz""";Worst_freq_err
2770         ELSE
2780             CALL Bad_measurement
2790         END IF
2800 !
2810     CASE "ORFS" ! ORFS measurement done.
2820     !
2830     ! This code illustrates a more 'generic' approach to reading measurement
2840     ! results. By using the capabilities designed into high-level
2850     ! measurements, routines that access measurement results do not have to
2860     ! explicitly know what the measurement execution conditions were. That
2870     ! information can be determined at the time the measurement results are
2880     ! queried.
2890     !
2900     OUTPUT Test_set;"FETC:ORFS:INT?" ! Check measurement integrity.
2910     ENTER Test_set;Integrity
2920     IF (Integrity=0) THEN
2930         OUTPUT Test_set;"SET:ORFS:SWIT:FREQ:POIN?" ! Get number of offsets
2940         ! tested.
2950         ENTER Test_set;Points
2960         IF Points THEN ! Only query if one or more offsets tested.
2970             ALLOCATE Orfs_swit_res(Points),Orfs_swit_offs(Points)
2980             OUTPUT Test_set;"SET:ORFS:SWIT:FREQ?" ! Get measurement offsets.
2990             ENTER Test_set;Orfs_swit_offs(*)
3000             OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:SWIT?" ! Get results.
3010             ENTER Test_set;Tx_power,Orfs_swit_res(*)
3020             PRINT "ORFS Swit Results: PDTCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
3030             PRINT USING "19X,""TX Power =""",M2D.2D,"" dBm""";Tx_power
3040             PRINT "      Offset (kHz)          Level (dBm)"
3050             PRINT "      -----"
3060 Orfs_image: IMAGE 6X,M4D.2D,12X,M4D.2D
3070             FOR J=1 TO Points
3080                 PRINT USING Orfs_image;(Orfs_swit_offs(J)/1.E+3),Orfs_swit_res(J)
3090             NEXT J
3100             DEALLOCATE Orfs_swit_res(*),Orfs_swit_offs(*)
3110         END IF
3120         OUTPUT Test_set;"SET:ORFS:MOD:FREQ:POIN?" ! Get number of offsets
3130         ! tested.
3140         ENTER Test_set;Points
3150         IF Points THEN ! Only query if one or more offsets tested.
3160             ALLOCATE Orfs_mod_res(Points),Orfs_mod_offs(Points)
3170             OUTPUT Test_set;"SET:ORFS:MOD:FREQ?" ! Get measurement offsets.
3180             ENTER Test_set;Orfs_mod_offs(*)
3190             OUTPUT Test_set;"FETC:ORFS:POW?;:FETC:ORFS:MOD?" ! Get results.
```

```

3200         ENTER Test_set;Tx_power,Pwr_30khz,Orfs_mod_res(*)
3210         PRINT "ORFS Mod Results: PDTCH =";Traf_chan;"and TXL =";Ms_pwr_lvl
3220         PRINT USING "18X,""30 KHz BW Power ="" ,M2D.2D,"" dBm""";Pwr_30khz
3230         PRINT "         Offset(kHz)             Level(dB)"
3240         PRINT "         -----             -----"
3250         FOR J=1 TO Points
3260             PRINT USING Orfs_image;(Orfs_mod_offs(J)/1.E+3),Orfs_mod_res(J)
3270         NEXT J
3280         DEALLOCATE Orfs_mod_res(*),Orfs_mod_offs(*)
3290     END IF
3300 ELSE
3310     CALL Bad_measurement
3320 END IF
3330 END SELECT
3340 EXIT IF Meas_done$="NONE"
3350 END LOOP ! If 'WAIT' is returned from 'INIT:DONE?' query, it just falls
3360           ! through the loop.
3370 SUBEND
3380 SUB Bad_measurement
3390 PRINT "Measurement error: "&Meas_done$
3400 PRINT "Measurement Integrity value =";Integrity
3410 SUBEND

```

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

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

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

### Reconfigure the Mobile Station Parameters

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

```
1390 ! Assign a new power level to the uplink burst
1400 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.

```
1540 ! Reconfigure the data connection to a new packet data traffic channel
1550 !
1560 OUTPUT Test_set;"CALL:SET:PDTCH:MS:TXL:BURS 5"
1570 OUTPUT Test_set;"CALL:SET:PDTCH 120"
1580 OUTPUT Test_set;"CALL:HAND"
1590 ! Use a call synchronzation command to ensure the reconfiguration succeeded.
1600 OUTPUT Test_set;"CALL:STAT:DATA?"
1610 ENTER Conn_status$
1620 IF Conn_status$<>"TRAN" THEN
1630     PRINT "Data connection failed to reconfigure properly."
1640     PRINT "Program terminated."
1650     STOP
1660 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:BAND command. If they are not specified as DCS band parameters, they become active immediately.

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

```

1800 ! Reconfigure the data connection to a new band
1810 !
1820 OUTPUT Test_set;"CALL:PDTCH:MS:TXL:DCS:BURS 15"
1830 OUTPUT Test_set;"CALL:PDTCH:DCS 665"
1840 OUTPUT Test_set;"CALL:PDTCH:BAND DCS"
1850 ! Use a call synchronizaton command to ensure the reconfiguration succeeded.
1860 OUTPUT Test_set;"CALL:STAT:DATA?"
1870 ENTER Conn_status$
1880 IF Conn_status$<>"TRAN" THEN
1890     PRINT "Data connection failed to reconfigure properly."
1900     PRINT "Program terminated."
1910     STOP
1920 END IF

```

# Step 7: End Connection

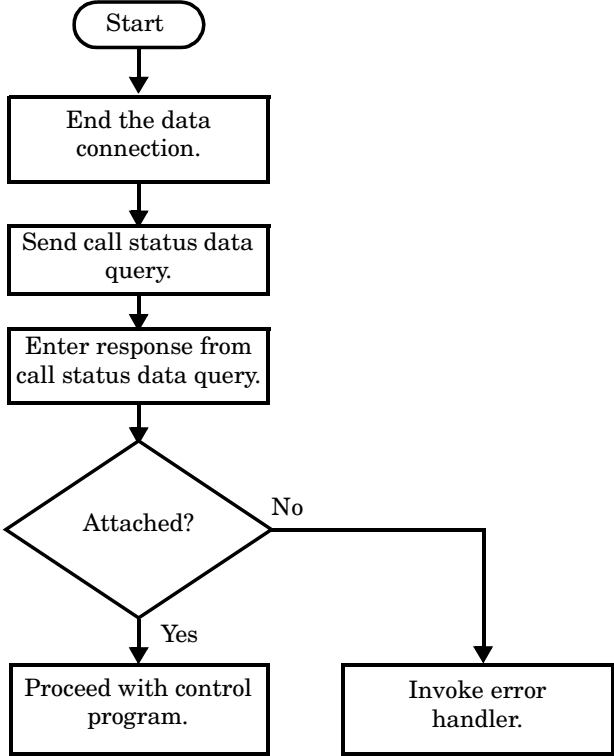
## End the Data Connection

The process for ending the data connection is shown in “Figure 1. Process for Stopping ETSI Test Mode” on page 296.

The CALL:FUNC:DATA:STOP command ends the data connection. As in “Step 4: Make a connection” on page 289, 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.

```
2080 OUTPUT Test_set;"CALL:FUNC:DATA:STOP"  
2090 OUTPUT Test_set;"CALL:STAT:DATA?"  
2100 ENTER Test_set;Conn_status$  
2110 IF Conn_status$<>"ATT" THEN  
2120     PRINT "Unable to terminate data connection correctly."  
2130     PRINT "PROGRAM TERMINATED."  
2140     STOP  
2150 END IF
```

Figure 1. Process for Stopping ETSI Test Mode





## 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.

```
2200 DISP "Initiate a GPRS Detach"
2210 Start_time=TIMEDATE
2220 LOOP
2230     OUTPUT Test_set;"CALL:STAT:DATA?"
2240     ENTER Test_set;Conn_state$
2250     EXIT IF Conn_state$="IDLE"
2260     Current_time=TIMEDATE-Start_time
2270     IF Current_time>=Timer THEN
2280         DISP ""
2290         PRINT "GPRS detach did not occur.  Program terminated"
2300         STOP
2310     END IF
2320     IF Conn_state$="DET" THEN
2330         DISP "GPRS detach is in process."
2340     END IF
2350 END LOOP
```

## Step 7: End Connection

# **7 Introduction to 8960 Programming**

# Introduction to Programming the Agilent Technologies 8960

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# Introduction

## Conventions Used in This Programming Guide

Throughout this guide the term *test set* refers to an Agilent Technologies 8960 Series 10 wireless communications test set with at least one licensed test application installed.

## Purpose of This Programming Guide

The test set represents state-of-the-art technology in one-box-testers and contains many powerful test capabilities which are accessible through easy-to-use GPIB programming commands. The purpose of this guide is to describe the key components of a control program for testing a mobile station in a manufacturing environment using the test set.

## How to Use This Programming Guide

The general programming concepts presented in this guide apply to any test application available for the test set. However, short examples which are specific to a particular test application are given throughout this guide to help illustrate the general programming concepts. These short examples are not generic; you may need to modify them for the test application you are using.

More in-depth programming examples are available to help you apply the general programming concepts presented in this guide to your test application. These programming examples are shipped with each test set's test application and are also available on the WWW at <http://www.agilent.com/find/8960support/> in the Reference, Programming area for each test application. The programming examples provide a complete control program for testing a mobile station in a manufacturing environment. They include detailed commenting to guide you through the contents of the example and to illustrate how the general programming concepts are applied in a specific test application.

If you are confident about programming the test set, you may choose to go straight to the programming example for your test application and only refer to this guide for additional information on a particular programming concept.

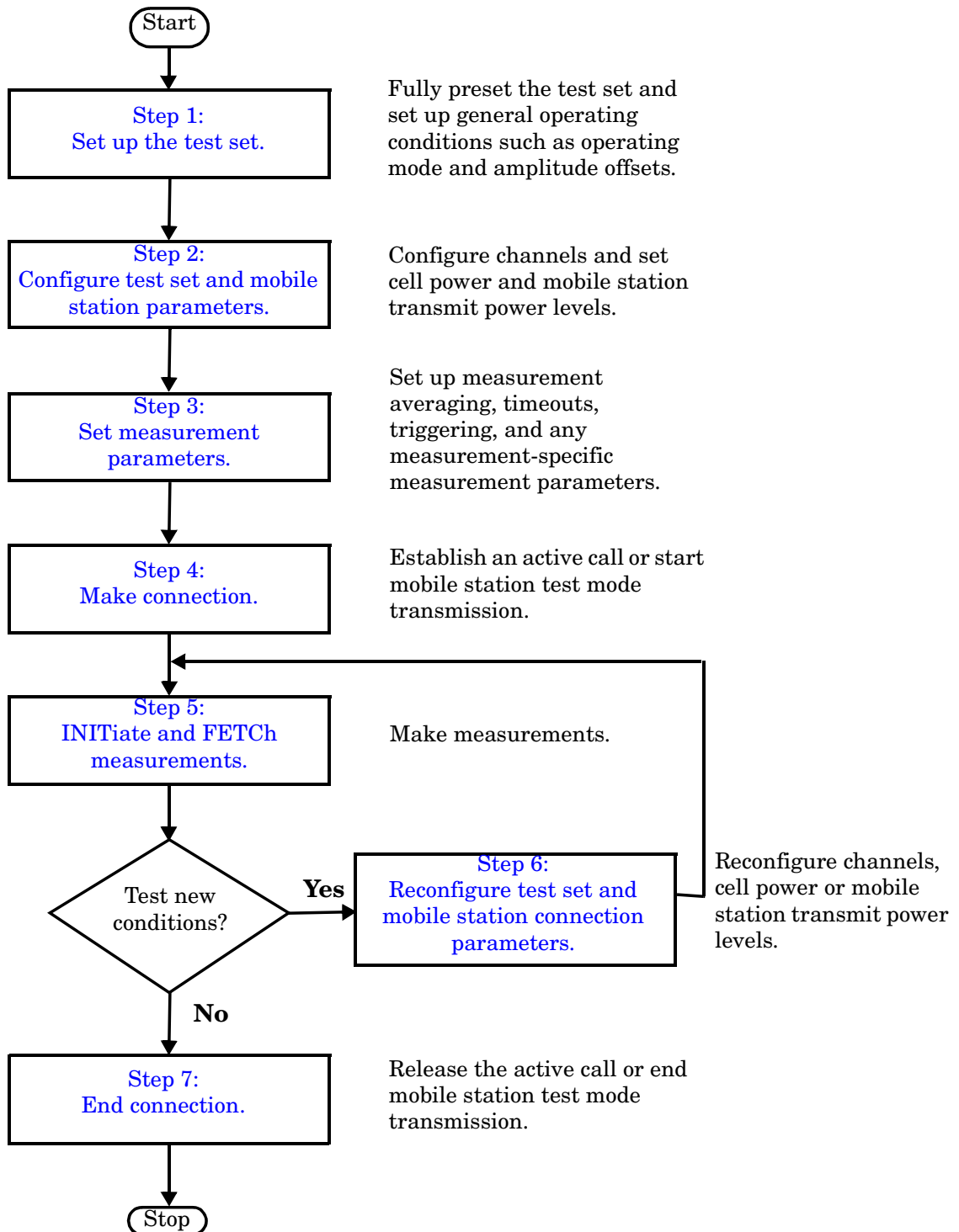
## How This Programming Guide Is Organized

This guide is organized around the program flowchart, which consists of seven steps a control program should execute to test a mobile station in a manufacturing environment.

Typically in a manufacturing environment:

- Steps 1, 2 and 3 of the Program Flowchart are done once each time a production run is started.
- Steps 4 and 7 are typically done once for each mobile station tested during the production run. (Some parameters in step 2 may also need to be reset for each new mobile station if they were altered during the testing of the previous mobile station. For example, if the last test performed on the previous mobile station was a sensitivity measurement, the cell power would likely still be set to a very low power and should be set back to a normal level for connection and testing of the next mobile station.)
- Steps 5 and 6 are done iteratively for each mobile station tested during the production run. The number of iterations for these steps is dependent upon how many mobile station operating conditions are being tested (for example, the number of channels and power levels).

Figure 7-1. Program Flowchart



## About the Programming Examples Presented in This Programming Guide

**Programming Language** For simplicity, the short programming examples presented in this guide are written in the HP BASIC programming language, also known as Rocky Mountain BASIC or RMB. The test application-specific comprehensive programming examples mentioned above are available in HP BASIC as well as other common programming languages.

### Syntax Used in the Programming Examples

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

```
SETup:TXPower:CONTinuous <ON|1|OFF|0>
```

the shortened form is:

```
SET:TXP:CONT <ON|1|OFF|0>
```

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

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

may appear in the programming examples as:

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

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

- When appropriate, the programming examples also use complex commands. Complex commands perform the action of turning a parameter state on and assigning a value to the parameter, rather than using two separate commands for these actions. For example, the command syntax:

```
SET:DAP:TIM:STAT ON
```

turns the state of the timeout parameter on. The command syntax:

```
SET:DAP:TIM:TIME 10s
```

assigns a value to the timeout parameter. The complex command:

```
SET:DAP:TIM:STIM 10s
```

sets the timeout parameter state to ON and sets 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. The shortened complex command:

```
SET:DAP:TIM 10s
```

also sets the state to ON and set the value to 10 seconds. In this example, the optional command mnemonic :STIME has been left off to shorten the complex command. This is the format that, in general, is used throughout this guide.

## Related Topics

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Figure 7-1., “Program Flowchart,”

Next Step:

[“Step 1: Set Up the Test Set”](#)

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## Step 1: Set Up the Test Set

### 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.

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**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 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.

**Related Topics**

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Figure 7-1., “Program Flowchart,”

Next Step:

[“Step 2: Configure Test Set and Mobile Station Parameters”](#)

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

### 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:KPCS 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.

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

- Set Active Band and Mode

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

### Commands to Set the Active Band

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

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

### Command to Set the Active Channel Type

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

- Active Cell and Test Mode Considerations

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

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

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

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

## Set Cell Power

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

### Command to Set Cell Power

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

- Active Cell and Test Mode Considerations

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

## Set Mobile Station Transmit Power

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

### Commands to Set Mobile Station Transmit Power

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

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

- **Manually Setting Expected Power**

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

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



## Set Up Additional Connection Parameters

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

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

All of these parameters are configured using the CALL subsystem.

## Related Topics

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Figure 7-1., “Program Flowchart,”

Next Step:

[“Step 3: Set Measurement Parameters”](#)

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## Step 3: Set Measurement Parameters

### Description

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

### Contents

- [“Measurement Parameters Overview”](#)
- [“Generic Measurement Parameters”](#)
- [“Measurement-Specific Measurement Parameters”](#)

### Measurement Parameters Overview

There are two different types of measurement parameters:

- Generic Measurement Parameters
- Measurement-Specific Measurement Parameters

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

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

---

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

---

## Generic Measurement Parameters

There are three types of generic measurement parameters:

- Measurement Count (used by most measurements)
  - Measurement Count State
  - Measurement Count Number
- Measurement Timeout (used by all measurements)
  - Measurement Timeout State
  - Measurement Timeout Time
- Measurement Trigger (used by most measurements)
  - Trigger Arm (used by all measurements)
  - Trigger Source (not applicable to analog measurements)
  - Trigger Delay (not applicable to analog measurements)

## Measurement Count Parameters

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

## Statistical Measurement Results Parameters

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

### Example 1. Programming Example:

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

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

### Step 3: Set Measurement Parameters

#### Measurement Timeout Parameters

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

#### Measurement Timeout Parameters

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

#### Example 2. Programming Example:

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

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

## Measurement Trigger Parameters

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

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

---

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

---

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

---

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

---

## Measurement Trigger Parameters

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

---

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

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

---

### Example 3. Programming Example:

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

sets the trigger arm to single for all measurements.

### Example 4. Programming Example:

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

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

### Example 5. Programming Example:

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

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

### 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 6. Programming Example:

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

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

### Example 7. Programming Example:

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

sets the first ORFS offset to 400 kHz.

### Example 8. Programming Example:

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

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

### Example 9. Program Example Setting Both Generic and Measurement-Specific Measurement Parameters

```

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

```

### Related Topics

\*\*\*\*\*

Figure 7-1., "Program Flowchart,"

Next Step:

["Step 4: Make Connection"](#)

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## Step 4: Make Connection

### 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.

#### Step 4: Make Connection

- Call-State-Change Detector Timeout Command

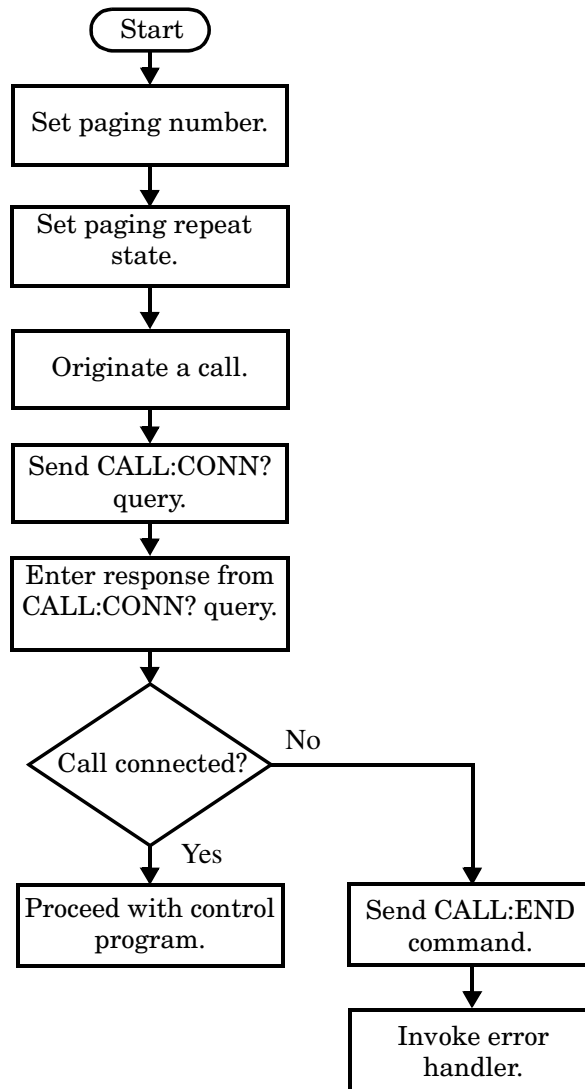
If the call-state-change detector is armed and a call connection is attempted but the call state never changes from the idle state, the CALL:CONN? query hangs the bus. This easily happens if the mobile is badly broken, the mobile is not connected to the test set, or no one pushes the send button on the 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 1. Process for Making a Base Station Originated Call




---

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

---

### Example 10. Programming Example

```

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

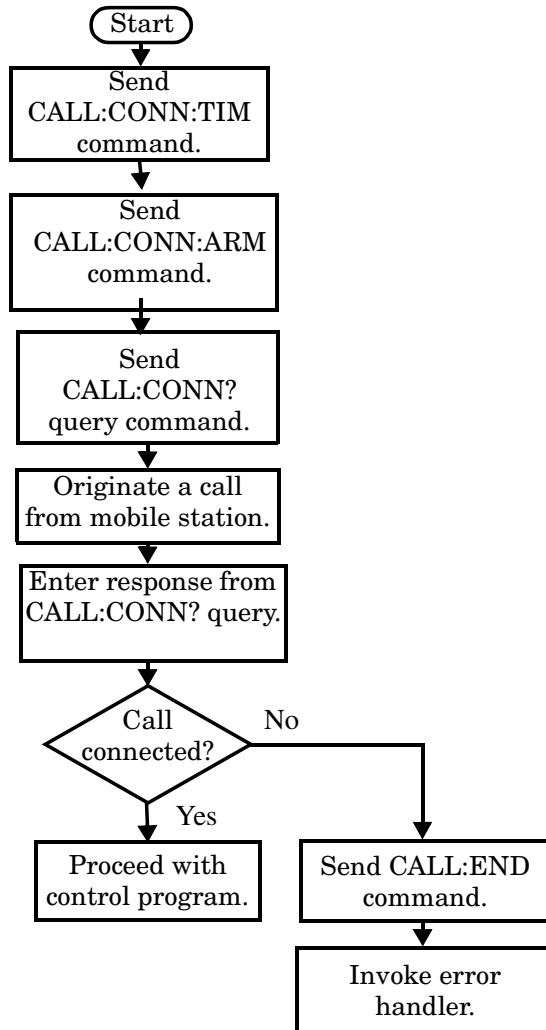
#### Step 4: Make Connection

```
OUTPUT Test_set;"CALL:CONN?" ! Hanging GPIB query
ENTER Test_set;Call_connected ! Program hangs here until
                                ! origination passes or fails

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

## Process for Making a Mobile Station Originated Call

Figure 2. Process for Making a Mobile Station Originated Call




---

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

---

### Example 11. Programming Example

```

OUTPUT Test_set;"CALL:CONN:TIM 10"           ! Set timeout time to 10 seconds
OUTPUT Test_set;"CALL:CONN:ARM"             ! Arm the change detector
  
```

---

## Step 4: Make Connection

```
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.

## Related Topics

\*\*\*\*\*

Figure 7-1., "Program Flowchart,"

Next Step:

["Step 5: INITiate and FETCh Measurements"](#)

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## Step 5: INITiate and FETCh Measurements

### Description

This step involves making measurements on the mobile station.

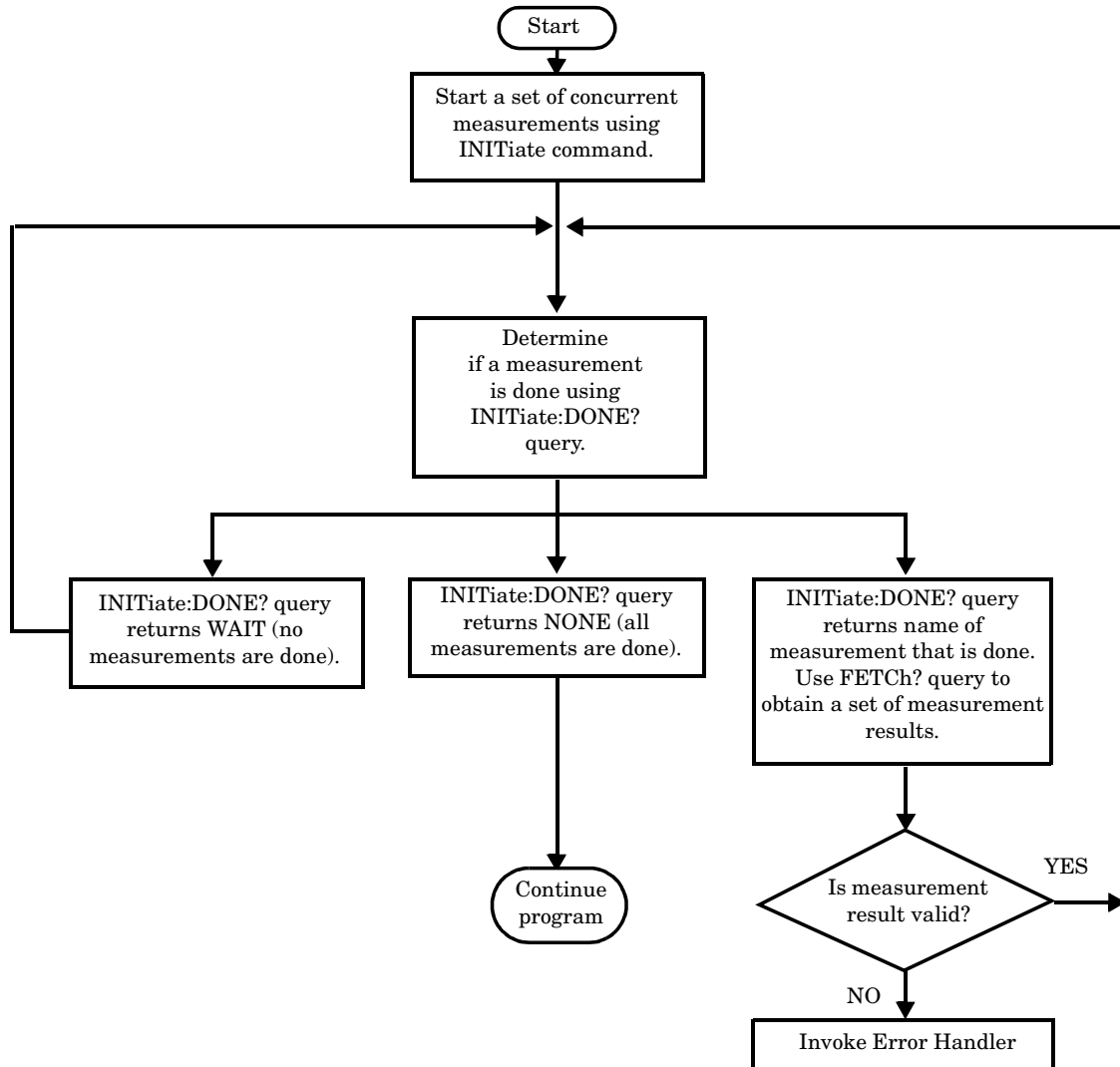
The test set has multiple signal paths and processors, which means you can make measurements concurrently and reduce test time. Making concurrent measurements involves starting a group of measurements, fetching the results of the measurements as they complete, and then verifying that the results are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

### Contents

- [“Concurrent Measurement Process”](#)
- [“Alternative Measurement Process”](#)

## Concurrent Measurement Process

Figure 3. 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.

**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.

## Step 5: INITiate and FETCh Measurements

### 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 12. Concurrent Measurement Process Programming Example**

```

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

```

## 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 13. Programming Example

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

## Alternative Measurement Process

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

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

### Example 14. Programming Example

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

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

## Related Topics

\*\*\*\*\*

Figure 7-1., "Program Flowchart,"

Next Step:

["Step 6: Reconfigure Test Set and Mobile Station Connection Parameters"](#)

\*\*\*\*\*

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

### 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.

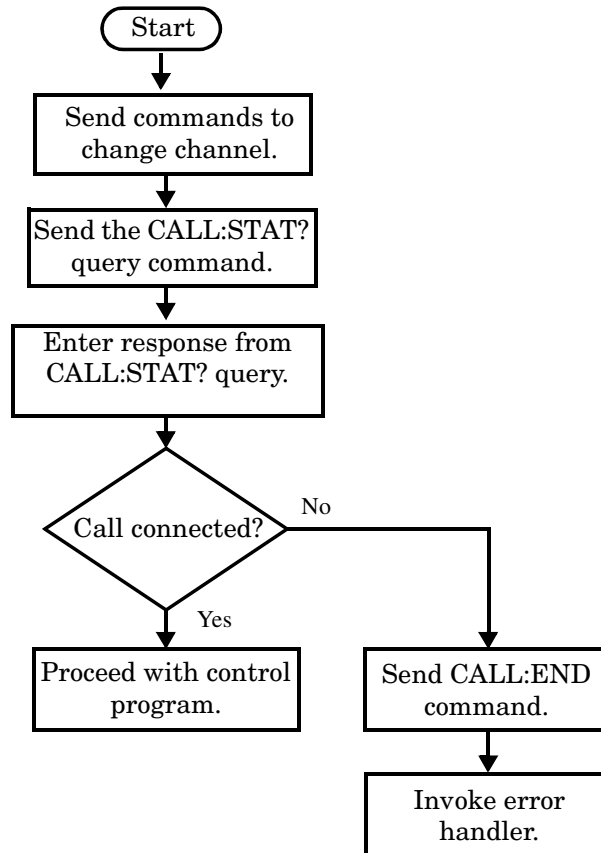
The CALL:STATus? query immediately returns the state of the call at the time the query is received.

#### 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 4. 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.

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

### 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.

### Related Topics

\*\*\*\*\*

Figure 7-1., “Program Flowchart,”

Next Step:

[“Step 7: End Connection”](#)

\*\*\*\*\*



---

## Step 7: End Connection

### 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”

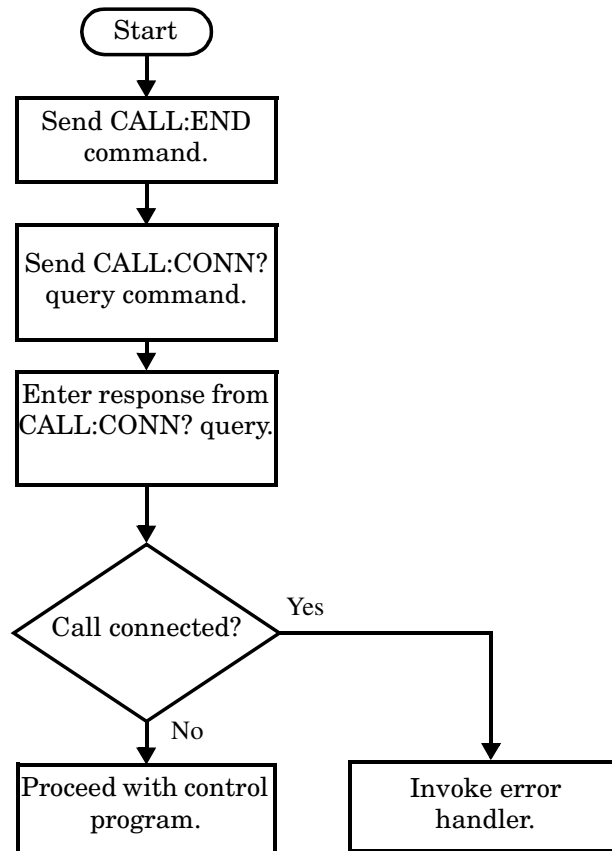
### Release the Call in Active Cell Mode

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 5. Process for Releasing an Active Call from the Base Station

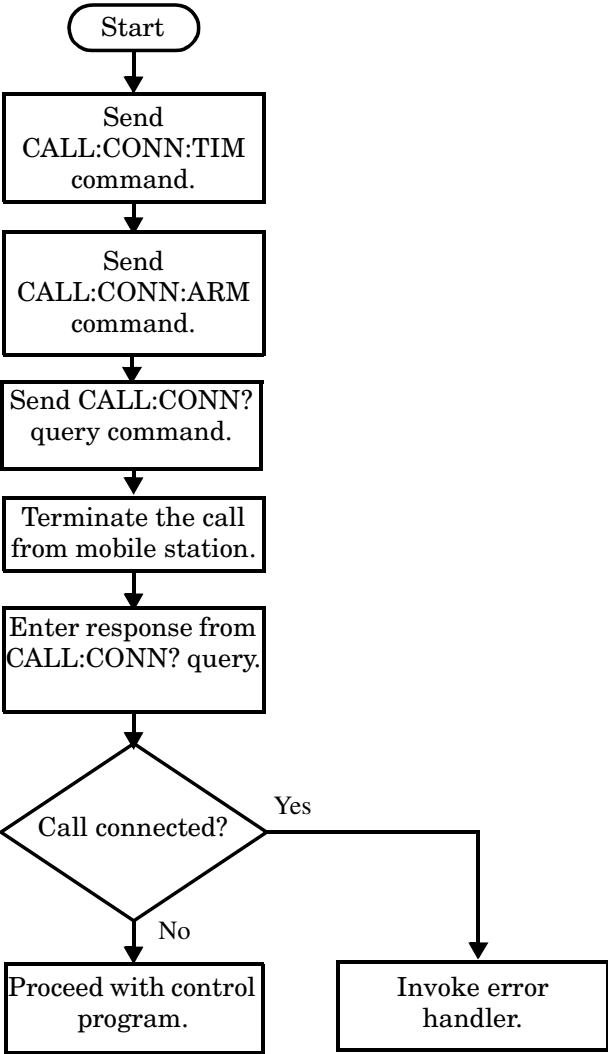


### Example 15. Programming Example

```
OUTPUT Test_set;"CALL:END"           ! Initiate a base station release.
OUTPUT Test_set;"CALL:CONN?"        ! Send call connected state query.
ENTER Test_set;Call_connected        ! Program hangs here until state
                                     ! change or timer expires.
IF Call_connected THEN                ! Check if disconnection successful
! <put error handler here>
END IF
! Call is disconnected so proceed with control program
```

**Releasing an Active Call from the Mobile Station**

**Figure 6. Process for Terminating an Active Call from the Mobile Station**



---

**NOTE** The test set cannot initiate a call disconnection from the mobile station. You must manually push the end button on the mobile station or send commands to a test bus built into the mobile station. For a mobile station release where the call is terminated by physically pushing a button on the phone (as opposed to using a test bus) ensure that the call-state-change-detector timeout time is long enough to allow the end button to be pushed.

---

**Example 16. Programming Example**

```
OUTPUT Test_set;"CALL:CONN:TIM 5" !Set timeout time to 5 seconds.
```

## Step 7: End Connection

```
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.

## Related Topics

\*\*\*\*\*

Figure 7-1., "Program Flowchart,"

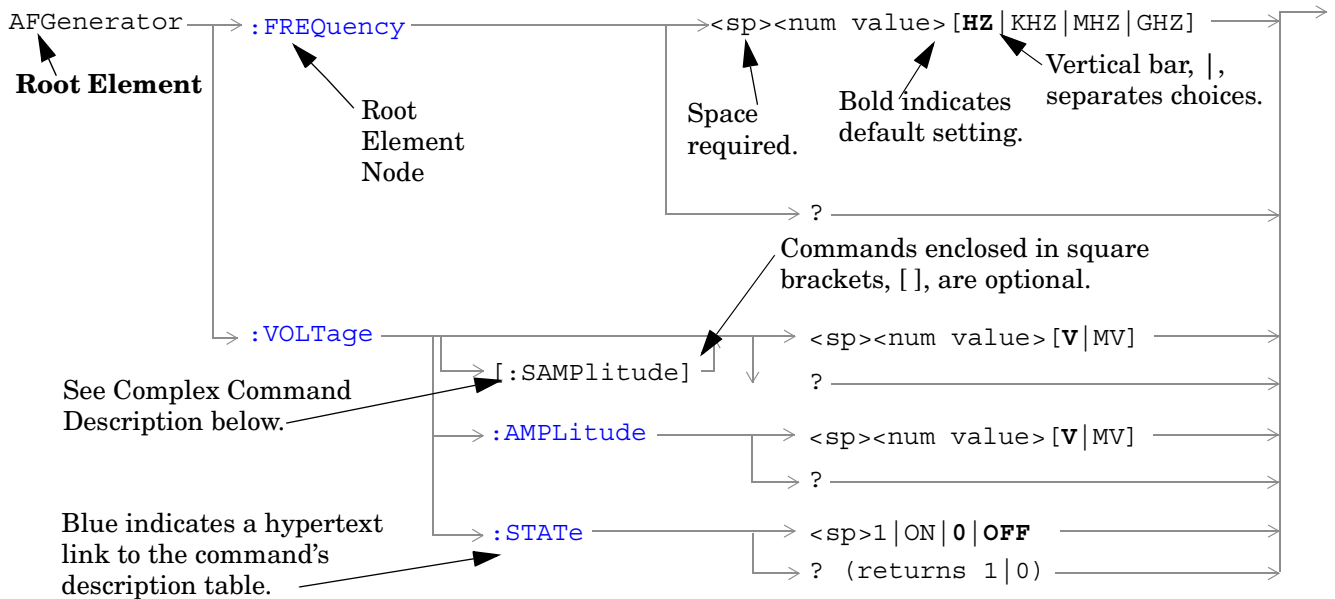
\*\*\*\*\*

# 8 GPIB Command Syntax



## Diagram Conventions

### Description



### Diagram Description

Statement elements are connected by lines. Each line can be followed in only one direction, as indicated by the arrow at the end of the line. Any combination of statement elements that can be generated by starting at the **Root Element** and following the line the **direction of the arrow** is syntactically correct. The drawings show the proper use of spaces. Where spaces are required they are indicated by **<sp>**, otherwise no spaces are allowed between statement elements.

**Complex Command Description** A complex command sets the state of the parameter to ON, and is used to set a value for that parameter. These parameters; amplitude, frequency, gain, number, time, and value can be used as a complex command. Refer to the specific command for the parameter that applies.

### Developing Code

It is recommended that you set the Test Set's operating environment to debug. To set the Test Set debug mode to "ON" use the following syntax:

```
SYSTEM:COMMunicate:GPIB:DEBug ON
```

#### Units-of-Measure

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.

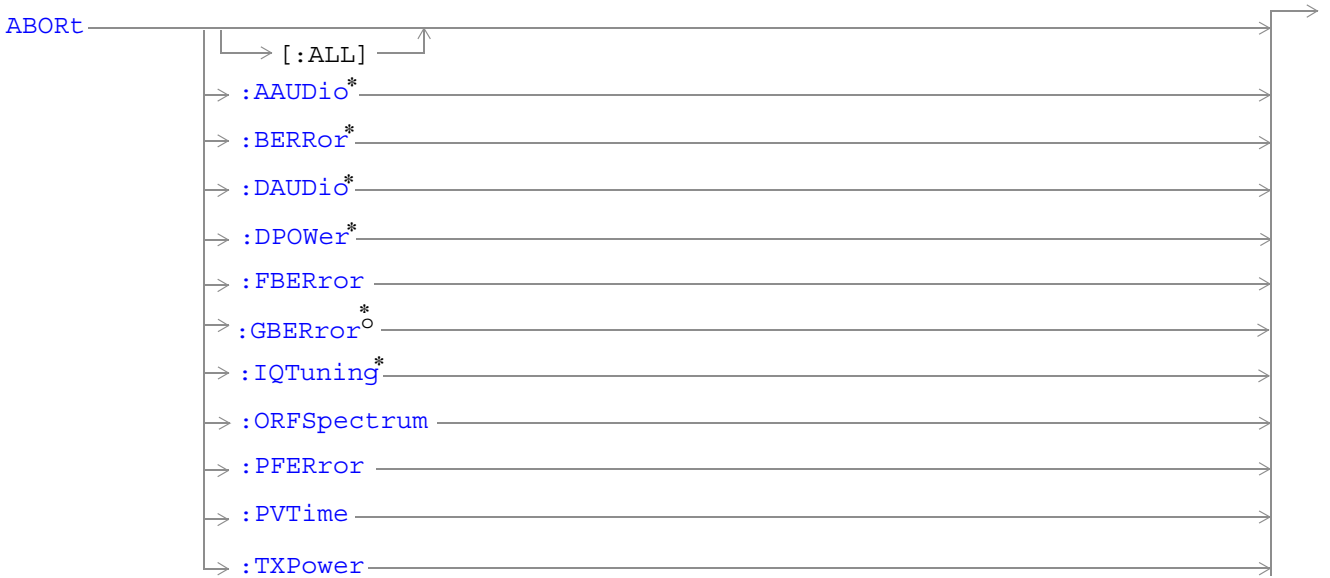
READ:<meas>? will execute an ABORt:<meas> action that aborts just one trigger sequence and then combines the INITiate and FETCh? commands.

### Syntax Diagram and Command Descriptions

“ABORt”

---

# ABORt



\* Not applicable to GPRS.

<sup>o</sup> Not applicable to GSM.

“Diagram Conventions” on page 343

**ABORt[:ALL]**

Function	GSM	Stops any and all measurements that are active. See <a href="#">“Measurement States” on page 221</a>
	GPRS	<p>If the trigger arm is set to single, see <a href="#">“Trigger Arm (Single or Continuous) Description” on page 221</a> the measurements will go to the idle state.</p> <p>If the trigger arm is set to continuous the measurements will re-arm and initiate again.</p>
Setting	GSM	<p>Range</p> <ul style="list-style-type: none"> <li>• AAUDio</li> <li>• BERRor</li> <li>• DAUDio</li> <li>• DPOWer</li> <li>• FBERRor</li> <li>• IQTuning</li> <li>• ORFSpectrum</li> <li>• PFERror</li> <li>• PVTime</li> <li>• TXPower</li> </ul>
	GPRS	<p>Range</p> <ul style="list-style-type: none"> <li>• GBERRor</li> <li>• ORFSpectrum</li> <li>• PFERror</li> <li>• PVTime</li> <li>• TXPower</li> </ul>
<p><b>Programming Example</b></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 <a href="#">“Measurement States” on page 221</a>
	GPRS	If the trigger arm is set to single, see <a href="#">“Trigger Arm (Single or Continuous) Description” on page 221</a> the measurements will go to the idle state. If the trigger arm is set to continuous the measurements will re-arm and initiate again.
Setting	GSM	Range <ul style="list-style-type: none"><li>• AAUDio</li><li>• BERRor</li><li>• DAUDio</li><li>• DPOWer</li><li>• FBERRor</li><li>• ORFSpectrum</li><li>• IQTuning</li><li>• PFERRor</li><li>• PVTime</li><li>• TXPower</li></ul>
	GPRS	Range <ul style="list-style-type: none"><li>• GBERRor</li><li>• ORFSpectrum</li><li>• PFERRor</li><li>• PVTime</li><li>• TXPower</li></ul>
Programming Example		
OUTPUT 714;"ABORT:PVTIME" !Aborts a PvT measurement.		

## AFGenerator Subsystem

This subsystem is *not* applicable to GPRS.

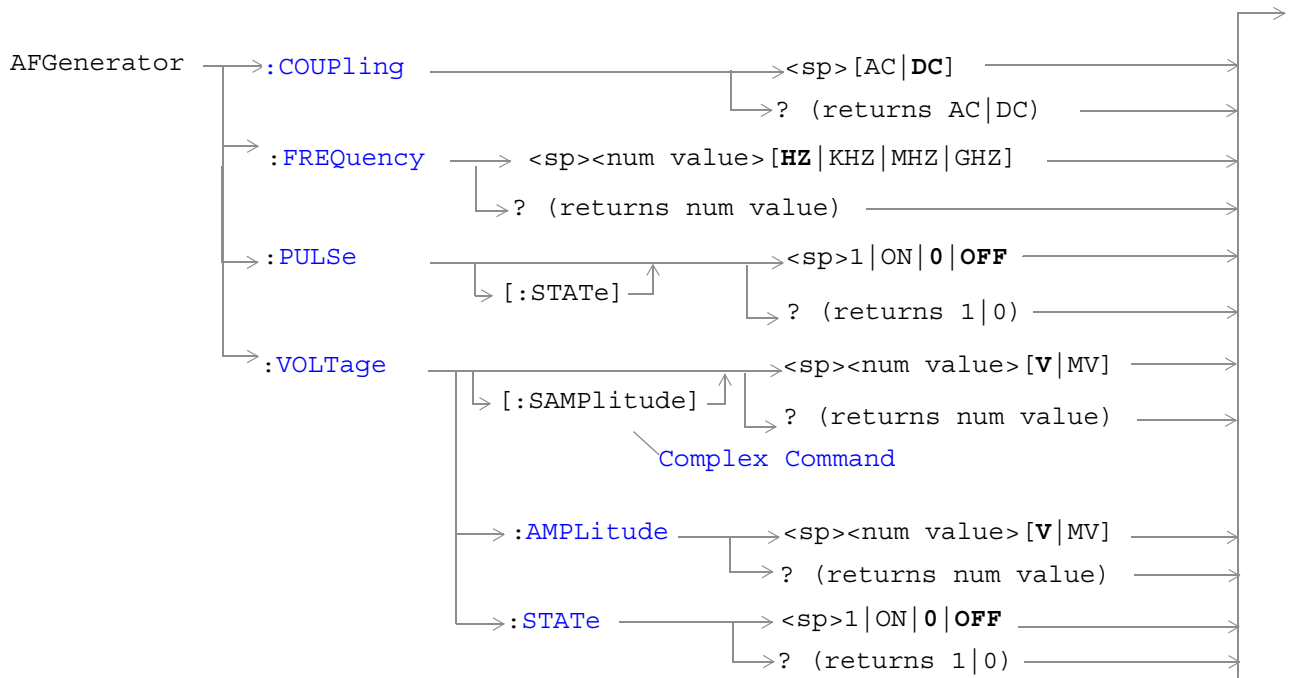
### Description

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 343

**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 <a href="#">"AFGenerator" on page 350</a> .
	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"><li>• .5 mV pk. &lt;= 1 V pk. output</li><li>• 5 mV pk. &gt; 1 V pk. output</li></ul>
Query		Range: 0 - 9 v peak Resolution: <ul style="list-style-type: none"><li>• .5 mV pk. &lt;= 1 V pk. output</li><li>• 5 mV pk. &gt; 1 V pk. output</li></ul>
*RST setting		zero volts
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE 2.1" !Sets the state to on and the output !voltage to 2.1 volts.</pre>		



**AFGenerator:VOLTage:AMPLitude**

Function	GSM	Sets/queries the amplitude for the audio generator when the audio generator state is on. The units (V MV) are optional, if no units are specified then units default to V.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 - 9 V pk. Resolution: <ul style="list-style-type: none"> <li>.5 mV pk. &lt;= 1 V pk. output</li> <li>5 mV pk. &gt; 1 V pk. output</li> </ul>
Query		Range: 0 - 9 V pk. Resolution: <ul style="list-style-type: none"> <li>.5 mV pk. &lt;= 1 V pk. output</li> <li>5 mV pk. &gt; 1 V pk. output</li> </ul>
*RST setting		zero volts
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:AMPLITUDE 1.414" !Sets the audio generator output !voltage to 1.414 volts peak.</pre>		

**AFGenerator:VOLTage:STATE**

Function	GSM	Sets/queries the audio generator state
	GPRS	This command is not applicable to GPRS.
Setting		0   OFF   1   ON
Query		0   1
*RST setting		0   off
<b>Programming Example</b> <pre>OUTPUT 714;"AFGENERATOR:VOLTAGE:STATE ON" !Set the audio generator state to ON.</pre>		

## CALibration Subsystem

### Description

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

### Syntax Diagram and Command Descriptions

“CALibration”



## CALibration

### CALibration:IQ2?

Function	GSM	Sets/queries the calibration of the IQ modulator for RF generator 2. It takes some time to complete calibration and can't be aborted except by cycling the power switch.
	GPRS	<ul style="list-style-type: none"><li>• Calibrates the IQ modulator for RF generator 2.</li><li>• Returns a value indicating success or failure of calibration.</li></ul>
Query		Range <ul style="list-style-type: none"><li>• 0 = Pass</li><li>• -340 = Fail</li></ul>
Programming Example		
OUTPUT 714;"CALIBRATION:IQ2?" !Performs a calibration of the IQ modulator !for RF generator 2 and returns 0 or -340		

---

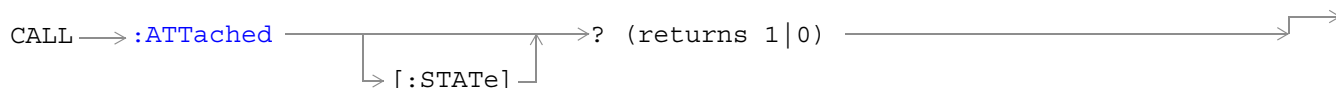
**NOTE** When the calibration is done the test set display will display:  
IQ Calibration completed successfully for modulator 2. Cycle power to continue.

---

### CALibration:DATE

Function	GSM	Sets/queries the date of the last system calibration done to the test set, not the IQ calibration date. 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"><li>• Year = 0000 to 9999</li><li>• Month = 01 to 12</li><li>• Day = 01 to 31</li></ul>
Query		Returns the date when system calibration was performed. Range <ul style="list-style-type: none"><li>• Year = 0000 to 9999</li><li>• Month = 1 to 12</li><li>• Day = 1 to 31</li></ul>
Programming Example		
OUTPUT 714;"CALIBRATION:DATE 1999,01,04" !Sets the date of the last system !calibration year, month and day.		

## CALL:ATTached



This diagram is not applicable to GSM.

[“Diagram Conventions” on page 343](#)

### 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 <a href="#">“Data Connection Processing State Synchronization” on page 58</a> .
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

<a href="#">“CALL:ACTivated” on page 359</a>	<a href="#">“CALL:MNCcode” on page 395</a>
<a href="#">“CALL:ATTached” on page 357</a>	<a href="#">“CALL:MS” on page 396</a>
<a href="#">“CALL:BA” on page 360</a>	<a href="#">“CALL:NCCode” on page 409</a>
<a href="#">“CALL:BAND” on page 368</a>	<a href="#">“CALL:OPERating” on page 410</a>
<a href="#">“CALL:BCCode” on page 369</a>	<a href="#">“CALL:ORIGinate” on page 412</a>
<a href="#">“CALL:BCHannel” on page 370</a>	<a href="#">“CALL:PAGing” on page 413</a>
<a href="#">“CALL:BURSt” on page 373</a>	<a href="#">“CALL:PDTCH   PDTChannel” on page 416</a>
<a href="#">“CALL:CONNected” on page 374</a>	<a href="#">“CALL:PMNCcode” on page 427</a>
<a href="#">“CALL:COUNt” on page 377</a>	<a href="#">“CALL:POWer” on page 429</a>
<a href="#">“CALL:DCONNected” on page 381</a>	<a href="#">“CALL:RFGenerator” on page 435</a>
<a href="#">“CALL:END” on page 384</a>	<a href="#">“CALL:SETup” on page 442</a>
<a href="#">“CALL:FUNCTion” on page 387</a>	<a href="#">“CALL:SIGNaling” on page 455</a>
<a href="#">“CALL:HANDover   HANDoff” on page 390</a>	<a href="#">“CALL:STATus” on page 456</a>
<a href="#">“CALL:IMEI” on page 392</a>	<a href="#">“CALL:TCHannel” on page 461</a>
<a href="#">“CALL:LACode” on page 393</a>	<a href="#">“CALL:TRANsferring” on page 468</a>
<a href="#">“CALL:MCCode” on page 394</a>	

## CALL:ACTivated

CALL → [:CELL] → :ACTivated → [:STATe] → <sp>1 | ON | 0 | OFF → ? (returns 1 | 0)

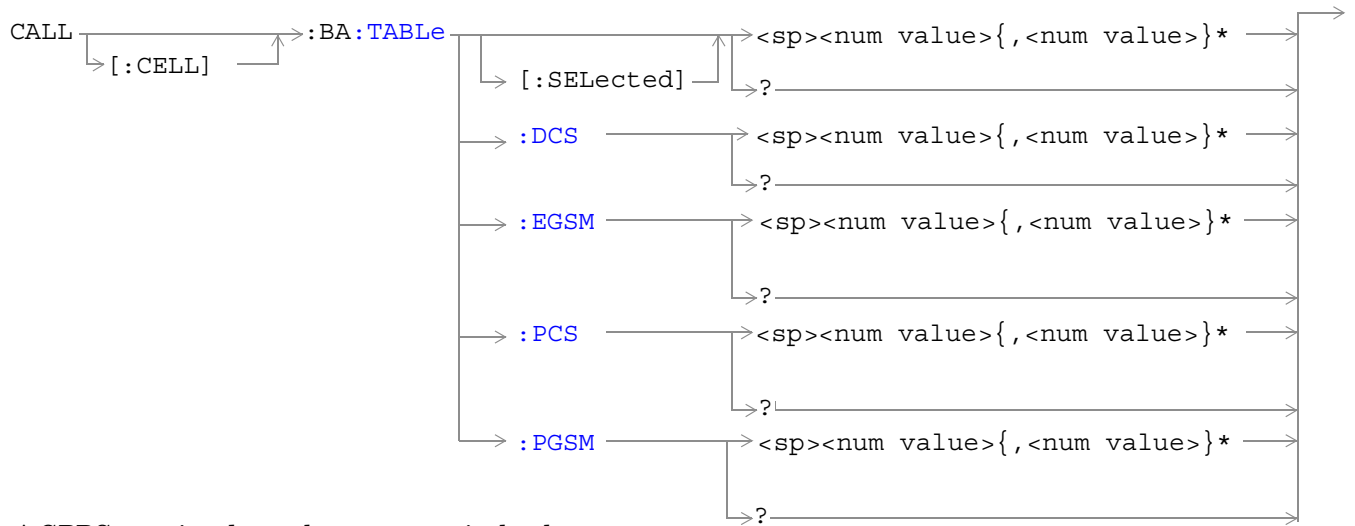
This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

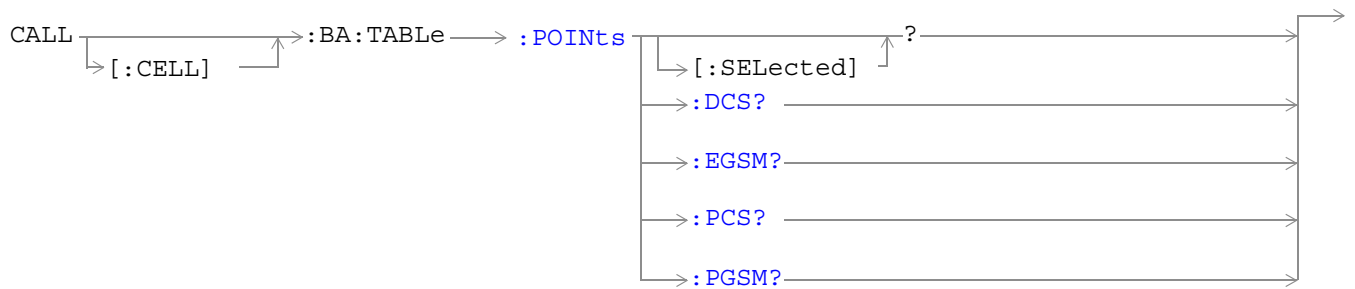
### CALL[:CELL]:ACTivated[:STATe]

Function	GSM	This command turns on or off, BS Emulator control of all signalling operations, uplink demodulation and downlink (BCH & TCH) generation. The query form returns a 1 (state = on) or a 0 (state = off).  When cell activated state is on and the test set is in active cell operating mode, burst type is determined by protocol. When the test set is in test mode operating mode, or when the cell activated state is off, the burst type may need to be specified before the test set can synchronize to the input signal's midamble. You specify the burst type using the command <a href="#">“CALL:BURSt:TYPE” on page 373</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: 1   ON   0   OFF	
Query	range: 1   0	
*RST Setting	1 (state = ON)	
Related Topics	<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a>	
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:ACTIVATED:STATE OFF" !Turns all signalling operations, !uplink demodulation and downlink !(BCH &amp; 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 343](#)



## 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:  <ul style="list-style-type: none"> <li>PGSM, EGSM, DCS broadcast band range: 0 to 124   512 to 885   975 to 1023</li> <li>PCS broadcast band range: 512 to 810</li> </ul> resolution: 1  default setting:  <b>GSM</b> <ul style="list-style-type: none"> <li>PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117</li> <li>EGSM BA Table: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110</li> <li>DCS BA Table: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862</li> <li>PCS BA Table: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790</li> </ul> states: <ul style="list-style-type: none"> <li>first entry = ON, all others = OFF</li> </ul> <b>GPRS</b> <ul style="list-style-type: none"> <li>PGSM BA Table: 20</li> <li>EGSM BA Table: 20</li> <li>DCS BA Table: 512</li> <li>PCS BA Table: 512</li> </ul> </p>	
Query	range: <ul style="list-style-type: none"> <li>PGSM, EGSM, DCS broadcast band range: 0 to 124   512 to 885   975 to 1023</li> <li>PCS broadcast band range: 512 to 810</li> <li>9.91E+37 (NAN) - for GSM only</li> </ul>	
*RST Setting	<b>GSM</b> PGSM BA Table: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 states: First entry = ON, all others = OFF  <b>GPRS</b> PGSM BA Table: 20	

## CALL:BA

<p>Programming Example</p> <p><b>GSM</b></p> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512,689,885" !Sets 3 table entries for the !selected broadcast band. !States of the remaining 13 !entries are set to OFF.  OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED" !Sets states of all table entries to OFF.</pre> <p><b>GPRS</b></p> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:SELECTED 512" !Sets the table entry for the selected !broadcast band.</pre>
--

## 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"><li>• 0 to 124   512 to 885   975 to 1023</li><li>• 9.91E+37 (NAN) - for GSM only</li></ul>
*RST Setting	<b>GSM</b> entries: 512, 698, 885, 537, 562, 587, 612, 637, 662, 712, 737, 762, 787, 812, 837, 862 states: 512 = ON, all others = OFF <b>GPRS</b> entry: 512	

<p>Programming Example</p> <p><b>GSM</b></p> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:DCS 512,612,787" !Sets three BA table entries for !the DCS broadcast band. States !of the remaining 13 entries are !set to OFF.  OUTPUT 714;"CALL:CELL:BA:TABLE:DCS" !Sets states of all table entries to OFF.</pre> <p><b>GPRS</b></p> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:DCS 637" !Sets the table entry for the DCS !broadcast band.</pre>
--

## 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"> <li>• 0 to 124   512 to 885   975 to 1023</li> <li>• 9.91E+37 (NAN) - for GSM only</li> </ul>	
*RST Setting	<b>GSM</b> entries: 20, 975, 37, 124, 986, 1008, 1019, 7, 18, 30, 53, 64, 76, 87, 99, 110 states: 20 = ON, all others = OFF  <b>GPRS</b> entry: 20	
Programming Example <b>GSM</b> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120,975,1012" !Sets three BA table entries for !the EGSM broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM" !Sets states of all table entries to OFF.</pre> <b>GPRS</b> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:EGSM 120" !Sets the table entry for the EGSM !broadcast band.</pre>		

## 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"> <li>• 512 to 810</li> <li>• 9.91E+37 (NAN) - for GSM only</li> </ul>	
*RST Setting	<p><b>GSM</b></p> <p>entries: 512, 660, 810, 530, 550, 570, 590, 610, 630, 650, 690, 710, 730, 750, 770, 790</p> <p>states: 512 = ON, all others = OFF</p> <p><b>GPRS</b></p> <p>entry: 512</p>	
<p>Programming Example</p> <p><b>GSM</b></p> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660,710,790" !Sets three BA table entries for !the PCS broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:PCS" !Sets states of all table entries to OFF.</pre> <p><b>GPRS</b></p> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:PCS 660" !Sets the table entry for the PCS !broadcast band.</pre>		

## 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"> <li>• 0 to 124   512 to 885   975 to 1023</li> <li>• 9.91E+37 (NAN) - for GSM only</li> </ul>	
*RST Setting	<b>GSM</b> entries: 20, 1, 62, 124, 9, 18, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117 states: 20 = ON, all others = OFF  <b>GPRS</b> entry: 20	
Programming Example <b>GSM</b> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 20,36,120" !Sets three BA Table entries for !the PGSM broadcast band. States !of the remaining 13 entries are !set to OFF. OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM" !Sets states of all BA Table entries to OFF.</pre> <b>GPRS</b> <pre>OUTPUT 714;"CALL:CELL:BA:TABLE:PGSM 62" !Sets the table entry for the PGSM !Broadcast channel.</pre>		

**CALL:BA****CALL[:CELL]:BA:TABLE:POINTS[:SElected]?**

Function	GSM	Queries the number of entries that are in the ON state in the selected broadcast band's BA Table. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLE[:SElected]? query. A return value of zero indicates that there are no table entries in the ON state.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 16 resolution: 1
*RST Setting		1
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:SELECTED?" !Queries the number of entries !that are in the ON state in the !selected broadcast band's BA Table. </pre>		

**CALL[:CELL]:BA:TABLE:POINTS:DCS?**

Function	GSM	Queries the number of entries that are in the ON state in the DCS broadcast band BA Table. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLE:DCS? query. A return value of zero indicates that there are no table entries in the ON state.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 16 resolution: 1
*RST Setting		1
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:DCS?" !Queries the number of entries that are !in the ON state in the DCS broadcast !band BA Table. </pre>		

**CALL[:CELL]:BA:TABLE:POINTS:EGSM?**

Function	GSM	Queries the number of entries that are in the ON state in the EGSM broadcast band BA Table. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLE:EGSM? query. A return value of zero indicates that there are no table entries in the ON state.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 16 resolution: 1
*RST Setting		1
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:EGSM?" !Queries the number of entries that !are in the ON state in the EGSM !broadcast band BA Table.</pre>		

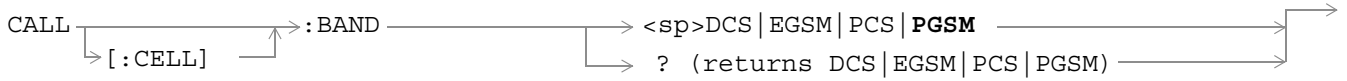
**CALL[:CELL]:BA:TABLE:POINTS:PCS?**

Function	GSM	Queries the number of entries that are in the ON state in the PCS cellband BA Table. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLE:PCS? query. A return value of zero indicates that there are no table entries in the ON state.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 16 resolution: 1
*RST Setting		1
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PCS?" !Queries the number of entries that !are in the ON state in the PCS !broadcast band BA Table.</pre>		

**CALL[:CELL]:BA:TABLE:POINTS:PGSM?**

Function	GSM	Queries the number of entries that are in the ON state in the PGSM broadcast band BA Table. This is the number of values that will be returned from the CALL[:CELL]:BA:TABLE:PGSM? query. A return value of zero indicates that there are no table entries in the ON state.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 16 resolution: 1
*RST Setting		1
Related Topics		See <a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a>
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:BA:TABLE:POINTS:PGSM?" !Queries the number of entries that !are in the ON state in the PGSM !broadcast band BA Table.</pre>		

## CALL:BAND



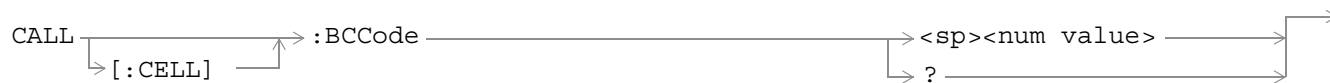
[“Diagram Conventions” on page 343](#)

### CALL[:CELL]:BAND

Function	GSM	This command sets/queries the band in which the broadcast channel (BCH) is transmitted. Setting the BCH will change the receiver control to auto (see <a href="#">“RFANalyzer:CONTrol:AUTO” on page 577</a> ).
	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	See <a href="#">“Cell Band Parameter” on page 740</a> .	
Programming Example		
OUTPUT 714; "CALL:CELL:BAND PGSM" !Sets the band for the BCH to PGSM.		



## CALL:BCCode



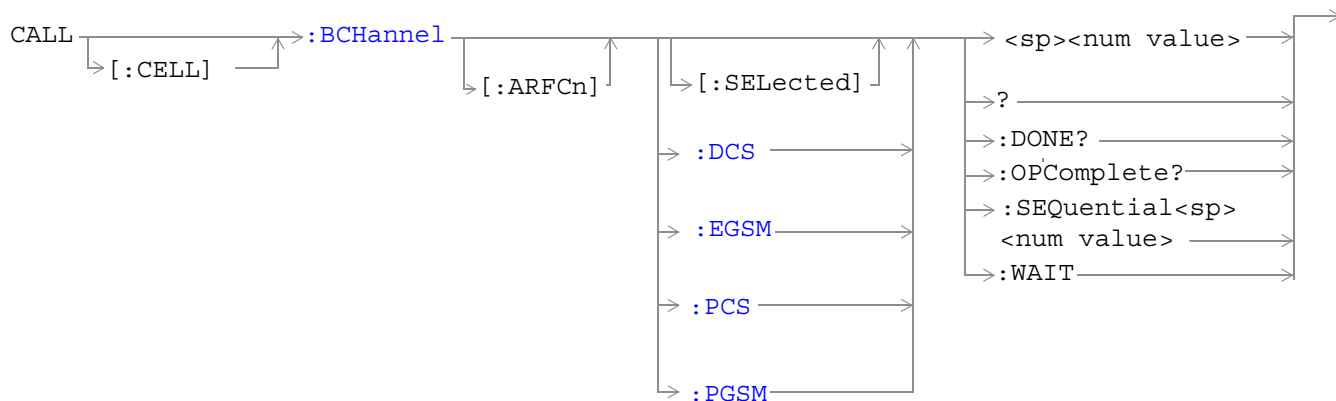
This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### CALL[:CELL]:BCCode

Function	GSM	Sets/queries the value of the Base Station Colour Code (BCC). This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 359</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 7 resolution: 1
Query		range: 0 to 7 resolution: 1
*RST Setting		5
Related Topics		See <a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a> .
Programming Example		
OUTPUT 714; "CALL:CELL:BCCODE 4" !Sets the cell's base station color code to 4.		

## CALL:BCHannel



“Diagram Conventions” on page 343

### CALL[:CELL]:BCHannel[:ARFCn][:SElected]

Function	GSM GPRS	This command sets/queries the Broadcast Channel number for the currently active (that is, the selected) broadcast band.
Setting		Depends upon the selected broadcast band. range: <ul style="list-style-type: none"> <li>PGSM broadcast band range: 1 to 124</li> <li>EGSM broadcast band range: 0 to 124   975 to 1023</li> <li>DCS broadcast band range: 512 to 885</li> <li>PCS broadcast band range: 512 to 810</li> </ul> resolution: 1
Query		Depends upon the selected broadcast band. range: <ul style="list-style-type: none"> <li>PGSM broadcast band range: 1 to 124</li> <li>EGSM broadcast band range: 0 to 124   975 to 1023</li> <li>DCS broadcast band range: 512 to 885</li> <li>PCS broadcast band range: 512 to 810</li> </ul> resolution: 1
*RST Setting		20
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763.</a>
Programming Example		
<pre> OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:SELECTED 512" !Sets BCH ARFCN for the selected !broadcast band to channel 512.           </pre>		

**CALL[:CELL]:BCHannel[:ARFCn]:DCS**

Function	GSM	This command sets/queries the Broadcast Channel number 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		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763.</a>
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:DCS 810" !Sets BCH ARFCN for DCS broadcast !band to 810.</pre>		

**CALL[:CELL]:BCHannel[:ARFCn]:EGSM**

Function	GSM	This command sets/queries the Broadcast Channel number 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		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763.</a>
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:BCHANNEL:ARFCN:EGSM 120" !Sets BCH ARFCN for EGSM broadcast !band to 120.</pre>		

**CALL:BCHannel****CALL[:CELL]:BCHannel[:ARFCn]:PCS**

Function	GSM	This command sets/queries the Broadcast Channel number 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		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763.</a>
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 number 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		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763.</a>
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 →

?

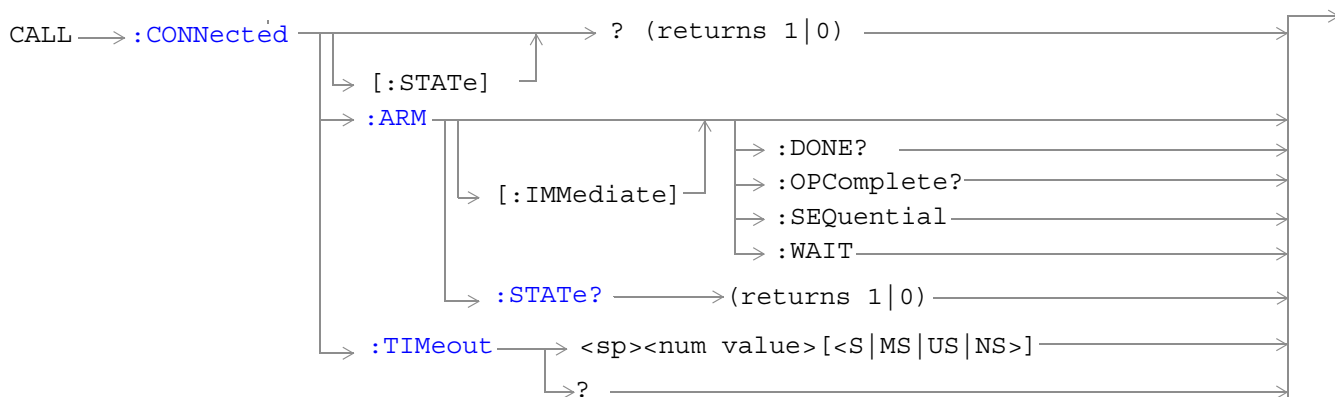
\* Not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### 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 <a href="#">“CALL:OPERating:MODE” on page 411</a> (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see <a href="#">“Expected Burst” on page 755</a> .
	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 <a href="#">“CALL:OPERating:MODE” on page 411</a> (If it is not set, the test set may not synchronize to the input signal's midamble). For more details on this parameter, see <a href="#">“Expected Burst” on page 755</a> .
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	<a href="#">“Test Mode Operating Modes” on page 753</a> .	
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 343

### 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 44.
	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: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 <a href="#">“Call Processing State Synchronization” on page 44.</a></p>
	GPRS	This command is not applicable to GPRS.
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CONNECTED:ARM:IMMEDIATE" !Arms the call-state-change detector.</pre>		

**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 <a href="#">“Call Processing State Synchronization” on page 44.</a></p>
	GPRS	This command is not applicable to GPRS.
Query	Range: 0   1	
*RST Setting	0	
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CONNECTED:ARM:STATE?" !Returns arm state of !call-state-change detector.</pre>		

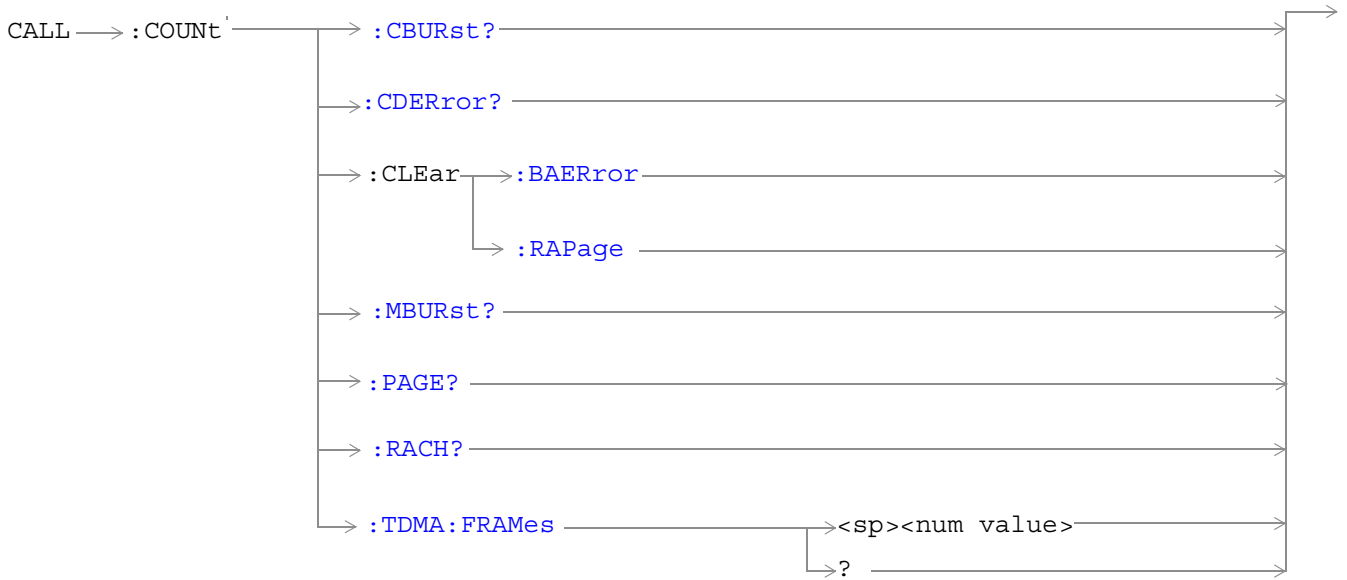
## CALL:CONNeCTed

### CALL:CONNeCTed:TIMEout

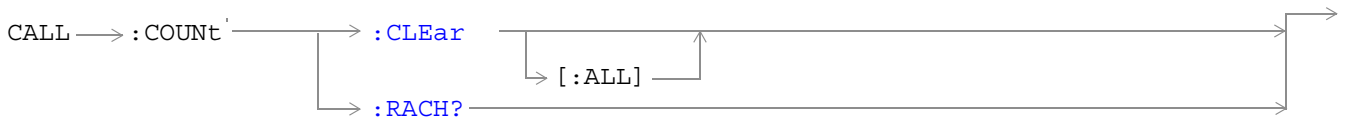
Function	GSM	Sets/queries the maximum time the test set will wait for a hanging CALL:CONNeCTed:STAtE? query to complete. Default setting units are seconds. To set timeout time in units other than seconds include optional unit specifier in command string.  A timeout timer is started whenever the call-state-change-detector becomes armed or gets rearmed when already armed. The duration of this timeout is a set using the CALL:CONNeCTed:TIMEout command and should be greater than the maximum amount of time the control program needs/wants to wait between arming the call-state-change detector and the connect/disconnect operation starting. Once the process starts and the call state has moved into one of the transitory states the GSM defined protocol timers take over and prevent the call state from staying in a transitory state forever. See <a href="#">“Call Processing State Synchronization” on page 44</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 100 seconds Resolution: 0.1 seconds
Query		Range: 0 to 100 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
Related Topics		<a href="#">“Call Processing State Synchronization” on page 44</a>
		<a href="#">“Call Processing Event Synchronization” on page 38</a>
Programming Example		
OUTPUT 714;"CALL:CONNECTED:TIMEOUT 3" !Sets the CALL:CONNeCTed:STAtE? query !timeout time to 3 seconds.		
OUTPUT 714;"CALL:CONNECTED:TIMEOUT 500 MS" !Sets the CALL:CONNeCTed:STAtE? query !timeout time to 500 ms.		



## CALL:COUNT



These commands are not applicable to GPRS.



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)

## CALL:COUNT

### 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		
<pre>OUTPUT 714;"CALL:COUNT:CLEar:BAERror" !Clears the corrupt burst, missing burst, and !decode error counters</pre>		

**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		
<pre>OUTPUT 714;"CALL:COUNT:CLEar:RAPage" !Clears the RACH and page counters.</pre>		

**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		
<pre>OUTPUT 714;"CALL:COUNT:MBURst?" !Returns the number of missing uplink bursts.</pre>		

**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		
<pre>OUTPUT 714;"CALL:COUNT:PAGE?" !Returns the number of pages sent by the base station !emulator.</pre>		

## CALL:COUNT

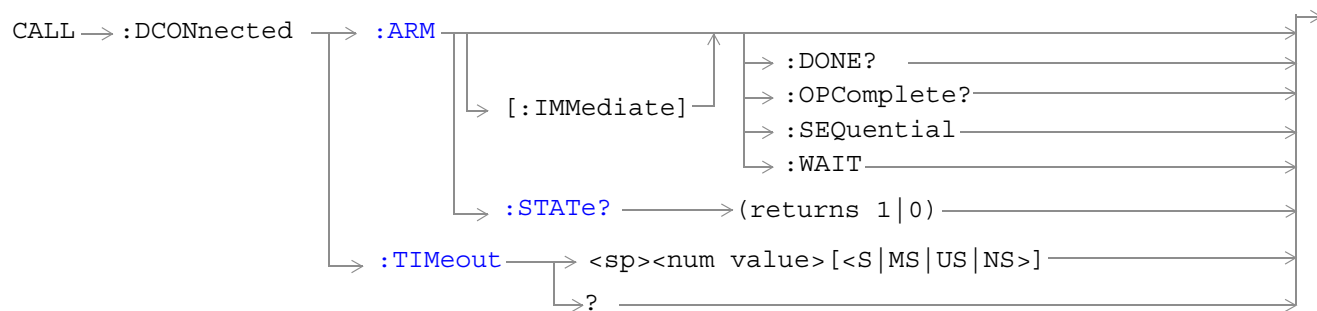
### CALL:COUNT:RACH?

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		
OUTPUT 714;"CALL:COUNT:RACH?" !Returns the number of RACH bursts received by the base !station emulator during call setup/data connection attempts.		

### CALL:COUNT: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		
OUTPUT 714;"CALL:COUNT:TDMA:FRAMES 15" !Sets the number of TDMA frames allowed !before transmitting the new TCH.		

## CALL:DCONnected



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)

## CALL:DCONnected

### 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 <a href="#">“Data Connection Processing State Synchronization” on page 58</a>.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Data Connection Processing Event Synchronization” on page 55</a>.</p>
Programming Example		
OUTPUT 714;"CALL:DCONnected:ARM:IMMediate" !Arms the data connection state change detector.		

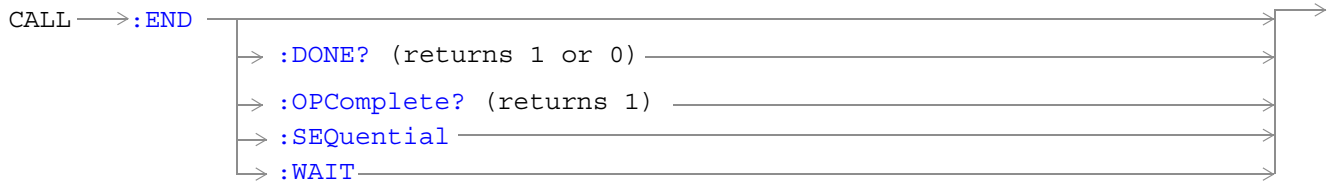
### CALL:DCONnected:ARM:STATe?

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 <a href="#">“Data Connection Processing State Synchronization” on page 58</a> .
Query		Range: 0 1
*RST Setting		0
Programming Example		
OUTPUT 714;"CALL:DCONnected:ARM:STATe?" !Returns arm state of !data connection state change detector		



---

## CALL:END



These commands are not applicable to GPRS.

“Diagram Conventions” on page 343



**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

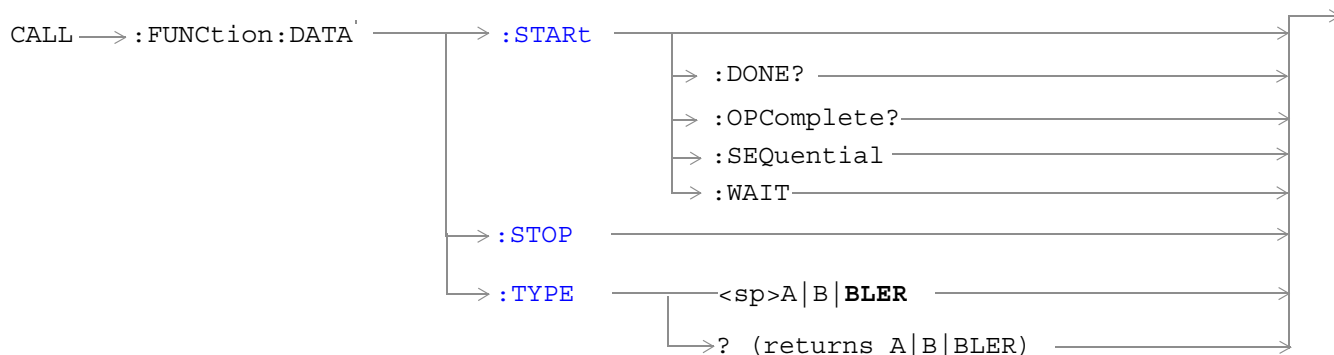
### CALL:END:SEQuential

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.		

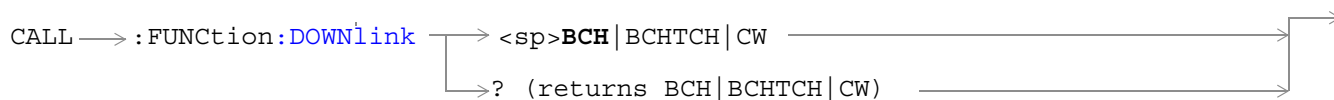
### CALL:END:WAIT

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	<a href="#">"Call Processing Event Synchronization" on page 38</a> <a href="#">"Call Processing State Synchronization" on page 44</a>	
Programming Example		
OUTPUT 714;"CALL:END" ! Terminate the active call. OUTPUT 714;"CALL:COUNT:CLEAR:BAERROR" !Clear the burst and decode !error counters. OUTPUT 714;"CALL:COUNT:CLEAR:RAPAGE" !Clear the RACH and Page counters. OUTPUT 714;"CALL:END:WAIT" !Wait here until CALL:END is finsihed. OUTPUT 714;"CALL:ORIGINATE" !Originate a new call.		

## CALL:FUNCTION



These commands are not applicable to GSM.



This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### CALL:FUNCTION:DATA:START

Function	GSM	This command is not applicable to GSM.
	GPRS	This command attempts to start the data connection. See <a href="#">“Data Connection Processing Event Synchronization” on page 55</a> . Additional commands can be appended to aid in controller/mobile station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 56</a> for examples.
Programming Example		
OUTPUT 714;“CALL:FUNCTION:DATA:START” !Starts data connection.		

## CALL:FUNCTION

### 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

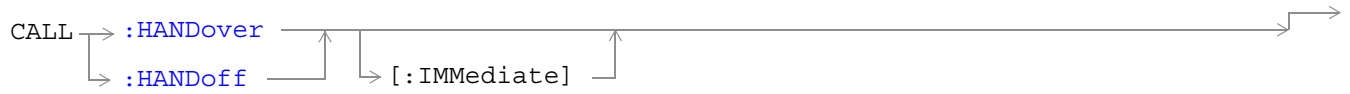
Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the type of data connection that is used when you use the command <a href="#">"CALL:FUNCTION:DATA:START" on page 387</a> to start a data connection.</p> <p>If you set this parameter to ETSI Type A, no packet data traffic 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 <a href="#">"CALL:PDTCH   PDTChannel:MSLot:CONFIguration" on page 424</a>. ETSI Type B is required if you want to perform BER measurements in active cell mode.</p> <p>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 <a href="#">"BLER Report Measurement Description" on page 89</a>). 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).</p> <p>It is recommended that you should always end the data connection (using <a href="#">"CALL:FUNCTION:DATA:STOP" on page 388</a>) 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.</p>
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	<a href="#">“Test Mode Operating Modes” on page 753</a>	
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:FUNCTION:DOWNLINK BCHTCH" !Sets Test Mode downlink  !configuration to generate a  !broadcast channel (BCH) and a  !traffic channel (TCH). </pre>		

---

## CALL:HANdOver | HANdOff



This command is not applicable to GSM.

[“Diagram Conventions” on page 343](#)

## 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"> <li>• Deferred PDTCH Band</li> <li>• Deferred PDTCH ARFCN [band]</li> <li>• Deferred mobile station TX Level [burst][band]</li> <li>• Deferred Multislot Configuration</li> <li>• Deferred Coding Scheme</li> <li>• Deferred P0</li> </ul> <p>For more information on the use of deferred parameters see <a href="#">“Using Deferred Parameters” on page 771</a>.</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"> <li>• When the cell operating mode is set to Active Cell (see <a href="#">“CALL:OPERating” on page 410</a>) 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.</li> <li>• When the cell operating mode is set to Active Cell (see <a href="#">“CALL:OPERating” on page 410</a>) 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.</li> <li>• 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.</li> </ul>
<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.

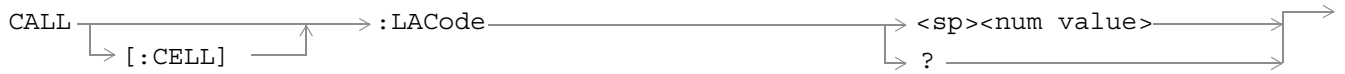
[“Diagram Conventions” on page 343](#)

### CALL:IMEI:AUTO

Function	GSM	Sets/queries whether or not the base station emulator should request the international mobile equipment identity (IMEI) on call setup.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1   ON   0   OFF	
Query	Range: 1   0	
*RST Setting	1	
Related Topics	<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a>	
<b>Programming Example</b> OUTPUT 714; "CALL:IMEI:AUTO OFF" !Sets automatically get IMEI state to OFF.		



## CALL:LACode



This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### CALL[:CELL]:LACode

Function	GSM	Sets/queries the value of the cell's Location Area Code (LAC). This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 359</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 65535 resolution: 1
Query		range: 0 to 65535 resolution: 1
*RST Setting		1
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a>
Programming Example		
OUTPUT 714;“CALL:CELL:LACODE 456” !Sets the cell's location area code 456.		

## CALL:MCCode



This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### CALL[:CELL]:MCCode

Function	GSM	Sets/queries the value of the Mobile Country Code (MCC). This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 359</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 999 resolution: 1
Query		range: 0 to 999 resolution: 1
*RST Setting		1
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a>
Programming Example		
OUTPUT 714;“CALL:CELL:MCCODE 4” !Sets the cell’s mobile country code to 4.		

## CALL:MNCCode



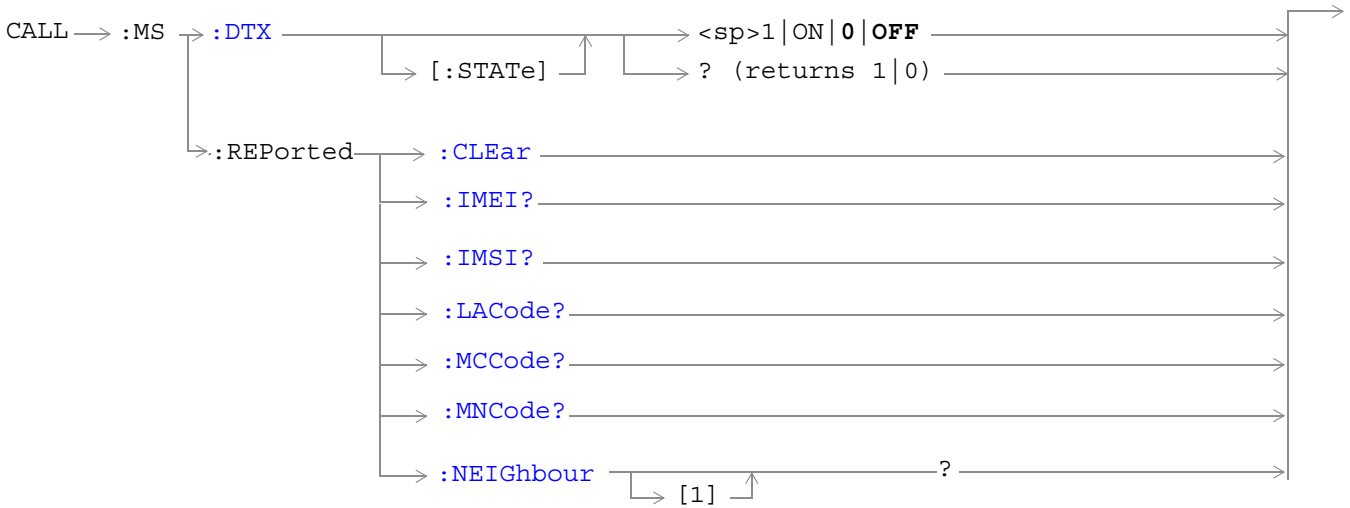
This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

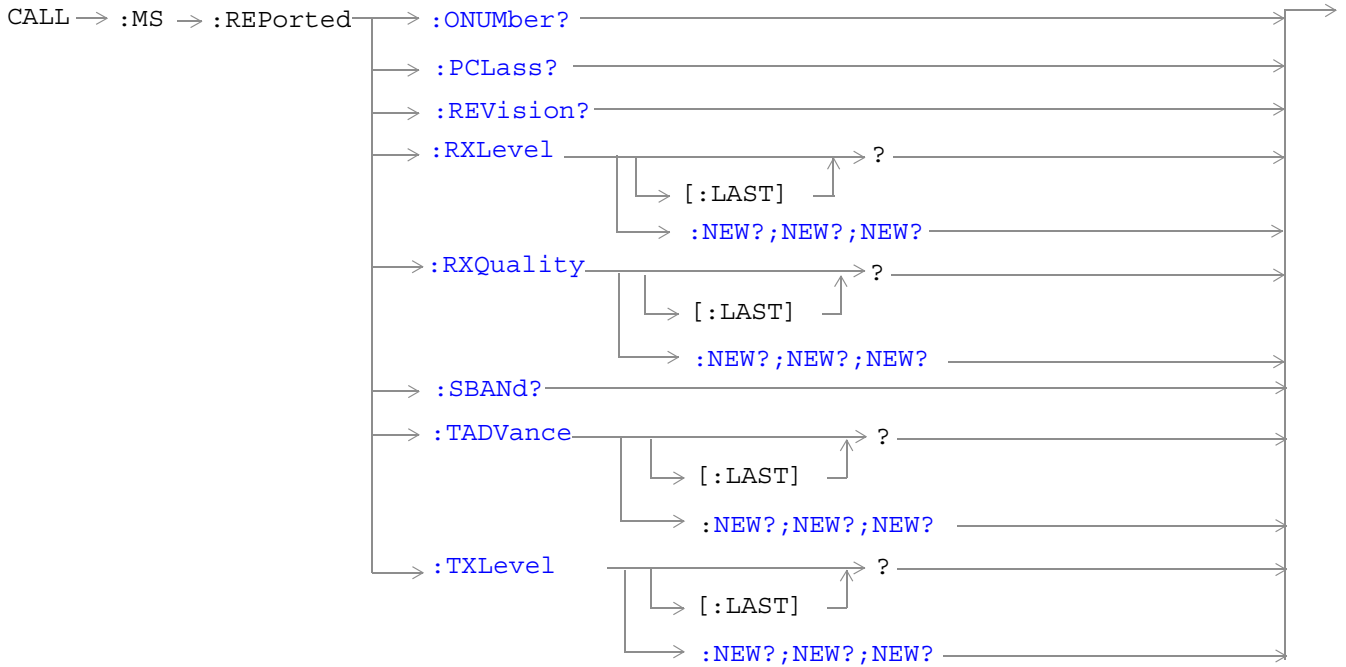
### CALL[:CELL]:MNCCode

Function	GSM	Sets/queries the value of the Mobile Network Code (MNC). This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 359</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 99 resolution: 1
Query		range: 0 to 99 resolution: 1
*RST Setting		1
Related Topics		<a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a>
Programming Example		
OUTPUT 714;"CALL:CELL:MNCODE 45" !Sets the cell's mobile network code to 45.		

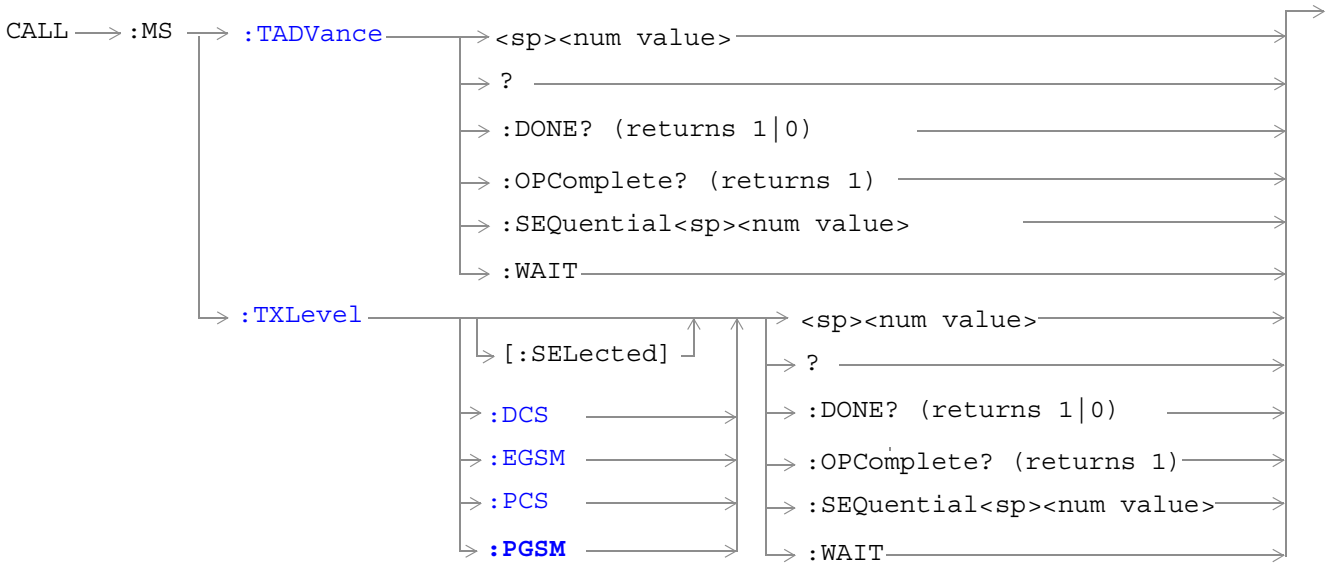
**CALL:MS**



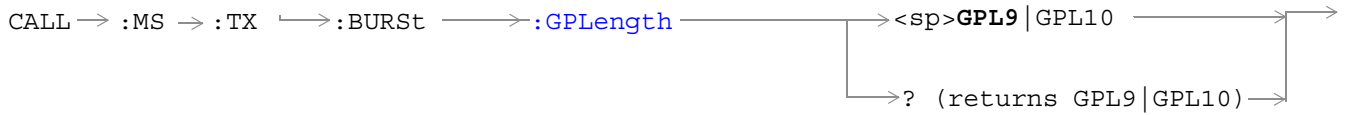
These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GSM.

“Diagram Conventions” on page 343

## CALL:MS

### 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 <a href="#">“Configuring Mobile Station Operating Parameters” on page 772</a> .
	GPRS	This command is not applicable to GPRS.
Setting	range: 1   ON   0   OFF	
Query	range: 0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714; "CALL:MS:DTX OFF" !Turns mobile station discontinuous !transmission OFF.		

### CALL:MS:REPorted:CLEar

Function	GSM	This command clears the mobile station SAACH reported items. The values of the four mobile reported items - that is, Timing Adv, Tx Level, Rx Level and Rx Qual - are set to 9.91E+37 (NAN).
	GPRS	This command is not applicable to GPRS.
Programming Example		
OUTPUT 714; "CALL:MS:REPORTED:CLEAR"		

### CALL:MS:REPorted:IMEI?

Function	GSM	This command queries the International Mobile Equipment Identity of the ME. An ME is a mobile station without a SIM.  This parameter is reported if the IMEI:AUTO state is ON, see <a href="#">“CALL:IMEI” on page 392</a> 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		
OUTPUT 714; "CALL:MS:REPORTED:IMEI?"		

**CALL:MS:REPorted:IMSI?**

Function	GSM	This command queries the International Mobile Subscriber Identity of the SIM in the mobile station.
	GPRS	This command is not applicable to GPRS.
Query		range: up to 15 decimal digits and "" 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:MCCode?**

Function	GSM	This command queries the last Mobile Country Code the mobile station was camped on.
	GPRS	This command is not applicable to GPRS.
Query		range: 0 to 999 and 9.91E+37 resolution: 1
*RST Setting		9.91E+37 (NAN)
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:MCCODE?"		

## CALL:MS

### 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?

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?"		



**CALL:MS:REPorted:PCLass?**

Function	GSM	This command queries the 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?"		

**CALL:MS:REPorted:REVision?**

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: UNKNown   PHASe1   PHASe2
*RST Setting		PHASe2
Programming Example		
OUTPUT 714 ; "CALL:MS:REPORTED:REVISION?"		

**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****CALL:MS:REPorted:RXLevel:NEW?;NEW?;NEW?**

Function	GSM	This command queries the received level of the TCH in dB (relative to -110 dBm) which the mobile station measured.  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 68 and 9.91E+37 resolution: 1	
*RST Setting	9.91E+37 (NAN)	
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:RXLEVEL:NEW?;NEW?;NEW?" !The third result is valid.		

**CALL:MS:REPorted:RXQuality[:LAST]?**

Function	GSM	This command queries the mobile station reported quality of the signal used for the RX Level during the last SACCH report.
	GPRS	This command is not applicable to GPRS.
Query	range: 0 to 7 and 9.91E+37 resolution: 1	
*RST Setting	9.91E+37 (NAN)	
Programming Example		
OUTPUT 714;"CALL:MS:REPORTED:RXQUALITY:LAST?"		

**CALL:MS:REPorted:RXQuality:NEW?;NEW?;NEW?**

Function	GSM	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****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: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 <a href="#">"Call Processing Subsystem Overlapped Commands"</a> on page 41.
	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"> <li>• Use GPL10 if the first burst in the multislot configuration is timeslot 4 or 7.</li> <li>• Use GPL9 if the first burst in the multislot configuration is in any other timeslot.</li> </ul>
Setting	range: GPL9   GPL10	
Query	range: GPL9   GPL10	
*RST Setting	GPL9	
Programming Example		
<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 <a href="#">“GSM Frequency Banded Parameters” on page 736</a>.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 39</a>.</p>
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 31 resolution: 1	
Query	range: 0 to 31 resolution: 1	
*RST Setting	Band: PGSM TXLevel: 15	
Programming Example		
<pre>OUTPUT 714;"CALL:MS:TXLEVEL:SElected 10"</pre>		

**CALL:MS:TXLevel:DCS**

Function	GSM	This command selects the mobile station uplink power control level for the DCS band. See <a href="#">“GSM Frequency Banded Parameters”</a> on page 736.  Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands”</a> on page 41.
	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 <a href="#">“GSM Frequency Banded Parameters”</a> on page 736.  Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands”</a> on page 41.
	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

### CALL:MS:TXLevel:PCS

Function	GSM	This command selects the mobile station uplink power control level for the PCS band. See <a href="#">“GSM Frequency Banded Parameters” on page 736</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> .
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 31 (default 10) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		Band: PGSM TXLevel: 15
Programming Example OUTPUT 714 ; "CALL:MS:TXLEVEL:PCS 31"		

### CALL:MS:TXLevel:PGSM

Function	GSM	This command selects the mobile station uplink power control level for the PGSM band. See <a href="#">“GSM Frequency Banded Parameters” on page 736</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> .
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 31 (default 15) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		Band: PGSM TXLevel: 15
Programming Example OUTPUT 714 ; "CALL:MS:TXLEVEL:PGSM 22"		



## CALL:NCCode



This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### CALL[:CELL]:NCCode

Function	GSM	Sets/queries the Network Color Code. See <a href="#">“Configuring the Broadcast Channel (BCH)” on page 763</a> . This can only be set when the Cell Activated State parameter is set to Off (see <a href="#">“CALL:ACTivated” on page 359</a> ).
	GPRS	This command is not applicable to GPRS.
Setting		range: 0 to 7 resolution: 1
Query		range: 0 to 7 resolution: 1
*RST Setting		1
Programming Example		
OUTPUT 714;"CALL:CELL:NCCODE 2"		

---

## CALL:OPERating

CALL → :OPERating:MODE → <sp>CELL | OFF | PBTest | PBPTest →  
→ ? →

This command is not applicable to GSM.

CALL → :OPERating:MODE → <sp>CELL | TEST →  
→ ? →

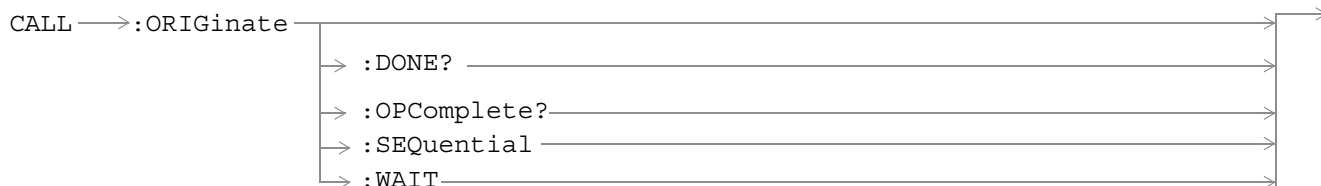
This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

**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 <a href="#">“Active Cell For GSM” on page 751</a> ). TEST sets the operating mode to Test Mode (see <a href="#">“GSM Test Mode Operation” on page 753</a> ).
	GPRS	This command sets/queries the operating mode (behavior) of the test set. CELL sets the operating mode to Active Cell (see <a href="#">“Active Cell For GPRS” on page 752</a> ). PBTest sets the operating mode to GPRS Test Mode BCH (see <a href="#">“GPRS Test Mode BCH Behavior” on page 761</a> ). PBPTest sets the operating mode to GPRS Test Mode PDTCH (see <a href="#">“GPRS Test Mode BCH + PDTCH Behavior” on page 761</a> ). OFF sets the operating mode to OFF (see <a href="#">“OFF Behavior” on page 761</a> ).
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
<p>Programming Example (GSM)</p> <pre>OUTPUT 714;"CALL:OPERATING:MODE TEST" !Sets the operating mode to Test Mode.</pre> <p>Programming Example (GPRS)</p> <pre>OUTPUT 714;"CALL:OPERATING:MODE PBPTest" !Sets the operating mode to GPRS Test Mode PDTCH.</pre>		

## CALL:ORIGinate



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

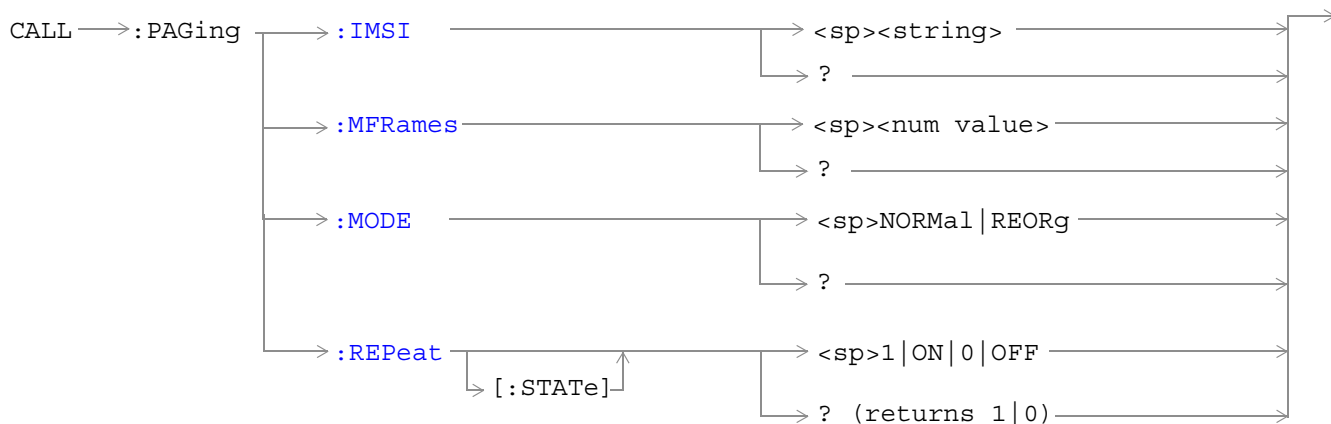
### CALL:ORIGinate

Function	GSM	Performs a BS Originated call. See <a href="#">“Call Processing Event Synchronization” on page 38</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 39</a> 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 343](#)

### CALL:PAGing:IMSI

Function	GSM	Sets/queries the paging IMSI (International Mobile Subscriber Identity) field, used for paging the MS. The test set will stay in Active Cell Status (Setup Request), see <a href="#">“Call Processing State Synchronization” on page 44</a> until the paging IMSI is returned if the state is on.  The paging IMSI is automatically updated by the test set during an MS originated call using the IMSI reported by the MS. If the MS has no SIM, the paging IMSI is left unchanged.
	GPRS	This command is not applicable to GPRS.
Setting	range: up to 15 decimal digits resolution: 1	
Query	range: up to 15 decimal digits resolution: 1	
*RST Setting	001012345678901	
Programming Example		
<pre> OUTPUT 714;"CALL:PAGing:IMSI `01012345678901`"!Set paging IMSI                                      !to 01012345678901.           </pre>		

## CALL:PAGing

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

Function	GSM	Sets/queries repeat paging state. When the state is ON paging repeats until the test set receives a RACH. When the state is off the test set returns the No response to page timer T3113 expiry. See <a href="#">“Fixed Timer Messages” on page 847</a> .
	GPRS	This command is not applicable to GPRS.
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"CALL:PAGING:REPEAT:STATE ON" !Turns paging repeat ON.		

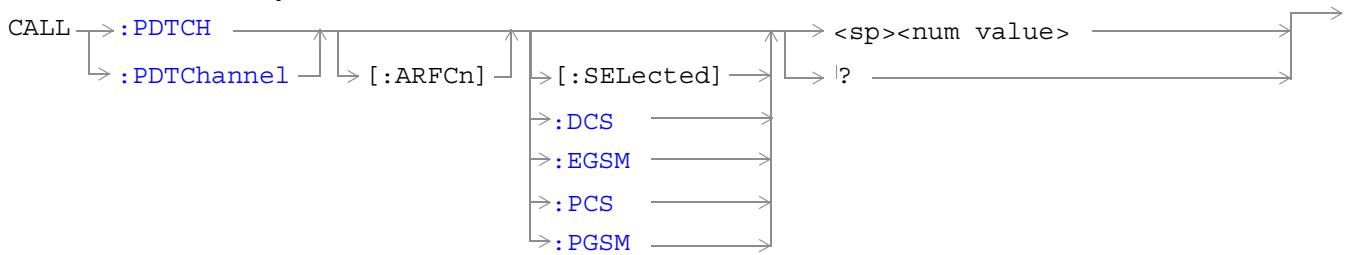
### CALL:PAGing:MODE

Function	GSM	Sets/queries the paging mode that the test set will use to page the MS. Some mobile stations can be set to a discontinuous reception mode (DRX), which configures the MS to look for a page in a pre-defined paging subchannel only.  When paging mode is set to Reorg (DRX off), the test set will page the MS on the paging channel in the next available paging subchannel without waiting for the defined paging group.  When paging mode is set to Normal (DRX on), the test set will page the MS on the correct paging subchannel defined by the mobile station's paging group.
	GPRS	This command is not applicable to GPRS.
Setting	range: REORg   NORMAl	
Query	range: REOR   NORM	
*RST Setting	Reorg	
Programming Example		
OUTPUT 714;"CALL:PAGING:MODE REOR" ! MS will be sent a page on the ! next available paging subchannel		

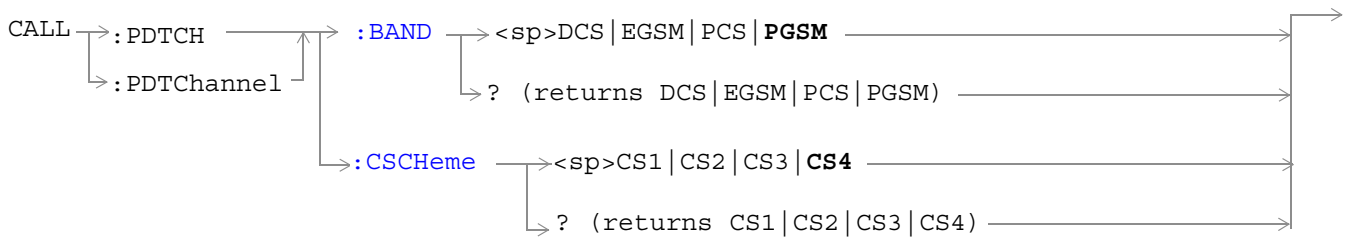
**CALL:PAGing:MFRames**

Function	GSM	Sets/queries the number of multiframes between paging subchannels.  This parameter is used when the paging mode is normal. MFRames and IMSI are used to define the mobile station's paging group. The paging group determines when an MS can expect a page if paging mode is normal.
	GPRS	This command is not applicable to GPRS.
Setting		range: 2 to 9 resolution: 1
Query		range: 2 to 9 resolution: 1
*RST Setting		2
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PAGING:MFRAMES 5" ! Sets the number of multiframes                                      ! between paging subchannels.</pre>		

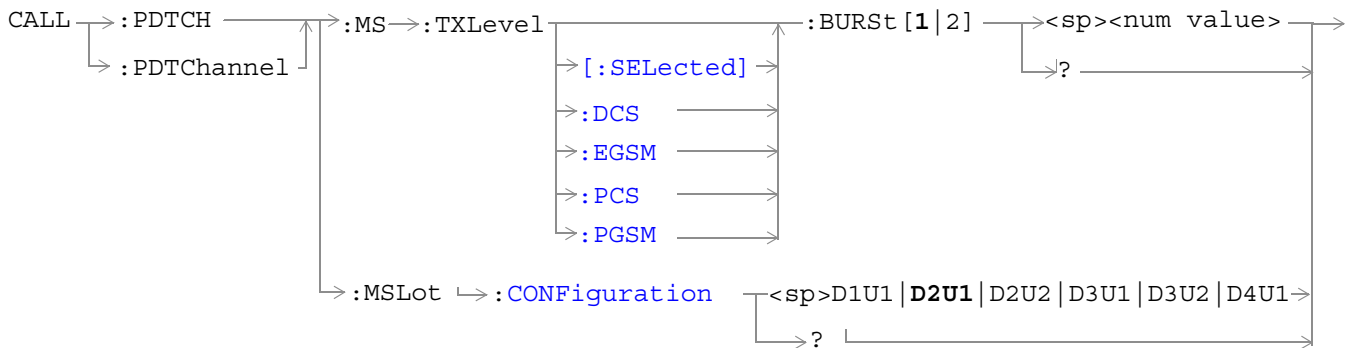
## CALL:PDTCH|PDTChannel



These commands are not applicable to GSM.

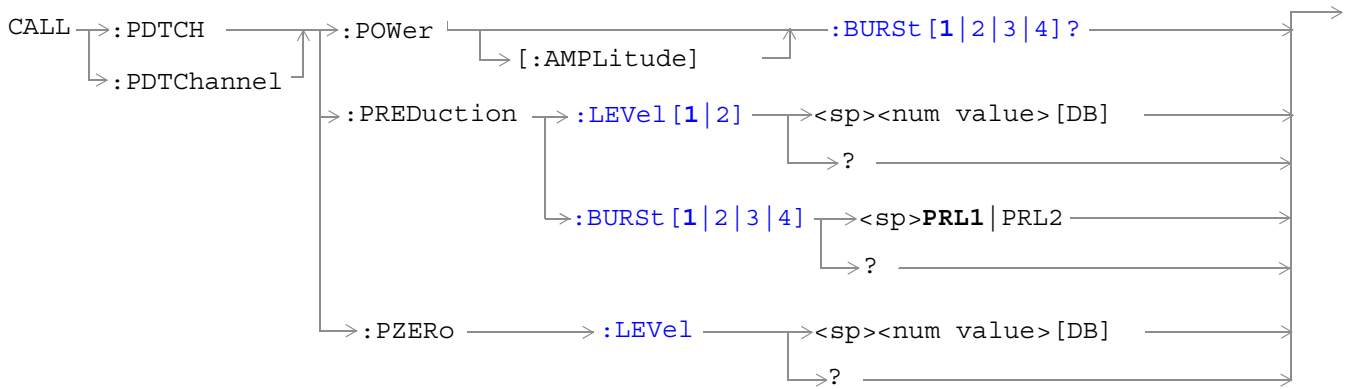


These commands are not applicable to GSM.



These commands are not applicable to GSM.





These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)

**CALL:PDTCHIPDTChannel****CALL:PDTCH | PDTChannel[:ARFCn][:SElected]**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the channel number of the downlink and uplink PDTCH for the band already selected.
Setting		range: <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 0 to 124 and 975 to 1023</li> <li>• PCS band, channels 512 to 810</li> <li>• PGSM band, channels 1 to 124</li> </ul> resolution: 1
Query		range: <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 0 to 124 and 975 to 1023</li> <li>• PCS band, channels 512 to 810</li> <li>• PGSM band, channels 1 to 124</li> </ul> resolution: 1
*RST setting		PGSM and EGSM bands: 30, DCS and PCS bands: 698
<b>Programming Example</b> <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 channel number for downlink and uplink PDTCH for the DCS band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 769</a> .
Setting		range: 512 to 885 (default: 698) resolution: 1
Query		range: 512 to 885 resolution: 1
*RST setting		698
<b>Programming Example</b> <pre> OUTPUT 714;"CALL:PDTCH:ARFCN:DCS 512" !Sets the PDTCH for the DCS band to ARFCN !512.           </pre>		

**CALL:PDTCH | PDTChannel[:ARFCn]:EGSM**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the channel number for downlink and uplink PDTCH for the EGSM band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)”</a> on page 769.
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		
<pre>OUTPUT 714;"CALL:PDTCH:ARFCN:EGSM 124" !Sets the PDTCH for the EGSM band to ARFCN !124.</pre>		

**CALL:PDTCH | PDTChannel[ARFCN]:PCS**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the channel number for downlink and uplink PDTCH for the PCS band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)”</a> on page 769.
Setting	range: 512 to 810 (default: 698) resolution: 1	
Query	range: 512 to 810 resolution: 1	
*RST setting	698	
Programming Example		
<pre>OUTPUT 714;"CALL:PDTCH:ARFCN:PCS 512" !Sets the PDTCH for the PCS band to ARFCN !512.</pre>		

CALL:PDTCH|PDTChannel

**CALL:PDTCH | PDTChannel[:ARFCn]:PGSM**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the channel number for downlink and uplink PDTCH for the PGSM band. See <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)”</a> on page 769.
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:CSCHEME**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the PDTCH coding scheme in ETSI test mode, or when the test set's operating mode is set to "GPRS Test Mode BCH+PDTCH" (see <a href="#">"GPRS Test Mode BCH + PDTCH Behavior" on page 761</a> ).  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:CSCHEME CS1" !Sets the PDTCH coding scheme to CS1.		

**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 <a href="#">"GPRS Frequency Banded Parameters" on page 738</a> .
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****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 <a href="#">“GPRS Frequency Banded Parameters” on page 738.</a>
Setting		range: 0 to 31 (default 10) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		10
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:MS:TXLevel:DCS:BURSt2 8" !Sets the uplink power level of burst two in !the DCS band to 8.</pre>		

**CALL:PDTCHIPDTChannel:MS:TXLevel:EGSM: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 EGSM band. See <a href="#">“GPRS Frequency Banded Parameters” on page 738.</a>
Setting		range: 0 to 31 (default 15) resolution: 1
Query		range: 0 to 31 resolution: 1
*RST Setting		15
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:MS:TXLevel:EGSM:BURSt1 15" !Sets the uplink power level of burst !one in the EGSM band to 15.</pre>		



## 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 388):</p> <ul style="list-style-type: none"> <li>• Type A - The multislot configuration command only affects the number of uplink timeslots, therefore configurations D1U1, D2U1, D3U1 and D4U1 will appear identical.</li> <li>• Type B - The multislot configuration command constrains the number of uplink timeslots to be less than or equal to the number of downlink timeslots.</li> <li>• BLER - The multislot configuration command only affects the number of downlink timeslots, therefore D2U2 and D2U1 will appear identical.</li> </ul> <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
<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																					
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:PDTCH:MSLot:CONFIguration D2U1" !Sets the multislot configuration to be 2 !downlink PDTCHs and 1 uplink PDTCH.</pre>																						



**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 <a href="#">“Testing a GPRS Mobile Station” on page 785</a> .  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 <a href="#">“CALL:PDTCH   PDTChannel:PREduction:LEVel[1   2]” on page 426</a> .  For further information see <a href="#">“Downlink PDTCH Power Control” on page 788</a> .  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:BURSt PRL1" !Sets the power reduction level of the first burst to !PRL1.		

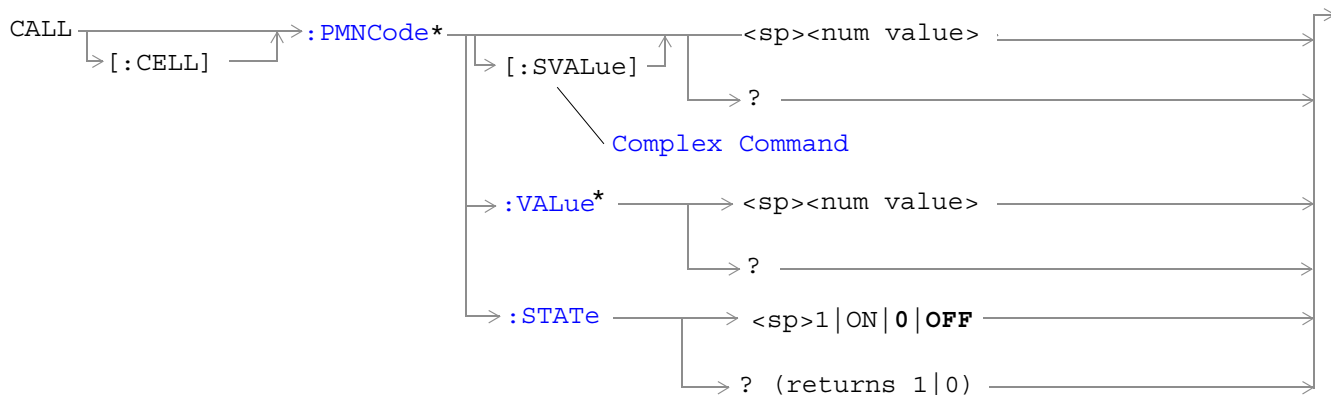
## CALL:PDTCH | PDTChannel:PREduction:LEVel[1|2]

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 three bursts using “CALL:PDTCH   PDTChannel:PREduction:BURSt[1   2   3   4]” on page 425.  For further information see “ <a href="#">Downlink PDTCH Power Control</a> ” on page 788.
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 “ <a href="#">Downlink PDTCH Power Control</a> ” on page 788.
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 130 dB.		

## CALL:PMNCode



\*These commands are not applicable to GPRS.

“Diagram Conventions” on page 343

### 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 359).
	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.		

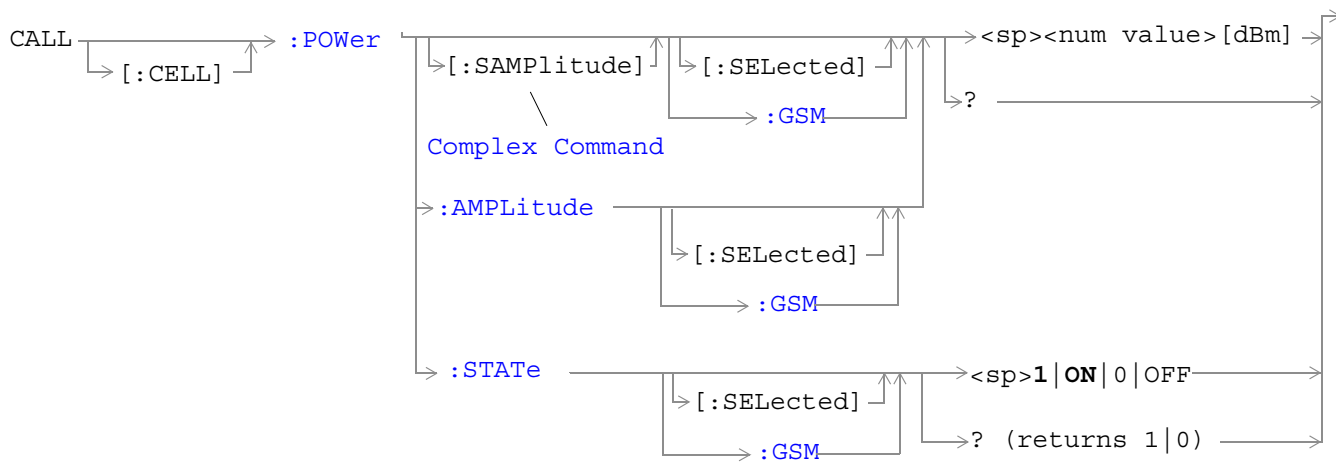
**CALL:PMNCode****CALL[:CELL]:PMNCode:VALue**

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 343

CALL:POWer

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

Function	GSM	<p>This command sets/queries the Cell Power for the currently selected system type and turns the state to ON. This is the same for BCH and TCH.</p> <p>The suffix dBm is optional.</p> <p>The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a>).</p>
	GPRS	<p>This command sets/queries the Cell Power for the currently selected system type and turns the state to ON.</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 <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 769</a>).</p> <p>The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a>).</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[:CELL]:POWER[:SAMPlitude]:GSM**

Function	GSM	<p>This command sets/queries the GSM Cell Power and turns the state to ON. This is the same for BCH and TCH.</p> <p>The suffix dBm is optional.</p> <p>The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a>).</p>
	GPRS	<p>This command sets/queries the GPRS Cell Power and turns the state to ON.</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 <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 769</a>).</p> <p>The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a>).</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: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 currently selected system type. This is the same for the BCH and TCH. The suffix dBm is optional. The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a> ).
	GPRS	This command sets/queries the Cell Power (BCH) for the currently selected system type. The suffix dBm is optional. The power level of the PDTCH is also affected by the setting of this command. However, the PDTCH level is also affected by other settings (see <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 769</a> ). The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a> ).
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 GSM Cell Power. This is the same for the BCH and TCH. The suffix dBm is optional. The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a> ).
	GPRS	This command sets/queries the GPRS Cell Power (BCH). The suffix dBm is optional. The power level of the PDTCH is also affected by the setting of this command. However, the PDTCH level is also affected by other settings (see <a href="#">“Configuring the Packet Data Traffic Channel (PDTCH)” on page 769</a> ). The Cell Power is affected when there is an amplitude offset (see <a href="#">“Measurement Related Configuration” on page 836</a> ).
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[:CELL]:POWER:STATE[:SElected]**

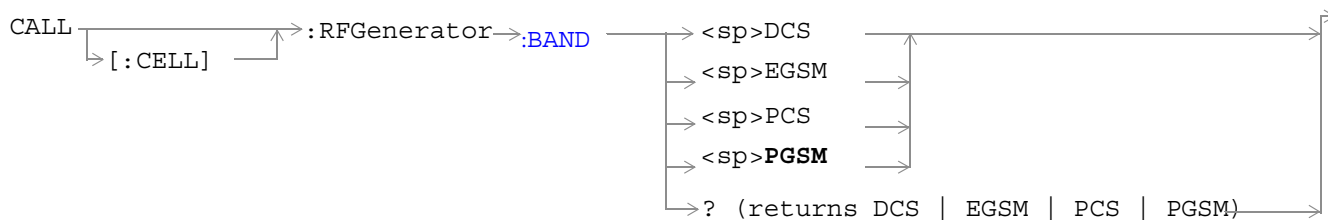
Function	GSM	This command sets/queries the Cell Power state for the currently selected system type.
	GPRS	When set to 1   ON, the RF power for the cell is turned on.
Setting	range: 0   OFF   1   ON	
Query	range: 0   1	
*RST Setting	ON	
Programming Example		
<pre>OUTPUT 714;"CALL:CELL:POWER:STATE:SElected 1" !Sets the cell power state to ON.</pre>		

## CALL:POWer

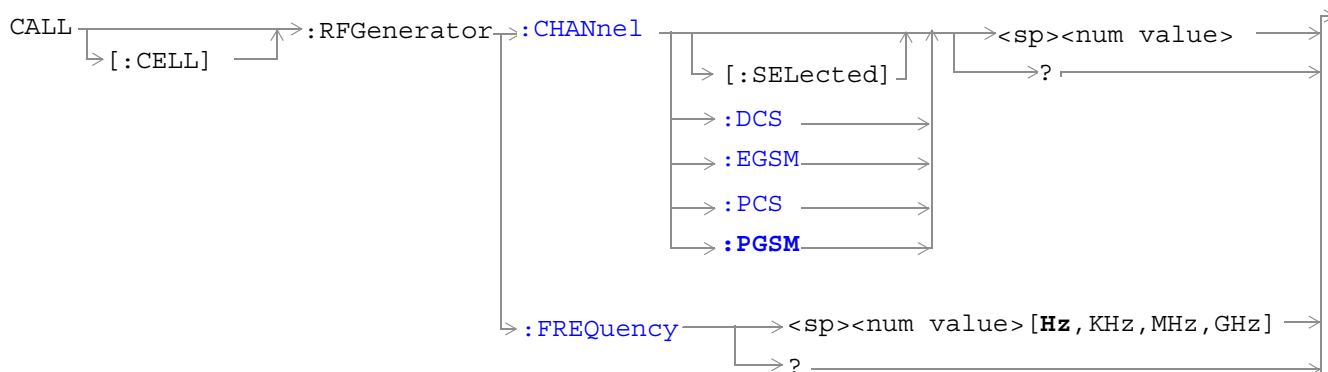
### CALL[:CELL]:POWer:STATe:GSM

Function	GSM	This command sets/queries the Cell Power state for the GSM and GPRS system types.
	GPRS	When set to 1 0, the RF power for the cell is turned on.
Setting		range: 0   OFF   1   ON
Query		range: 0   1
*RST Setting		ON
Programming Example		
OUTPUT 714;"CALL:CELL:POWer:STATe:GSM 1" !Sets the cell power state to ON.		

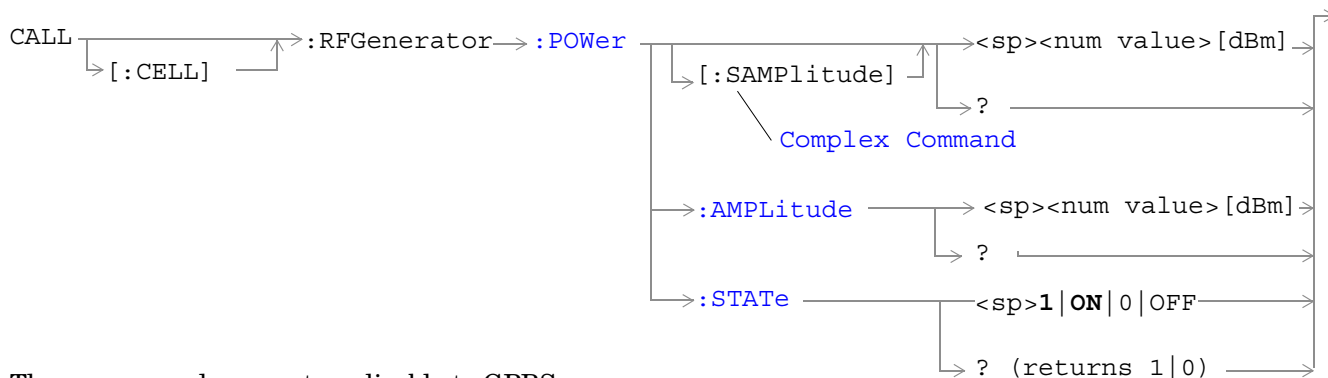
## CALL:RFGenerator



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 343

**CALL:RFGenerator****CALL[:CELL]:RFGenerator:BAND**

Function	GSM	Sets/queries the RF Gen Channel band. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760.</a>
	GPRS	This command is not applicable to GPRS.
Setting		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
Query		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
*RST Setting		20 (PGSM band)
<b>Programming Example</b> OUTPUT 714;"CALL:CELL:RFGENERATOR:BAND DCS" !Sets the RF Generator band to DCS.		

**CALL[:CELL]:RFGenerator:CHANnel[:SElected]**

Function	GSM	Sets/queries the RF Gen Channel for the band already selected. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
Query		range: <ul style="list-style-type: none"> <li>• DCS channels 512 to 885</li> <li>• EGSM channels 975 to 1023 and 0 to 124</li> <li>• PCS channels 512 to 810</li> <li>• PGSM channels 1 to 124</li> </ul>
*RST Setting		20 (PGSM band)
<b>Programming Example</b> <pre>OUTPUT 714;"CALL:CELL:RFGENERATOR:CHANNEL:SELECTED 512" !Sets the RF Generator !channel to 512 for the !band already selected.</pre>		

**CALL[:CELL]:RFGenerator:CHANnel:DCS**

Function	GSM	Sets/queries the RF Gen Channel for the DCS band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting	range: 512 to 885 (default 512) resolution: 1	
Query	range: 512 to 885 resolution: 1	
*RST Setting	20 (PGSM band)	
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : CHANNEL : DCS 512"		

**CALL[:CELL]:RFGenerator:CHANnel:EGSM**

Function	GSM	Sets/queries the RF Gen Channel for the EGSM band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting	range: 0 to 124   975 to 1023 (default: 20) resolution: 1	
Query	range: 0 to 124   975 to 1023 resolution: 1	
*RST Setting	20 (PGSM band)	
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : CHANNEL : EGSM 124"		

**CALL[:CELL]:RFGenerator:CHANnel:PCS**

Function	GSM	Sets/queries the RF Gen Channel for the PCS band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: 512 to 810 (default: 512) resolution: 1
Query		range: 512 to 810 resolution: 1
*RST Setting		20 (PGSM band)
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : CHANNEL : PCS 512"		

**CALL[:CELL]:RFGenerator:CHANnel:PGSM**

Function	GSM	Sets/queries the RF Gen Channel for the PGSM band using the RF Generator. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Commands” on page 41</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: 1 to 124 (default: 20) resolution: 1
Query		range: 1 to 124 resolution: 1
*RST Setting		20 (PGSM band)
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : CHANNEL : PGSM 124"		

**CALL[:CELL]:RFGenerator:FREQUENCY**

Function	GSM	Sets/queries the RF Gen Frequency selection. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . The units (Hz   KHz   MHz   GHz) are optional, if no units are specified then units default to Hz.
	GPRS	This command is not applicable to GPRS.
Setting		range: 292 MHz to 2700 MHz resolution: 1
Query		range: 292 MHz to 2700 MHz resolution: 1
*RST Setting		939 MHz
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : FREQUENCY 896 . 2MHZ"		

**CALL[:CELL]:RFGenerator:POWER[:SAMPLitude]**

Function	GSM	Sets/queries the value for RF Gen Power and turns the state to ON. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760</a> . The RF Gen Power field is affected when there is an amplitude offset, see <a href="#">“Measurement Related Configuration” on page 836</a> .
	GPRS	This command is not applicable to GPRS.
Setting		range: -10 to -100 dBm resolution: .01 dBm
Query		range: -10 to -100 dBm resolution: .01 dBm
*RST Setting		-85 dBm
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : POWER : SAMPLITUDE -50DBM"		



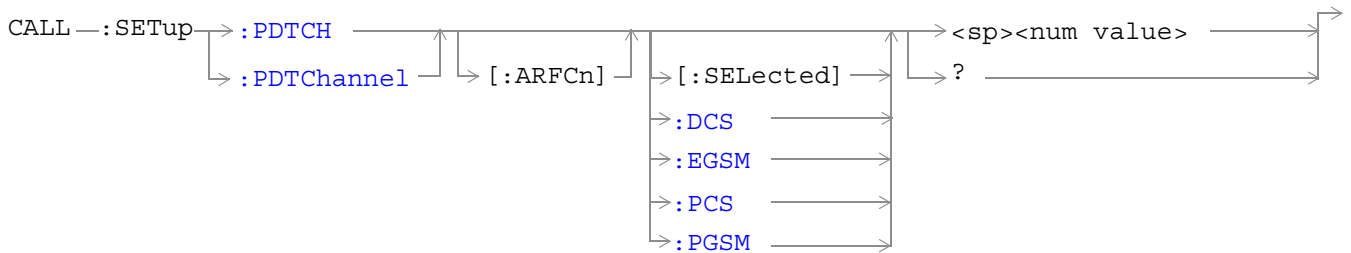
**CALL[:CELL]:RFGenerator:POWer:AMPLitude**

Function	GSM	Set/queries Rf Gen Power. The suffix dBm is optional. Operating mode = Test Mode and Downlink Function = CW. see <a href="#">“CW Test Function Behavior” on page 760.</a> The RF Gen Power field is affected when there is an amplitude offset, see <a href="#">“Measurement Related Configuration” on page 836.</a>
	GPRS	This command is not applicable to GPRS.
Setting		range: -10 to -100 dBm resolution: .01 dBm
Query		range: -10 to -100 dBm resolution: .01 dBm
*RST Setting		-85 dBm
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : POWER : AMPLITUDE - 50DBM"		

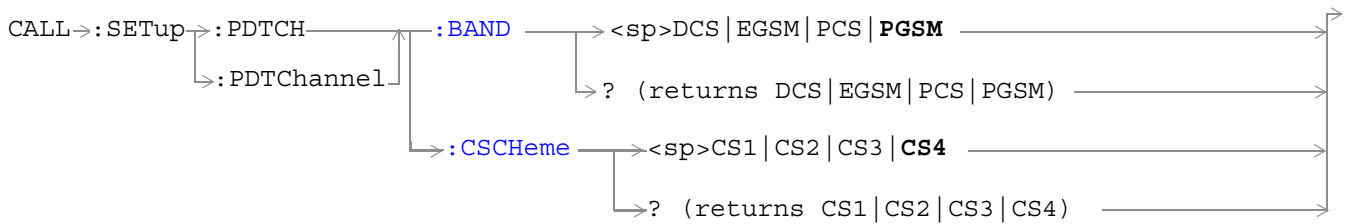
**CALL[:CELL]:RFGenerator:POWer:STATE**

Function	GSM	Sets/queries the RF Gen Power State. Operating mode = Test Mode and Downlink Function = CW. See <a href="#">“CW Test Function Behavior” on page 760.</a>
	GPRS	This command is not applicable to GPRS.
Setting		range: 0   OFF   1   ON
Query		range: 0   OFF   1   ON
*RST Setting		ON
Programming Example		
OUTPUT 714 ; "CALL : CELL : RFGENERATOR : POWER : STATE OFF"		

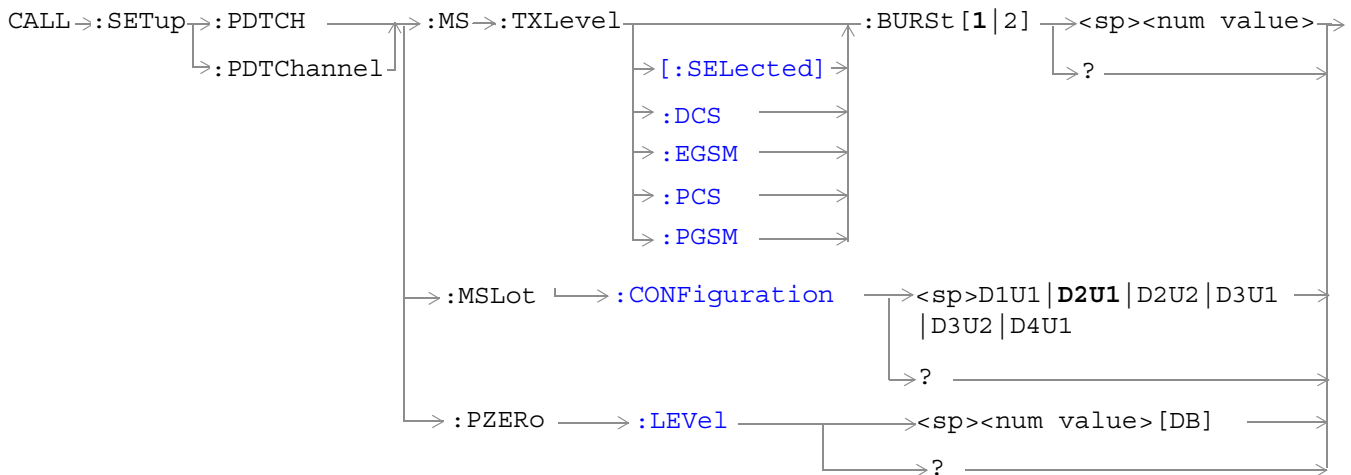
## CALL:SETup



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 343](#)

**CALL:SETup:PDTCH | PDTChannel[:ARFCn][:SElected]**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred ARFCN for the band specified using the command <a href="#">“CALL:SETup:PDTCH   PDTChannel:BAND” on page 447</a>. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see <a href="#">“CALL:HANdOver   HANdOff[:IMMediate]” on page 391</a>).</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 <a href="#">“Frequency Banded Parameters” on page 736</a> for a detailed description of the implications of being a banded parameter.</p>
Setting	<p>range:</p> <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 0 to 124 and 975 to 1023</li> <li>• PCS band, channels 512 to 810</li> <li>• PGSM band, channels 1 to 124</li> </ul> <p>resolution: 1</p>	
Query	<p>range:</p> <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 0 to 124 and 975 to 1023</li> <li>• PCS band, channels 512 to 810</li> <li>• PGSM band, channels 1 to 124</li> </ul> <p>resolution: 1</p>	
*RST setting	PGSM and EGSM bands: 30, DCS and PCS bands: 698	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"CALL:SETup:PDTCH 515" !Sets the ARFCN to 515 if it is                                 !appropriate in the current band.</pre>		

## CALL:SETup

### CALL:SETup:PDTCH | PDTChannel[:ARFCn]:DCS

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred 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 391).</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 736 for a detailed description of the implications of being a banded parameter.</p>
Setting		range: 512 to 885 resolution: 1
Query		range: 512 to 885 resolution: 1
*RST setting		698
<b>Programming Example</b>		
OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:DCS 600 !Sets the ARFCN to 600 in the DCS band.		

## CALL:SETup:PDTCH | PDTChannel[:ARFCn]:EGSM

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred 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 391).</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 736 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
<b>Programming Example</b> OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:EGSM 987" !Sets the ARFCN to 987 in the EGSM band.		

## CALL:SETup

### CALL:SETup:PDTCH | PDTChannel[:ARFCn]:PCS

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred 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 391).</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 736 for a detailed description of the implications of being a banded parameter.</p>
Setting		range: 512 to 810 resolution: 1
Query		range: 512 to 810 resolution: 1
*RST setting		698
<b>Programming Example</b>		
OUTPUT 714;"CALL:SETup:PDTCH:ARFCn:PCS 608" !Sets the ARFCN to 608 in the PCS band.		

**CALL:SETup:PDTCH | PDTChannel[:ARFCn]:PGSM**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>This command sets/queries the deferred 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 391).</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 736 for a detailed description of the implications of being a banded parameter.</p>
Setting		<p>range: 1 to 124</p> <p>resolution: 1</p>
Query		<p>range: 1 to 124</p> <p>resolution: 1</p>
*RST setting		30
<b>Programming Example</b> OUTPUT 714;"CALL: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	<p>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 391).</p>
Setting		range: PGSM   EGSM   DCS   PCS
Query		range: PGSM   EGSM   DCS   PCS
*RST setting		PGSM
<b>Programming Example</b> OUTPUT 714;"CALL:SETup:PDTCH:BAND DCS" !Sets the deferred band to DCS		

## CALL:SETup

### 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 to be used in ETSI test mode and BCH + PDTCH mode. Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see <a href="#">“CALL:HANdOver   HANdOff[:IMMediate]”</a> on page 391).</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	
<b>Programming Example</b> OUTPUT 714;"CALL:SETup:PDTCH:CSCHEME CS4" !Sets the PDTCH deferred coding scheme to CS4		

### 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 <a href="#">“CALL:SETup:PDTCH   PDTChannel:MS:TXLevel[:SELEcted]:BURSt[1 2]”</a> on page 448). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see <a href="#">“CALL:HANdOver   HANdOff[:IMMediate]”</a> on page 391).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to <a href="#">“Frequency Banded Parameters”</a> on page 736 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 <a href="#">“Bursted Parameters”</a> on page 744 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	
<b>Programming Example</b> OUTPUT 714;"CALL:SETup:PDTCH:MS:TXLevel:BURSt2 13"! Sets the deferred mobile station TX level for the 2nd uplink burst in the currently selected band.		



## CALL:SETup:PDTCH | 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 <a href="#">“CALL:SETup:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1   2]”</a> on page 448). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see <a href="#">“CALL:HANdOver   HANdOff[:IMMediate]”</a> on page 391).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to <a href="#">“Frequency Banded Parameters”</a> on page 736 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 <a href="#">“Bursted Parameters”</a> on page 744 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
<b>Programming Example</b> <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

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 <a href="#">“CALL:SETup:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 448</a>). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see <a href="#">“CALL:HANdOver   HANdOff[:IMMediate]” on page 391</a>).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to <a href="#">“Frequency Banded Parameters” on page 736</a> 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 <a href="#">“Bursted Parameters” on page 744</a> for a detailed description of being a bursted parameter.</p>
Setting		<p>range: 0 to 31</p> <p>resolution: 1</p>
Query		<p>range: 0 to 31</p> <p>resolution: 1</p>
*RST setting		15
<p>Programming Example</p> <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: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 <a href="#">“CALL:SETup:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1   2]”</a> on page 448). Deferred parameters are applied when a channel change is executed using the CALL:HANdOver command (see <a href="#">“CALL:HANdOver   HANdOff[:IMMediate]”</a> on page 391).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to <a href="#">“Frequency Banded Parameters”</a> on page 736 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 <a href="#">“Bursted Parameters”</a> on page 744 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
<b>Programming Example</b> <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

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 <a href="#">“CALL:SETup:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1 2]” on page 448</a>). Deferred parameters are applied when a channel change is executed using the CALL:HANDover command (see <a href="#">“CALL:HANDover   HANDoff[:IMMediate]” on page 391</a>).</p> <p>The mobile station transmit power level is a frequency banded parameter. Refer to <a href="#">“Frequency Banded Parameters” on page 736</a> 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 <a href="#">“Bursted Parameters” on page 744</a> for a detailed description of being a bursted parameter.</p>
Setting		<p>range: 0 to 31</p> <p>resolution: 1</p>
Query		<p>range: 0 to 31</p> <p>resolution: 1</p>
*RST setting		15
<p>Programming Example</p> <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

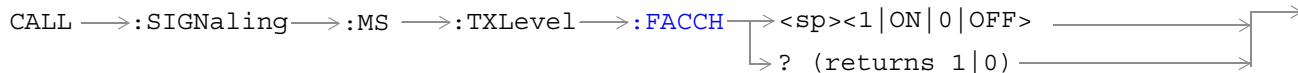
Function	GSM	This command is not applicable to GSM.																					
	GPRS	<p>This command sets/queries the deferred number of downlink and uplink PDTCHs. These deferred PDTCHs are only applied when the Execute Channel Change action is initiated using “CALL:HANdOver   HANdOff[:IMMediate]” on page 391.</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"> <li>• Type A - The multislot configuration command only affects the number of uplink timeslots, therefore configurations D1U1, D2U1, D3U1, and D4U1 will appear identical.</li> <li>• Type B - The multislot configuration command constrains the number of uplink timeslots to be less than or equal to the number of downlink timeslots.</li> <li>• BLER - The multislot configuration command only affects the number of downlink timeslots, therefore D2U2 and D2U1 will appear identical.</li> </ul> <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		D1U1   D2U1   D2U2   D3U1   D3U2   D4U1 “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.																					
Query		range: D1U1   D2U1   D2U2   D3U1   D3U2   D4U1																					
*RST Setting		D2U1																					
<b>Programming Example</b> <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

### CALL:SETup:PDTCH | PDTChannel:PZERO:LEVel

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>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 “<a href="#">CALL:HANDoVer   HANDoFF[:IMMediate]</a>” on page 391.</p> <p>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.</p>
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:SETup:PDTCH:PZERO:LEVel 15 dB" ! Sets the deferred Power Reduction ! reference level to 15 dB.		

## CALL:SIGNaling



This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### 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"		

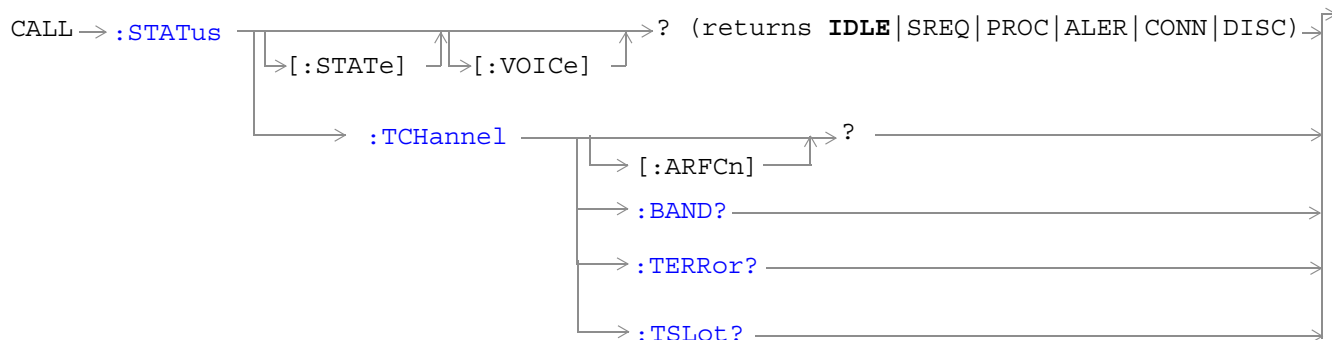
## Related Topics

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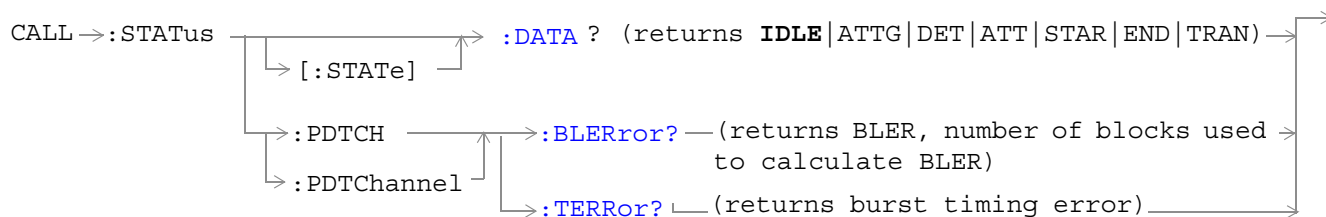
[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

\*\*\*\*\*

## CALL:STATUS



These commands are not applicable to GPRS.



These commands are not applicable to GSM.

“Diagram Conventions” on page 343



**CALL:STATUS[:STATE][:VOICE]?**

Function	GSM	This query returns the status of the call. For details on the call states see <a href="#">“Call Processing State Synchronization”</a> on page 44.
	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 <a href="#">“Data Connection Processing State Synchronization”</a> on page 58.
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 388).</p> <p>The BLER result is only updated when the data connection state is transferring (TRAN). See “CALL:STATus[:STATe]:DATA?” on page 457. The BLER result is reset using “SYSTEM:MEASurement:RESet” on page 728.</p> <p>If you require more details on BLER, see “BLER Report Measurement Description” on page 89.</p>
Query		<p>Block error rate</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Blocks tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>
*RST setting		Block error rate: 9.91E+37 (NAN), Blocks tested: 9.91E+37 (NAN)
<b>Programming Example</b> OUTPUT 714 ; "CALL:STATus:PDTCH:BLERror?"		

## CALL:STATus: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>
<b>Programming Example</b> OUTPUT 714 ; "CALL:STATus:PDTCH:TERRor?"		

**CALL:STATUS:TCHannel[:ARFCN]?**

Function	GSM	This query returns the TCH ARFCN for the current band. The CALL:STATUS:STATE must be connected, see <a href="#">“CALL:STATUS[:STATE]:[VOICE]?”</a> on page 457.
	GPRS	This command is not applicable to GPRS.
Query		range: <ul style="list-style-type: none"> <li>• DCS band, channels 512 to 885</li> <li>• EGSM band, channels 975 to 1023 and 0 to 124</li> <li>• PCS band, channels 512 to 810</li> <li>• PGSM band, channels 1 to 124</li> <li>• 9.91E+37</li> </ul> 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 <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766. The CALL:STATUS:STATE must be connected, see <a href="#">“CALL:STATUS[:STATE]:[VOICE]?”</a> on page 457.
	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 ?"		

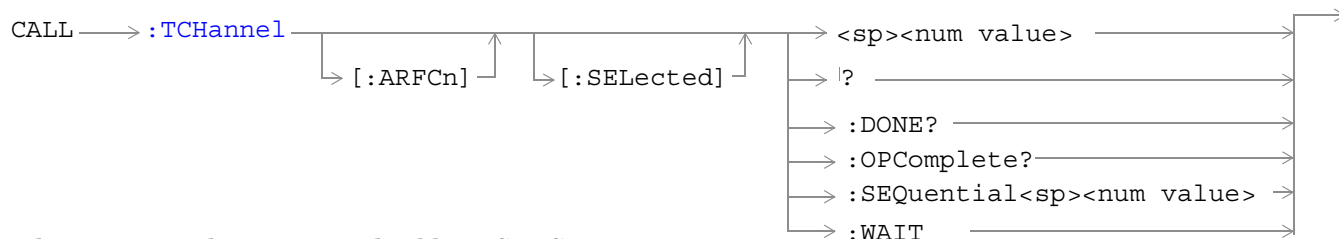
**CALL:STATUS:TCHannel:TERRor?**

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 <a href="#">“CALL:STATUS[:STATE]:[VOICE]?”</a> on page 457.</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: .25 T</p>	
*RST setting	9.91E+37 (NAN)	
<b>Programming Example</b> OUTPUT 714;"CALL:STATUS:TCHANNEL:TERROR?" ! Returns Burst Timing Error.		

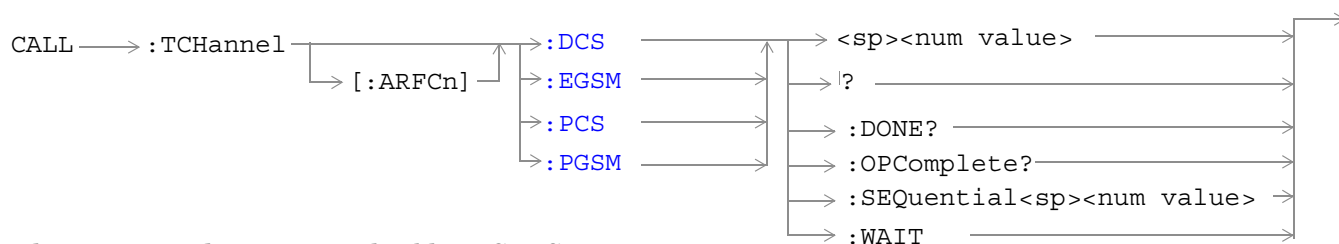
**CALL:STATUS:TCHannel:TSLot?**

Function	GSM	<p>This query returns the Timeslot that the BS Emulator is using for the TCH. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766.</p> <p>The CALL:STATUS:STATE must be connected, see <a href="#">“CALL:STATUS[:STATE]:[VOICE]?”</a> on page 457.</p>
	GPRS	This command is not applicable to GPRS.
Query	range: 3   4   5   9.91E+37	
*RST setting	9.91E+37 (NAN)	
<b>Programming Example</b> OUTPUT 714;"CALL:STATUS:TCHANNEL:TSLOT?"		

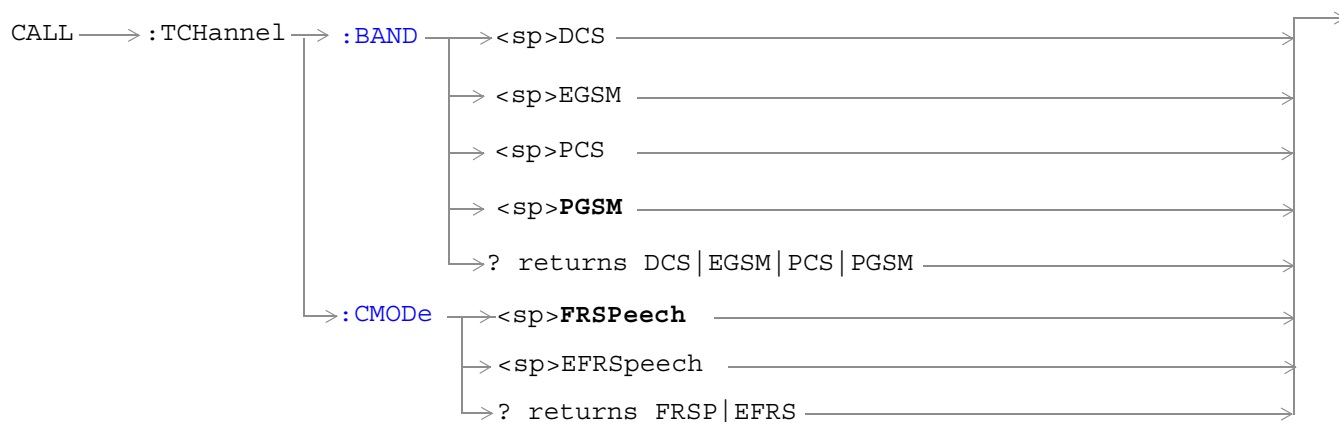
## CALL:TCHannel



These commands are not applicable to GPRS.

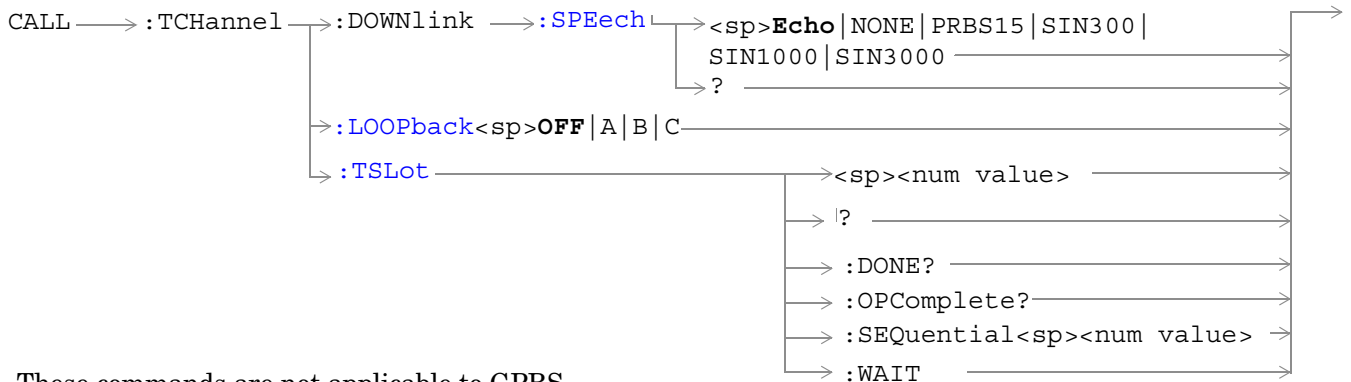


These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

## CALL:TCHannel



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### 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 <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands” on page 39</a> for examples.
	GPRS	This command is not applicable to GPRS.
Setting		range: <ul style="list-style-type: none"> <li>DCS band, channels 512 to 885 (default: 698)</li> <li>EGSM band, channels 0 to 124 and 975 to 1023 (default: 30)</li> <li>PCS band, channels 512 to 810 (default: 698)</li> <li>PGSM band, channels 1 to 124 (default: 30)</li> </ul> resolution: 1
Query		range: <ul style="list-style-type: none"> <li>DCS band, channels 512 to 885</li> <li>EGSM band, channels 0 to 124 and 975 to 1023</li> <li>PCS band, channels 512 to 810</li> <li>PGSM band, channels 1 to 124</li> </ul> resolution: 1
*RST Setting		PGSM and EGSM bands: 30, DCS and PCS bands: 698
<b>Programming Example</b> OUTPUT 714; "CALL:TCHANNEL:ARFCN:SELECTED 512" !Selects ARFCN of 512 on the !test set.		

**CALL:TCHannel[:ARFCn]:DCS**

Function	GSM	<p>Sets/queries the channel number for downlink and uplink TCH for DCS band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUs[:STATe][:VOICel?”</a> on page 457.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 39 for examples.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>range: 512 to 885 (default: 698)</p> <p>resolution: 1</p>	
Query	<p>range: 512 to 885</p> <p>resolution: 1</p>	
*RST Setting	698	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:DCS 512"		

**CALL:TCHannel[:ARFCn]:EGSM**

Function	GSM	<p>Sets/queries channel number for downlink and uplink TCH for EGSM band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766.</p> <p>TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUs[:STATe][:VOICel?”</a> on page 457.</p> <p>Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 39 for examples.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>range: 0 to 124   975 to 1023 (default: 30)</p> <p>resolution: 1</p>	
Query	<p>range: 0 to 124   975 to 1023</p> <p>resolution: 1</p>	
*RST Setting	30	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:ARFCN:EGSM 124"		

## CALL:TCHannel

### CALL:TCHannel[ARFCN]:PCS

Function	GSM	Sets/queries channel number for downlink and uplink TCH for PCS band. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766.  TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUS[:STATE][:VOICE]?”</a> on page 457.  Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 39 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 <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766.  TCH ARFCN may be set and queried when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUS[:STATE][:VOICE]?”</a> on page 457.  Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 39 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:BAND**

Function	GSM	Sets/queries which GSM band the BS Emulator should use for the TCH.  The test set may be queried for the current TCH band when the CALL:STATUS:STATE is idle or connected, see <a href="#">“CALL:STATUS[:STATE][:VOICE]?”</a> on page 457.  The test set uses this command to perform a channel assignment, see <a href="#">“How the Test Set Performs a Dualband Handover”</a> on page 184 when the MS will support the band and the CALL:STATUS:STATE is CONNECTed.
	GPRS	This command is not applicable to GPRS.
Setting	range: DCS   EGSM   PCS   PGSM bands resolution: 1	
Query	range: DCS   EGSM   PCS   PGSM bands resolution: 1	
*RST Setting	PGSM	
Related Topic	See <a href="#">“Traffic Band Parameter”</a> on page 740 .	
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 <a href="#">“Programming a Channel Mode Change”</a> on page 182.
	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

### CALL:TCHannel:DOWNlink:SPEech

Function	GSM	Set which kind of Speech data is transmitted on the downlink TCH. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766 or <a href="#">“Fast Bit Error Measurement Description”</a> on page 113 or <a href="#">“Test Mode Operating Modes”</a> on page 753.
	GPRS	This command is not applicable to GPRS.
Setting	range: ECHO   NONE   PRBS15   SIN300   SIN1000   SIN3000	
Query	range: ECHO   NONE   PRBS15   SIN300   SIN1000   SIN3000	
*RST Setting	ECHO	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:DOWNLINK:SPEECH ECHO"		

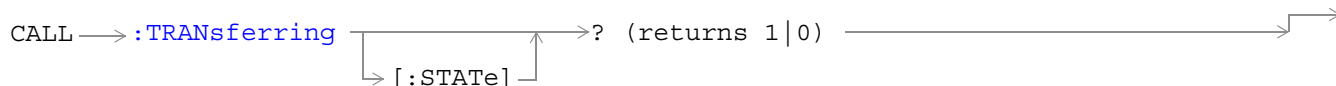
### CALL:TCHannel:LOOPback

Function	GSM	Sets traffic channel loopback state and type for the MS.  The loopback type must be set before a Fast Bit Error or a Bit Error measurement will function.  The test set will automatically set the correct loopback type if the signalling loopback control is set to on, after the measurement the test set will automatically set the loopback to off. See <a href="#">“SETup:BERRor:SLControl[:STATe]”</a> on page 603 or <a href="#">“SETup:FBERRor:SLControl[:STATe]”</a> on page 610.  See <a href="#">“Fast Bit Error Measurement Description”</a> on page 113 or <a href="#">“GSM Bit Error Measurement”</a> on page 78.
	GPRS	This command is not applicable to GPRS.
Setting	range: <ul style="list-style-type: none"><li>• OFF - Sets the TCH Loop state for the MS to OFF. The loop back is open.</li><li>• A- Sets the TCH Loop state for the MS to type A. Full-rate speech TCH loopback with signalling of erased frames, (residual).</li><li>• B- Sets the TCH Loop state for the MS to type B. Full-rate speech TCH loopback without signalling of erased frames, (non-residual).</li><li>• C - Sets the TCH Loop state for the MS to type C. TCH burst by burst loopback.</li></ul>	
*RST Setting	OFF	
Programming Example		
OUTPUT 714 ; "CALL:TCHANNEL:LOOPBACK C" !Sets loopback type.		

## CALL:TCHannel:TSLot

Function	GSM	Sets the Timeslot number used for downlink and uplink Traffic Channel. See <a href="#">“Configuring the Traffic Channel (TCH)”</a> on page 766. Additional commands can be appended to aid in controller/Mobile Station synchronization. See <a href="#">“Call Processing Subsystem Overlapped Command Synchronization Commands”</a> on page 39 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 343](#)

### 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 <a href="#">“Data Connection Processing State Synchronization” on page 58</a> .
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.

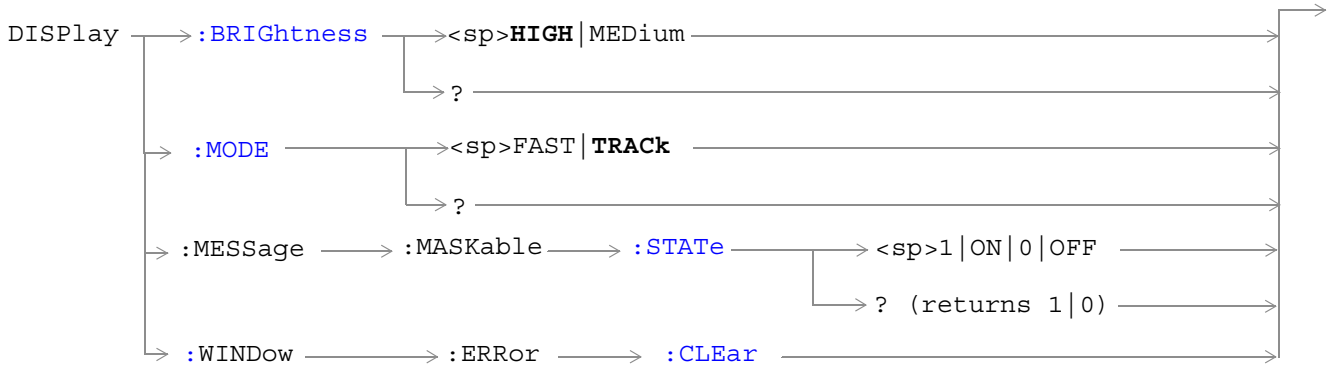
### Display Backlight Dimming

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 343](#)

**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 <a href="#">“Display Backlight Dimming” on page 469</a> .
Setting	Range: MEDium   HIGH	
Query	Range: MED   HIGH	
Factory setting	HIGH (this parameter is not affected by any reset operation and can only be changed by direct user access)	
Programming Example		
OUTPUT 714;"DISPLAY:BRIGHTNESS MEDIUM" !Sets display brightness to medium.		

**DISPlay:MODE**

Function	GSM	Sets/queries the test set's display mode.
	GPRS	See <a href="#">“Display Mode (Track/Fast)” on page 840</a> .
Setting	Range: FAST   TRACK	
Query	Range: FAST   TRAC	
*RST setting	TRACK	
Programming Example		
OUTPUT 714;"DISPLAY:MODE FAST" !Sets display mode to fast.		

**DISPlay:MESSAge:MASKable:STATe**

Function	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

### 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 474](#)

[“FETCh:BERRor” on page 482](#)

[“FETCh:DAUDio” on page 490](#)

[“FETCh:DPOWer” on page 494](#)

[“FETCh:FBERror” on page 497](#)

[“FETCh:GBERror” on page 501](#)

[“FETCh:IQTuning” on page 504](#)

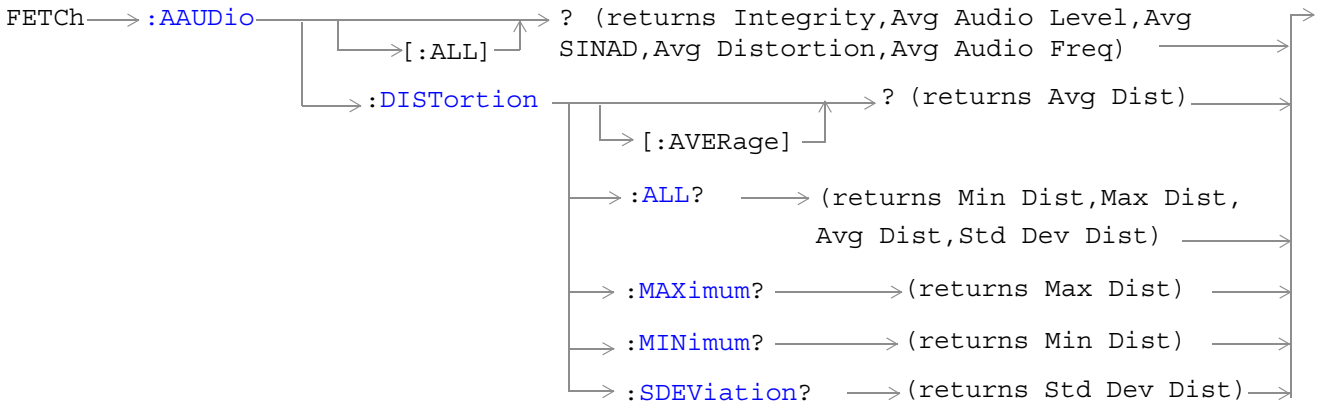
[“FETCh:ORFSpectrum” on page 508](#)

[“FETCh:PFERror” on page 516](#)

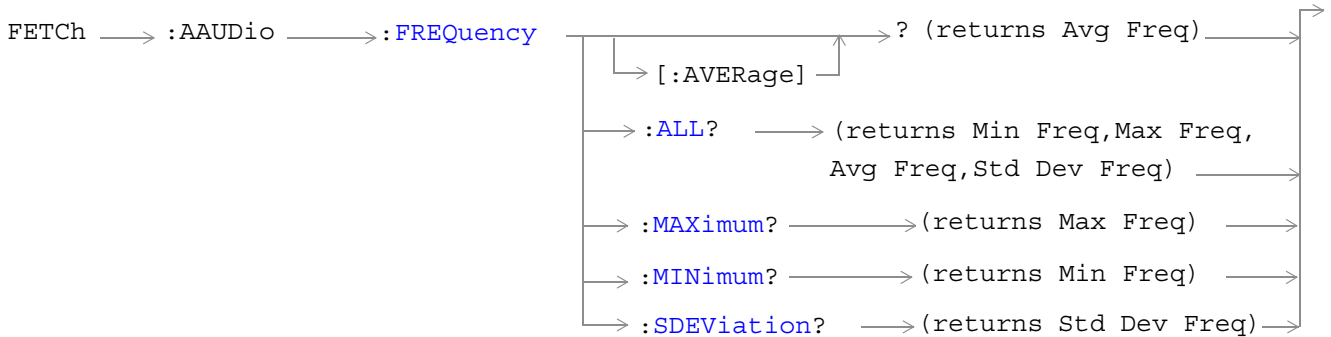
[“FETCh:PVTime” on page 523](#)

[“FETCh:TXPower” on page 550](#)

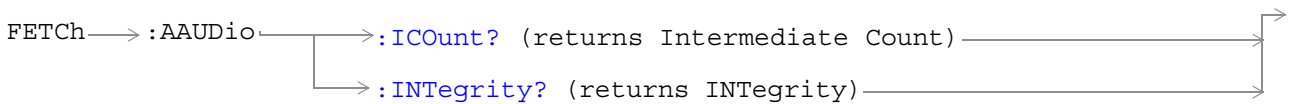
## FETCh:AAUDio



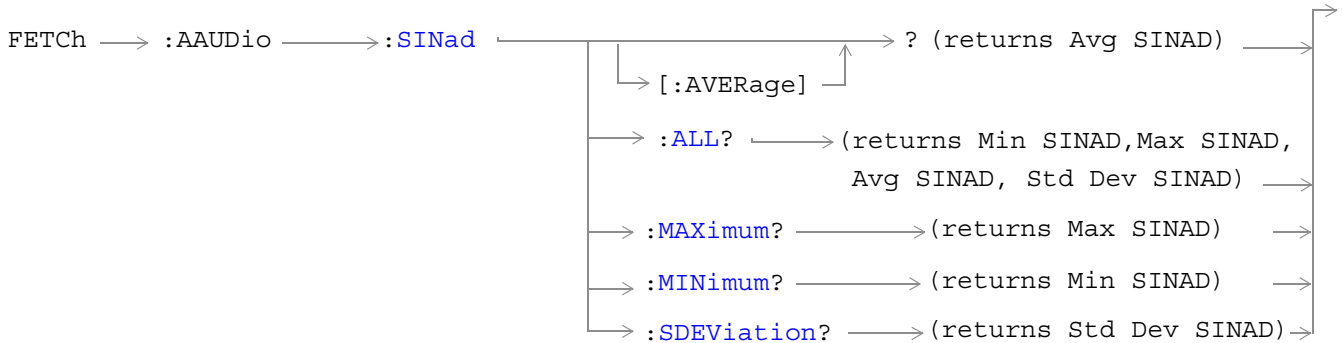
These commands are not applicable to GPRS.



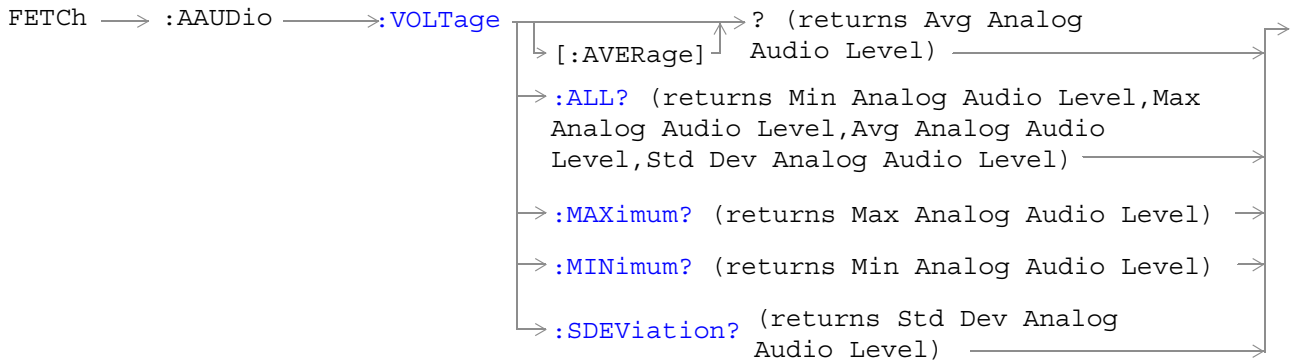
These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 343

**FETCh:AAUDio[:ALL]?**

Function	GSM	<p>This query returns the analog audio measurement results. This query returns an integrity indicator (see <a href="#">“Integrity Indicator” on page 191</a>), average analog audio level, average SINAD, average distortion and the average audio frequency. Values are returned in a comma-separated list.</p> <p>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.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Average analog audio level</p> <ul style="list-style-type: none"> <li>• Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></li> <li>• Resolution: 0.1 mV<sub>rms</sub></li> </ul> <p>Average SINAD</p> <ul style="list-style-type: none"> <li>• Range: -99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Average distortion</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99%</li> <li>• Resolution: 0.01%</li> </ul> <p>Average audio frequency</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99999 Hz</li> <li>• Resolution: 0.01 Hz</li> </ul>

**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"> <li>• Range: 0 to 99%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul>

**FETCh:AAUDio:DISToRtion: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"> <li>• Range: 0 to 99%, 9.91 E+37</li> <li>• Resolution: 0.01%</li> </ul> <p>Standard deviation audio distortion:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99%, 9.91 E+37</li> <li>• Resolution: 0.001%</li> </ul>

**FETCh:AAUDio:DISToRtion: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:DISToRtion: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:DISToRtion: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"> <li>• Range: 0 to 99999 Hz, 9.91 E+37</li> <li>• Resolution: 0.01 Hz</li> </ul>

**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"> <li>• Range: 0 to 99999 Hz, 9.91 E+37</li> <li>• Resolution: 0.01 Hz</li> </ul> <p>Standard deviation audio frequency:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 99999 Hz, 9.91 E+37</li> <li>• Resolution: 0.001 Hz</li> </ul>

**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: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 <a href="#">“Integrity Indicator” on page 191</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See <a href="#">“Integrity Indicator” on page 191</a> . 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"> <li>• Range:-99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

**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"> <li>• Range: -99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> Standard deviation SINAD <ul style="list-style-type: none"> <li>• Range: -99 to 99 dB, 9.91 E+37</li> <li>• Resolution: 0.001 dB</li> </ul>

**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 m $V_{rms}$ to 20 $V_{rms}$ Resolution: 0.1 m $V_{rms}$



**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"> <li>• Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></li> <li>• Resolution: 0.1 mV<sub>rms</sub></li> </ul> <p>Maximum</p> <ul style="list-style-type: none"> <li>• Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></li> <li>• Resolution: 0.1 mV<sub>rms</sub></li> </ul> <p>Average</p> <ul style="list-style-type: none"> <li>• Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></li> <li>• Resolution: 0.1 mV<sub>rms</sub></li> </ul> <p>Standard deviation</p> <ul style="list-style-type: none"> <li>• Range: 0 V to 14.14214 V</li> <li>• Resolution: 0.01 mV</li> </ul>

**FETCh:AAUDio:VOLTage:MAXimum?**

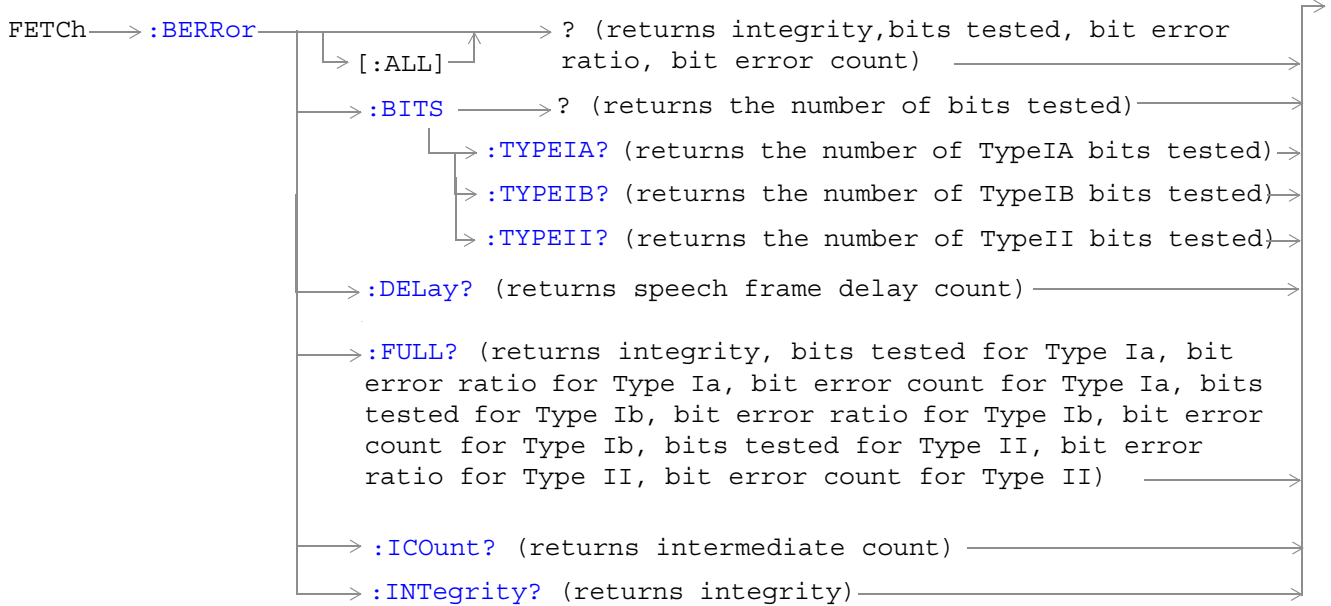
Function	GSM	This query returns the analog audio multi-measurement maximum analog audio voltage.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></p> <p>Resolution: 0.1 mV<sub>rms</sub></p>

**FETCh:AAUDio:VOLTage:MINimum?**

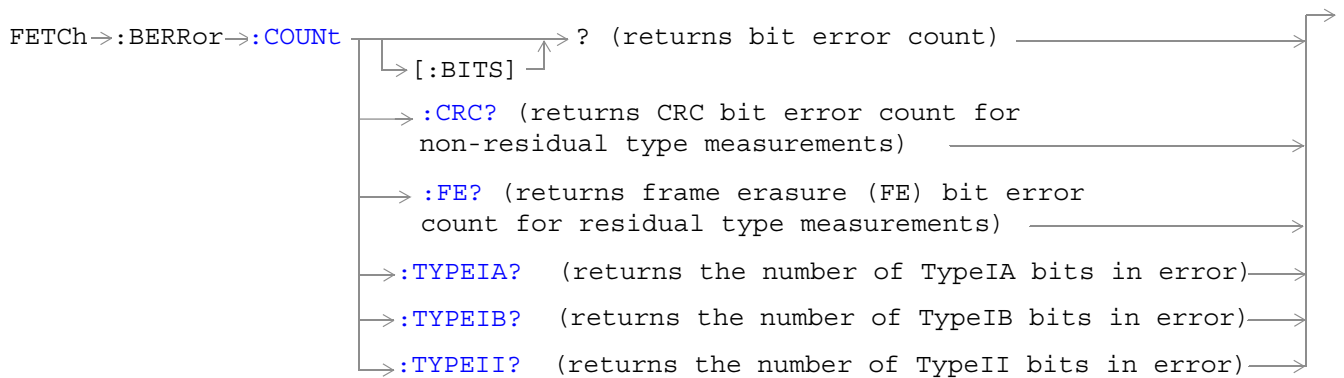
Function	GSM	This query returns the analog audio multi-measurement minimum analog audio voltage.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 10 mV<sub>rms</sub> to 20 V<sub>rms</sub></p> <p>Resolution: 0.1 mV<sub>rms</sub></p>

**FETCh:AAUDio:VOLTage:SDEVIation?**

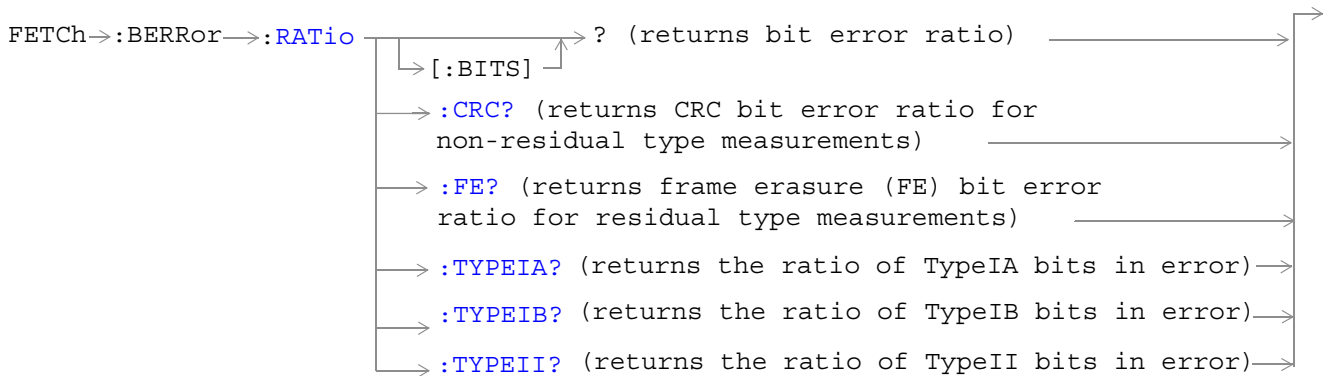
Function	GSM	This query returns the analog audio multi-measurement standard deviation.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 V to 14.14214 V</p> <p>Resolution: 0.01 mV</p>

**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 343](#)

**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, “ <a href="#">FETCh:BERRor:FULL?</a> ” on page 487, returns the same results but for all bit types simultaneously.) See “ <a href="#">Bit Error Measurement Description</a> ” on page 78.
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See “<a href="#">Integrity Indicator</a>” on page 191.</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,131 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 1 to 999,131 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**FETCh:BERRor:BITS?**

Function	GSM	<p>Queries the number of bits actually tested. This query only returns the result of the bit type set using the SETup:BERRor[:TYPE] command.</p> <p>The number of bits actually tested will exceed the number requested because the test set rounds up the number requested to the nearest number that results in an integral number of speech frames. One speech frame is 132 bits. The test set measures complete a speech frame and it is queried for bits. See “<a href="#">Bit Error Measurement Description</a>” on page 78</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,131 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>
*RST Setting		10,000

**FETCh:BERRor:BITS:TYPEIA|TYPEIB|TYPEII?**

Function	GSM	Queries the number of bits which have been tested. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See <a href="#">“Bit Error Measurement Description” on page 78</a>
	GPRS	This command is not applicable to GPRS.
Query		Range for Type Ia: 0 to 999,000 and 9.91 E+37 (NAN) Range for Type Ib: 0 to 2,637,369 and 9.91 E+37 (NAN) Range for Type II: 0 to 1,558,440 and 9.91 E+37 (NAN) Resolution: 1

**FETCh:BERRor:COUNT[:BITS]?**

Function	GSM	Queries the number of bits that were in error during the last bit error test. See <a href="#">“Bit Error Measurement Description” on page 78</a> The manual user must set the measurement unit to count.
	GPRS	This command is not applicable to GPRS.
Query		Range: 1 to 999,131 and 9.91 E+37 (NAN) Resolution: 1

**FETCh:BERRor:COUNT:CRC?**

Function	GSM	Queries the number of bad cyclic redundancy checks (CRCs) for a non-residual measurement type, loopback type B test. See <a href="#">“Bit Error Measurement Description” on page 78</a> The mobile station re-transmits the CRC it received from the test set on the uplink. A bad CRC occurs when the CRC transmitted by the test set does not match what is received back from the mobile station. The manual user must set the measurement unit to count.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 19,980 and 9.91 E+37 (NAN) Resolution: 1

**FETCh:BERRor:COUNT:FE?**

Function	GSM	Queries the number of frames erased during a residual measurement type, loopback 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****FETCh:BERRor:COUNT:TYPEIA|TYPEIB|TYPEII?**

Function	GSM	Queries the number of bits in error. This query allows you to select the bit type you want to query; either Type Ia, Type Ib or Type II. See <a href="#">“Bit Error Measurement Description” on page 78</a>
	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:DELay?**

Function	GSM	<p>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.</p> <p>This value is displayed in the Speech Frames Delay field.</p> <p>This value can be determined automatically, or manually set by the user. See <a href="#">“SETup:BERRor:MANual:DELay” on page 602</a> and <a href="#">“SETup:BERRor:LDControl:AUTO” on page 602</a>.</p> <p>Refer also to the <a href="#">“Bit Error Measurement Description” on page 78</a> for a description of frame delay and how it is used in the bit error measurement.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 15 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>
*RST Setting		Auto

## FETCh:BERRor:FULL?

Function	GSM	<p>Queries the bit error measurement.</p> <p>Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a>, Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II bits. (A similar query, <a href="#">“FETCh:BERRor[:ALL]?” on page 484</a>, returns the same results but only for the bit type previously set using the SETup:BERRor[:TYPE] command.) See <a href="#">“Bit Error Measurement Description” on page 78</a></p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2,637,369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2,637,369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 15,584,400 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type II Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 1,558,440 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

## FETCh:BERRor

### FETCh:BERRor:ICount?

Function	GSM	Queries the intermediate count of bits tested (measurement progress report). See <a href="#">“Measurement Progress Report” on page 198</a>
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 999 Resolution: 1

### FETCh:BERRor:INTEgrity?

Function	GSM	Returns the integrity indicator value for the last bit error measurement performed. Zero indicates a normal result.  See <a href="#">“Integrity Indicator” on page 191</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See <a href="#">“Integrity Indicator” on page 191</a> . Resolution: 1

### FETCh:BERRor:RATIo[:BITS]?

Function	GSM	Queries the ratio of bits in error to the number of bits tested during the last bit error test and returns it as a percentage. See <a href="#">“Bit Error Measurement Description” on page 78</a>  The manual user must set the measurement unit to %.
	GPRS	This command is not applicable to GPRS.
Query		Range: 1 to 100 and 9.91 E+37 (NAN) Resolution: 0.01

### FETCh:BERRor:RATIo:CRC?

Function	GSM	Queries the ratio of bad cyclic redundancy checks (CRCs) to the total number of CRCs received for a non-residual measurement type, looback type B test and returns it as a percentage. See <a href="#">“Bit Error Measurement Description” on page 78</a>  The mobile station re-transmits the CRC it received from the test set on the uplink.  A bad CRC occurs when the CRC transmitted by the test set does not match what is received back from the mobile station.  The manual user must set the measurement’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



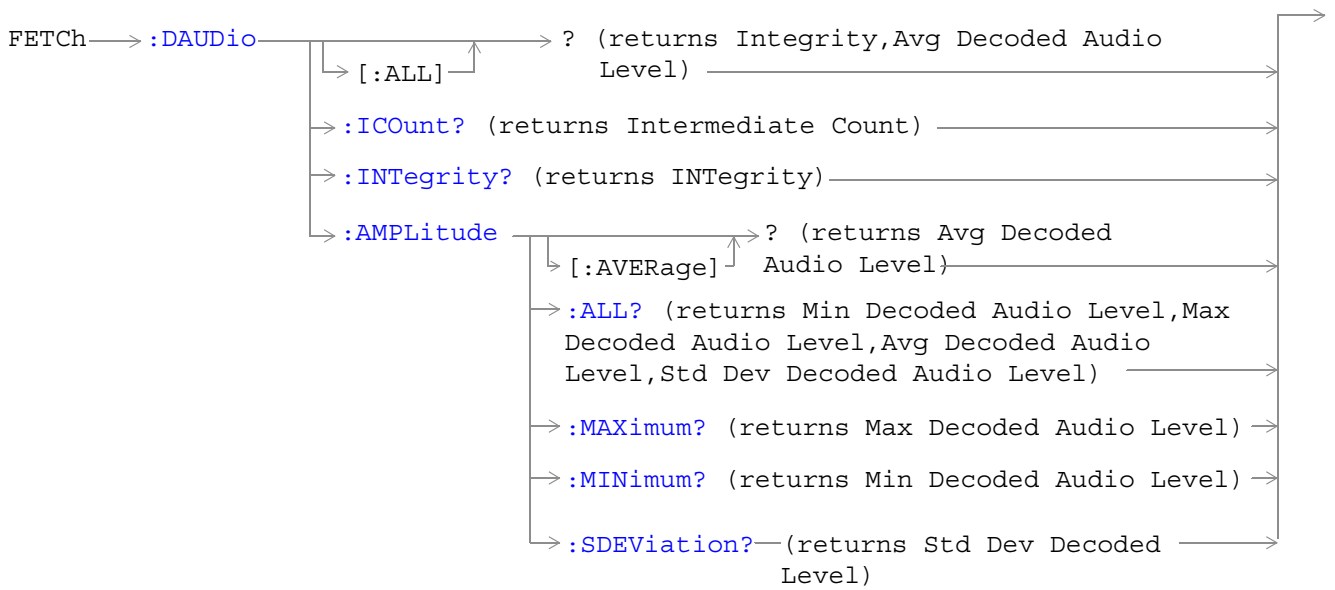
**FETCh:BERRor:RATio:FE?**

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 <a href="#">“Bit Error Measurement Description” on page 78</a> 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:TYPEIAITYPEIBITYPEII?**

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 <a href="#">“Bit Error Measurement Description” on page 78</a>
	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 343](#)

**FETCh:DAUDio[:ALL]?**

Function	GSM	Queries integrity indicator and average decoded audio results. Values are returned in a comma-separated list.
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicator: <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> Decoded audio: <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul>

**FETCh:DAUDio:ICount?**

Function	GSM	Queries the intermediate count of decoded audio multi-measurements completed. This value is not displayed on the test set.
	GPRS	This command is not applicable to GPRS.
Query		Range: 1 to 999 Resolution: 1

**FETCh:DAUDio:INTEgrity?**

Function	GSM	Queries the integrity indicator for the last decoded audio measurement completed. Zero indicates a normal measurement. See <a href="#">“Integrity Indicator” on page 191</a> for descriptions of non-zero integrity indicators.
	GPRS	This command is not applicable to GPRS.
Query		Range: See <a href="#">“Integrity Indicator” on page 191</a> . Resolution: 1

**FETCh:DAUDio:AMPLitude[:AVERage]?**

Function	GSM	Queries the average decoded audio result from an uplink speech level measurement in percent full scale.  If the decoded audio multi-measurement count field is off, the level returned by this command is displayed in the Decoded Audio Level field. If the decoded audio multi-measurement count is on, the level returned by this query is displayed in the Average field
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 100% Resolution: 0.01% FS

**FETCh:DAUDio:AMPLitude:ALL?**

Function	GSM	Queries the decoded audio multi-measurement minimum, maximum, average and standard deviation. Values are returned in a comma-separated list.  The values returned are displayed in the Minimum, Maximum, Average, and Std. Dev. fields, which are displayed when the decoded audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		<p>Minimum:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul> <p>Maximum:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul> <p>Average:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100%</li> <li>• Resolution: 0.01% FS</li> </ul> <p>Standard deviation:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 71%</li> <li>• Resolution: 0.001% FS</li> </ul>

**FETCh:DAUDio:AMPLitude:MAXimum?**

Function	GSM	Queries the decoded audio multi-measurement maximum decoded audio voltage. The value returned is displayed in the Decoded Audio Maximum field, which is displayed when the decoded audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 100% Resolution: 0.01% FS

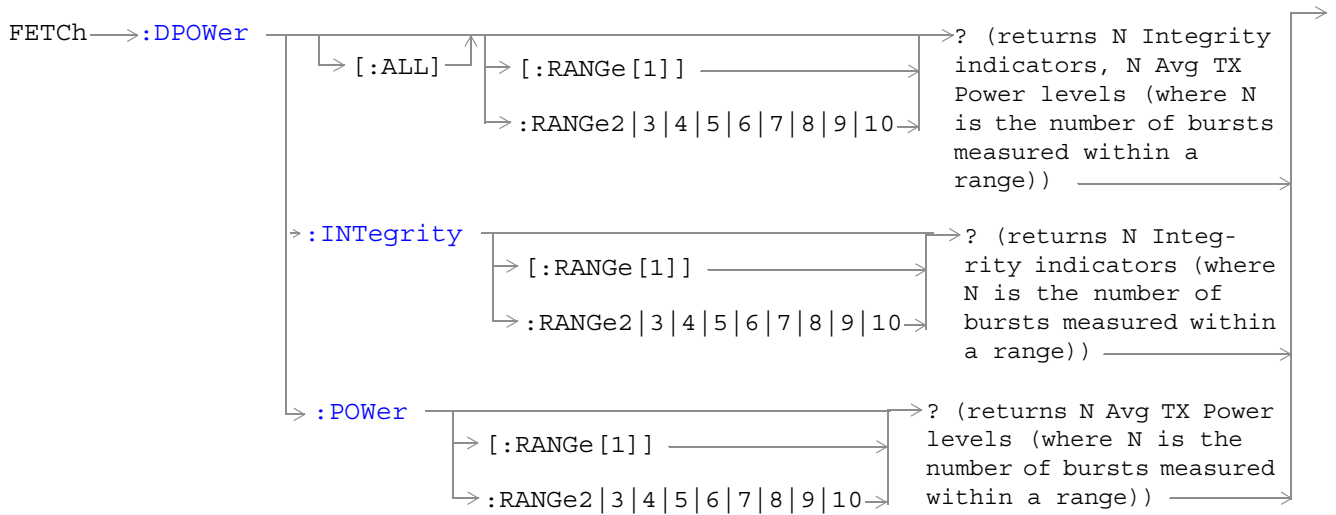
**FETCh:DAUDio:AMPLitude:MINimum?**

Function	GSM	Queries the decoded audio multi-measurement minimum decoded audio voltage The value returned is displayed in the Decoded Audio Minimum field, which is displayed when the decoded audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 100% Resolution: 0.01% FS

**FETCh:DAUDio:AMPLitude:SDEVIation?**

Function	GSM	Queries the decoded audio multi-measurement standard deviation. The value returned is displayed in the Decoded Audio Std Dev. field, which is displayed when the Decoded Audio multi-measurement count is not off.
	GPRS	This command is not applicable to GPRS.
Query		Range: 0 to 71% Resolution: 0.001% FS

## FETCh:DPOWer



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

**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 “ <a href="#">SETup:DPOWer:COUNT:NUMBer</a> ” on page 619.  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"> <li>• Range: See “<a href="#">Integrity Indicator</a>” on page 191.</li> <li>• Resolution: 1</li> </ul> Average TX power levels for each individual burst <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dBm</li> </ul>
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 “ <a href="#">SETup:DPOWer:COUNT:NUMBer</a> ” on page 619.  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 “ <a href="#">Integrity Indicator</a> ” on page 191.  Resolution: 1
Programming Example		
OUTPUT 714;"FETCh:DPOWer:INTegrity:RANGe3?" !Queries the integrity results for bursts 201 through 300.		

**FETCh:DPOWer**

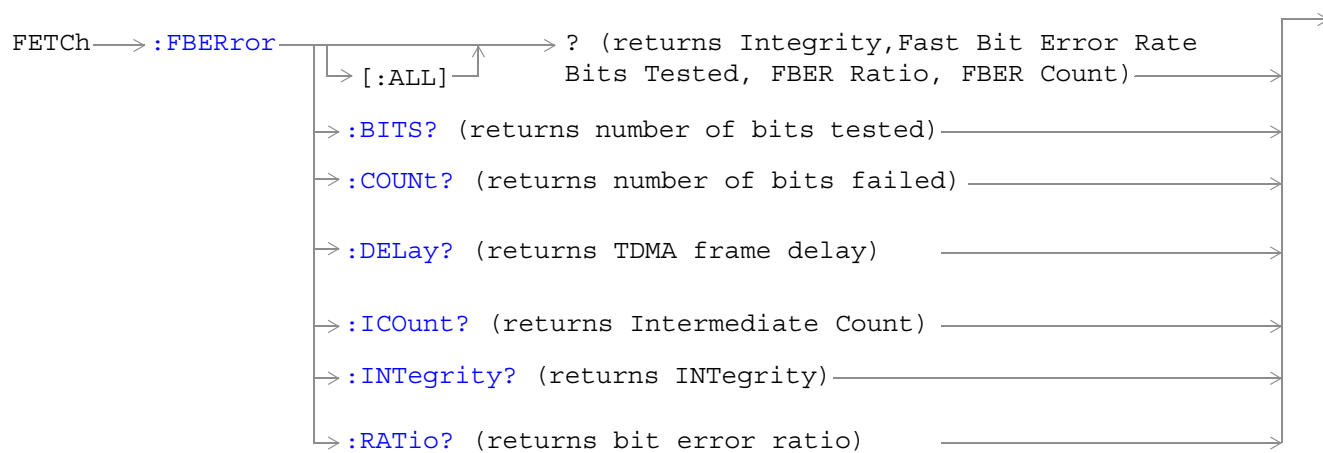
**FETCh:DPOWer:POWer[:RANGe[1]]?**

**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 “ <a href="#">SETup:DPOWer:COUNT:NUMBER</a> ” on page 619.  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
<b>Programming Example</b>		
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 343](#)

## 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		<p>Integrity indicator:</p> <ul style="list-style-type: none"> <li>• See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Bits tested:</p> <ul style="list-style-type: none"> <li>• Range: 1 to 999,455 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Fast bit error count:</p> <ul style="list-style-type: none"> <li>• Range: 1 to 999,455 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

## FETCh:FBERror:BITS?

Function	GSM	Queries the total number of information bits tested during the last fast bit error measurement. See <a href="#">“SETup:FBERror:COUNT” on page 608</a>  This value is not available on the front panel display.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 1 to 999,455 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

## FETCh:FBERror:COUNT?

Function	GSM	Queries the number of information bits that were deemed errors during the last fast bit error test.  This value is not available on the front panel display.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 1 to 999,455 and 9.91 E+37 (NAN)</p> <p>Resolution: 1</p>

**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 <a href="#">“SETup:FBERror:MANual:DELay” on page 609</a> and <a href="#">“SETup:FBERror:LDControl:AUTO” on page 608</a> for setting this value manually.</p> <p>Refer also to the <a href="#">“Fast Bit Error Measurement Description” on page 113</a> 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

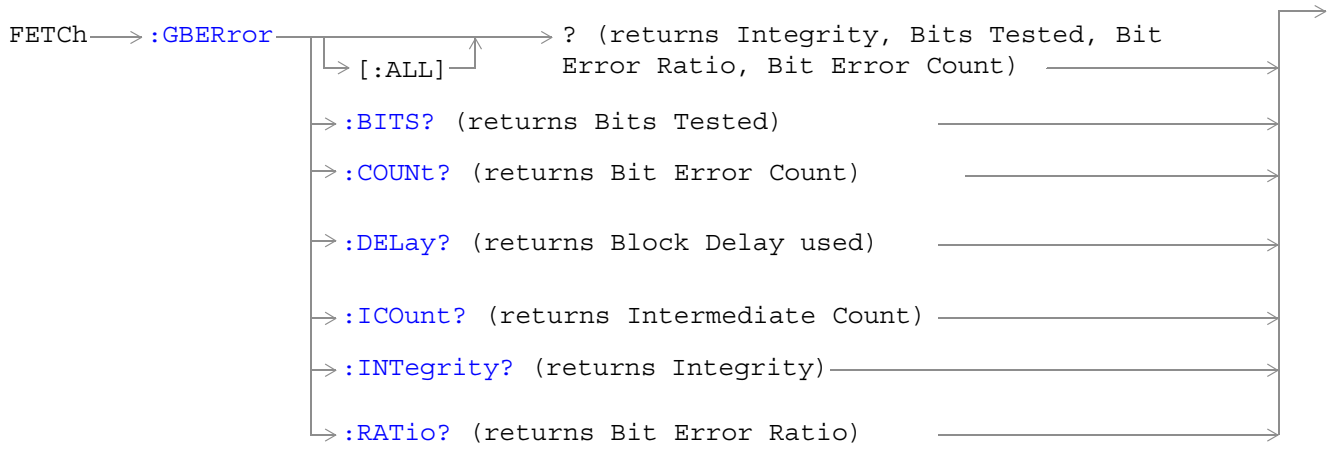
**FETCh:FBERror:INTegrity?**

Function	GSM	<p>Returns the integrity indicator value for the last fast bit error measurement performed. Zero indicates a normal result.</p> <p>See <a href="#">“Integrity Indicator” on page 191</a> for descriptions of non-zero integrity indicators.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: See <a href="#">“Integrity Indicator” on page 191</a>.</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		Range: 0 to 100 and 9.99 E+37 Resolution: 0.01

## FETCh:GBERror



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)

**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"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191.</a></li> <li>• Resolution: 1</li> </ul> <p>Bits tested:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,427 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Bit error count:</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,427 and 9.91 E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**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 <a href="#">“FETCh:GBERror:COUNT?” on page 502.</a>
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: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 <a href="#">“SETup:GBERror:MANual:DELay” on page 624</a> and <a href="#">“SETup:GBERror:LDControl:AUTO” on page 624</a> for setting this value manually.  Refer also to the <a href="#">“GPRS Bit Error Measurement” on page 81</a> 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)

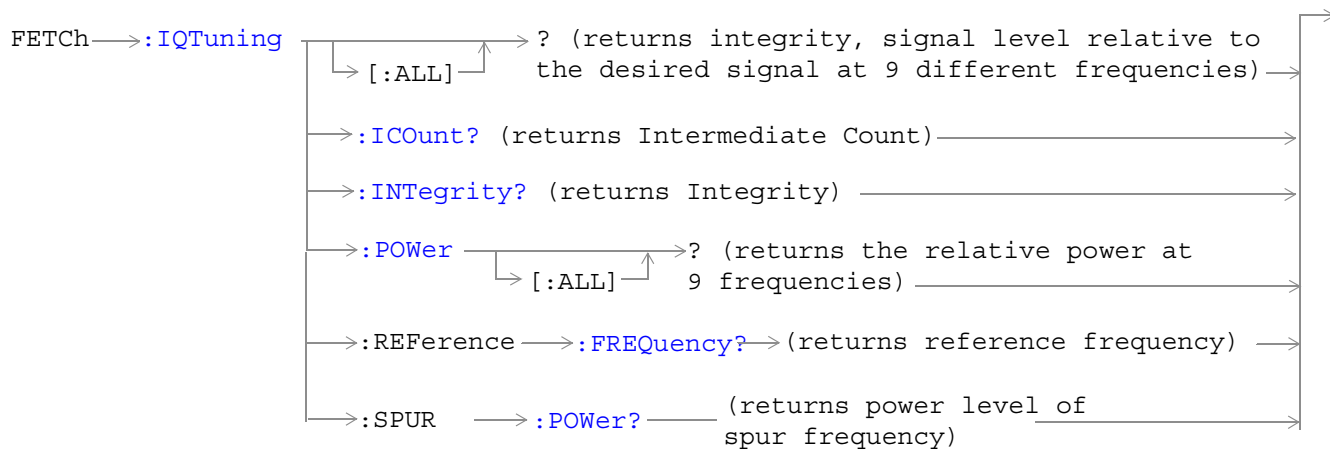
**FETCh:GBERror:INTEGRity?**

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 <a href="#">“Integrity Indicator” on page 191</a> for descriptions of non-zero integrity indicators.
Query		Range: See <a href="#">“Integrity Indicator” on page 191</a> . 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 343](#)



## FETCh:IQTuning[:ALL]?

Function	GSM	Queries the I/Q Tuning measurement results. Query returns the integrity indicator and the relative power level at the following offset frequencies: carrier frequency, +/-67.7083 kHz, +/-135.417 kHz, +/-203.125 kHz, +/-270.833 kHz. The spur measurement result is also returned.
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See “<a href="#">Integrity Indicator</a>” on page 191.</li> <li>• Resolution: 1</li> </ul> <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> <li>• -270.833 kHz</li> <li>• -203.125 kHz</li> <li>• -135.417 kHz</li> <li>• -67.7083 kHz</li> <li>• carrier frequency</li> <li>• +67.7083 kHz</li> <li>• +135.417 kHz</li> <li>• +203.125 kHz</li> <li>• +270.833 kHz</li> </ul> <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

## FETCh:IQTuning:ICount?

Function	GSM	Queries the intermediate number of I/Q Tuning multi-measurements completed.
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: 0 to 999</p> <p>Resolution: 1</p>

**FETCh:IQTuning:INTEgrity?**

Function	GSM	Returns the integrity indicator value for the last I/Q Tuning measurement performed. Zero indicates a normal result.
	GPRS	This command is not applicable to GPRS.
Query		Range: See <a href="#">“Integrity Indicator” on page 191.</a> Resolution: 1

**FETCh:IQTuning:POWer[:ALL]?**

Function	GSM	Queries the I/Q Tuning measurement results. Query returns the relative power level at the following offset frequencies: carrier frequency, $\pm 67.7083$ kHz, $\pm 135.417$ kHz, $\pm 203.125$ kHz, $\pm 270.833$ kHz. The spur measurement result is also returned.
	GPRS	This command is not applicable to GPRS.
Query		<p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> <li>• -270.833 kHz</li> <li>• -203.125 kHz</li> <li>• -135.417 kHz</li> <li>• -67.7083 kHz</li> <li>• carrier frequency</li> <li>• +67.7083 kHz</li> <li>• +135.417 kHz</li> <li>• +203.125 kHz</li> <li>• +270.833 kHz</li> </ul> <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:IQTuning:REFeRence:FREQUency?**

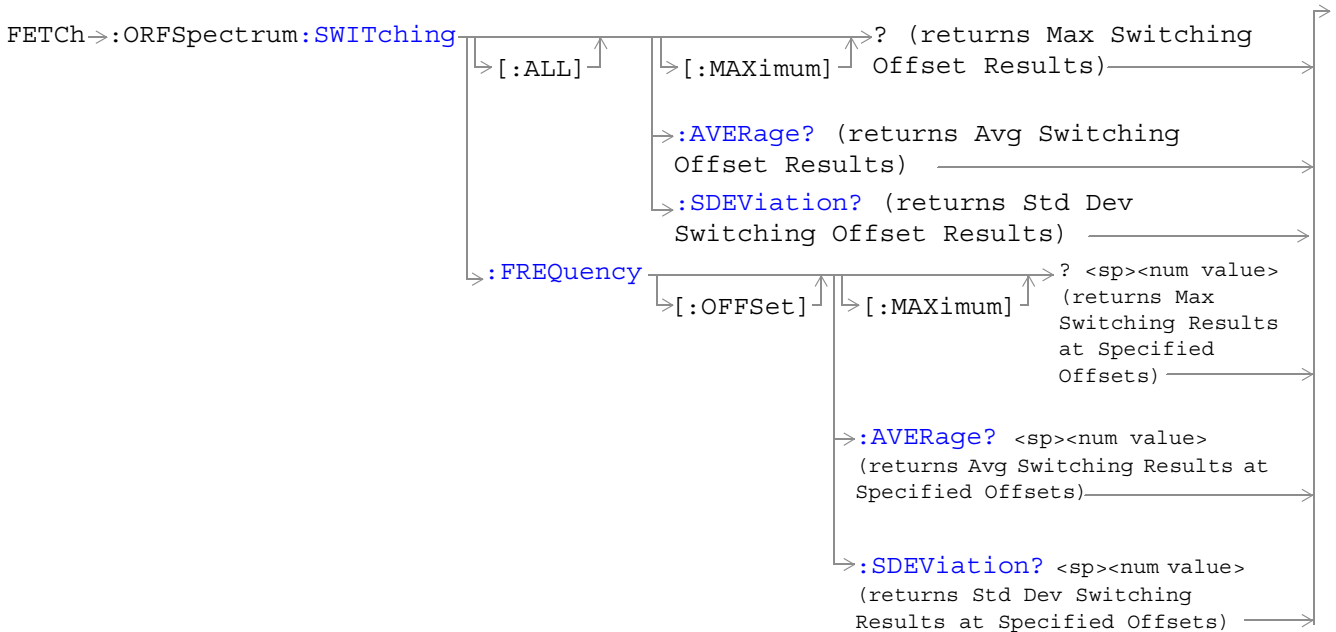
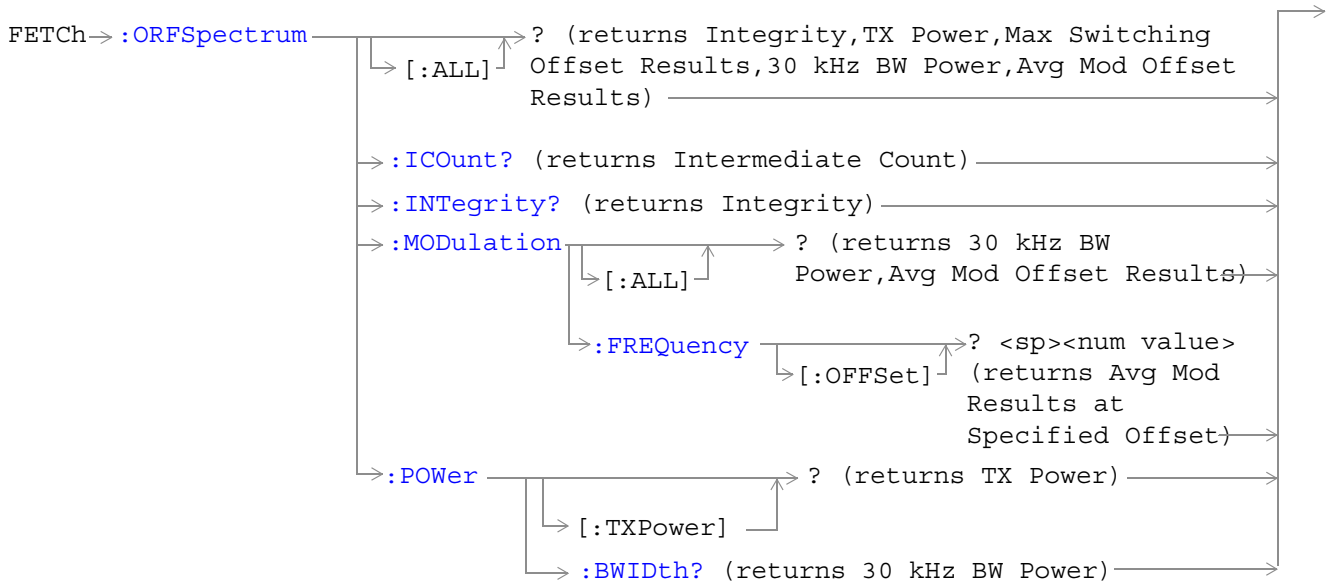
Function	GSM	Queries the offset frequency being used as the reference for the measurement.
	GPRS	This command is not applicable to GPRS.
Query		NEG67KHZ   ZEROKHZ   POS67KHZ   UNKNOWN

---

**FETCh:IQTuning:SPUR:POWer?**

Function	GSM	Queries the relative power level of the spur frequency.
	GPRS	This command is not applicable to GPRS.
Query		Range: -100 to +100 dB and 9.91 E+37 (NAN) Resolution: 0.01 dB

## FETCh:ORFSpectrum



“Diagram Conventions” on page 343

## FETCh:ORFSpectrum[:ALL]?

Function	GSM	<p>Queries integrity indicator, TX carrier power, up to eight comma-separated output RF spectrum due to switching (max) results, 30 kHz bandwidth power, and up to 22 output RF spectrum due to modulation (average) results.</p> <p>The “SETup:ORFSpectrum:SWITChing:FREQuency[:OFFSet]” command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The “SETup:ORFSpectrum:SWITChing:FREQuency:POINts?” queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching (max) values to expect when you FETCh results.</p> <p>The “SETup:ORFSpectrum:MODulation:FREQuency[:OFFSet]” command sets up the number of output RF spectrum due to modulation offsets that are turned on and their frequency values. The “SETup:ORFSpectrum:MODulation:FREQuency:POINts?” command queries the number of output RF spectrum due to modulation points that are turned on, indicating the number of output RF spectrum due to modulation (average) values to expect when you FETCh results.</p>
	GPRS	
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See “Integrity Indicator” on page 191.</li> <li>• Resolution: 1</li> </ul> <p>TX Carrier Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF Spectrum Due to Switching (Max)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>30 kHz Bandwidth Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF Spectrum due to Modulation (Average)</p> <ul style="list-style-type: none"> <li>• Range: -200 dB to +100 dB and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

## FETCh:ORFSpectrum:ICount?

Function	GSM	<p>Queries the intermediate count of ORFS multi-measurements completed. This number will climb to the number returned by “SETup:ORFSpectrum:ICount:MAXimum?” on page 635.</p>
	GPRS	
Query		<p>Range: 0 to 29971</p> <p>Resolution: 1</p>

**FETCh:ORFSpectrum:INTegrity?**

Function	GSM	Queries the integrity indicator for the output RF spectrum analyzer measurement. Zero indicates a normal result.
	GPRS	See <a href="#">“Integrity Indicator” on page 191</a> for descriptions of non-zero integrity indicators.
Query		Range: See <a href="#">“Integrity Indicator” on page 191</a> . Resolution: 1

**FETCh:ORFSpectrum:MODulation[:ALL]?**

Function	GSM	Queries TX Carrier Power, 30 kHz BW Power, and up to 22 comma-separated output RF spectrum due to modulation (average) results
	GPRS	The <a href="#">“SETup:ORFSpectrum:MODulation:FREQUENCY[:OFFSet]”</a> command sets up the number of output RF spectrum due to modulation offsets that are turned on and their frequency values. The <a href="#">“SETup:ORFSpectrum:MODulation:FREQUENCY:POINts?”</a> command queries the number of output RF spectrum due to modulation points that are turned on, indicating the number of output RF spectrum due to modulation (average) values to expect when you FETCh output RF spectrum due to modulation results.
Query		<p>TX Carrier Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>30 kHz Bandwidth Power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to +100 dBm and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF Spectrum due to Modulation (Average)</p> <ul style="list-style-type: none"> <li>• Range: -200 dB to +100 dB and 9.91 E+37</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:ORFSpectrum:MODulation:FREQUENCY[:OFFSet]?**

Function	GSM	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.
	GPRS	<p>Frequencies must have a one-to-one correspondence to ORFS due to modulation frequency offsets that are currently turned on. Frequencies must be separated by commas. (See <a href="#">“SETup:ORFSpectrum:MODulation:FREQUENCY[:OFFSet]”</a> for the command that turns on frequency offsets.)</p> <p>Each frequency value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>

Query	Range: -200 dB to +100 dB and 9.91 E+37 Resolution: 0.01 dB
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCH:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET? 200 KHZ, 400 KHZ" !Returns the ORFS due to modulation (average) measurement !results at the 200 kHz and 400 kHz offsets only, assuming these offsets are turned on.</pre>	

**FETCh:ORFSpectrum:POWer?**

Function	GSM	Returns the TX carrier power measurement result from the last ORFS measurement. This measurement is made using the method described in the <a href="#">“Transmit Power Measurement Description” on page 166.</a>
	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 <a href="#">“Output RF Spectrum Measurement Description” on page 120.</a>
	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 <a href="#">“SETup:ORFSpectrum:SWITChing:FREQuency:OFFSet”</a> command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The <a href="#">“SETup:ORFSpectrum:SWITChing:FREQuency:POINts?”</a> queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching (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		
OUTPUT 714;"FETCH:ORFSPECTRUM:SWITCHING:ALL:MAXIMUM?" !Returns the ORFS due to !switching (maximum) !measurement results at !all frequency offsets !currently turned on.		



**FETCh:ORFSpectrum:SWITChing[:ALL]:AVERAge?**

Function	GSM	<p>Queries output RF spectrum due to switching (average) 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><b>Programming Example</b></p> <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><b>Programming Example</b></p> <pre> OUTPUT 714;"FETCh:ORFSPECTRUM:SWITChing:FREQUency:OFFSet:MAXimum? 200 KHZ, 400 KHZ" !Returns the ORFS due to switching (maximum) measurement results !at the 200 kHz and 400 kHz offsets only, assuming these offsets are !turned on                     </pre>		

**FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet]:AVERAge?**

Function	GSM	<p>Queries the ORFS due to switching measurement, allowing frequency offset values to be appended to the command. Returns ORFS due to switching (average) measurements at the frequencies listed, in the order they are listed.</p> <p>Frequencies must have a one-to-one correspondence to ORFS due to switching frequency offsets that are currently turned on. Frequencies must be separated by commas. (See <a href="#">“SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]”</a> for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>
	GPRS	
Query	<p>Range: -100 dB to +100 dB and 9.91 E+37</p> <p>Resolution: 0.01 dB</p>	
<p>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>		

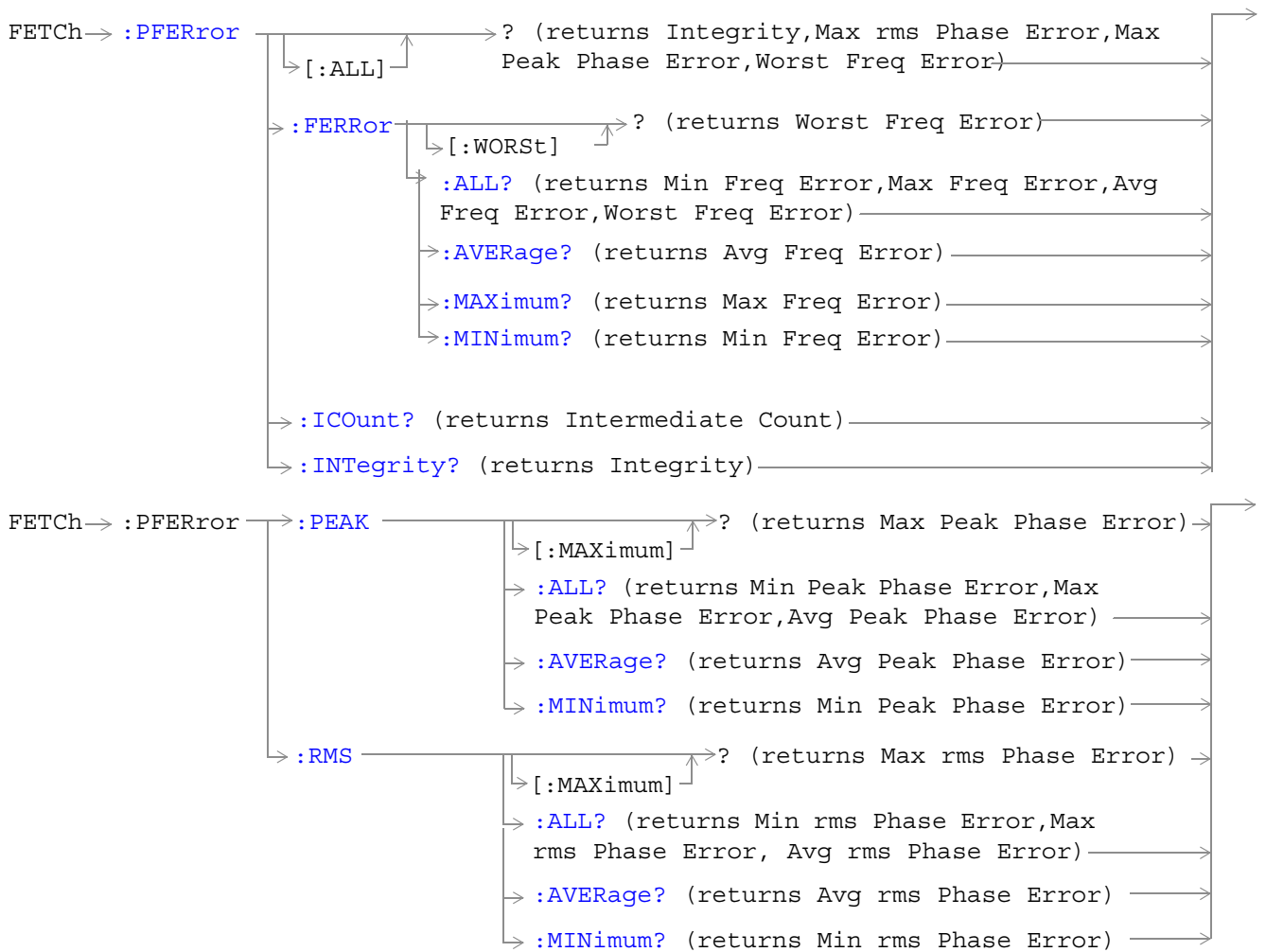
**FETCh:ORFSpectrum:SWITChing:FREQUency[:OFFSet]:SDEVIation?**

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 <a href="#">“SETup:ORFSpectrum:SWITChing:FREQUency[:OFFSet]”</a> for the command that turns on frequency offsets.)</p> <p>Each value is (optionally) followed by: HZ   KHZ   MHZ   GHZ . The default units are HZ (hertz).</p>
	GPRS	
Query	<p>Range: 0 dB to +150 dB and 9.91 E+37</p> <p>Resolution: 0.001 dB</p>	
<p>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	Queries output RF spectrum due to switching (standard deviation) measurement results at all frequency offsets currently turned on (there can be up to eight).
	GPRS	The “SETup:ORFSpectrum:SWITChing:FREQuency[:OFFSet]” command sets up the number of output RF spectrum due to switching offsets that are turned on and their frequency values. The “SETup:ORFSpectrum:SWITChing:FREQuency:POINts?” queries the number of output RF spectrum due to switching points that are turned on, indicating the number of output RF spectrum due to switching values to expect when you FETCh results.
Query		Range: -100 dBm to +100 dBm and 9.91 E+37 Resolution: 0.01 dB
<b>Programming Example</b> <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 343](#)

**FETCh:PFERror[:ALL]?**

Function	GSM	Queries integrity indicator, maximum rms phase error, maximum peak phase error and worst frequency error.
	GPRS	
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191.</a></li> <li>• Resolution: 1</li> </ul> <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Worst Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul>
<p>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:FERRor:ALL?**

Function	GSM	Queries minimum, maximum, average, and worst frequency error, in Hz.
	GPRS	The minimum frequency error is the value closest to negative infinity from the last multi-measurement cycle. The maximum frequency error is the value closest to positive infinity from the last multi-measurement cycle.
Query		<p>Minimum Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul> <p>Maximum Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul> <p>Average Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul> <p>Worst Frequency Error</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.1 kHz</li> </ul>
<p>Programming Example</p> <pre>OUTPUT 714;"FETCh:PFERror:FERRor:ALL?" !Returns minimum, maximum, average and !worst frequency error results.</pre>		

**FETCh:PFERror:FERRor AVERAge?**

Function	GSM	Queries the single or average (from a multi-measurement) frequency error measurement result, in Hz.
	GPRS	
Query		<p>Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</p> <p>Resolution: 0.1 kHz</p>

**FETCh:PFERror:FERRor: MAXimum?**

Function	GSM	Queries the maximum (from a multi-measurement) frequency error measurement result, in Hz.
	GPRS	
Query		<p>Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN)</p> <p>Resolution: 0.1 kHz</p>

**FETCh:PFERror:FERRor:MINimum?**

Function	GSM	Queries the minimum (from a multi-measurement) frequency error measurement result, in Hz.
	GPRS	
Query		Range: -750 kHz to +750 kHz and 9.91 E+37 (NAN) Resolution: 0.1 kHz

**FETCh:PFERror:ICount?**

Function	GSM	Queries the intermediate count of phase and frequency multi-measurements completed. This number will increase to the value returned by “SETup:PFERror:COUNT:NUMBER” on page 644.
	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 191 for descriptions of non-zero integrity indicators.
	GPRS	
Query		Range: See “Integrity Indicator” on page 191. Resolution: 1

**FETCh:PFERror:PEAK[:MAXimum]?**

Function	GSM	Queries the maximum (from a multi-measurement) peak phase error result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees

**FETCh:PFERror:PEAK:ALL?**

Function	GSM	Queries the minimum, maximum, and average peak phase error measurement result, in degrees.
	GPRS	
Query		<p>Minimum Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Maximum Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Average Peak Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul>
<p>Programming Example</p> <pre>OUTPUT 714;"FETCH:PFERROR:PEAK:ALL?" !Returns minimum, maximum, and average peak phase error results.</pre>		

**FETCh:PFERror:PEAK:AVERAge?**

Function	GSM	Queries the single or average (from a multi-measurement) peak phase error measurement result, in degrees.
	GPRS	
Query		<p>Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 degrees</p>

**FETCh:PFERror:PEAK:MINImun?**

Function	GSM	Queries the minimum (from a multi-measurement) peak phase error measurement result, in degrees.
	GPRS	
Query		<p>Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 degrees</p>



**FETCh:PFERror:rms[:MAXimum]?**

Function	GSM	Queries the Maximum (from a multi-measurement) rms phase error measurement result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees
Programming Example		
OUTPUT 714;"FETCH:PFERROR:rms:MAXIMUM?" !Returns the maximum rms phase error.		

**FETCh:PFERror:rms:ALL?**

Function	GSM	Queries the minimum, maximum, and average rms phase error measurement result, in degrees.
	GPRS	
Query		<p>Minimum rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Maximum rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Average rms Phase Error</p> <ul style="list-style-type: none"> <li>• Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul>
Programming Example		
OUTPUT 714;"FETCH:PFERROR:rms:ALL?" !Returns minimum, maximum, and average !rms phase error.		

**FETCh:PFERror:rms:AVERage?**

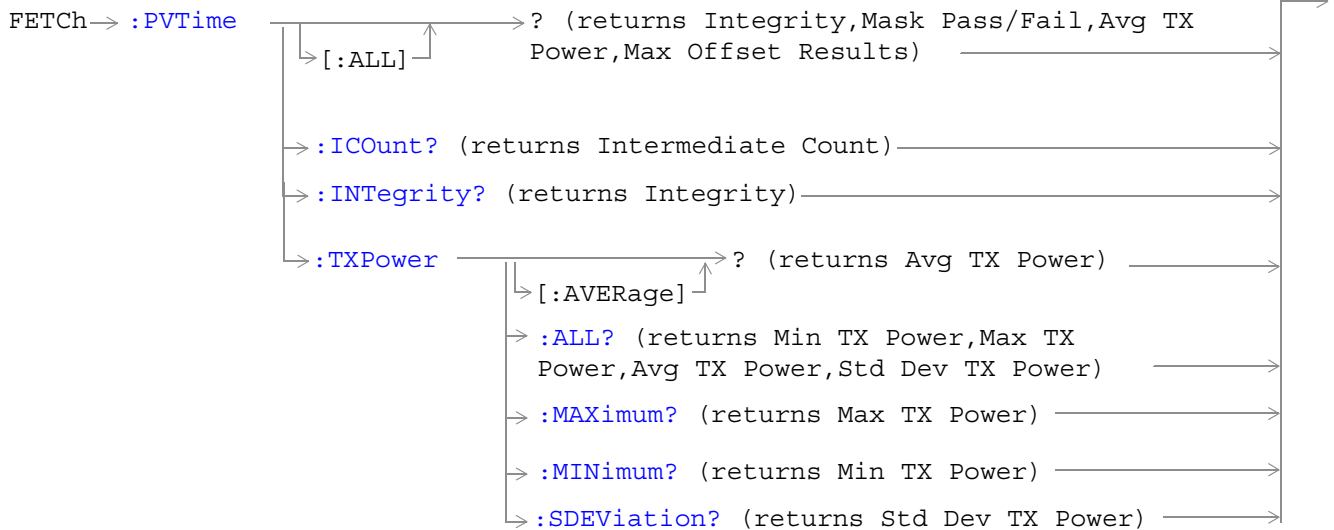
Function	GSM	Queries the single or average (from a multi-measurement) rms phase error measurement result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees

FETCh:PFERror

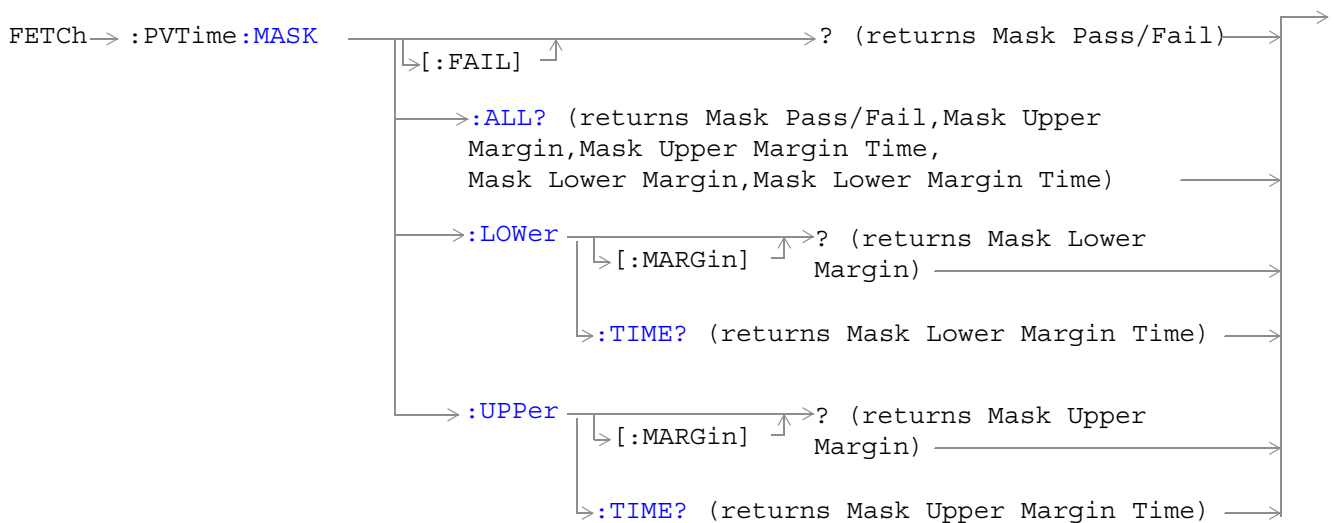
**FETCh:PFERror:rms:MINimum?**

Function	GSM	Queries the minimum (from a multi-measurement) rms phase error measurement result, in degrees.
	GPRS	
Query		Range: 0 degrees to 180 degrees and 9.91 E+37 (NAN) Resolution: 0.01 degrees

## FETCh:PVTime

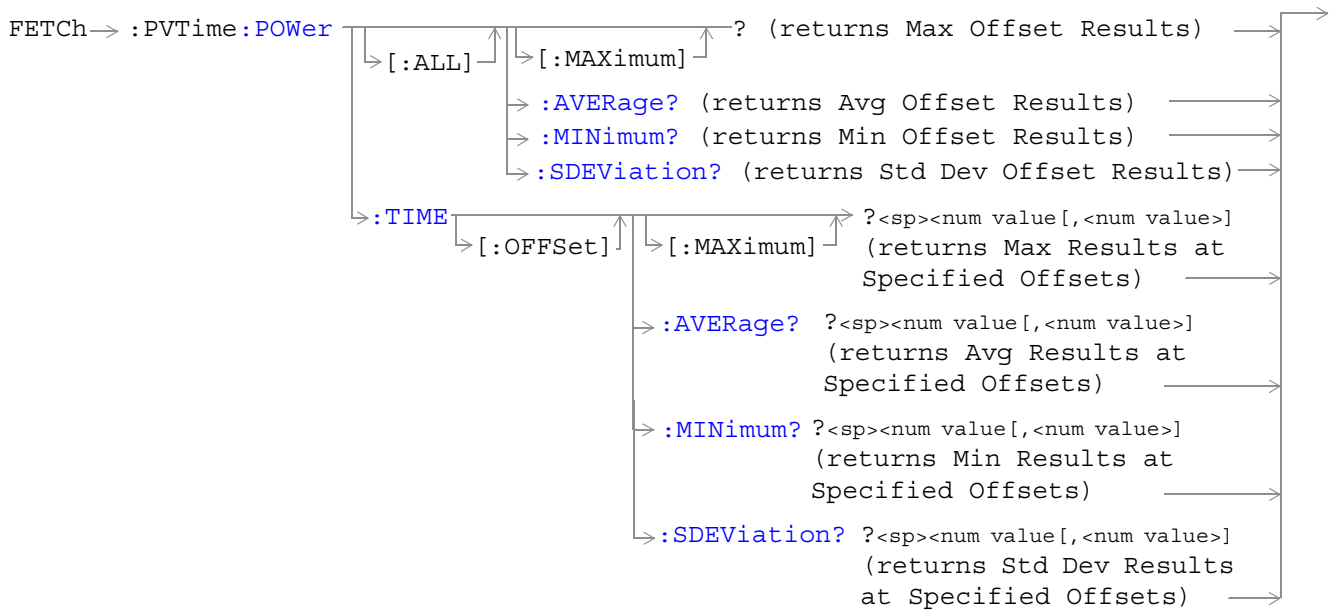


These commands are not applicable to GPRS.

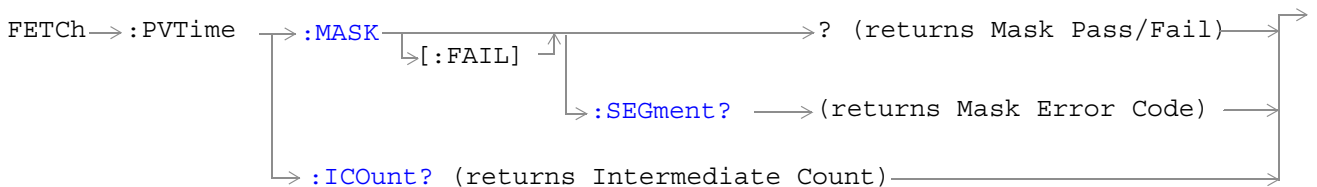


These commands are not applicable to GPRS.

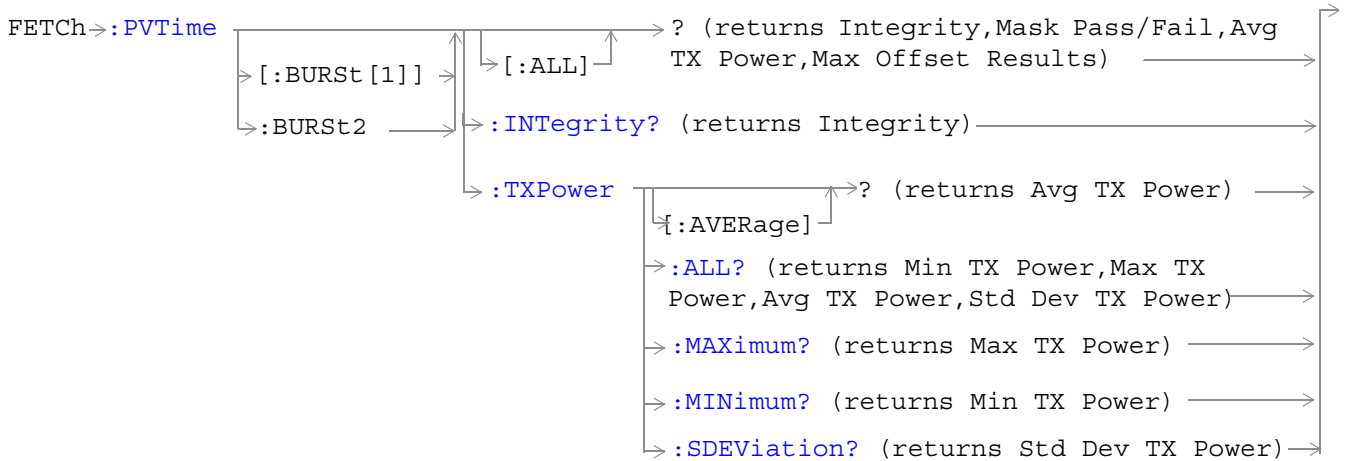
## FETCh:PVTime



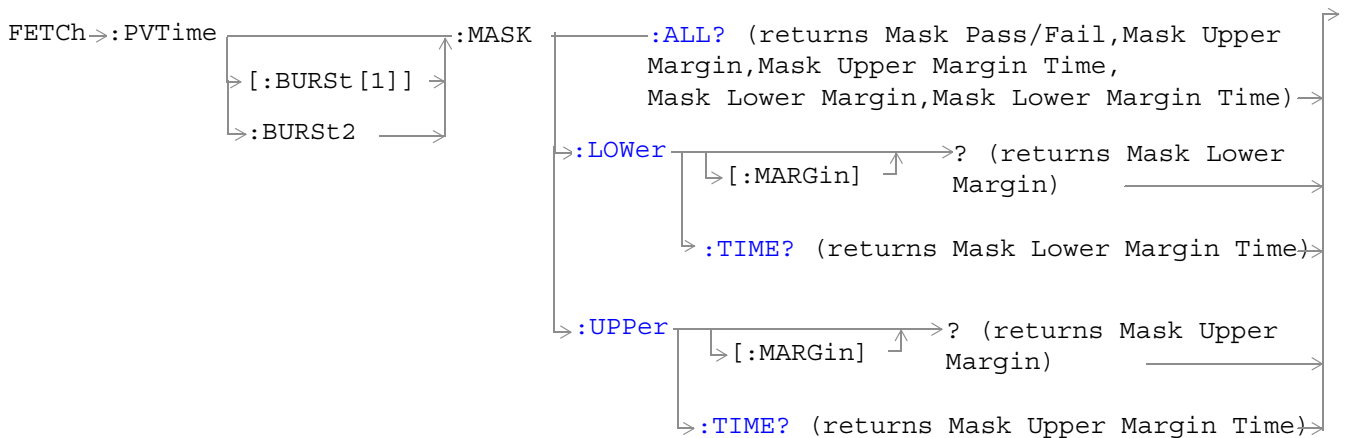
These commands are not applicable to GPRS.



These commands are not applicable to GSM.

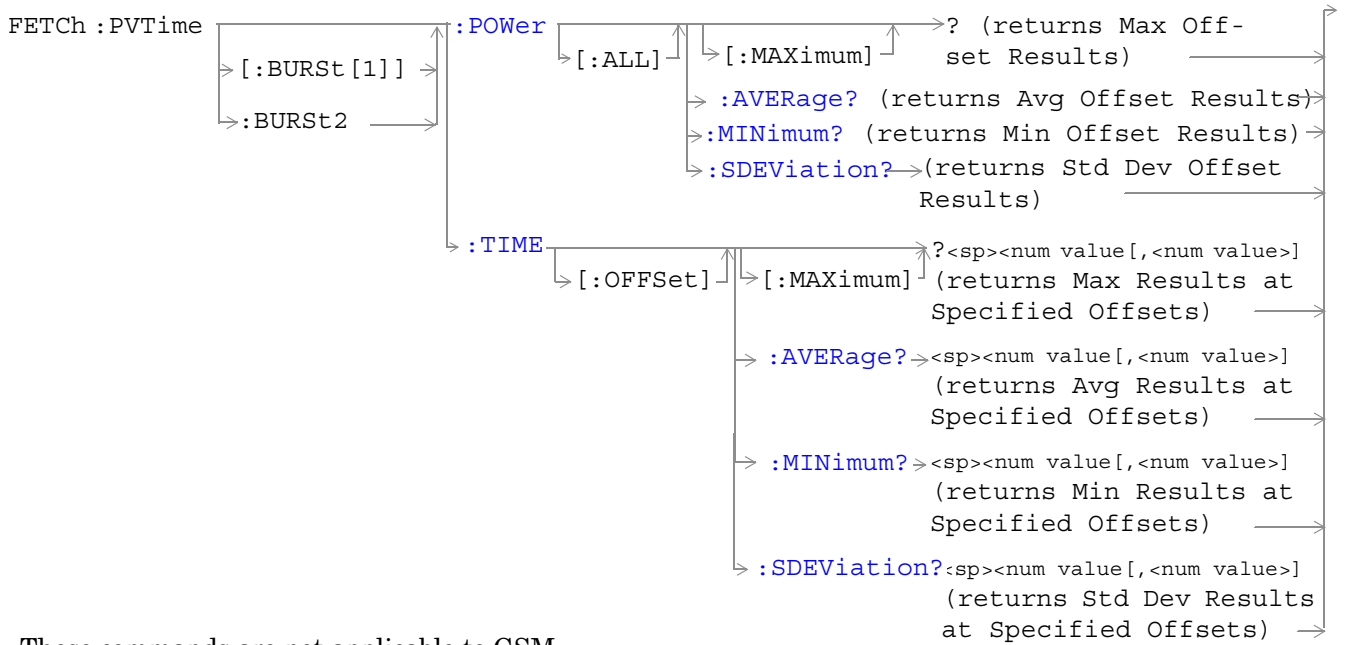


These commands are not applicable to GSM.



These commands are not applicable to GSM.

**FETCh:PVTime**



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)

**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 <a href="#">“SETup:PVTime:TIME:POINts?”</a> on page 654. The time offsets are set up using the command <a href="#">“SETup:PVTime:TIME[:OFFSet]”</a> on page 651.</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator”</a> on page 191.</li> <li>• Resolution: 1</li> </ul> <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)</li> </ul> <p>Power versus time TX carrier power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time power (maximum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:PVTime:TXPower:ALL?**

Function	GSM	Queries power versus time carrier power (average), power versus time carrier power (minimum), power versus time carrier power (maximum), and power versus time carrier power (standard deviation).
	GPRS	This command is not applicable to GPRS.
Query		<p>Power versus time carrier power (average)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (minimum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (maximum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (standard deviation)</p> <ul style="list-style-type: none"> <li>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul>

**FETCh:PVTime:TXPower:MINimum?**

Function	GSM	Queries power versus time carrier power (minimum).
	GPRS	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		Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB

**FETCh:PVTime:TXPower[:AVERage]?**

Function	GSM	Queries power versus time carrier power (average).
	GPRS	This command is not applicable to GPRS.
Query		Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) 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"> <li>• Upper limit margin time</li> <li>• Upper limit margin result</li> <li>• Lower limit margin time</li> <li>• Lower limit margin result</li> </ul> <p>Margin time is the point in time, relative to burst bit 0, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the power level boundary specified by the power versus time mask). See the <a href="#">“Typical GSM PvT Measurement” on page 140</a>.</p> <p>Margin result is the difference between the measured power and the power level boundary specified by the power versus time mask. See the <a href="#">“Typical GSM PvT Measurement” on page 140</a>.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)</li> </ul> <p>Power versus time upper limit margin time worst case result</p> <ul style="list-style-type: none"> <li>• Range: -50 <math>\mu</math>s to 593 <math>\mu</math>s and 9.91 E+37 (NAN)</li> <li>• Resolution: 1 ns</li> </ul> <p>Power versus time upper limit margin worst case result:</p> <ul style="list-style-type: none"> <li>• Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time lower limit margin time worst case result</p> <ul style="list-style-type: none"> <li>• Range: -50 <math>\mu</math>s to 593 <math>\mu</math>s and 9.91 E+37 (NAN)</li> <li>• Resolution: 1 ns</li> </ul> <p>Power versus time lower limit margin worst case result</p> <ul style="list-style-type: none"> <li>• Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:PVTime:MASK[:FAIL]?**

Function	GSM	Queries power versus time measurement mask pass/fail indicator.
	GPRS	
Query	Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)	

**FETCh:PVTime:MASK[: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"> <li>• 0 = No Mask Failures</li> <li>• 1 (bit 1) = Rising Edge Failure</li> <li>• 2 (bit 2) = Falling Edge Failure</li> <li>• 4 (bit 3) = Active Part of First Burst</li> <li>• 8 (bit 4) = First Guard Period</li> <li>• 16 (bit 5) = Active Part of Second Burst</li> </ul> <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 <a href="#">“Typical GSM PvT Measurement”</a> on page 140.</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 <a href="#">"Typical GSM PvT Measurement" on page 140</a> .
	GPRS	This command is not applicable to GPRS.
Query		Range: $-50 \mu\text{s}$ to $593 \mu\text{s}$ and $9.91 \text{ E}+37$ (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 <a href="#">"Typical GSM PvT Measurement" on page 140</a> .
	GPRS	This command is not applicable to GPRS.
Query		Range: $-100 \text{ dB}$ to $0 \text{ dB}$ and $9.91 \text{ E}+37$ (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 <a href="#">"Typical GSM PvT Measurement" on page 140</a> .
	GPRS	This command is not applicable to GPRS.
Query		Range: $-50 \mu\text{s}$ to $593 \mu\text{s}$ and $9.91 \text{ E}+37$ (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	Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset that is currently turned on.  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: 0 dBc to +100 dBc and 9.91 E+37 (NAN) Resolution: 0.001 dB	

**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"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query.</li> </ul>	
<p><b>Programming Example</b></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"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> </ul> <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query.</li> </ul>	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:MAXIMUM? 0 US, 570.8 US" !Returns the maximum of power versus time measurements at the 0.0 ms !and 570.8 ms offsets.</pre>		



**FETCh:PVTime:POWer:TIME[:OFFSet]:AVERAge?**

Function	GSM	<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"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> </ul> <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime:TIME[:OFFSet]” query.</li> </ul>	
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"FETCH:PVTIME:POWER:TIME:OFFSET:AVERAGE? 0 US, 570.8 US" !Returns the average of power versus time measurements at the !0.0 ms and 570.8 ms offsets.</pre>		

**FETCh:PVTime:POWer:TIME[:OFFSet]:SDEVIation?**

Function	GSM	<p>Queries the standard deviation, from a number of multi-measurements, at each user-settable time offset appended to this command. Specified time values must correspond to user-settable time offsets that are currently turned on, and must be rounded to the same values. (9.91 E+37 (NAN) will be returned for specified offsets that do not correspond to offsets currently turned on).</p> <p>Power levels are relative to the power versus time carrier power measurement.</p> <p>The “<a href="#">SETUp:PVTime:TIME[:OFFSet]</a>” 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"> <li>• Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “<a href="#">SETUp:PVTime:TIME[:OFFSet]</a>” query.</li> </ul>
<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:ICount?**

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 “<a href="#">Integrity Indicator</a>” on page 191 for descriptions of non-zero integrity indicators.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Range: See “<a href="#">Integrity Indicator</a>” on page 191.</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 <a href="#">“SETup:PVTime[BURSt[1]]:TIME:POINts?SETup:PVTime:BURSt2:TIME:POINts?”</a> on page 654. The time offsets are set up using the command <a href="#">“SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]SETup:PVTime:BURSt2:TIME[:OFFSet]”</a> on page 652.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator”</a> on page 191.</li> <li>• Resolution: 1</li> </ul> <p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)</li> </ul> <p>Power versus time TX carrier power</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time power (maximum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:PVTime[: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"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (minimum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (maximum)</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time carrier power (standard deviation)</p> <ul style="list-style-type: none"> <li>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul>

**FETCh:PVTime[: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		Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB

**FETCh:PVTime[:BURSt[1]]:TXPower[:AVERage]?****FETCh:PVTime:BURSt2:TXPower[:AVERage]?**

Function	GSM	This command is not applicable to GSM.
	GPRS	Queries power versus time average carrier power for the burst of the multislot configuration that you specify.
Query		Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN) 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"> <li>• Upper limit margin time</li> <li>• Upper limit margin result</li> <li>• Lower limit margin time</li> <li>• Lower limit margin result</li> </ul> <p>Margin time is the point in time, relative to burst bit 0, that corresponds with the worst case measurement result (the measurement with the least difference between measured power and the power level boundary specified by the power versus time mask). See the <a href="#">“Typical GPRS PvT Mask for a Two Burst Multislot Configuration”</a> on page 146.</p> <p>Margin result is the difference between the measured power and the power level boundary specified by the power versus time mask. See the <a href="#">“Typical GPRS PvT Mask for a Two Burst Multislot Configuration”</a> on page 146.</p>
Query		<p>Power versus time mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0 (pass) or 1 (fail) and 9.91 E+37 (NAN)</li> </ul> <p>Power versus time upper limit margin time worst case result</p> <ul style="list-style-type: none"> <li>• Range: -50 <math>\mu</math>s to 593 <math>\mu</math>s and 9.91 E+37 (NAN)</li> <li>• Resolution: 1 ns</li> </ul> <p>Power versus time upper limit margin worst case result:</p> <ul style="list-style-type: none"> <li>• Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time lower limit margin time worst case result</p> <ul style="list-style-type: none"> <li>• Range: -50 <math>\mu</math>s to 593 <math>\mu</math>s and 9.91 E+37 (NAN)</li> <li>• Resolution: 1 ns</li> </ul> <p>Power versus time lower limit margin worst case result</p> <ul style="list-style-type: none"> <li>• Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:PVTime[: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 <a href="#">“Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 146.</a>
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 <a href="#">“Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 146.</a>
Query		Range: -50 $\mu$ s to 593 $\mu$ 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	<p>Queries the power versus time measurement's lower limit margin, worst case result for the burst of the multislot configuration that you specify.</p> <p>The lower limit margin, worst case result is the power versus time measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask. See the <a href="#">“Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 146.</a></p>
Query		<p>Range: -100 dB to 0 dB and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCh:PVTime[:BURSt[1]]:MASK:LOWer:TIME?**  
**FETCh:PVTime:BURSt2:MASK:LOWer:TIME?**

Function	GSM	This command is not applicable to GSM.
	GPRS	<p>Queries the power versus time measurement's lower limit margin time, worst case result for the burst of the multislot configuration that you specify.</p> <p>The lower limit margin time result is the point in time, relative to bit 0 in the GSM burst, that corresponds with the worst case measurement (the measurement with the least difference between measured power and the lower power level boundary specified by the power versus time mask). See the <a href="#">“Typical GPRS PvT Mask for a Two Burst Multislot Configuration” on page 146.</a></p>
Query		<p>Range: -50 <math>\mu</math>s to 593 <math>\mu</math>s and 9.91 E+37 (NAN)</p> <p>Resolution: 1 ns</p>

**FETCh:PVTime[:BURSt[1]]:POWer[:ALL]:MINimum?**  
**FETCh:PVTime:BURSt2:POWer[:ALL]: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 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 <a href="#">“SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]SETup:PVTime:BURSt2:TIME[:OFFSet]”</a> command sets up the number of offsets that are turned on and their time values. The <a href="#">“SETup:PVTime[BURSt[1]]:TIME:POINts?SETup:PVTime:BURSt2:TIME:POINts?”</a> 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][: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"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]SETup:PVTime:BURSt2:TIME[:OFFSet]” query.</li> </ul>	
<p><b>Programming Example</b></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"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]SETup:PVTime:BURSt2:TIME[:OFFSet]” query.</li> </ul>
<p><b>Programming Example</b></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"> <li>• Range: -100 dBc to +10 dBc and 9.91 E+37 (NAN)</li> </ul> <p>Resolution: 0.01 dB</p> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]SETup:PVTime:BURSt2:TIME[:OFFSet]” query.</li> </ul>
<p><b>Programming Example</b></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 “<a href="#">SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]</a>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"> <li>• Range: 0 dBc to +100 dBc and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul> <p>Time offsets:</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 time offset values, corresponding to entries in the Power vs Time table of user-defined time offsets currently turned on. The default units are s (seconds).</li> <li>• Resolution: Rounded to the same value as displayed in the Power vs Time table and returned by the “<a href="#">SETup:PVTime[:BURSt[1]]:TIME[:OFFSet]</a>SETup:PVTime:BURSt2:TIME[:OFFSet]” query.</li> </ul>
<p>Programming Example</p> <pre>OUTPUT 714;"FETCh:PVTime:POWER:TIME:OFFSET:SDEVIATION? 0US, 570.8US"</pre> <p>!Returns the standard deviation of power versus time measurements at the 0.0 us and 570.8 us offsets.</p>		

**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 “<a href="#">Integrity Indicator</a>” on page 191 for descriptions of non-zero integrity indicators.</p>
Query		<p>Range: See “<a href="#">Integrity Indicator</a>” on page 191.</p> <p>Resolution: 1</p>



**FETCh:TXPower[:ALL]?**

Function	GSM	Queries integrity indicator and average transmit power.
	GPRS	A value of zero for the integrity indicator is normal. See <a href="#">“Integrity Indicator” on page 191</a> for non-zero integrity indicators.
Query		Integrity: <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> Transmit power: <ul style="list-style-type: none"> <li>• Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**FETCh:TXPower:ICount?**

Function	GSM	Queries the intermediate count of transmit power measurements completed.
	GPRS	
Query		Range: 1 to 999 Resolution: 1

**FETCh:TXPower:INTEgrity?**

Function	GSM	Queries the integrity indicator. Zero indicates normal.
	GPRS	For non-zero integrity indicators, refer to <a href="#">“Integrity Indicator” on page 191</a> .
Query		Range: See <a href="#">“Integrity Indicator” on page 191</a> . Resolution: 1

**FETCh:TXPower:POWER[:AVERage]?**

Function	GSM	Queries average transmit power.
	GPRS	
Query		Range: –100 dBm to 100 dBm and 9.91 E+37 (NAN) Resolution: 0.01 dB

**FETCh:TXPower:POWer:ALL?**

Function	GSM	Queries average, minimum, maximum and standard deviation of transmit power multi-measurement results.
	GPRS	
Query		<p>Average:</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Minimum:</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Maximum:</p> <ul style="list-style-type: none"> <li>• Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Standard deviation:</p> <ul style="list-style-type: none"> <li>• Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.001 dB</li> </ul>

**FETCh:TXPower:POWer:MAXimum?**

Function	GSM	Queries maximum transmit power results from a multi-measurement.
	GPRS	
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCh:TXPower:MINimum?**

Function	GSM	Queries minimum transmit power results from a multi-measurement.
	GPRS	
Query		<p>Range: -100 dBm to 100 dBm and 9.91 E+37 (NAN)</p> <p>Resolution: 0.01 dB</p>

**FETCh:TXPower:SDEVIation?**

Function	GSM	Queries the standard deviation from a transmit power multi-measurement.
	GPRS	
Query		<p>Range: 0 dB to 100 dB and 9.91 E+37 (NAN)</p> <p>Resolution: 0.001 dB</p>



---

# INITiate Subsystem

## Syntax Diagrams and Command Descriptions

[“INITiate” on page 555](#)

### 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 199](#).

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 221](#).

---

**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.

---

## INITiate Subsystem

```
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

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

Function	GSM	Starts measurements with the test set.
	GPRS	The INITiate command is associated with the SETup command, and the FETCh? command, see <a href="#">“SETup Subsystem” on page 588</a> and <a href="#">“FETCh? Subsystem” on page 473</a> .  One or more measurements may be initiated on the same program line. See <a href="#">“Concurrent Measurements” on page 187</a> .  This command is also used to activate a measurement. See <a href="#">“INITiate Programming Examples (how INIT commands are used)” on page 553</a> .

#### Programming Example

```
OUTPUT 714;" INITIATE:TXPOWER:ON" !Initiates a TX Power measurement.
OUTPUT 714;" INITIATE:TXPOWER;PFERROR:ON" !Initiates TX Power and
!phase and frequency error measurements.
OUTPUT 714;" INITIATE:PVTIME;ORFSPECTRUM;FBERROR:ON" !Initiates power
!versus time output RF spectrum, and fast bit error rate measurements.
```

### INITiate:<measurement mnemonic>:OFF

Function	GSM	Deactivates the selected measurement. See <a href="#">“Measurement States” on page 221</a> .
	GPRS	Only one measurement can be deactivated at a time. To stop one or more measurements and leave them in the active state, see <a href="#">“ABORT” on page 346</a> .

#### Programming Example

```
OUTPUT 714;" INITIATE:TXPOWER:OFF" !Deactivates TX power measurement.
```

### INITiate:COUNT?

Function	GSM	Queries the number of measurements that have been initiated (that are activate). See <a href="#">“Measurement States” on page 221</a> .
	GPRS	
Query		Range: 0 to 10 Resolution: 1

**INITiate:DONE?**

Function	GSM	Queries (one at a time) which measurements if any are available or have timed out.
	GPRS	See <a href="#">“Measurement Event Synchronization” on page 199</a> for details on how to use this command. See <a href="#">“Measurement States” on page 221</a> to understand the test set’s measurement states. See <a href="#">“INITiate:DONE:FLAG:&lt;measurement mnemonic&gt;” on page 558</a> 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 <a href="#">“INITiate:DONE?” on page 557</a> .
	GPRS	
Programming Example		
OUTPUT 714; "INITIATE:DONE:CLEAR" !clears done flag.		

**INITiate:DONE:FLAG[:ALL]**

Function	GSM	Specifies that all measurements are considered, (included or excluded) when the DONE? query is sent.  If a measurements trigger arm, see <a href="#">“Trigger Arm (Single or Continuous) Description” on page 221</a> , has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see <a href="#">“INITiate:DONE?” on page 199</a> . The INITiate:DONE? query will probably not be able to catch the measurement at the instant it is done, therefore the measurement will never appear to be done. If a measurement trigger arm must be left in continuous mode the user should (exclude) it, using this command, from the INITiate:DONE? query results.  Once the INITiate:DONE:FLAG has been set to EXCLUDE for a measurement, the user must send the INCLUDE command for that measurement in order to query that measurement with, the INITiate:DONE? query. The test set will not reset any (excluded measurement) to be an (included measurement) with any form of preset, see <a href="#">“Preset Descriptions” on page 791</a> .
	GPRS	
Setting	Range	<ul style="list-style-type: none"> <li>• INCLUDE: include all measurements</li> <li>• EXCLUDE: exclude all measurements</li> </ul>
Programming Example		
OUTPUT 714; "INITIATE:DONE:FLAG:ALL EXCLUDE" !Excludes all measurements from !contributing the INITIATE:DONE? !query, see "INITIATE:DONE?" on !page 6.		

**INITiate:DONE:FLAG:<measurement mnemonic>**

Function	GSM	Specifies which measurements are considered, (included or excluded) when the DONE? query is sent.
	GPRS	<p>If a measurements trigger arm, see <a href="#">“Trigger Arm (Single or Continuous) Description” on page 221</a>, has been left in continuous mode, the done flag for that measurement will toggle between DONE and WAIT, see <a href="#">“INITiate:DONE?” on page 199</a>. The INITiate:DONE? query will probably not be able to catch the measurement at the instant it is done, therefore the measurement will never appear to be done. If a measurement trigger arm must be left in continuous mode the user should (exclude) it, using this command, from the INITiate:DONE? query results.</p> <p>Once the INITiate:DONE:FLAG has been set to EXCLude for a measurement, the user must send the INCLude command for that measurement in order to query that measurement with, the INITiate:DONE? query. The test set will not reset any (excluded measurement) to be an (included measurement) with any form of preset, see <a href="#">“Preset Descriptions” on page 791</a>.</p>
Setting	GSM	<p>Range</p> <ul style="list-style-type: none"> <li>INCLude           <ul style="list-style-type: none"> <li>:AAUDio   :BERRor   :DAUDio   :DPOWer   :FBERRor   :IQTuning   :ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> <li>EXCLude           <ul style="list-style-type: none"> <li>:AAUDio   :BERRor   :DAUDio   :DPOWer   :FBERRor   :IQTuning   :ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> </ul>
	GPRS	<p>Range</p> <ul style="list-style-type: none"> <li>INCLude           <ul style="list-style-type: none"> <li>GBERRor   :ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> <li>EXCLude           <ul style="list-style-type: none"> <li>GBERRor   :ORFSpectrum   :PFERRor   :PVTime   :TXPower</li> </ul> </li> </ul>
Related Topics		<a href="#">“INITiate:DONE?” on page 557</a>
<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 <a href="#">“INITiate:&lt;measurement mnemonic&gt;[:ON]” on page 556</a> .
	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.

---

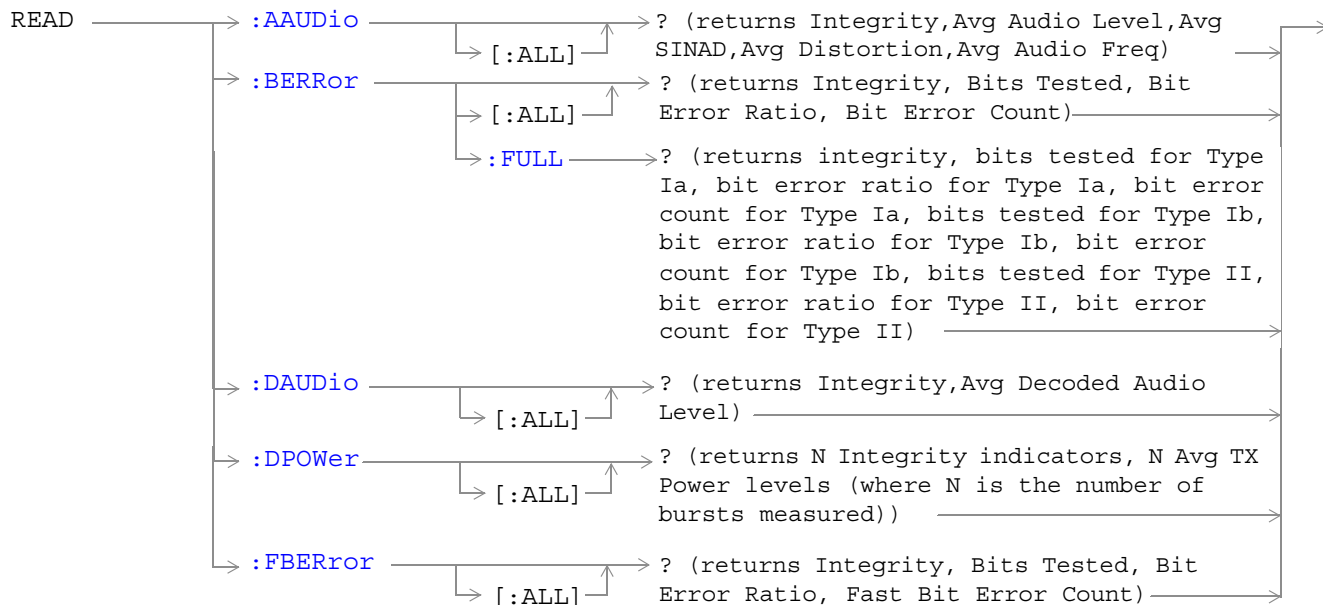
**NOTE** Trigger arming for each measurement is controlled in the SETUp subsystem. Best practice during remote operation is to set trigger arm to single (Continuous Off).

---

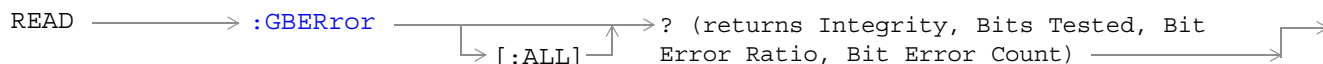
### Programming Example

```
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

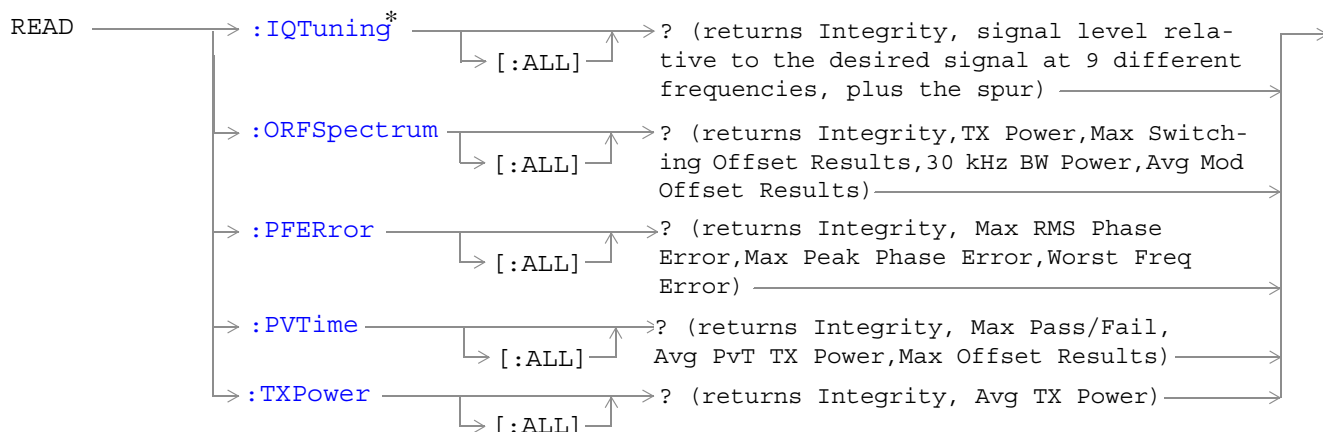


These commands are not applicable to GPRS.

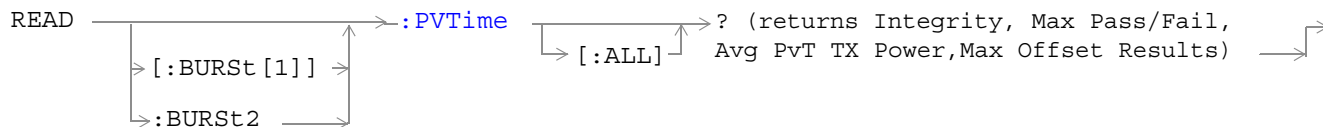


\* This command is not applicable to GSM.





\* Not applicable to GPRS.



This command is not applicable to GSM.

“Diagram Conventions” on page 343

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 <a href="#">“Integrity Indicator” on page 191</a>), 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 <a href="#">“Integrity Indicator” on page 191</a> and analog audio (average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:AAUDio” on page 474</a>.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Analog audio (average)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 20 volts</li> <li>• Resolution: 0.1mv</li> </ul>

**READ:BERRor[:ALL]?**

Function	GSM	<p>Queries (initiates and fetches) one RX bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a>, Bits Tested, Bit Error Ratio and Bit Error Count, for the bit type set using <a href="#">“SETup:BERRor[:TYPE]” on page 600</a>. (A similar query, <a href="#">“READ:BERRor:FULL?” on page 563</a>, 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 <a href="#">“FETCh:BERRor” on page 482</a>.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to (&lt;RX bits to test +131) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to (&lt;RX bits to test +131) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**READ:BERRor:FULL?**

Function	GSM	<p>Queries (initiates and fetches) one RX bit error measurement as a sequential operation. Either all of the residual or non-residual results are returned, depending on the type of bit error measurement set using <a href="#">“SETup:BERRor[:TYPE]” on page 600</a>.</p> <p>Returns Integrity Indicator (see <a href="#">“Integrity Indicator” on page 191</a>), Bits Tested, Bit Error Ratio and Bit Error Count for Type Ia, Type Ib and Type II.</p> <p>(A similar query, <a href="#">“READ:BERRor[:ALL]?” on page 562</a>, returns the same results but only for the bit type previously set using <a href="#">“SETup:BERRor[:TYPE]” on page 600</a>.)</p> <p>The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:BERRor” on page 482</a>.</p>
	GPRS	This command is not applicable to GPRS.

<p>Query</p>	<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191.</a></li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ia Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ia Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999000 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2637369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type Ib Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type Ib Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 2637369 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 15584400 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Type II Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01</li> </ul> <p>Type II Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 1558440 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>
--------------	--

**READ:DAUDio[:ALL]?**

Function	GSM	Queries (initiates and fetches) one decoded audio (uplink speech level) measurement as a sequential operation.  Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a> and decoded audio (average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:DAUDio” on page 490</a> .
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicator <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> Decoded audio (average) <ul style="list-style-type: none"> <li>• Range: 0 to 100% FS (full scale)</li> <li>• Resolution: 0.01% FS</li> </ul>

**READ:DPOWer[:ALL]?**

Function	GSM	Queries the Dynamic Power measurement results. Query returns N integrity indicators and N average TX power levels (where N is the number of bursts measured). To set the number of bursts you want to measure, use <a href="#">“SETup:DPOWer:COUNT:NUMBer” on page 619</a> .
	GPRS	This command is not applicable to GPRS.
Query		Integrity indicators for each individual burst <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> Average TX power levels for each individual burst <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dBm</li> </ul>

READ

READ:FBERror[:ALL]?

Function	GSM	<p>Queries (initiates and fetches) one fast bit error measurement as a sequential operation.</p> <p>Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a>, Bits Tested, Bit Error Ratio, and Fast Bit Error Count using mobile station burst-by-burst loopback (type C loopback). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:FBERror” on page 497</a>.</p>
	GPRS	This command is not applicable to GPRS.
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Fast bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to (RX Fast BER bits to test + 455) and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

**READ: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 <a href="#">“Integrity Indicator” on page 191</a> , Bits Tested, Bit Error Ratio, and Bit Error Count. The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:GBERror” on page 501</a> .
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Bits tested</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,427 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error ratio</p> <ul style="list-style-type: none"> <li>• Range: 0 to 100 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul> <p>Bit error count</p> <ul style="list-style-type: none"> <li>• Range: 0 to 999,427 and 9.91E+37 (NAN)</li> <li>• Resolution: 1</li> </ul>

READ

READ:IQTuning[:ALL]?

Function	GSM	<p>Queries (initiates and fetches) the I/Q Tuning measurement results. Query returns the integrity indicator and the relative power level at the following offset frequencies: carrier frequency, <math>\pm 67.7083</math> kHz, <math>\pm 135.417</math> kHz, <math>\pm 203.125</math> kHz, <math>\pm 270.833</math> kHz. The spur measurement result is also returned.</p> <p>The FETCh command should be used to return other measurement results. See <a href="#">“FETCh:IQTuning” on page 504</a>.</p>
	GPRS	<p>This command is not applicable to GPRS.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Signal level relative to the desired signal at 9 different frequencies</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91 E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>The order of the signal level results are:</p> <ul style="list-style-type: none"> <li>• -270.833 kHz</li> <li>• -203.125 kHz</li> <li>• -135.417 kHz</li> <li>• -67.7083 kHz</li> <li>• carrier frequency</li> <li>• +67.7083 kHz</li> <li>• +135.417 kHz</li> <li>• +203.125 kHz</li> <li>• +270.833 kHz</li> </ul> <p>Relative power of the spur frequency:</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dB and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>



**READ:ORFSpectrum[:ALL]?**

Function	GSM	Queries (initiates and fetches) one output RF spectrum measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a> , TX Power, Output RF Spectrum due to Switching (Max), 30 kHz Bandwidth Power, and Output RF Spectrum due to Modulation (Average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:ORFSpectrum” on page 508</a> .
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>TX power</p> <ul style="list-style-type: none"> <li>• Range: –100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RFspectrum due to switching (Max)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 8 comma separated values –100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>30 kHz bandwidth power</p> <ul style="list-style-type: none"> <li>• Range: –100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Output RF spectrum due to modulation (average)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 22 comma separated values –200 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

READ

READ:PFERror[:ALL]?

Function	GSM	Queries (initiates and fetches) one Phase and Frequency Error measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a> , RMS Phase Error (Max), Peak Phase Error(Max), Frequency Error (Worst). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:PFERror” on page 516</a> .  Worst frequency error (negative or positive) is the value furthest from zero.
Query	<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>rms phase error (max)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 180 degrees and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Peak phase error (max)</p> <ul style="list-style-type: none"> <li>• Range: 0 to 180 degrees and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 degrees</li> </ul> <p>Frequency error (worst)</p> <ul style="list-style-type: none"> <li>• Range: -750 kHz to +750 kHz and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 Hz</li> </ul>	

## READ:PVTime[:ALL]?

Function	GSM	Queries (initiates and fetches) one power versus time measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a> , Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:PVTime” on page 523</a> .
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0   1 and 9.91E+37 (NAN)</li> </ul> <p>Power versus time transmit power</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time offset (max)</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 comma-separated power versus time values returned with max power = -100 dBc to +100 dBc (relative to power versus time carrier power) and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

READ

**READ[:BURSt[1]]:PVTime[:ALL]?**  
**READ:BURSt2:PVTime[:ALL]?**

Function	GSM	This command is not applicable for GSM.
	GPRS	<p>Queries (initiates and fetches) one power versus time measurement as a sequential operation for the burst in the multislot configuration that you specify.</p> <p>Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a>, Mask pass/fail, power versus time transmit power and up to 12 power versus time offset (max) results. The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:PVTime” on page 523</a>.</p>
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Mask pass/fail</p> <ul style="list-style-type: none"> <li>• Range: 0   1 and 9.91E+37 (NAN)</li> </ul> <p>Power versus time transmit power</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul> <p>Power versus time offset (max)</p> <ul style="list-style-type: none"> <li>• Range: Up to 12 comma-separated power versus time values returned with max power = -100 dBc to +100 dBc (relative to power versus time carrier power) and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

**READ:TXPower[:ALL]?**

Function	GSM	Queries (initiates and fetches) one TX power measurement as a sequential operation.
	GPRS	Returns Integrity Indicator see <a href="#">“Integrity Indicator” on page 191</a> and transmit power (average). The FETCh command should be used to obtain other measurement results. See <a href="#">“FETCh:TXPower” on page 550</a> .
Query		<p>Integrity indicator</p> <ul style="list-style-type: none"> <li>• Range: See <a href="#">“Integrity Indicator” on page 191</a>.</li> <li>• Resolution: 1</li> </ul> <p>Transmit power (average)</p> <ul style="list-style-type: none"> <li>• Range: -100 to +100 dBm and 9.91E+37 (NAN)</li> <li>• Resolution: 0.01 dB</li> </ul>

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## RFANalyzer Subsystem

Last updated: December 12, 2000

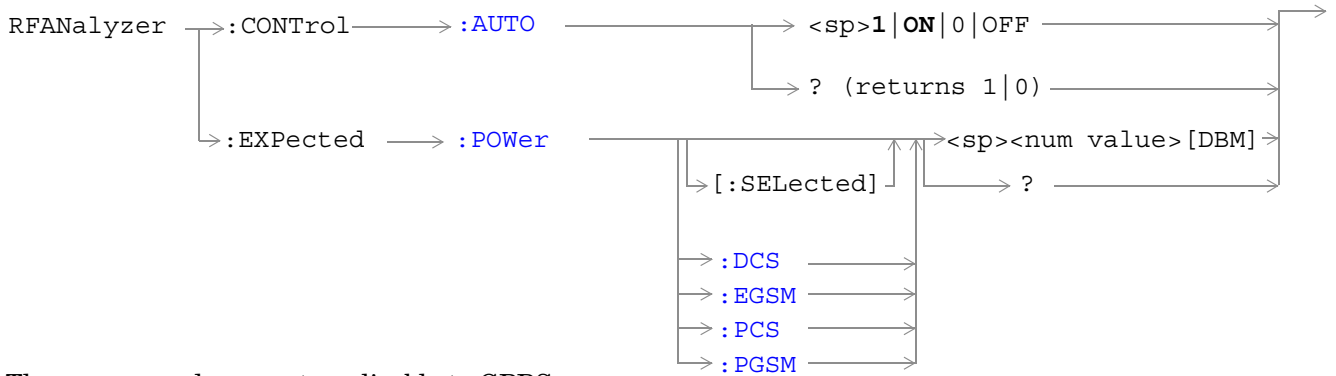
### Description

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.

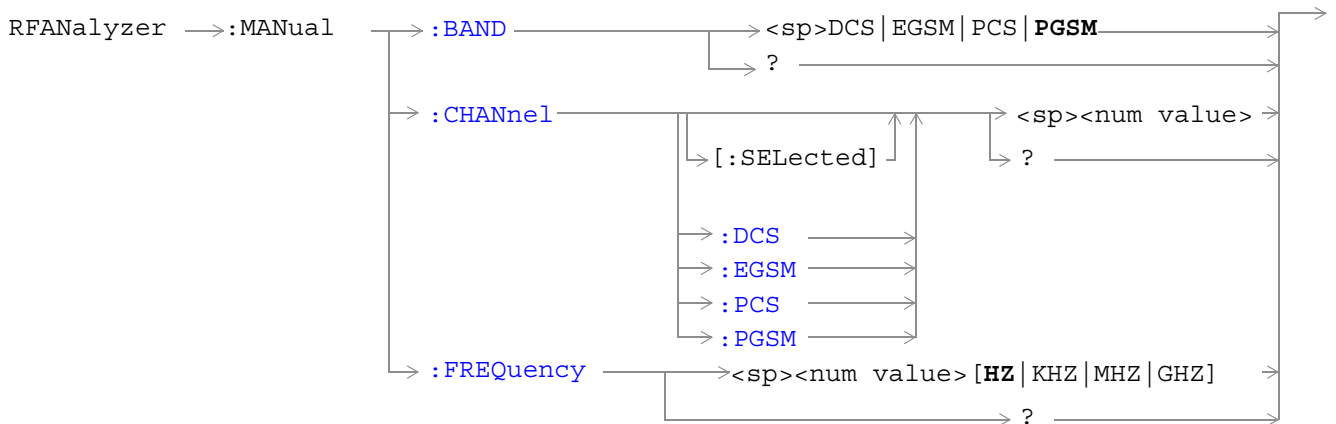
### Syntax Diagrams and Command Descriptions

[“RFANalyzer” on page 574](#)

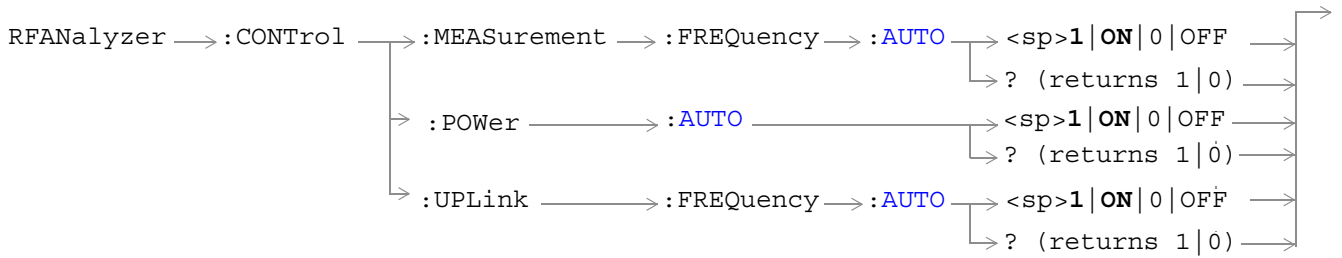
## RFAnalyzer



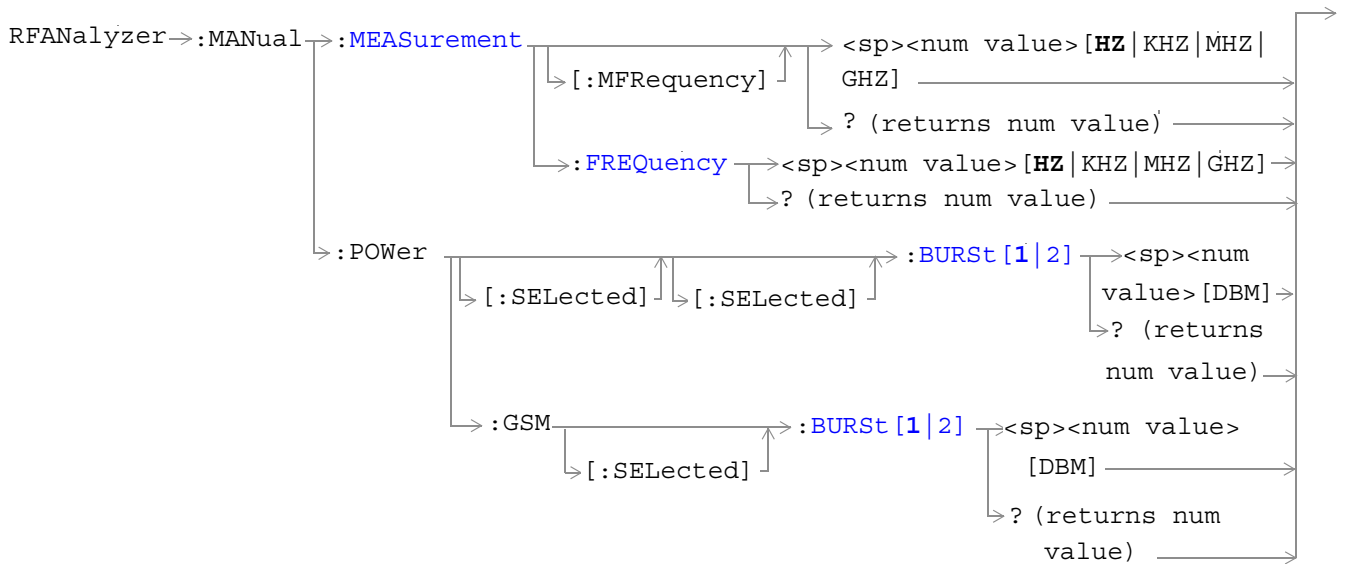
These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

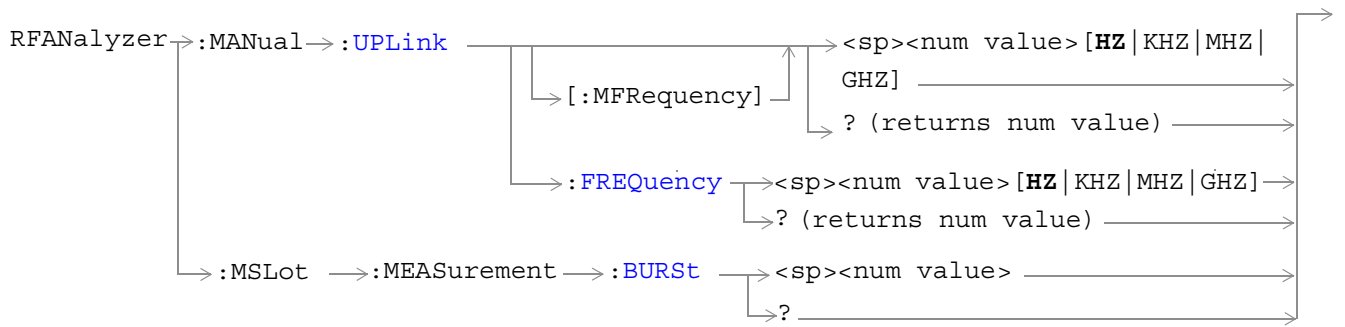


These commands are not applicable to GSM.



These commands are not applicable to GSM.

## RFAnalyzer



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)



**RFANalyzer:CONTROL:AUTO**

Function	GSM	<p>Sets/queries the test set's receiver control. The measuring receiver is either under the control of the test set's base station emulator (AUTO ON) or under manual control by the user (AUTO OFF). See <a href="#">"Receiver Control" on page 776</a>.</p> <p>Setting the manual band will change the receiver control to manual. see <a href="#">"RFANalyzer:MANual:BAND" on page 580</a>.</p> <p>Setting the manual channel in the band that is currently active will change the receiver control to manual. See <a href="#">"RFANalyzer:MANual:CHANnel[:SElected]" on page 580</a>.</p> <p>Setting the manual frequency will change the receiver control to manual. See <a href="#">"RFANalyzer:MANual:FREQuency" on page 583</a>.</p> <p>Setting the broadcast band will change the receiver control to auto. See <a href="#">"CALL:BAND" on page 368</a>.</p>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1   ON   0   OFF	
Query	Range: 0   1	
*RST setting	1   ON	
<b>Programming Example</b> <pre>OUTPUT 714;"RFANALYZER:CONTROL:CONTROL:AUTO 0" !Sets receiver control to manual.</pre>		

**RFANalyzer:EXPEcted:POWer[:SElected]**

Function	GSM	<p>Sets/queries the power level in DBM that the mobile station is expected to transmit for the selected band. The units DBM are optional. The test set will set up its input signal path to measure this power level when a user is in manual control. See <a href="#">"Expected Power" on page 778</a>.</p>
	GPRS	This command is not applicable to GPRS.
Setting	<p>Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 836</a>.</p> <p>Resolution: .01 DBM</p>	
Query	<p>Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">"Measurement Related Configuration" on page 836</a>.</p> <p>Resolution: .01 DBM</p>	
*RST setting	<p>Sets the receiver control to auto</p> <p>Band: PGSM</p> <p>Expected Power: +13DBM</p>	
<b>Programming Example</b> <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:SELECTED 10" !Sets the test set expected !input level to 10 DBM.</pre>		

**RFAnalyzer:EXPeCted:POWeR:DCS**

Function	GSM	Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See <a href="#">“Receiver Control” on page 776.</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836.</a>  Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. see <a href="#">“Measurement Related Configuration” on page 836.</a>  Resolution: .01 dBm
*RST setting		Sets the receiver control to auto  Band: PGSM  Expected Power: +13dBm
<b>Programming Example</b>  <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:DCS -10" !Sets expected power in DCS band !to -10 DBM.</pre>		

**RFAnalyzer:EXPeCted:POWeR:EGSM**

Function	GSM	Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See <a href="#">“Receiver Control” on page 776.</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836.</a>  Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836.</a>  Resolution: .01 dBm
*RST setting		Sets the receiver control to auto  Band: PGSM  Expected Power: +13 dBm
<b>Programming Example</b>  <pre>OUTPUT 714;"RFANALYZER:EXPECTED:POWER:EGSM -10" !Sets expected power in EGSM !band to -10 dBm.</pre>		

**RFAnalyzer:EXpected:POWer:PCS**

Function	GSM	Sets/queries the power level in dBm that the mobile station is expected to transmit at. The units DBM are optional. The test set will set up its input signal path to measure this power level. See <a href="#">“Receiver Control” on page 776</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836</a> .  Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836</a> .  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 <a href="#">“Receiver Control” on page 776</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836</a> .  Resolution: .01 dBm
Query		Range: -60 to +53 dBm, after the Amplitude Offset (optional) has been factored in. See <a href="#">“Measurement Related Configuration” on page 836</a> .  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 <a href="#">“Receiver Control” on page 776</a> .  The receiver control is set to manual when a manual band is selected. See <a href="#">“RFAnalyzer:CONTRol:AUTO” on page 577</a> .  The manual band must be set before manual channel will update.
	GPRS	This command is not applicable to GPRS.
Setting	Range: DCS   EGSM   PCS   PGSM	
Query	Range: DCS   EGSM   PCS   PGSM	
*RST setting	PGSM	
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:BAND DCS" !Sets the band in manual !receiver control.</pre>		

**RFAnalyzer:MANual:CHANnel[:SELEcted]**

Function	GSM	Sets/queries the ARFCN that the mobile station is expected to transmit on for the band selected. The test set will tune to the corresponding uplink frequency for the frequency band currently selected. See <a href="#">“Receiver Control” on page 776</a> .  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 <a href="#">“Receiver Control” on page 776</a> .  The manual band must be set before the manual channel will update. see <a href="#">“RFAnalyzer:MANual:BAND” on page 580</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: 512 to 885 Resolution: 1
Query		Range: 512 to 885 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:DCS 512" !Sets ARFCN for 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 <a href="#">“Receiver Control” on page 776</a> .  The manual band must be set before manual channel will update. See <a href="#">“RFAnalyzer:MANual:BAND” on page 580</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 124 and 975 to 1023 Resolution: 1
Query		Range: 0 to 124 and 975 to 1023 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
Programming Example		
<pre>OUTPUT 714;"RFANALYZER:MANUAL:CHANNEL:EGSM 975" !Sets ARFCN for EGSM in manual !receiver mode.</pre>		

**RFAnalyzer:MANual:CHANnel:PCS**

Function	GSM	Sets/queries the ARFCN that the mobile station is expected to transmit on. The test set will tune to the corresponding uplink frequency for the PCS frequency band. See <a href="#">“Receiver Control” on page 776</a> .  The manual band must be set before manual channel will update. See <a href="#">“RFAnalyzer:MANual:BAND” on page 580</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: 512 to 810 Resolution: 1
Query		Range: 512 to 810 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
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 <a href="#">“Receiver Control” on page 776</a> .  The manual band must be set before manual channel will update. See <a href="#">“RFAnalyzer:MANual:BAND” on page 580</a> .
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 124 Resolution: 1
Query		Range: 1 to 124 Resolution: 1
*RST setting		Sets the receiver control to auto Band: PGSM Traffic Channel: 30
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 <a href="#">“Receiver Control” on page 776</a> .  The units (HZ   KHZ   MHZ   GHZ) are optional, if no units are specified then units default to HZ.  Setting the manual frequency changes the receiver control to manual. See <a href="#">“RFAnalyzer:CONTRol:AUTO” on page 577</a> .
	GPRS	This command is not applicable to GPRS.
Setting	Range: 292.5 MHz to 2700 MHz Resolution: .01 Hz	
Query	Range: 292.5 MHz to 2700 MHz Resolution: .01 Hz	
*RST setting	896 MHz	
<b>Programming Example</b> <pre>OUTPUT 714;"RFANALYZER:MANUAL:FREQUENCY 942.6MHZ" !Sets the expected frequency !to 942.6 MHz in manual !receiver mode.</pre>		

**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 <a href="#">“Receiver Control” on page 776</a> .
Setting	Range: 1   ON   0   OFF	
Query	Range: 1   0	
*RST setting	1   ON	
<b>Programming Example</b> <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 <a href="#">"Receiver Control" on page 776</a> .
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 <a href="#">"Receiver Control" on page 776</a> .
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:MEASurement:FREQuency**

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the frequency used to tune the test set's measuring receiver for all mobile carriers: analog (including CW) or digital systems (cellular or PCS band), when manual mode is selected (RFAnalyzer:CONTRol:MEASurement:FREQuency:AUTO OFF).
Setting		Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query		Range: 292.5 MHz to 2700 MHz Resolution: 1 Hz
*RST setting		896.000 MHz
<b>Programming Example</b> OUTPUT 714;"RFAnalyzer:MANual:MEASurement:FREQuency 942.6 MHZ" !Sets the test set's receiver frequency to 942.6 MHz when manual control is used.		

**RFAnalyzer:MANual:POWER[:SELEcted][:SELEcted]:BURSt[1|2]**

Function	GSM	This command is not applicable to GSM.
	GPRS	Sets/queries the power level in dBm that the test set's receiver is expecting the mobile station uplink burst to transmit at for the selected band and burst.  This command automatically sets the test set to manual mode. see <a href="#">"Receiver Control" on page 776</a> .
Setting		Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see <a href="#">"Measurement Related Configuration" on page 836</a> . Resolution: 0.01 dBm
Query		Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see <a href="#">"Measurement Related Configuration" on page 836</a> . Resolution: 0.01 dBm
*RST setting		PGSM and EGSM bands: 13 dBm, DCS and PCS bands: 10 dBm
<b>Programming Example</b> OUTPUT 714;"RFAnalyzer:MANual:POWER:BURSt 7" ! Sets the test set expected burst power level to 7 dBm.		

**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 <a href="#">"Measurement Related Configuration" on page 836</a> .
Query		Range: -60 dBm to +53 dBm, after the Amplitude Offset (optional) has been included, see <a href="#">"Measurement Related Configuration" on page 836</a> . 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		
<pre>OUTPUT 714;"RFAnalyzer:MANual:UPLink:FREQuency 942.6 MHz" !Sets the test set's demodulation receiver frequency to 942.6 MHz.</pre>		

**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 <a href="#">"CALL:SETup:PDTCH   PDTChannel:MSLot:CONFiguration" on page 453</a>.</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 will be set to 1 and any subsequent attempts to set the measurement burst to 2 will generate an out of range error (see <a href="#">"CALL:PDTCH   PDTChannel:MSLot:CONFiguration" on page 424</a>).</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															
<pre>OUTPUT 714;"RFAnalyzer:MSLot:MEASurement:BURSt 2" !Sets the measurement burst number to !2</pre>															

# SETup Subsystem

## Description

The SETup subsystem is used to configure the test set for each measurement. Typical settings include:

- Multi-Measurement Count, how many measurements will be made each time a measurement is initiated.
- Trigger Arm, determines if a measurement will make one measurement then return to idle (single), or automatically rearm on completion of a measurement and repeat the process (continuous).
- Trigger Source, how a measurement is triggered.
- Trigger Delay, controls the delay time between the trigger and the start of sampling.
- Measurement Timeout, length of time before a measurement times out.

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**NOTE** Trigger arming for each measurement is controlled in the SETup subsystem. The choices are single or continuous. In most cases, it is a best practice (during remote operation) to use “single” measurement mode. This simplifies the tasks of starting concurrent measurements, using the INIT subsystem commands to determine which measurements are ready to be fetched, then using the FETCh subsystem to obtain results. The command “SETup:CONTInuous:OFF sets all measurements to “single” trigger mode.

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## Syntax Diagrams and Command Descriptions

“SETup:AAUDio” on page 589

“SETup:BErRor” on page 598

“SETup:CONTInuous” on page 612

“SETup:DAUDio” on page 613

“SETup:DPOWer” on page 618

“SETup:FBError” on page 605

“SETup:GBError” on page 622

“SETup:IQTuning” on page 627

“SETup:ORFSpectrum” on page 633

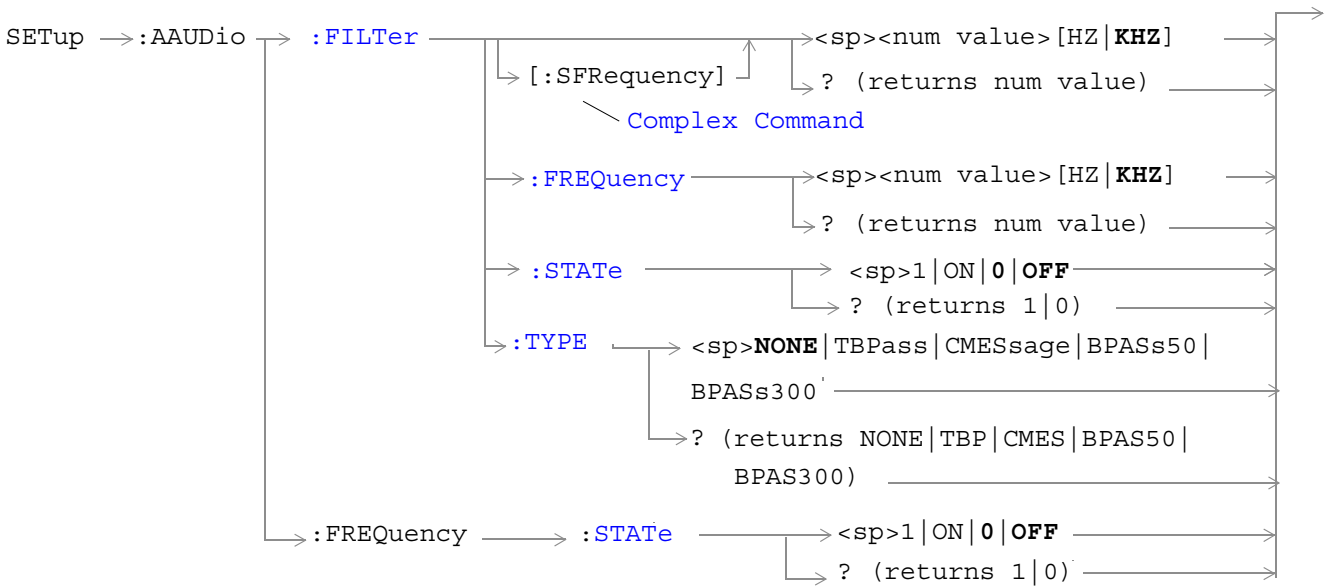
“SETup:PFError” on page 642

“SETup:PVTime” on page 647

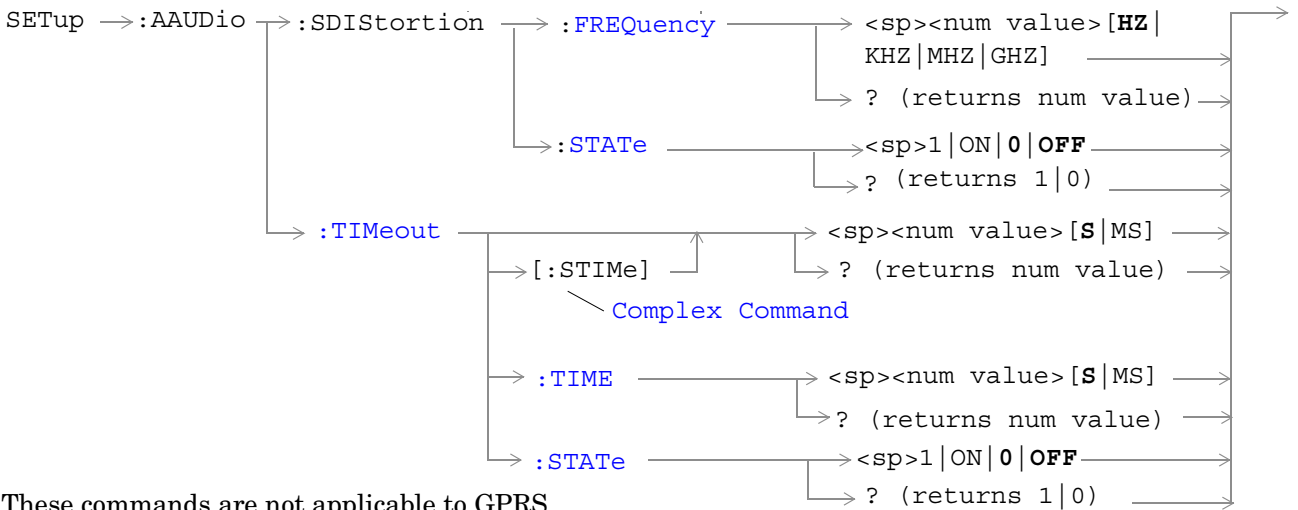
“SETup:TXPower” on page 657



SETup:AAUDio



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 343

**SETup:AAUDio:CONTinuous**

Function	GSM	Selects/queries the trigger arm state for Analog Audio measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Continuous trigger arm mode = 1   ON Single trigger arm mode = 0   OFF
Query		0   1
*RST setting		Single
Programming Example		
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

### SETup:AAudio:COUNT:STATE

Function	GSM	Selects/queries the Analog Audio multi-measurement count state.
	GPRS	This command is not applicable to GPRS.
Setting	1   ON   0   OFF	
Query	1   0	
*RST setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:COUNT:STATE ON" !Turns the analog audio measurement !multi-measurement count state on.		

### SETup:AAudio:DEMPHasis:STATE

Function	GSM	Sets/queries whether 750 us de-emphasis is enabled.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1   ON   0   OFF	
Query	Range: 1   0	
*RST setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:DEMPHasis:STATE ON" !Turns the de-emphasis on.		

### SETup:AAudio:DETECTOR[:TYPE]

Function	GSM	Sets/queries the detector type for audio level measurements.
	GPRS	This command is not applicable to GPRS.
Setting	Range: RMS   PEAK	
Query	Range: RMS   PEAK	
*RST setting	RMS	
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:DETECTOR:TYPE PEAK"		



**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		
<pre>OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:SRLEVEL 5V" !Sets expander state to on and level to 5 V.</pre>		

**SETup:AAUDio:EXPANDOR:RLevel**

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		
<pre>OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:RLEVEL 5V" !Sets expander reference level to 5 V.</pre>		

**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		
<pre>OUTPUT 714;"SETUP:AAUDIO:EXPANDOR:STATE ON"</pre>		

SETup:AAUDio

**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 589.
	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
<p>Programming Example</p> <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
<p>Programming Example</p> <pre>OUTPUT 714;"SETUP:AAUDIO:FILTER:SFREQUENCY 1000" !This sets the aaudio filter state !to on and sets the bandpass !filter frequency to 1 kHz.</pre>		

**SETup:AAUDio:FILTer:FREQuency**

Function	GSM	Sets/queries the center frequency for the 100 Hz bandpass filter applied to Analog Audio measurements. Units (KHZ   HZ) are optional, if no units are specified then units default to Hz. See “SETup:AAUDio” on page 589.
	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 audio 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 589
	GPRS	This command is not applicable to GPRS.
Setting		1   ON   0   OFF
Query		1   0
*RST setting		0   OFF
Programming Example		
OUTPUT 714;"SETUP:AAUDIO:FILTER:STATE ON" !Sets filter state on.		

**SETup:AAUDio: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

### 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: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
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STIME 3" !Sets the timeout                                      !state to on and sets the                                      !timeout value.</pre>		

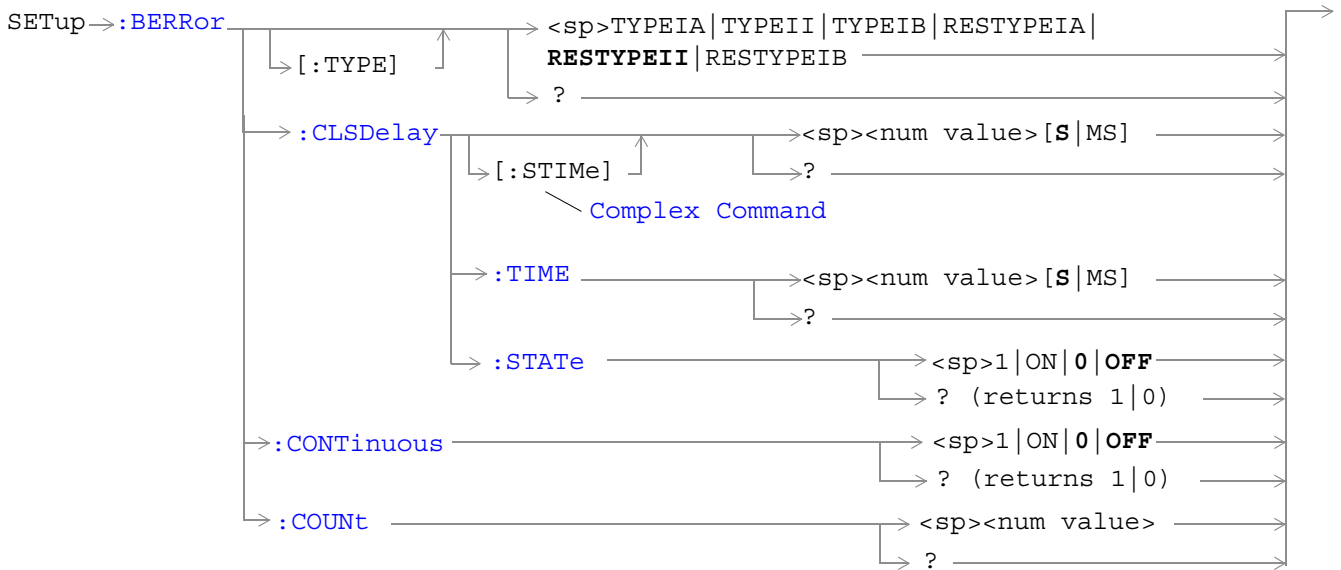
**SETup:AAudio:TIMEout:STATE**

Function	GSM	Selects/queries the Analog Audio measurement timeout state.
	GPRS	This command is not applicable to GPRS.
Setting		1   ON   0   OFF
Query		1   0
*RST setting		0   OFF
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.</pre>		

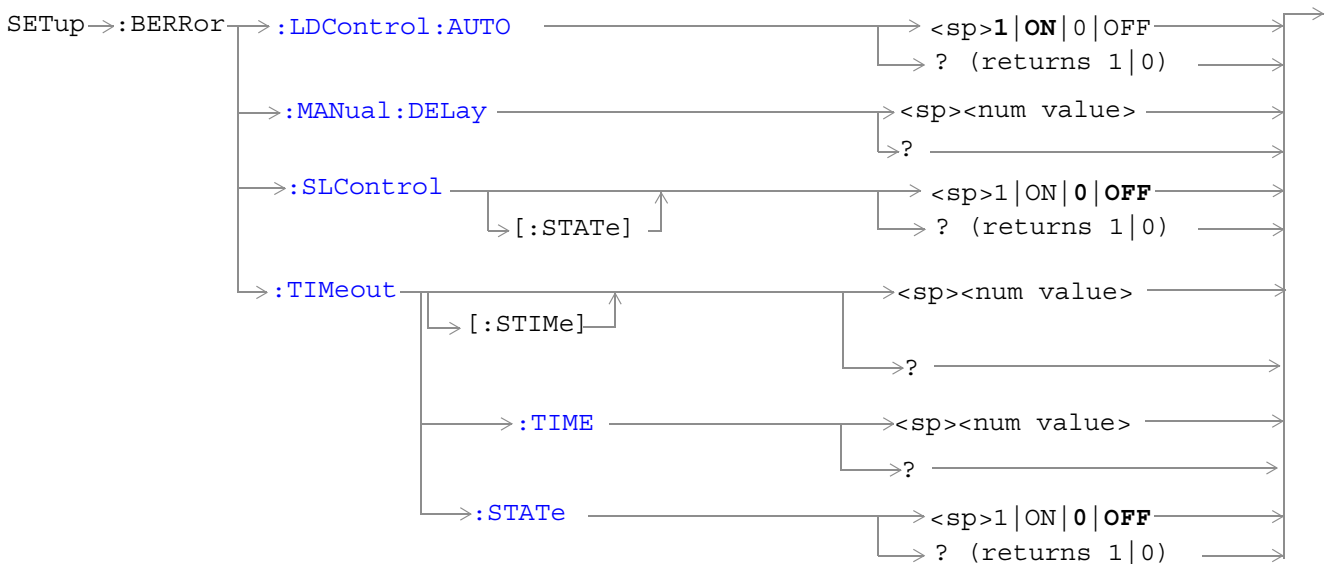
**SETup:AAudio:TIMEout:TIME**

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
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:AAUDIO:TIMEOUT:TIME 5" !Sets timeout value to 5 seconds.</pre>		

## SETup:BERRor



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 343

**SETup:BERRor:CLSDelay[:STIME]**

Function	GSM	<p>Selects/queries the closed loop signalling delay time in seconds for Bit Error measurements and sets the delay state to ON. The units (S   MS) are optional, if no units are specified than units default to S.</p> <p>The delay time defines how long the test set should wait before starting a BERR measurement. The downlink signalling operation must be completed and the test set must send a close loop command to the MS before the measurement can begin. The delay time allows time for the loop to close.</p> <p>When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
Query		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
*RST Setting		500 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:CLSDELAY:STIME 400 MS" ! Set state to on  ! and delay time</pre>		

**SETup:BERRor:CLSDelay:TIME**

Function	GSM	<p>Selects/queries the closed loop signalling delay time in seconds for Bit Error measurements. The units (S   MS) are optional, if no units are specified than units default to S.</p> <p>The delay time defines how long the test set should wait before starting a BERR measurement. The downlink signalling operation must be completed and the test set must send a close loop command to the MS before the measurement can begin. The delay time allows time for the loop to close.</p> <p>When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period.</p>
	GPRS	This command is not applicable to GPRS.
Setting		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
Query		<p>Range: 0 to 5 seconds</p> <p>Resolution: 100 ms</p>
*RST Setting		500 ms
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:CLSDELAY:TIME 600MS" ! Set delay time</pre>		

## SETup:BERRor

### SETup:BERRor:CLSDelay:STATe

Function	GSM	Selects/queries the closed loop signalling delay state for Bit Error measurements. If the state is off the test set will not wait to start a BERR measurement after a downlink signalling operation has completed.  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.  When a close loop message is set to the MS the closed loop signalling delay time will hold off the BERR measurement from starting for the specified time period.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1   ON   0   OFF	
Query	Range: 1   0	
*RST Setting	1   ON	
Programming Example 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: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“ <a href="#">SETup:BERRor:MANual:DELaY</a> ” on page 602  Refer also to the “ <a href="#">Bit Error Measurement Description</a> ” 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   auto	
Related Topics	<a href="#">“SETup:BERRor:MANual:DELaY” on page 602</a>	
Programming Example		
OUTPUT 714;"SETUP:BERROR:LDCONTROL:AUTO OFF" !sets BER delay to manual the user !must select the manual frame !delay number.		

### SETup:BERRor:MANual:DELaY

Function	GSM	Sets/queries the number of frames the test set will use to correlate uplink information bits with downlink information bits when loop delay control mode is manual (AUTO OFF). To set the delay mode to manual, refer to “ <a href="#">SETup:BERRor:LDControl:AUTO</a> ” on page 602.  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 <b>OFF</b> ).  Refer to “ <a href="#">Bit Error Measurement Description</a> ” 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		
OUTPUT 714;"SETUP:BERROR:MANUAL:DELAY 4" !Set delay of 4 speech frames.		

**SETup:BERRor:SLControl[:STATe]**

Function	GSM	<p>Selects/queries the Signalling loopback control state for an BER measurement.</p> <p>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.</p> <p>The loopback type is controlled manually using <b>Mobile Loopback (F12)</b> on <b>Call Parm</b>s menu 1 of 4. See <b>“CALL:TCHannel:LOOPback”</b> on page 466 for a programming 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	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERROR:SLCONTROL ON" ! Test set will send                                      ! loopback type automatically</pre>		

**SETup:BERRor:TIMEout[:STIME]**

Function	GSM	<p>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.</p>
	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	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:BERR:TIMEOUT:STIME 8" !Sets BER measurement timeout to                                      !8 seconds and the state to on.</pre>		

## SETup:BERRor

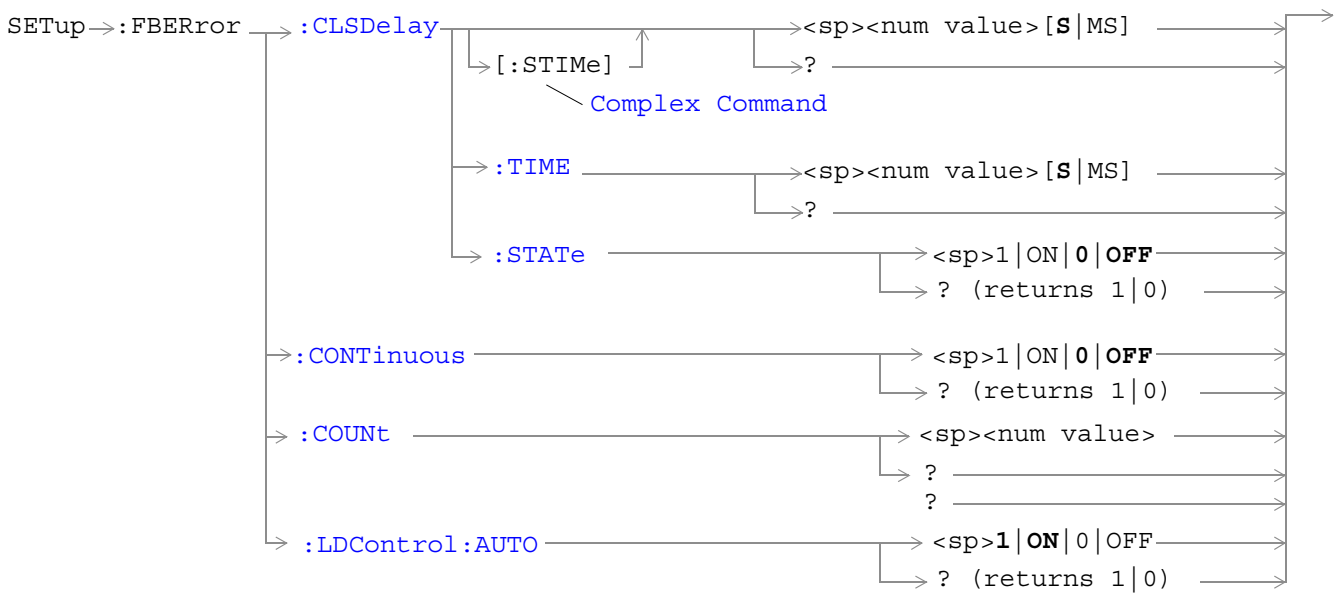
### SETup:BERRor:TIMEout:TIME

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		
OUTPUT 714;"SETUP:BERR:TIMEOUT:TIME 8" !Sets BER measurement timeout to !8 seconds.		

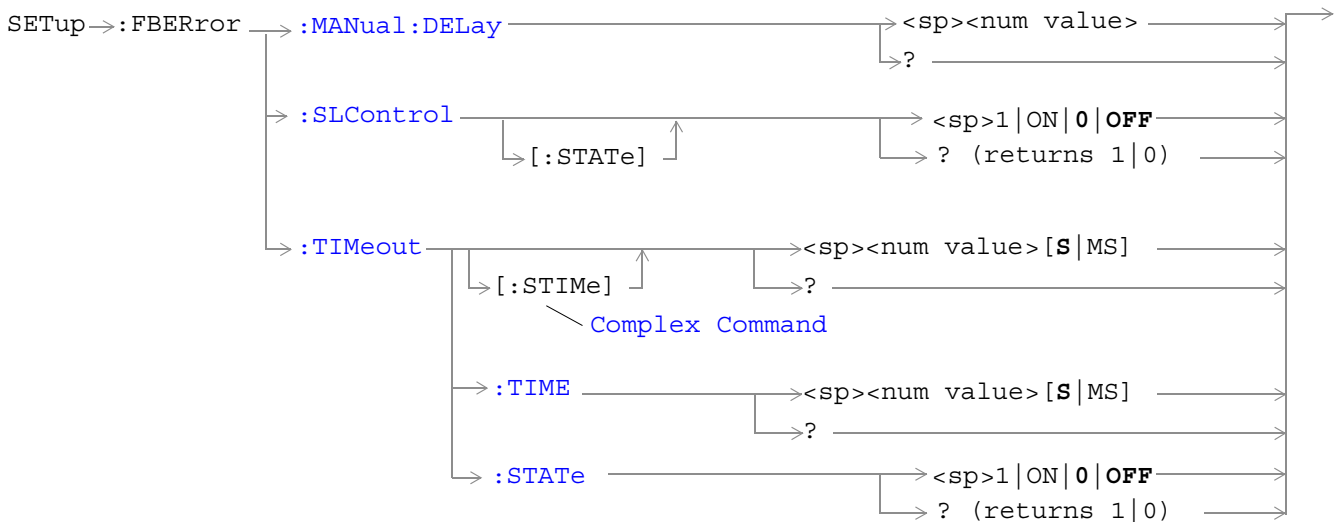
### SETup:BERRor:TIMEout:STATE

Function	GSM	Sets/queries the timeout state for BER measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0   OFF   1   ON
Query		0   1
*RST Setting		0   off
Programming Example		
OUTPUT 714;"SETUP:BERROR:TIMEOUT:STATE ON" !Sets the timeout state to on.		

## SETup:FBError



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 343

## SETup:FBERror

### 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		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:FBERROR:CLSDELAY:STIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.		

### 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		Range: 0 to 5 seconds Resolution: 100 ms
Query		Range: 0 to 5 seconds Resolution: 100ms
*RST Setting		500 ms
Programming Example		
OUTPUT 714;"SETUP:FBERROR:CLSDELAY:TIME 500 MS" ! Sets the Close Loop Delay ! to 500 ms.		

**SETup:FBERror:CLSDelay:STATE**

Function	GSM	This command selects/queries the closed loop signalling delay state for Fast Bit Error measurements. If the state is off the test set will not wait to start a FBER measurement after a downlink signalling operation has completed.  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:CONTInous**

Function	GSM	This command selects/queries the trigger state for Fast Bit Error Rate tests.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1   ON = Continuous trigger mode 0   OFF = Single trigger mode	
Query	Range: 1   0	
*RST Setting	0   single	
Programming Example		
<pre>OUTPUT 714;"SETUP:FBERROR:CONTINUOUS 0" !Specifies single trigger mode for Fast !BER measurements.</pre>		

## SETup:FBError

### 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		
OUTPUT 714; ``SETUP:FBERROR:COUNT 10000" !Specifies the number of Fast BER bits !to test at 10,000 bits.		

### SETup:FBError:LDControl:AUTO

Function	GSM	This command sets/queries loopback delay control mode. If loopback control mode is automatic (auto on), the test set will determine the frame delay value that will allow correlation between uplink information bits with downlink information bits. .  If loopback delay control mode is manual (auto off) , the test set will use the frame delay value entered in the TDMA Frames Delay field. Refer to <a href="#">“SETup:FBError:MANual:DELay” on page 609</a> .  Refer also to the <a href="#">“Fast Bit Error Measurement Description” on page 113</a> for a description of frame delay and its use in the fast bit error rate measurement.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1   ON   0   OFF
Query		Range: 1   0
*RST Setting		1   AUTO
Related Topics		see <a href="#">“SETup:FBError:MANual:DELay” on page 609</a>
Programming Example		
OUTPUT 714; "SETUP:FBERROR:LDCONTROL OFF" !Set delay control to manual the user !must select the manual frame !delay number.		



**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 “<a href="#">SETup:FBERror:LDControl:AUTO</a>” on page 608.</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 “<a href="#">Fast Bit Error Measurement Description</a>” on page 113 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 “ <a href="#">SETup:FBERror:LDControl:AUTO</a> ” on page 608	
<b>Programming Example</b> OUTPUT 714;"SETUP:FBERROR:MANUAL:DELAY 6" !Set frame delay to 6 frames.		

## SETup:FBERror

### SETup:FBERror:SLControl[:STATE]

Function	GSM	This command selects/queries the Signalling loopback control state for an FBER measurement.  When the state is set to on, the test set will automatically send the command for Type C (burst-by-burst) loopback to the MS when a FBER measurement is activated, and then set loopback to off when the measurement is complete.  The loopback type is controlled manually from the Mobile Loopback F12 key, see <a href="#">“CALL:TCHannel:LOOPback” on page 466</a> for a program example and details about the command.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1   ON   0   OFF	
Query	Range: 1   0	
*RST Setting	1   ON	
Programming Example		
OUTPUT 714;"SETUP:FBERROR:SLCONTROL ON" ! Sets the Signal Loop Control state to on.		

### SETup:FBERror:TIMEout[:STIME]

Function	GSM	This command selects/queries the timeout value in seconds for the trigger state during Fast Bit Error measurements and sets the timeout state to ON. The units (S MS) are optional, if no units are specified than units default to S.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 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:FBERROR:TIMEOUT:STIME 20" !Sets the timeout value to !20 seconds and the state to on.		

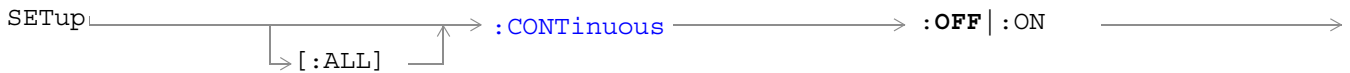
**SETup:FBError:TIMEout:TIME**

Function	GSM	This command selects/queries the timeout value in seconds for the trigger state during Fast Bit Error measurements. The units (S   MS) are optional, if no units are specified than units default to S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds 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: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		
<pre>OUTPUT 714;"SETUP:FBERROR:TIMEOUT:STATE ON" !Sets the timeout state to on.</pre>		

## SETup:CONTinuous

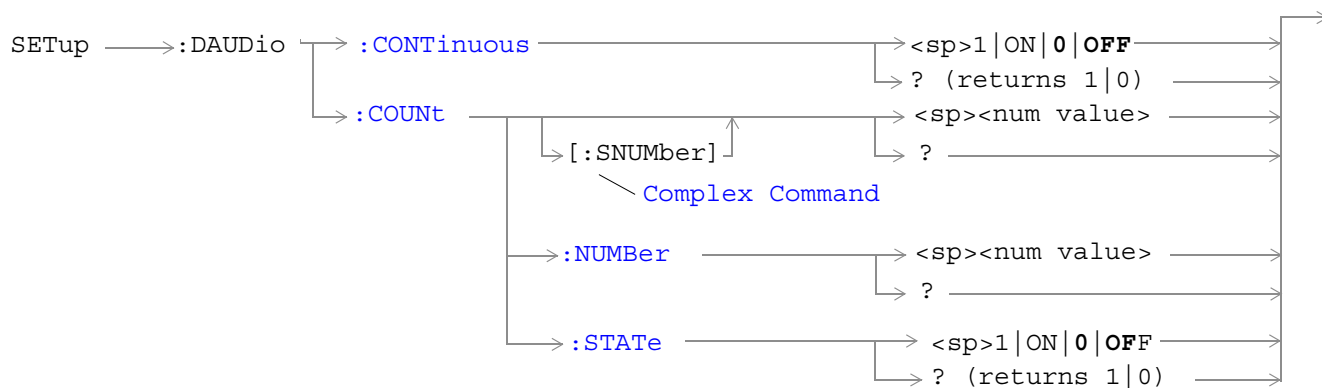


“Diagram Conventions” on page 343

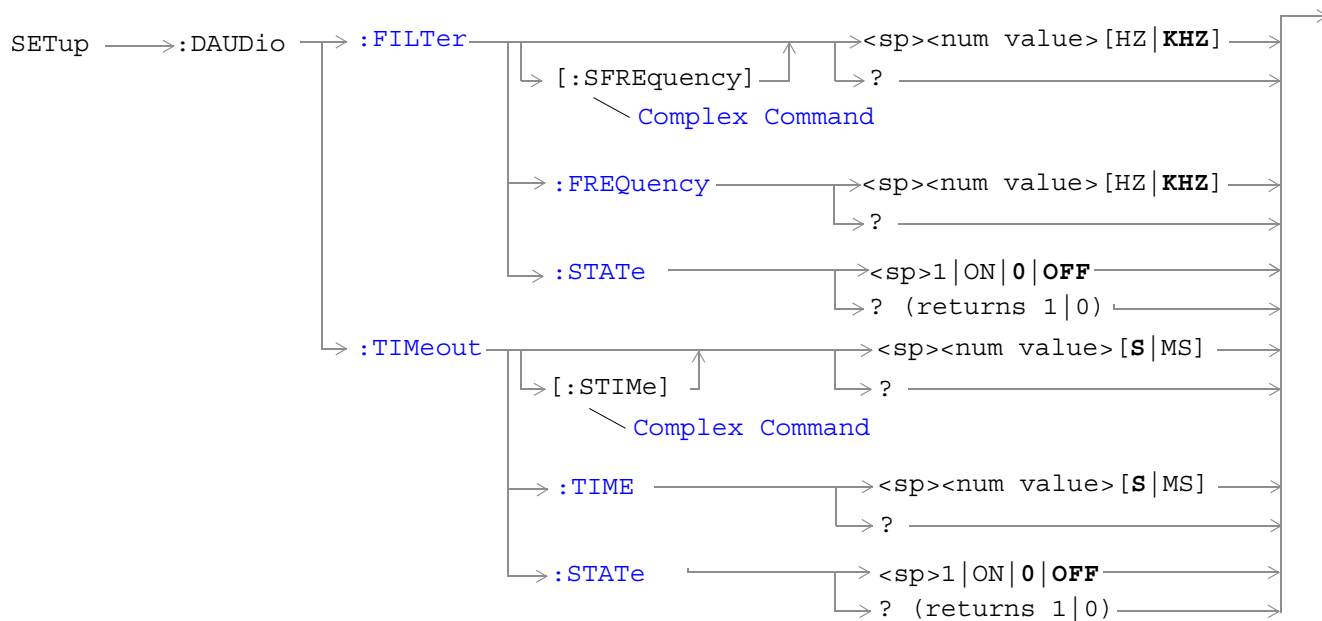
### SETup[:ALL]:CONTinuous

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 221.  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 791.
	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 649 allows you to set the trigger arm for the Power versus Time measurement.)
Setting	Range	<ul style="list-style-type: none"> <li>• Continuous trigger = ON</li> <li>• Single trigger = OFF</li> </ul>
*RST Setting	Single	
<b>Programming Example</b> <pre> OUTPUT 714;"SETUP:ALL:CONTINUOUS:OFF" !Sets trigger arm for all measurements                                      !to single.           </pre>		

## SETup:DAUDio



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

“Diagram Conventions” on page 343

## SETup:DAUDio

### SETup:DAUDio:CONTInuous

Function	GSM	This command selects/queries the trigger state for Decoded Audio measurements.
	GPRS	This command is not applicable to GPRS.
Setting	Continuous 1 ON Single 0 OFF	
Query	1 0	
*RST Setting	0 Single	
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:CONTINUOUS OFF" !Set DAUDIO measurement to single !trigger mode.		

### SETup:DAUDio:COUNT[:SNUMBER]

Function	GSM	This command selects/queries the number of Decoded Audio multi-measurements the Test Set will make. This command sets the count state to ON.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:COUNT:SNUMBER 10" !Sets the value to 10 and the state !to on.		

### SETup:DAUDio:COUNT:NUMBER

Function	GSM	This command selects/queries the number of Decoded Audio measurements the test set will make when the multi-measurement count state is on.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 1 to 999 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	1   ON   0   OFF	
Query	1   0	
*RST Setting	0   OFF	
Programming Example		
<pre>OUTPUT 714;"SETUP:DAUDIO:COUNT:STATE OFF" !Sets trigger state for !DAUDIO measurement.</pre>		

**SETup:DAUDio:FILTer [:SFREquency]**

Function	GSM	This command sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. This command sets the count state to ON. The units (HZ   KHZ) are optional, if no units are specified then units default to KHZ. see <a href="#">"Decoded Audio Measurement Description" on page 92</a>
	GPRS	This command is not applicable to GPRS.
Setting	Range: 200 Hz to 3.6 kHz Resolution: 1 Hz	
Query	Range: 200 Hz to 3.6 kHz Resolution: 1 Hz	
*RST Setting	1000 Hz	
Programming Example		
<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

### SETup:DAUDio:FILTer:FREQuency

Function	GSM	This command sets/queries the center frequency for the 100 Hz bandpass filter applied to Decoded Audio measurements. The units (HZ   KHZ) are optional, if no units are specified then units default to KHZ. see <a href="#">“Decoded Audio Measurement Description” on page 92</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 200 Hz to 3.6 kHz Resolution: 1 Hz
Query		Range: 200 Hz to 3.6 kHz Resolution: 1 Hz
*RST Setting		1000 Hz
Programming Example		
OUTPUT 714;"DAUDIO:FILTER:FREQUENCY 217HZ" !Sets bandpass filter frequency.		

### SETup:DAUDio:FILTer:STATe

Function	GSM	This command selects/queries the Decoded Audio bandpass filter state. see <a href="#">“Decoded Audio Measurement Description” on page 92</a>
	GPRS	This command is not applicable to GPRS.
Setting		1   ON   0   OFF
Query		1   0
Programming Example		
OUTPUT 714;"ABORT:ALL" !Aborts all active measurements in progress.		
Programming Example		
OUTPUT 714;"SETUP:DAUDIO:FILTER:STATE OFF" !Sets bandpass filter state to off.		



**SETup: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		
<pre>OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STIME 6" !Sets the value to 6 seconds and the !state to on.</pre>		

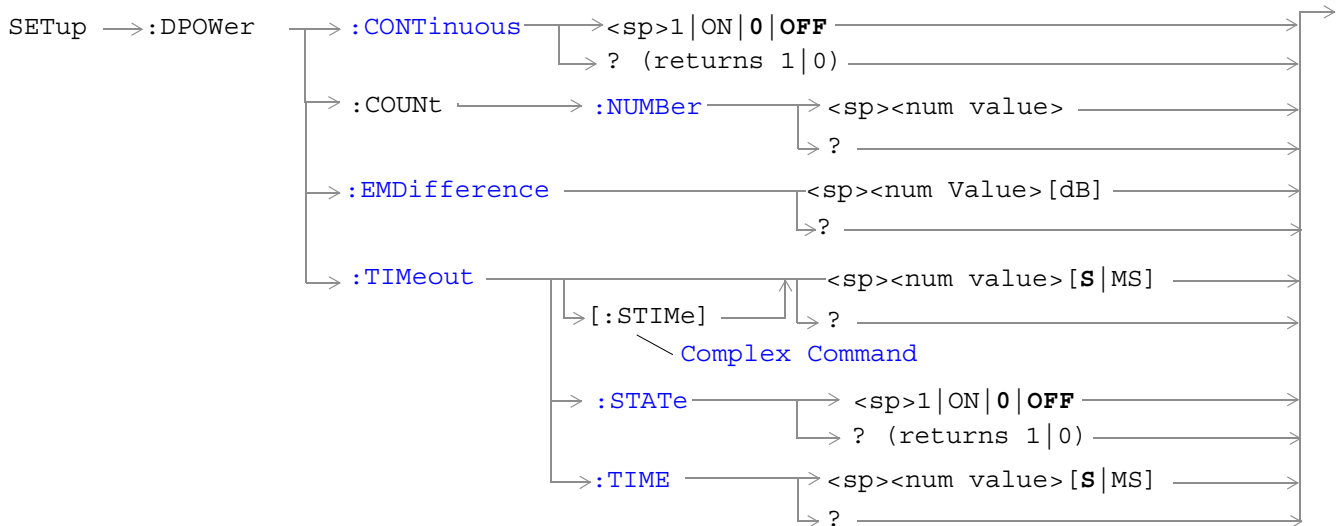
**SETup:DAUDio:TIMEout:TIME**

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		
<pre>OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:TIME 15" !Sets timeout value to 15 seconds.</pre>		

**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		1   ON   0   Off
Query		1   0
*RST Setting		0   OFF
Programming Example		
<pre>OUTPUT 714;"SETUP:DAUDIO:TIMEOUT:STATE ON" !Sets timeout state to on.</pre>		

## SETup:DPOWER



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### SETup:DPOWER:CONTInuous

Function	GSM	This command selects/queries the trigger state for Dynamic Power measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Continuous trigger mode: 1 ON Single trigger mode: 0 OFF
Query		1 0
*RST Setting		0 OFF
Programming Example		
OUTPUT 714;"SETUP:DPOWER:CONTINUOUS ON" !Sets trigger mode to continuous for a Dynamic Power measurement.		

**SETup:DPOWer:COUNT:NUMBer**

Function	GSM	This command sets/queries the number of bursts for the Dynamic Power measurement.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DPOWER:COUNT:NUMBER 300" !Sets the number of bursts for the Dynamic Power measurement to 300.</pre>		

**SETup:DPOWer:EMDifference**

Function	GSM	<p>This command sets/queries the Expected Maximum Difference from Previous Measurement parameter for the Dynamic Power measurement. The units dB are optional.</p> <p>The Expected Maximum Difference from Previous Measurement parameter is used with the measured transmit power from the previous burst to set the maximum RF power that the base station emulator is expecting the mobile to transmit in the next burst.</p> <p>The setting of this parameter does not affect the receiver Expected Power parameter. See <a href="#">“RFAnalyzer:EXpected:POWer[:SElected]” on page 577</a>.</p>
	GPRS	This command is not applicable to GPRS.
Setting		Range: -30 dB to +30 dB Resolution: 0.01 dB
Query		Range: -30 dB to +30 dB Resolution: 0.01 dB
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:DPOWER:EMDIFFERENCE 3" !Sets the Expected Maximum ! Difference from previous measurement parameter ! to 3 dB. (Example: If the previous burst ! measures 30 dBm and you expect the maximum ! amplitude of the next burst to be 3 dB lower, set the ! Expected Maximum Difference parameter to 3).</pre>		

## SETup:DPOWer

### SETup:DPOWer:TIMEout[:STIME]

Function	GSM	This command sets/queries the Dynamic Power measurement timeout value in seconds and sets the time-out state to on. The units (S   MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 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 5" !Sets the timeout state to on and the timeout value to 5 seconds for the Dynamic Power measurement.		

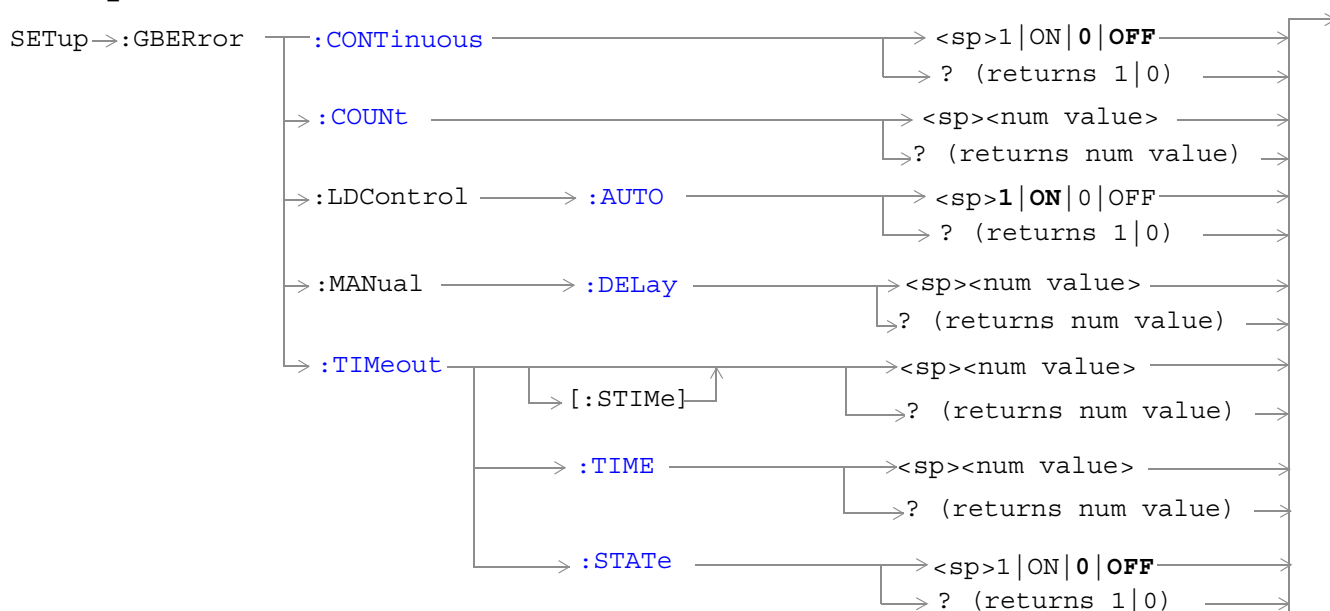
### SETup:DPOWer:TIMEout:STATe

Function	GSM	This command sets/queries the time-out state for the Dynamic Power measurement.
	GPRS	This command is not applicable to GPRS.
Setting		0   OFF   1   ON
Query		0   1
*RST Setting		0   OFF
Programming Example		
OUTPUT 714;"SETUP:DPOWER:IQTUNING:TIMEOUT:STATE ON" !Sets the timeout state to on for a Dynamic Power measurement.		

**SETup:DPOWER:TIMEout:TIME**

Function	GSM	This command sets/queries the time-out value in seconds that is used for the Dynamic Power measurements when the time-out state is ON. The units (S MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
Query		Range: 0.1 to 999 seconds Resolution: 0.1 seconds
*RST Setting		10 seconds
<b>Programming Example</b> OUTPUT 714;"SETUP:DPOWER:TIMEOUT:TIME 6" !Sets the timeout value to 6 seconds for a dynamic power measurement.		

## SETup:GBERror



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)

### 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	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
<b>Programming Example</b> OUTPUT 714;"SETup:GBERror:COUNT 880" !Sets the number of bits to measure to 880.	

## SETup:GBERror

### 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 <a href="#">“SETup:GBERror:MANual:DELay” on page 624</a> . Refer to <a href="#">“How is a Bit Error (BER) Measurement Made?” on page 81</a> for a description of block delay and its use in the BER measurement.
Setting	Range: 0   OFF   1   ON	
Query	0   1	
*RST Setting	1   ON	
Programming Example		
OUTPUT 714;"SETup:GBERror:LDControl:AUTO OFF" !Sets the loopback delay control mode !to manual.		

### SETup:GBERror:MANual:DELay

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the block delay when loopback delay control mode is manual. To set the delay mode to manual, refer to <a href="#">“SETup:GBERror:LDControl:AUTO” on page 624</a> . Refer to <a href="#">“GPRS Bit Error Measurement” on page 81</a> 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		
OUTPUT 714;"SETup:GBERror:MANual:DELay 6" !Sets the number of blocks to 6.		



**SETup:GBERror:TIMEout[:STIME]**

Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the timeout value in seconds for the trigger state during BER measurements and turns the timeout state on. The units (S   MS) are optional, if no units are specified than units default to S.
Setting		Range: 0.1 to 999 Resolution: 0.1
Query		Range: 0.1 to 999 Resolution: 0.1
*RST Setting		10 seconds
<b>Programming Example</b> OUTPUT 714;"SETup:GBERror:TIMEout:STIME 12" !Sets BER measurement timeout to !12 seconds and the state to on.		

**SETup:GBERror:TIMEout:TIME**

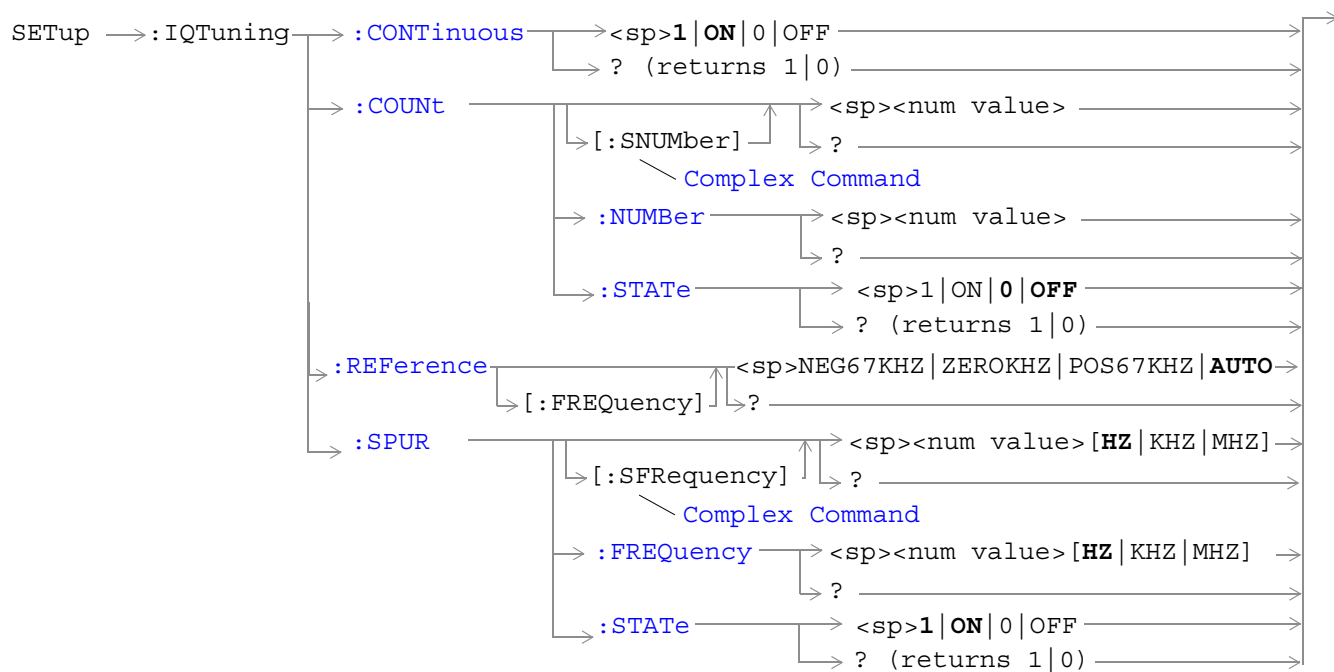
Function	GSM	This command is not applicable to GSM.
	GPRS	This command sets/queries the timeout value in seconds for the trigger state during BER measurements. The units (S   MS) are optional, if no units are specified than units default to S (seconds).
Setting		Range: 0.1 to 999 Resolution: 0.1
Query		Range: 0.1 to 999 Resolution: 0.1
*RST Setting		10 seconds
<b>Programming Example</b> OUTPUT 714;"SETup:GBERror:TIMEout:TIME 8" !Sets BER measurement timeout to !8 seconds.		

## SETup:GBERror

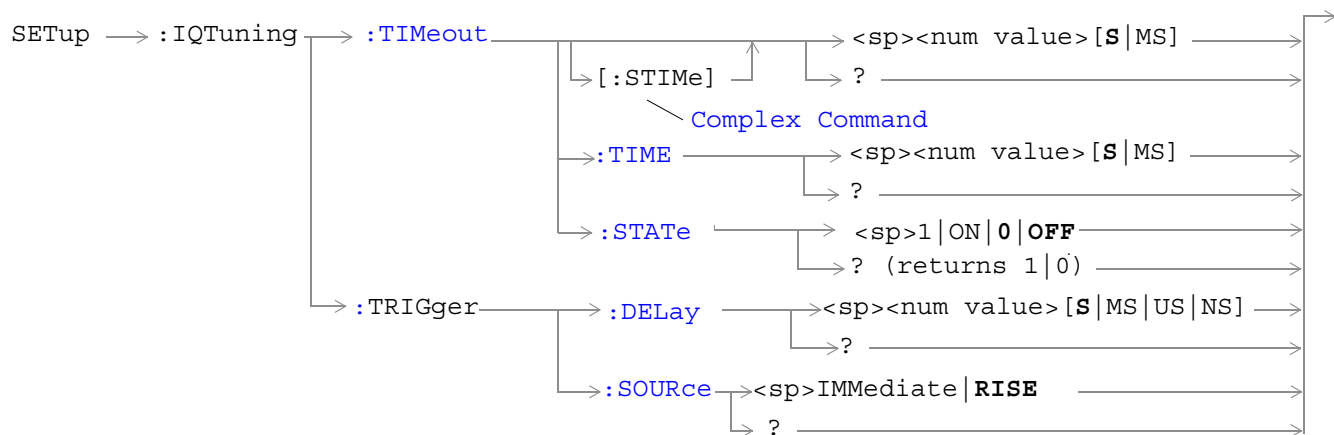
### SETup:GBERror:TIMEout:STATE

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	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.

[“Diagram Conventions” on page 343](#)

## SETup:IQTuning

### SETup:IQTuning:CONTInuous

Function	GSM	This command selects/queries the trigger state for I/Q Tuning measurements.
	GPRS	This command is not applicable to GPRS.
Setting		Continuous trigger mode: 1   ON Single trigger mode: 0   OFF
Query		1   0
*RST Setting		1   ON
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:CONTINUOUS OFF" !Sets trigger mode to single for an I/Q Tuning measurement.		

### SETup:IQTuning:COUNT:STATe

Function	GSM	This command sets/queries the I/Q Tuning multi-measurement count state.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0   OFF   1   ON
Query		0   1
*RST Setting		0   OFF
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:COUNT:STATE ON" !Turns on the multi-measurement mode for I/Q Tuning measurements.		

### SETup:IQTuning:COUNT:NUMBer

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes when the multi-measurement count state is on. See <a href="#">"I/Q Tuning Measurement Description" on page 107.</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:COUNT:NUMBER 80" !Sets the multi-measurement count number for I/Q Tuning measurements to 80.		

**SETup:IQTuning:COUNT[:SNUMBer]**

Function	GSM	This command sets/queries the number of I/Q Tuning multi-measurements the test set makes. This command sets the count state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:COUNT:SNUMBER 25" !Sets the state to ON and the multi-measurement count value to 25.		

**SETup:IQTuning:REFeRence[:FREQUency]**

Function	GSM	This command sets/queries the reference offset frequency to be used for the measurement. This means that if your mobile is transmitting all 1s you should set this command to NEG67KHZ, and if your mobile is transmitting all 0s it should be set to POS67KHZ. Alternatively you could select AUTO which allows the test set to select the most appropriate offset.
	GPRS	This command is not applicable to GPRS.
Setting		NEG67KHZ   ZEROKHZ   POS67KHZ   AUTO
Query		NEG67KHZ   ZEROKHZ   POS67KHZ   AUTO
*RST Setting		AUTO
<b>Programming Example</b> OUTPUT 714;"SETUP:IQTUNING:REFERENCE:FREQUENCY NEG67KHZ" !Sets the I/Q Tuning measurements reference frequency to -67 kHz.		

## SETup:IQTuning

### SETup:IQTuning:SPUR:FREquency

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement. The units (HZ   KHZ   MHZ) are optional, if no units are specified then the default is HZ.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz Resolution: 100 Hz
Query		Range: -19 MHz to +19 MHz Resolution: 100 Hz
*RST Setting		0 MHz
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:SPUR:FREQUENCY 10MHZ" !Sets the I/Q Tuning spur measurement to 10 MHz.		

### SETup:IQTuning:SPUR:STATE

Function	GSM	This command sets/queries the spur state for the I/Q Tuning measurement.
	GPRS	This command is not applicable to GPRS.
Setting		0   OFF   1   ON
Query		0   1
*RST Setting		0   OFF
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:SPUR:STATE ON" !Sets the spur state to on.		

### SETup:IQTuning:SPUR[:SFREquency]

Function	GSM	This command sets/queries the spur frequency for the I/Q Tuning measurement. The units (HZ   KHZ   MHZ) are optional, if no units are specified then the default is HZ. This command sets the spur state to ON.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz Resolution: 100 Hz
Query		Range: -13.0 MHz to -1.0 MHz and +1.0 MHz to +13 MHz Resolution: 100 Hz
*RST Setting		0   OFF
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:SFREquency 10MHZ" !Sets the spur state on with a frequency of 10 MHz.		

**SETup:IQTuning:TIMEout:STATE**

Function	GSM	This command sets/queries the timeout state for the I/Q Tuning measurement.
	GPRS	This command is not applicable to GPRS.
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEout:STATE ON" !Sets the timeout state to on for an I/Q Tuning measurement.</pre>		

**SETup:IQTuning:TIMEout[:STIME]**

Function	GSM	This command sets/queries the I/Q Tuning measurement time-out value in seconds and sets the time-out state to on. The units (S   MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 seconds	
Query	Range: 0.1 to 999 seconds Resolution: 0.1 seconds	
*RST Setting	10 seconds	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:STIME 3" !Sets the timeout state to on and the timeout value to 3 seconds.</pre>		

**SETup:IQTuning:TIMEout:TIME**

Function	GSM	This command sets/queries the time-out value in seconds that is used for the I/Q Tuning measurements when the time-out state is ON. The units (S   MS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting	Range: 0.1 to 999 seconds Resolution: 0.1 seconds	
Query	Range: .1 to 999 seconds Resolution: .1 seconds	
*RST Setting	10 seconds	
<b>Programming Example</b> <pre>OUTPUT 714;"SETUP:IQTUNING:TIMEOUT:TIME 4" !Sets the timeout value to 4 seconds.</pre>		

## SETup:IQTuning

### SETup:IQTuning:TRIGger:DELay

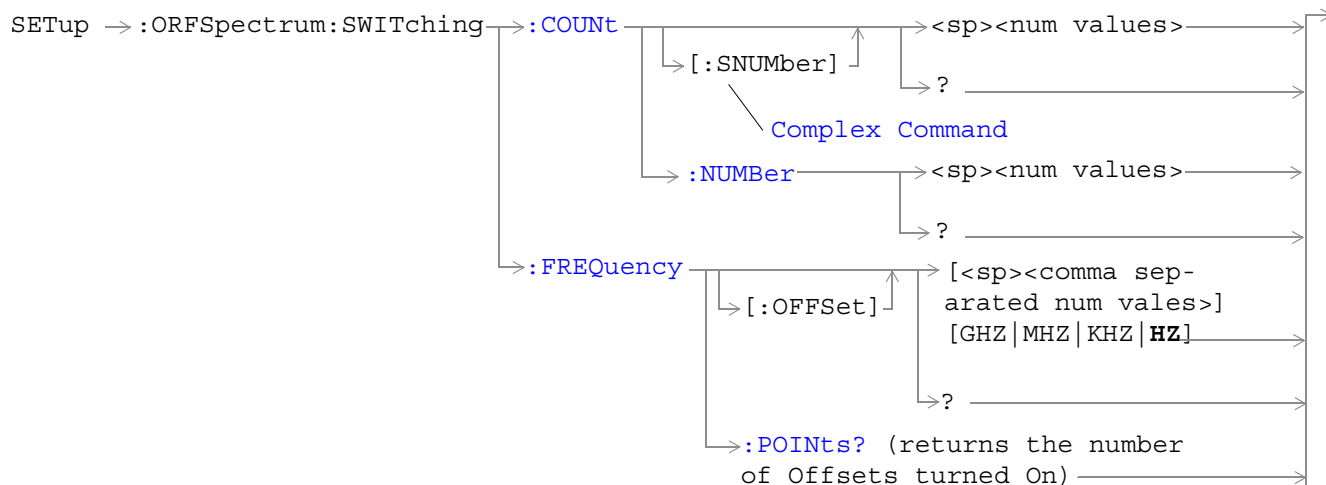
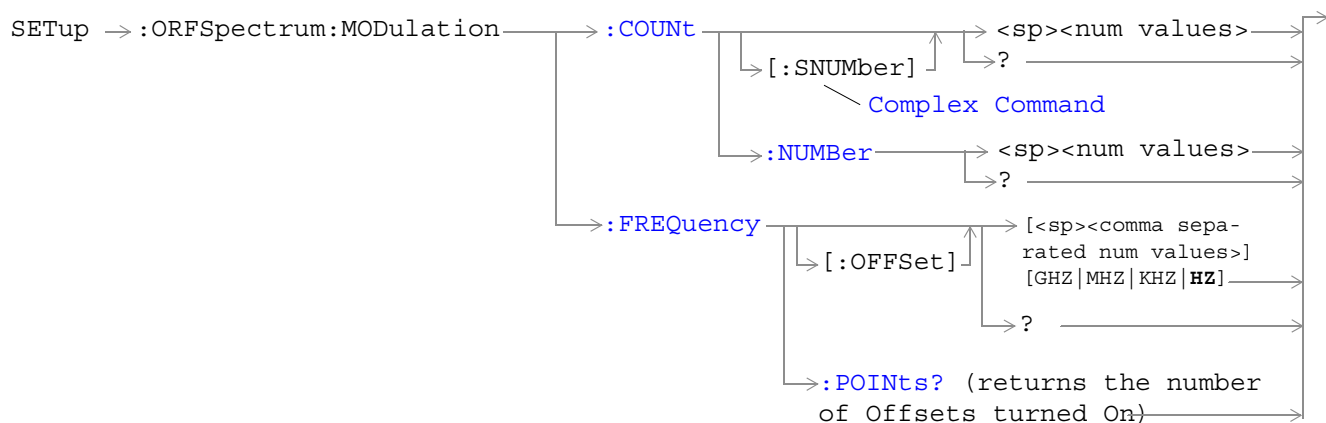
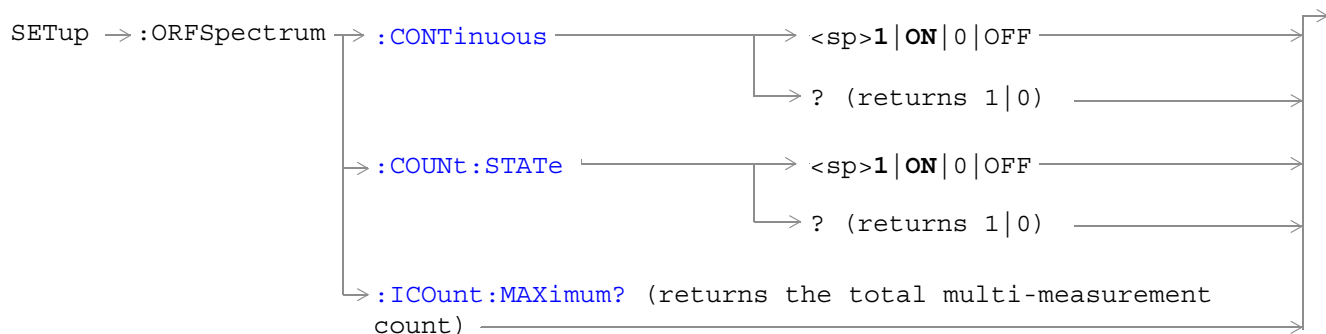
Function	GSM	This command sets/queries the trigger delay time in seconds for an I/Q Tuning measurement. The units (S   MS   US   NS) are optional, if no units are specified then the default is S.
	GPRS	This command is not applicable to GPRS.
Setting		Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater
Query		Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater
*RST Setting		zero seconds
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:TRIGGER:DELAY 1.2MS" !Sets the trigger delay time to 1.2 milli seconds.		

### SETup:IQTuning:TRIGger:SOURce

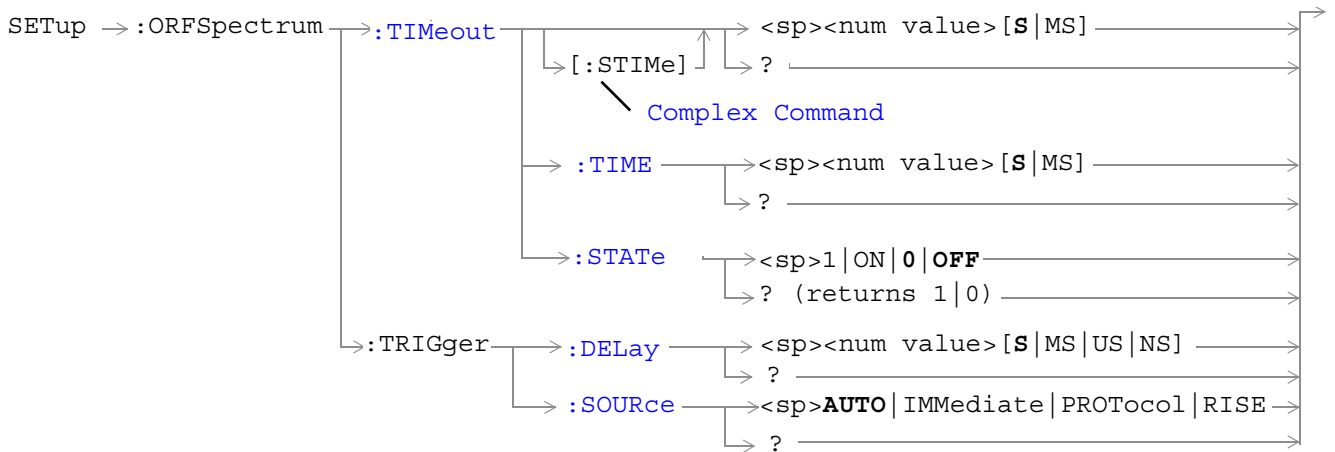
Function	GSM	This command sets/queries the trigger source for an I/Q Tuning measurement.
	GPRS	This command is not applicable to GPRS.
Setting		RISE   IMMEDIATE See <a href="#">"Triggering of Measurements" on page 219</a> .
Query		RISE   IMM
*RST Setting		RISE
Programming Example		
OUTPUT 714;"SETUP:IQTUNING:TRIGGER:SOURCE IMM" !Sets the trigger source to immediate.		



## SETup:ORFSpectrum



## SETup:ORFSpectrum



“Diagram Conventions” on page 343

## SETup:ORFSpectrum:CONTInuous

Function	GSM	This command selects/queries the trigger state for output RF spectrum measurements.
	GPRS	
Setting	Continuous trigger mode: 1 ON Single trigger mode: 0 OFF	
Query	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	0 OFF 1 ON	
Query	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: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><math>M = (\text{the number of modulation offsets}) \times (\text{the number of multi-measurements for ORFS due to modulation})</math>.</p> <p><math>S = (\text{the number of switching offsets}) \times (\text{the number of multi-measurements for ORFS due to switching})</math>.</p> <p>See <a href="#">“Output RF Spectrum Measurement Description”</a> on page 120 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

### SETup:ORFSpectrum:MODulation:COUNT:NUMBER

Function	GSM	This command sets/queries the number of ORFS due to modulation multi-measurements the test set will make when the multi-measurement count state is on. See <a href="#">“Output RF Spectrum Measurement Description” on page 120.</a>
	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 <a href="#">“Output RF Spectrum Measurement Description”</a> on page 120.
	GPRS	
Setting		Range: 0 to 22 comma-separated values ranging from -1.8 MHz to -10 Hz, and +10 Hz to +1.8 MHz Resolution: 10 Hz
Query		Range: 0 to 22 comma-separated values ranging from -1.8 MHz to -10 Hz, and +10 Hz to +1.8 MHz Resolution: 10 Hz
*RST Setting		Offset 1: 400.0 kHz Offset 2: 600.0 kHz Offsets 3 to 22: off

## Programming Example

```
OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET 400 KHZ, 700 KHZ"
!Turns on the first two ORFS due to modulation measurement offsets and sets
!them to 400 kHz and 700 kHz offsets. All other offsets are in the off state.
```

```
OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET 700 KHZ" !Turns on
!the first
!ORFS due to
!modulation
!measurement
!offset and
!sets it to
!A 700 kHz
!offset. All
!other
!offsets are
!in the off
!state.
```

```
OUTPUT 714;"SETUP:ORFSPECTRUM:MODULATION:FREQUENCY:OFFSET" !Turns all offsets
!for ORFS due to
!modulation
!measurement to the
!off state.
```

## SETup:ORFSpectrum

### SETup:ORFSpectrum:MODulation:FREQuency:POINts?

Function	GSM	This command queries the number of frequency offsets currently on during an ORFS due to modulation measurement. See <a href="#">“Output RF Spectrum Measurement Description” on page 120.</a>
	GPRS	
Query		Range: 0 to 22 Resolution: 1

### SETup:ORFSpectrum:SWITChing:COUNT[:SNUMber]

Function	GSM	This command sets/queries the ORFS due to switching multi-measurement count value and turns the state on.
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
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 <a href="#">“Output RF Spectrum Measurement Description” on page 120.</a>
	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 <a href="#">“Output RF Spectrum Measurement Description”</a> on page 120.
	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

### SETup:ORFSpectrum:SWITching:FREQuency:POINts?

Function	GSM	This command queries the number of frequency offsets currently on during an ORFS due to switching measurement. See “ <a href="#">Output RF Spectrum Measurement Description</a> ” on page 120.
	GPRS	
Query		Range: 0 to 8 Resolution: 1

### SETup:ORFSpectrum:TIMEout:TIME

Function	GSM	This command selects/queries the timeout value in seconds that will be used for ORFS measurements when the “ <a href="#">SETup:ORFSpectrum:TIMEout:STATE</a> ” is ON. The units (S MS) are optional. If no units are specified than units default to S.
	GPRS	
Setting		Range: 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 1" !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 !10 seconds and the state to on.		



**SETup:ORFSpectrum:TIMEout:STATE**

Function	GSM	This command selects/queries the ORFS measurement timeout state.
	GPRS	
Setting	0 OFF   1 ON	
Query	0 1	
*RST Setting	0 OFF	
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TIMEOUT:STATE ON" !Sets timeout state to on.		

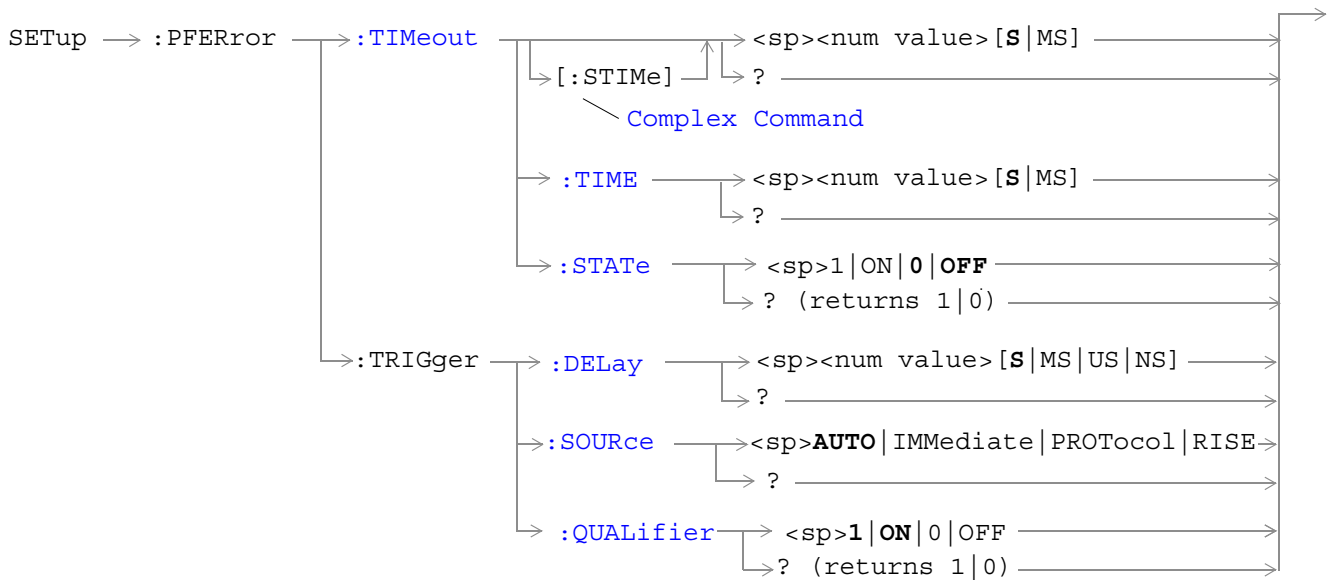
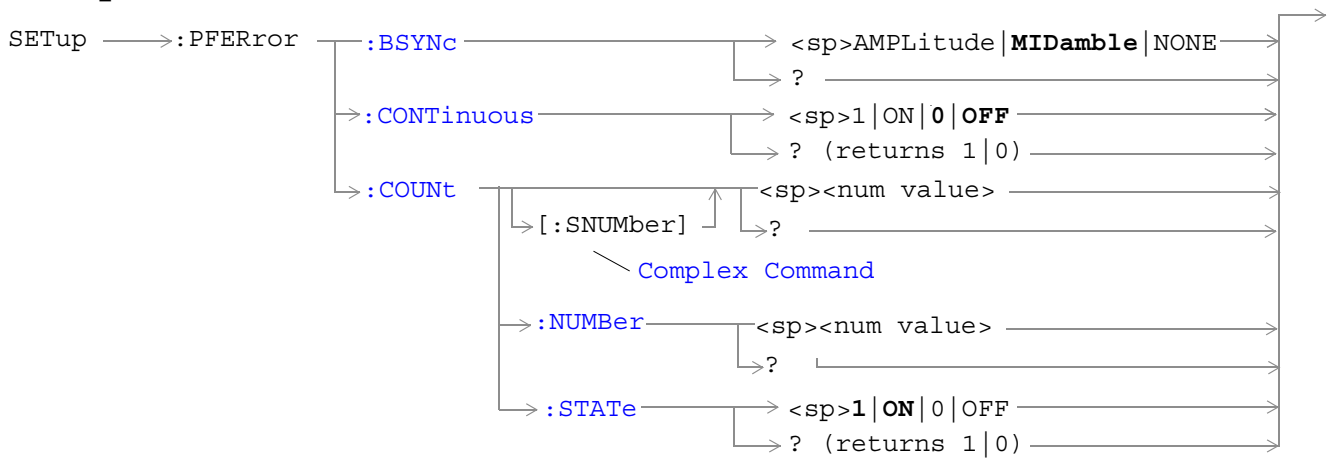
**SETup:ORFSpectrum:TRIGger:DELay**

Function	GSM	This command sets/queries the trigger delay for ORFS measurements. The units (S MS US NS) are optional, if no units are specified than units default to S.
	GPRS	
Setting	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 nanoseconds whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 nanoseconds whichever is greater	
*RST Setting	0 seconds	
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:DELAY 1MS" !Sets the trigger delay value !to 1 millisecond.		

**SETup:ORFSpectrum:TRIGger:SOURce**

Function	GSM	This command selects/queries the trigger source for ORFS measurements. See <a href="#">“Output RF Spectrum Measurement Description”</a> on page 120.
	GPRS	
Setting	Range: AUTO   IMMEDIATE   PROTOCOL   RISE See <a href="#">“Triggering of Measurements”</a> on page 219.	
Query	Range: AUTO   IMM   PROT   RISE	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714;"SETUP:ORFSPECTRUM:TRIGGER:SOURCE AUTO" !Sets the trigger source to Auto.		

## SETup:PFERror



“Diagram Conventions” on page 343

**SETup:PFERror:BSYNc**

Function	GSM	This command sets/queries the burst synchronization mode for phase/frequency measurements. See <a href="#">“Burst Synchronization of Measurements”</a> on page 180.
	GPRS	
Setting	Range: MIDamble   AMPLitude   NONE	
Query	Range: MID   AMPL   NONE	
*RST Setting	MIDamble	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:BSYNC MIDAMBLE" !Sets the burst synchronization.		

**SETup:PFERror:CONTInuous**

Function	GSM	This command sets/queries the trigger state for phase/frequency measurements.
	GPRS	
Setting	Single trigger mode = 0   OFF Continuous trigger mode = 1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:PFERROR: CONTINUOUS OFF" !Specifies single trigger mode for !phase/frequency measurements.		

**SETup:PFERror:COUNT[:SNUMber]**

Function	GSM	This command sets/queries the number of phase/frequency measurements the test set will make and turns the multi-measurement count state on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	0   off	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:COUNT:SNUMBER 100" !Sets the value to 100 and the !state to on		

## SETup:PFERror

### SETup:PFERror:COUNT:NUMBer

Function	GSM	This command sets/queries the number of phase/frequency measurements the Test Set will make when the multi-measurement count state is on.
	GPRS	
Setting		Range: 1 to 999 Resolution: 1
Query		Range: 1 to 999 Resolution: 1
*RST Setting		10
Programming Example		
OUTPUT 714;"SETUP:PFERROR:COUNT:NUMBER 55" !Sets the multi-measurement count !value to 55.		

### SETup:PFERror:COUNT:STATE

Function	GSM	This command sets/queries the phase/frequency multi-measurement count state.
	GPRS	
Setting		Range: 0 OFF   1 ON
Query		0 1
*RST Setting		0 OFF
Programming Example		
OUTPUT 714;"SETUP:PFERROR:COUNT:STATE ON" !Turns on multi-measurement mode for !the phase/frequency measurement.		

### SETup:PFERror:TIMEout[:STIME]

Function	GSM	This command sets/queries the phase/frequency measurement timeout value in seconds and sets the timeout state to on. The units (S MS) are optional, if no units are specified then unit default to S.
	GPRS	
Setting		Range: 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.
	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. See <a href="#">"Phase and Frequency Error Measurement Description"</a> on page 128.
	GPRS	
Setting	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
*RST Setting	0 seconds	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TRIGGER:DELAY 1.2MS" !Sets trigger delay time to !1.2 milli-seconds		

## SETup:PFERror

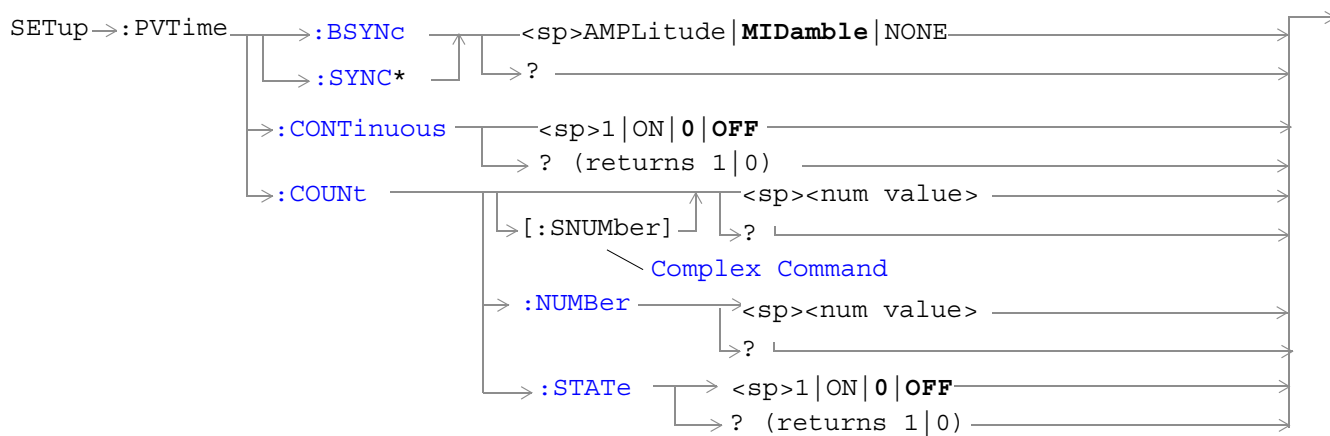
### SETup:PFERror:TRIGGer:SOURce

Function	GSM	This command sets/queries the trigger source for phase/frequency measurements. See <a href="#">“Phase and Frequency Error Measurement Description”</a> on page 128.
	GPRS	
Setting	AUTO   PROTOcol   RISE   IMMEDIATE See <a href="#">“Triggering of Measurements”</a> on page 219.	
Query	AUTO   PROT   RISE   IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TRIGGER:SOURCE AUTO" !Sets trigger source to AUTO.		

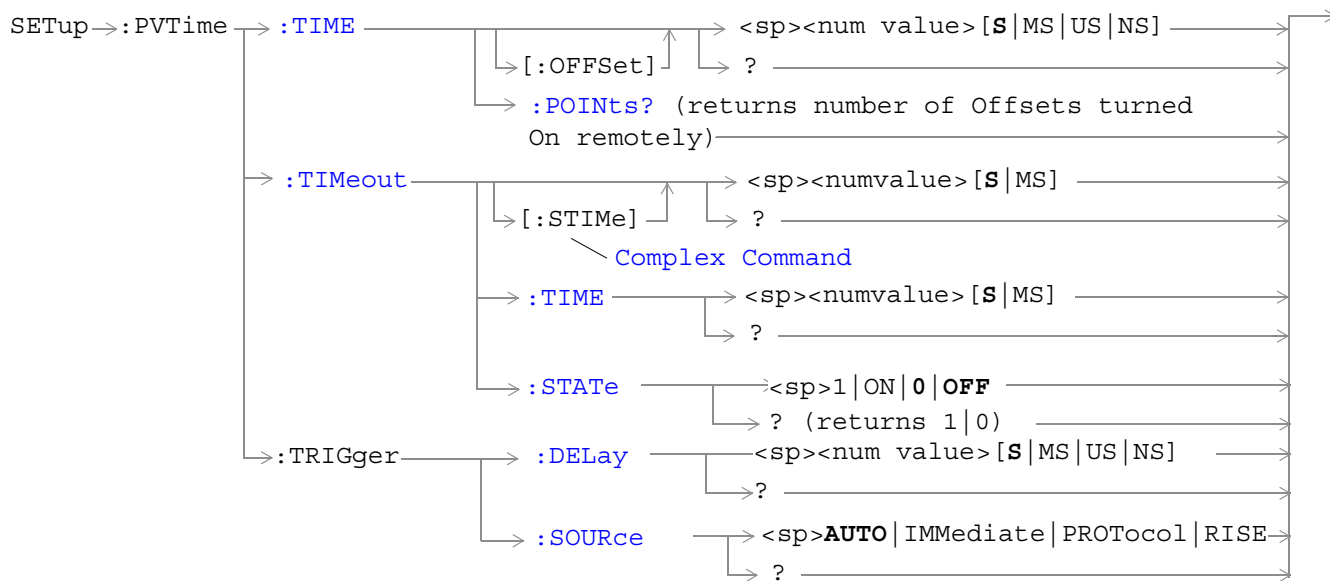
### SETup:PFERror:TRIGGer:QUALifier

Function	GSM	This command selects/queries the trigger qualifier for phase/frequency measurements. See <a href="#">“Trigger Qualifier Description”</a> on page 222.
	GPRS	
Setting	Range: 0   OFF   1   ON	
Query	0   1	
*RST Setting	1   ON	
Programming Example		
OUTPUT 714;"SETUP:PFERROR:TRIGGER:QUALIFIER OFF" !Sets trigger qualifier state !to off.		

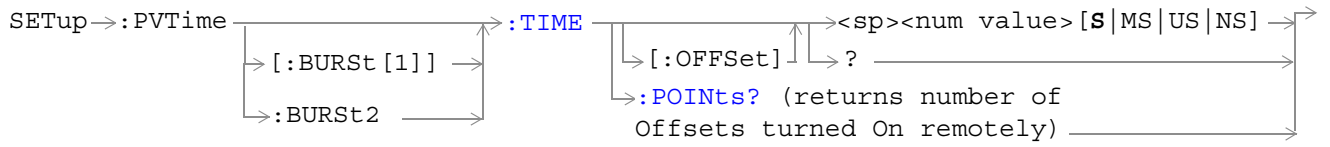
## SETup:PVTime



\* Not applicable to GSM



## SETup:PVTime



These commands are not applicable to GSM.

[“Diagram Conventions” on page 343](#)



**SETup:PVTime:BSYNc**

Function	GSM	This command sets/queries the burst synchronization mode for power versus time measurements. See <a href="#">“Burst Synchronization of Measurements” on page 180.</a>
	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 <a href="#">“Measurement States” on page 221.</a>
	GPRS	
Setting	Single trigger mode = 0   OFF Continuous trigger mode = 1   ON	
Query	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		0 OFF   1  ON
Query		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 <a href="#">"Burst Synchronization of Measurements" on page 180.</a>
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 GPRS	<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 <a href="#">“Power versus Time Measurement Description” on page 137</a>. 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>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</p> <p>time offset 2 = -18 us</p> <p>time offset 3 = -10 us</p> <p>time offset 4 = 0 us</p> <p>time offset 5 = 321.2 us</p> <p>time offset 6 = 331.2 us</p> <p>time offset 7 = 339.2 us</p> <p>time offset 8 = 349.2 us</p> <p>time offset 9 = 542.8 us</p> <p>time offset 10 = 552.8 us</p> <p>time offset 11 = 560.8 us</p> <p>time offset 12 = 570.8 us</p>	
<p><b>Programming Example</b></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

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 <a href="#">“Power versus Time Measurement Description” on page 137</a>. 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 <a href="#">“Time Offset Range Restrictions for GPRS Mobiles Which Support Two Uplink Timeslots” on page 152</a>.</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><b>Burst 1</b></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 <math>\mu</math>s  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><b>Burst 2</b></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>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SETUP:PVTIME:BURSt2:TIME:OFFSET 0US, 0US, 0US, 0US, 321.2.0US, 331.2US"</pre> <p>!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.</p>	

## SETup:PVTime

### 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 533 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 533 command is sent.
Query		Range: 0 to 12 Resolution: 1
*RST Setting		12

### SETup:PVTime:TIMEout[:STIME]

Function	GSM	This command sets/queries the timeout value in seconds that 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	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TIMEOUT:STATE ON" !Sets timeout state to on.		

**SETup:PVTime:TRIGger:DELay**

Function	GSM	This command selects/queries the trigger delay in seconds for power versus time measurements. The units (S   MS   US   NS) are optional, if no units are specified then units default to S.
	GPRS	
Setting	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
*RST Setting	0 seconds	
Programming Example		
OUTPUT 714;"SETUP:PVTIME:TRIGGER:DELAY 1.1MS" !Sets trigger delay value to 1.1 !milli-seconds.		

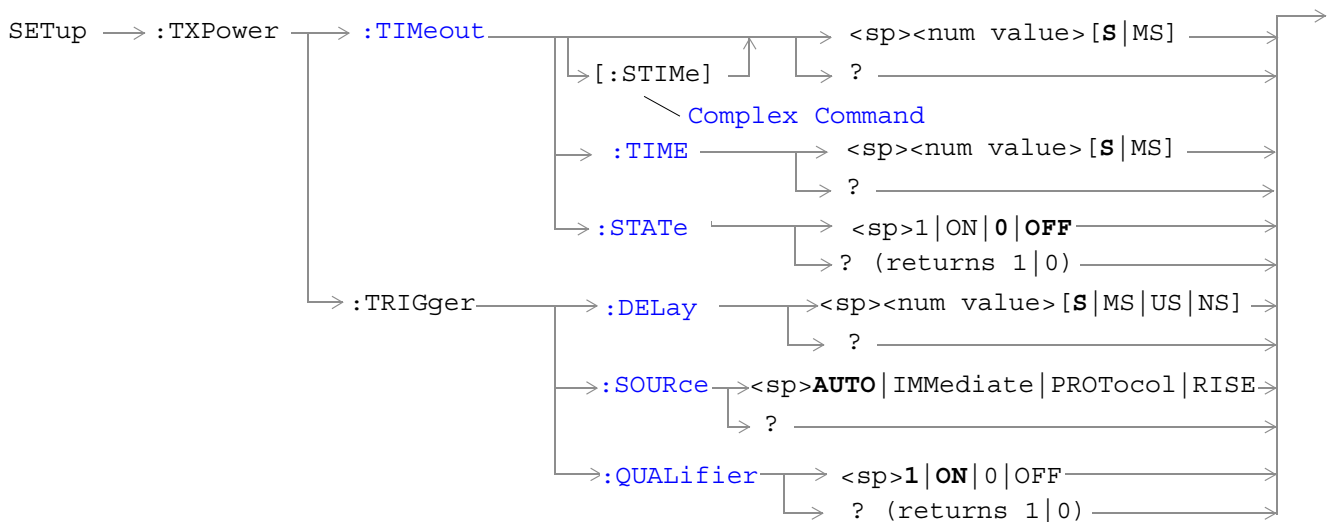
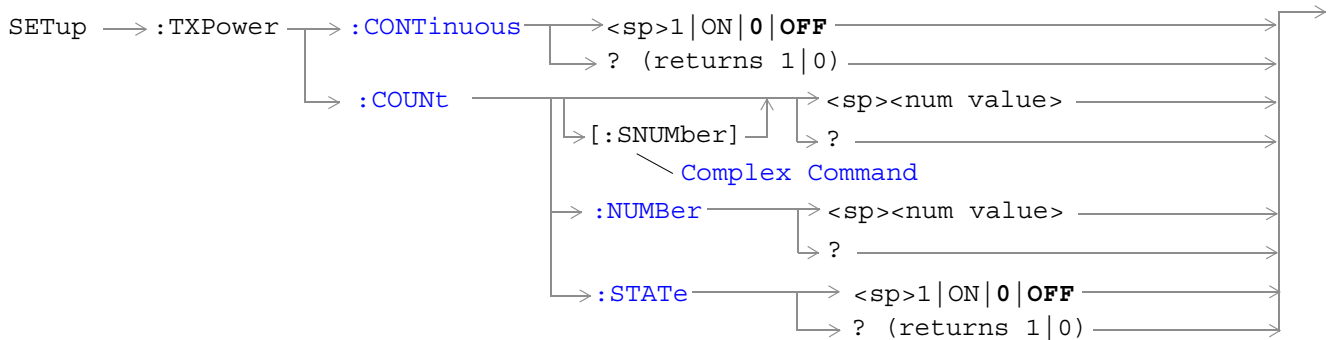
## SETup:PVTime

### SETup:PVTime:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for power versus time measurements. See <a href="#">“Triggering of Measurements” on page 219</a> .
	GPRS	
Setting	AUTO   PROTOcol   RISE   IMMEDIATE	
Query	AUTO   PROT   RISE   IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714; "SETUP:PVTIME:TRIGGER:SOURCE AUTO" !Sets trigger source to Auto.		



## SETup:TXPower



“Diagram Conventions” on page 343

## SETup:TXPower

### SETup:TXPower:CONTInuous

Function	GSM	This command sets/queries the trigger state for TX carrier power measurements.
	GPRS	
Setting	Single trigger mode = 0   OFF Continuous trigger mode = 1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER: CONTINUOUS OFF" !Specifies single trigger mode for !TX Carrier Power measurements.		

### SETup:TXPower:COUNT[:SNUMBER]

Function	GSM	This command sets/queries the number of TX carrier power measurements the test set will make and turns the multi-measurement count state on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:COUNT:SNUMBER 99" !Sets the state to on and the !multi-measurement count value !to 99.		

### SETup:TXPower:COUNT:NUMBER

Function	GSM	This command sets/queries the number of TX power measurements the test set will make when the multi-measurement state is on.
	GPRS	
Setting	Range: 1 to 999 Resolution: 1	
Query	Range: 1 to 999 Resolution: 1	
*RST Setting	10	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:COUNT:NUMBER 5" !Sets the TX Power multi-measurement !count number to 5.		

**SETup:TXPower:COUNT:STATE**

Function	GSM	This command sets/queries the TX power multi-measurement count state.
	GPRS	
Setting	0 OFF   1 ON	
Query	0 1	
*RST Setting	0 OFF	
Programming Example		
<pre>OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE ON" !Sets the multi-measurement count !state to on.</pre>		

**SETup:TXPower:TIMEout[:STIME]**

Function	GSM	This command sets/queries TX carrier power measurement timeout value and also sets the state to on. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	
Setting	Range: 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:TXPOWER:TIMEOUT:STIME 20" !Sets the state to on and the !timeout value to 20 seconds.</pre>		

**SETup:TXPower:TIMEout:TIME**

Function	GSM	This command sets/queries the timeout value in seconds that will be used for TX power measurements. The units (S MS) are optional, if no units are specified then units default to S.
	GPRS	
Setting	Range: 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:TXPOWER:TIMEOUT:TIME 20" !Sets the TX power measurement !timeout to 20 seconds.</pre>		

## SETup:TXPower

### SETup:TXPower:TIMEout:STATE

Function	GSM	This command selects/queries TX carrier power measurement timeout state.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	0   OFF	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:COUNT:STATE 1" !Turns the TX carrier power timeout !state on.		

### SETup:TXPower:TRIGger:DELAY

Function	GSM	This command sets/queries the trigger delay in seconds for TX carrier power measurements. The units (S MS US NS) are optional, if no units are specified then units default to S.
	GPRS	
Setting	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
Query	Range: -2.31 ms to +2.31 ms Resolution: 5 significant digits or 100 ns, whichever is greater	
*RST Setting	zero seconds	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:TRIGGER:DELAY 1.5MS" !Set trigger delay time to !1.5 milliseconds		

### SETup:TXPower:TRIGger:SOURce

Function	GSM	This command selects/queries the trigger source for TX carrier power measurements. See <a href="#">"Triggering of Measurements" on page 219</a> .
	GPRS	
Setting	AUTO   PROTOcol   RISE   IMMEDIATE	
Query	AUTO   PROT   RISE   IMM	
*RST Setting	AUTO	
Programming Example		
OUTPUT 714;"SETUP:TXPOWER:TRIGGER:SOURCE AUTO" !Sets trigger source to AUTO.		

**SETup:TXPower:TRIGger:QUALifier**

Function	GSM	This command sets/queries the trigger qualification for TX carrier power measurements. When ON, an automatic trigger re-arm occurs if a measurement is triggered when no valid signal (burst) is present. See <a href="#">“Trigger Qualifier Description” on page 222</a> .
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	1   ON	
<b>Programming Example</b> <pre> OUTPUT 714;"SETUP:TXPOWER:TRIGGER:QUALIFIER ON" !Sets trigger qualifier state !to on. </pre>		

---

# STATus Subsystem Description

## Description

The STATus subsystem is used to communicate current test set status information to the controlling application program.

## Syntax Diagrams and Command Descriptions

[“STATus:OPERation” on page 663](#)

[“STATus:PRESet” on page 682](#)

[“STATus:QUEStionable” on page 683](#)

[“Standard Event Status Register” on page 701](#)

[“Status Byte Register” on page 700](#)

## Status Register Bit Definitions

[“Status Byte Register Bit Assignments” on page 700](#)

[“Standard Event Status Register Bit Assignment” on page 702](#)

[“STATus:QUEStionable Condition Register Bit Assignment” on page 688](#)

[“STATus:QUEStionable:CALL Condition Register Bit Assignment” on page 689](#)

[“STATus:QUEStionable:CALL:GSM Condition Register Bit Assignment” on page 691](#)

[“STATus:QUEStionable:ERRors Condition Register Bit Assignment” on page 693](#)

[“STATus:QUEStionable:ERRors:GSM Condition Register Bit Assignment” on page 697](#)

[“STATus:QUEStionable:HARDware Condition Register Bit Assignment” on page 699](#)

[“STATus:OPERation Condition Register Bit Assignment” on page 668](#)

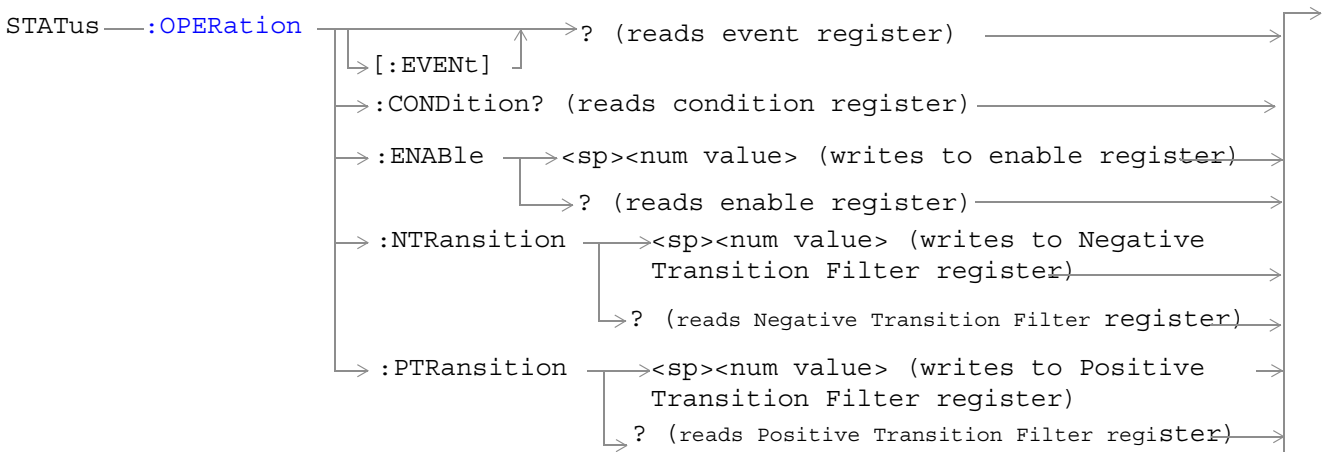
[“STATus:OPERation:CALL Condition Register Bit Assignment” on page 670](#)

[“STATus:OPERation:CALL:GSM Condition Register Bit Assignment” on page 673](#)

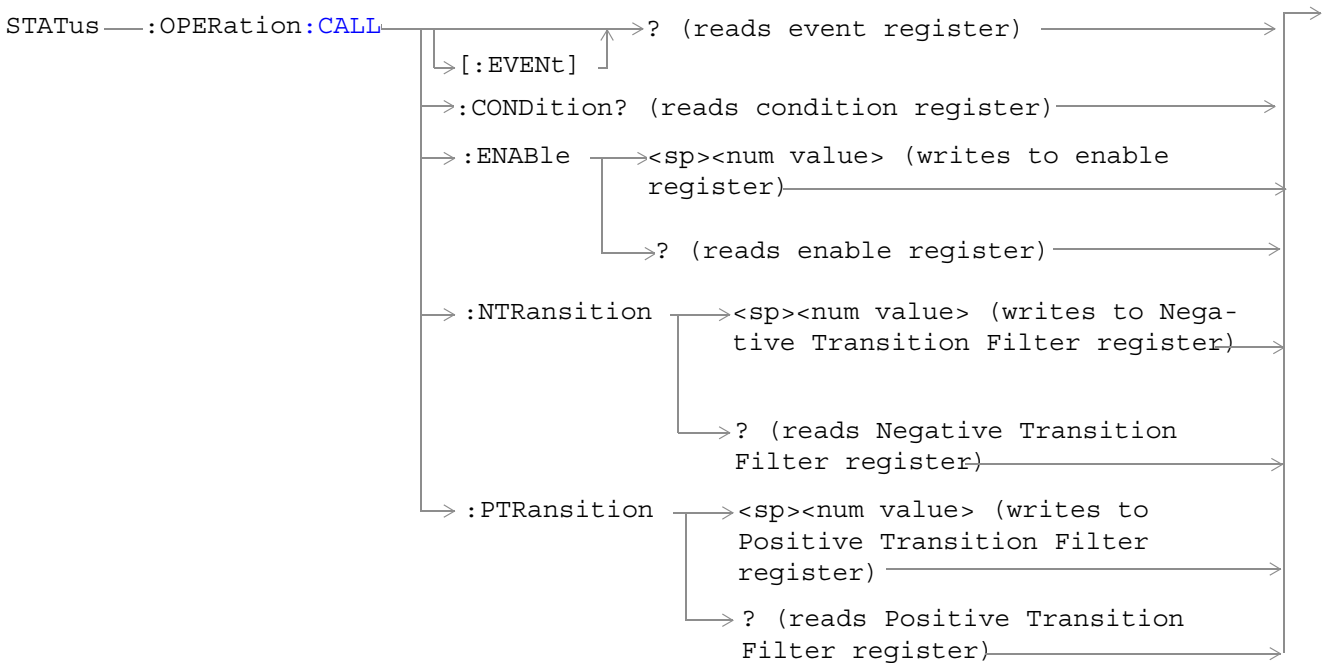
[“STATus:OPERation:NMRReady Condition Register Bit Assignment” on page 675](#)

[“STATus:OPERation:NMRReady:GSM Condition Register Bit Assignment” on page 679](#)

## STATUS:OPERation

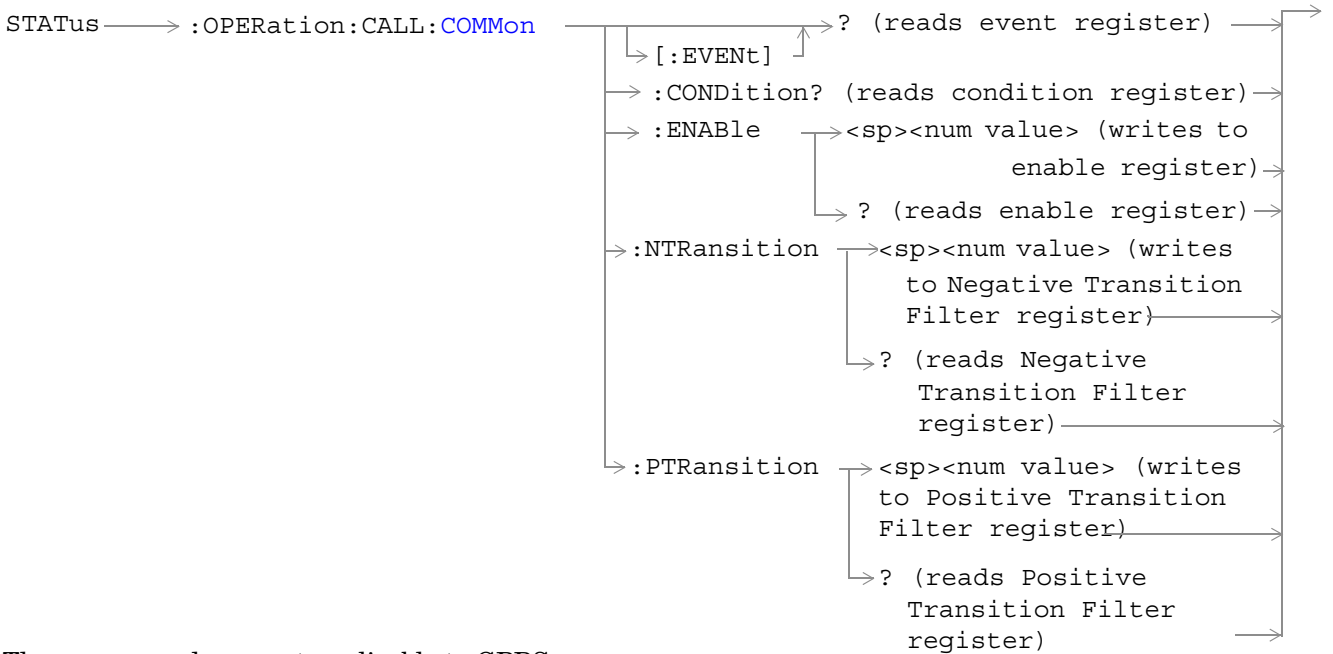


These commands are not applicable to GPRS.

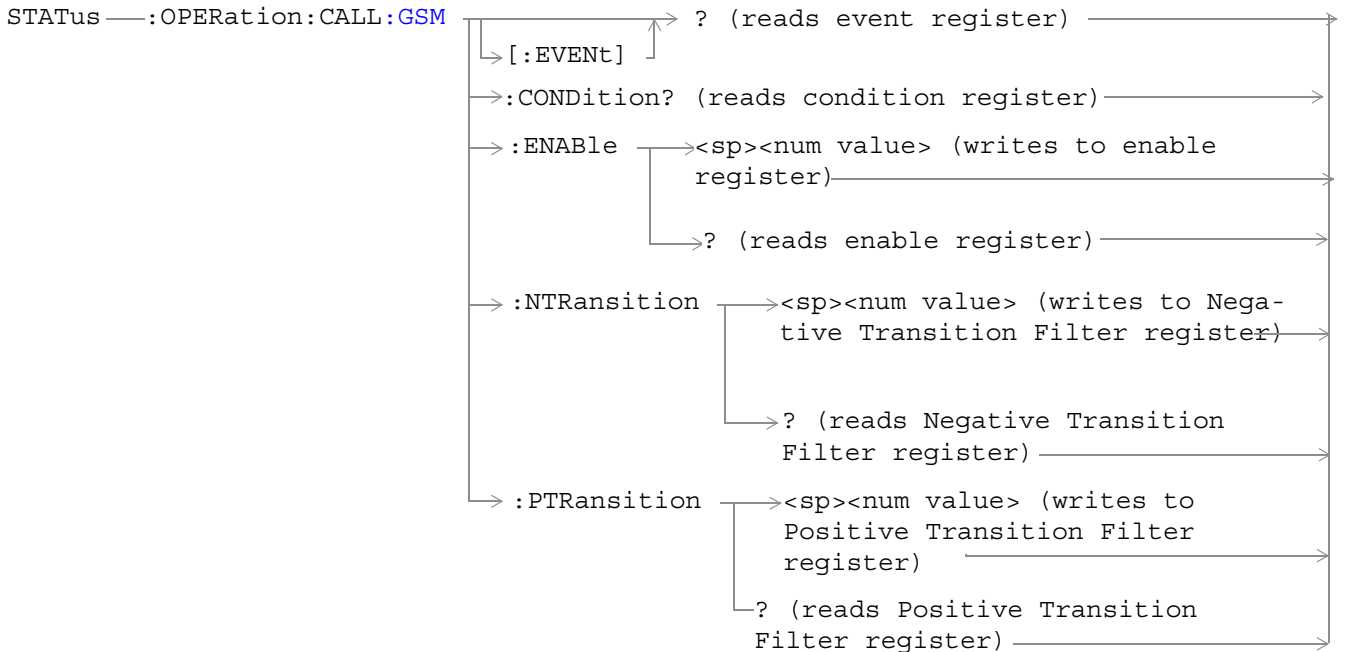


These commands are not applicable to GPRS.

## STATUS:OPERation

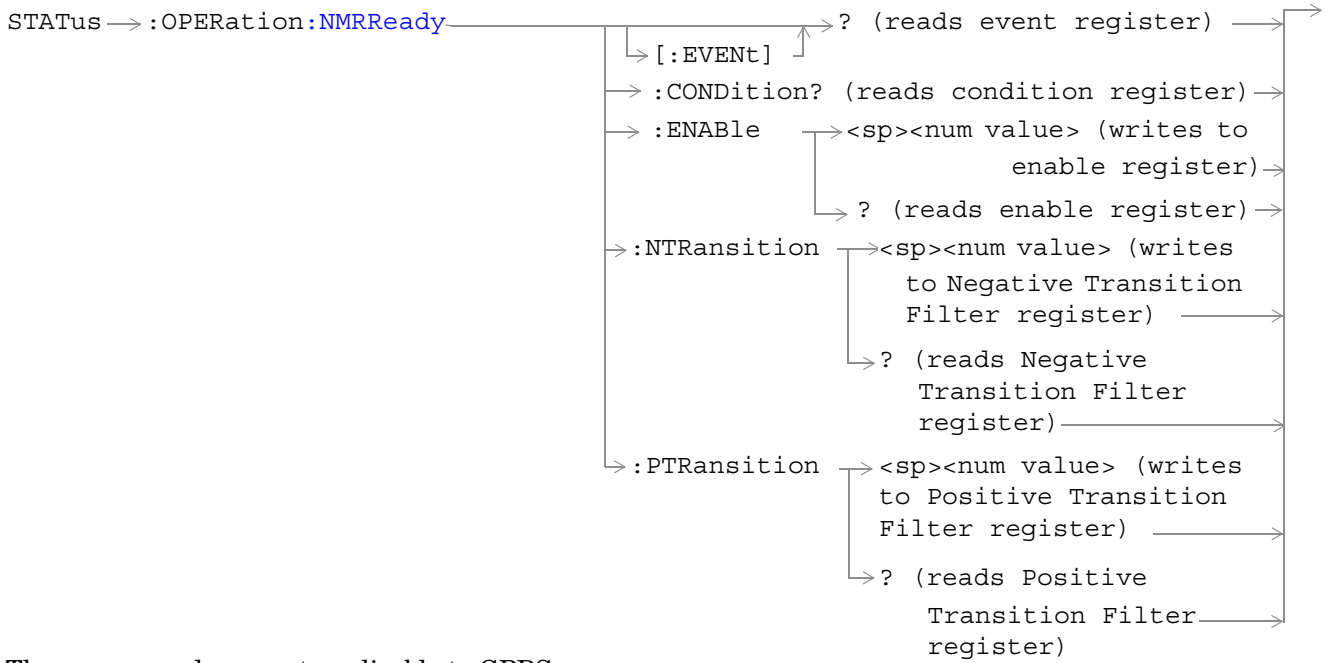


These commands are not applicable to GPRS.



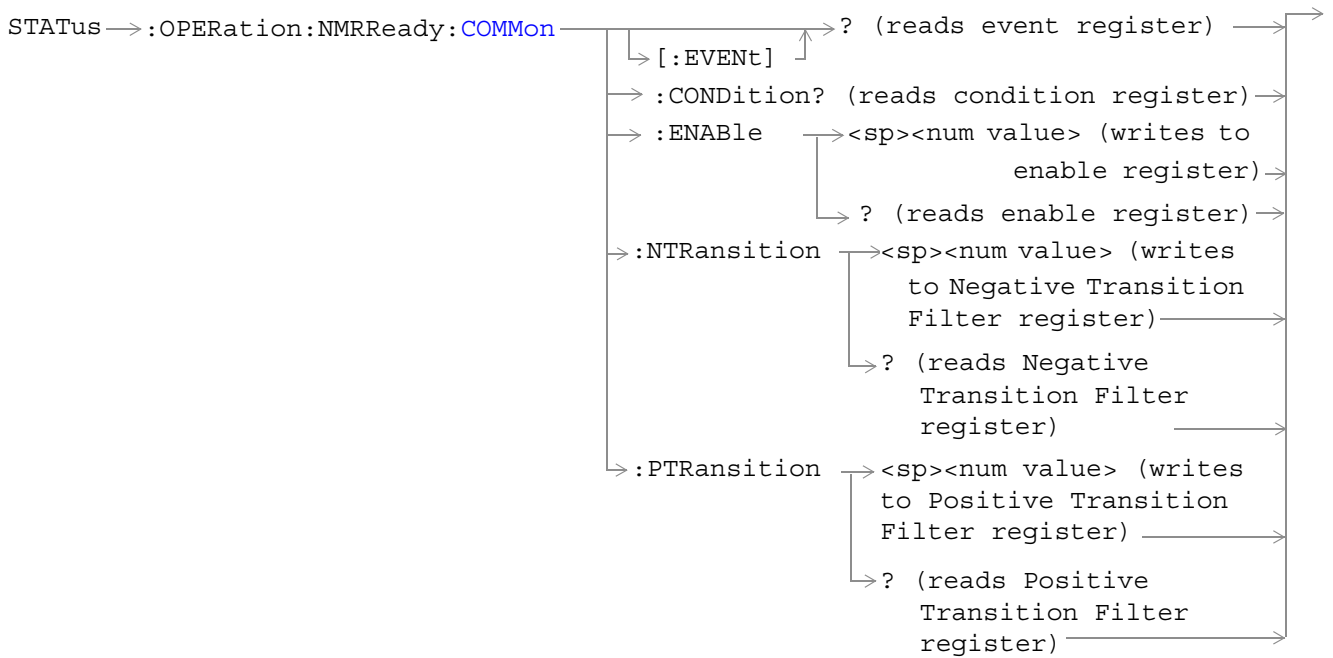
These commands are not applicable to GPRS.



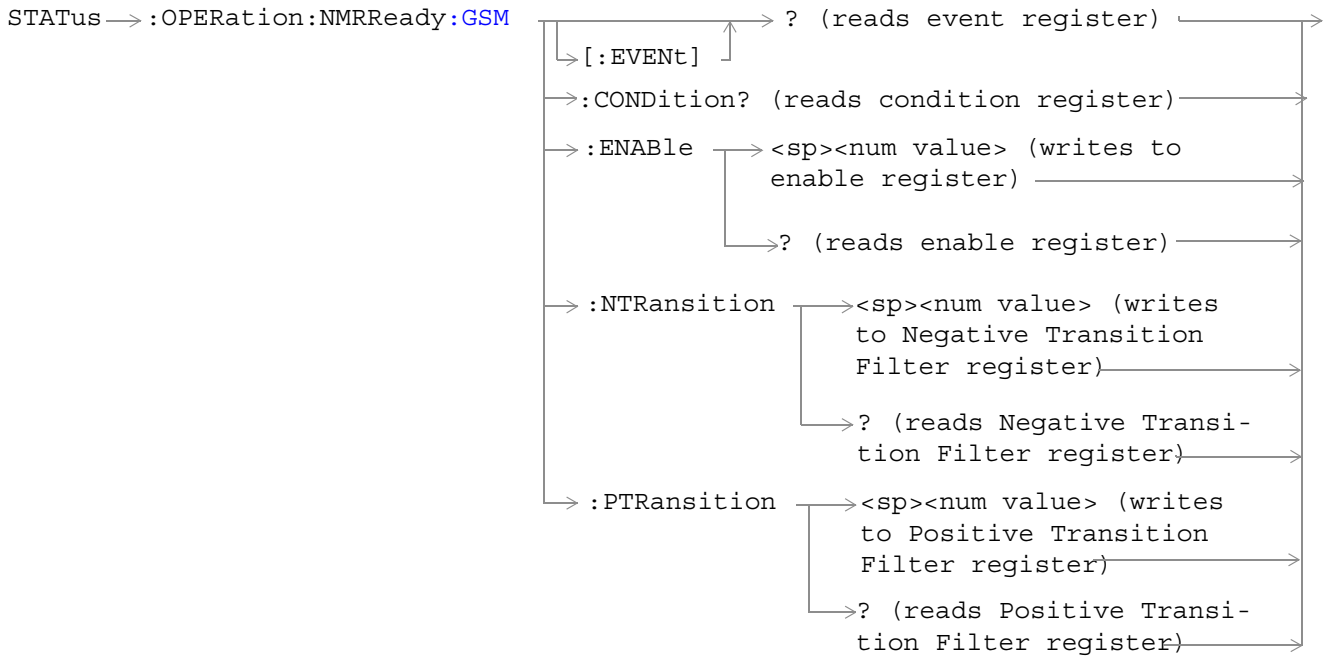


These commands are not applicable to GPRS.

## STATUS:OPERation



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

**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.

**Program Examples - STATus:OPERation**

```
OUTPUT 714;"STATUS:OPERATION:EVENT?" !Queries and clears the Operation
!Event Register
OUTPUT 714;"STATUS:OPERATION:CONDITION?" !Queries and clears the Operation
!Condition Register
OUTPUT 714;"STATUS:OPERATION:ENABLE 1024" !Sets the Operation
!Enable
!Register for bit 10
OUTPUT 714;"STATUS:OPERATION:NTRANSITION 2" !Sets the Operation
!Negative Transition
!Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:PTRANSITION 2" !Sets the Operation
!Positive Transition
!Filter Register for bit 1
```

**STATUS:OPERation:CALL Condition Register Bit Assignment**

The STATUS:OPERation:CALL register bits will be used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:GSM register.
1	2	COMMon Summary bit	This bit is the summary bit for the STATUS:OPERation:CALL:COMMon register.
0	1	Extension Bit	This bit will always be 0.

**Program Examples - STATUS:OPERation:CALL**

```

OUTPUT 714;"STATUS:OPERATION:CALL:EVENT?" !Queries and clears the Operation Call Event
!Register
OUTPUT 714;"STATUS:OPERATION:CALL:CONDITION?" !Queries and clears the Operation Call
!Condition Register
OUTPUT 714;"STATUS:OPERATION:CALL:ENABLE 4" !Sets the Operation Call Enable
!Register for bit 2
OUTPUT 714;"STATUS:OPERATION:CALL:NTR 4" !Sets the Negative Transition Filter
!Register for bit 2
OUTPUT 714;"STATUS:OPERATION:CALL:PTR 256" !Sets the Positive Transition Filter
!Register for bit 8
    
```

**STATUS:OPERation:CALL:COMMON Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:OPERation:CALL:COMMON register bits will be used to indicate status of processes that occur during normal call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.)	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Registering (MS initiated)	This bit is set to a 1 when the Mobile Station initiates registration.
9	512	Registering (BS initiated)	This bit is set to a 1 when the Base Station initiates registration.
8	256	Reserved for future use.	This bit will always be 0.
7	128	BS Originating	This bit will be a 1 when: <ul style="list-style-type: none"> <li>• Active Cell mode - the call processing state leaves the idle state</li> <li>• Test mode - the test set has noted a base station origination.</li> </ul>
6	64	Call Control Status Changing	This bit is set to a 1 when the call control status change detector has been armed.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Call Control Status Alerting	This bit will be a 1 when the test set is in the call alerting state (ringing).
2	4	Call Control Status Connected	This bit will be a 1 when the test set is in the call connected state.
1	2	Call Control Status Idle	This bit will be a 1 when the test set is in the call idle state.
0	1	Extension Bit	This bit will always be 0.

## STATUS:OPERation

### Program Examples STATUS:OPERation:CALL:COMMON

```
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:EVENT?" !Queries and clears the Operation
!Call
!Common Event Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:CONDITION?" !Queries and clears the Operation
!Call
!Common Condition Register
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:ENABLE 1024" !Sets the Operation
!Call
!Common Enable
!Register for bit 10
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:NTRANSITION 2" !Sets the Operation
!Call
!Common Negative Transition
!Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:CALL:COMMON:PTRANSITION 2" !Set the Operation
!Call
!Common Positive Transition
!Filter Register for bit 1
```



### STATUS:OPERation:CALL:GSM Condition Register Bit Assignment

The STATUS subsystem is not applicable to GPRS.

The STATUS:OPERation:CALL:GSM register bits will be used to indicate status of processes that occur during normal GSM call processing operations.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	BS Disconnecting	This bit will be a 1 when: <ul style="list-style-type: none"> <li>Active Cell mode - the call processing state reaches (or is in) the idle state</li> <li>Test mode - the test set has noted a base station termination.</li> </ul>
7	128	BS Originating	This bit will be a 1 when: <ul style="list-style-type: none"> <li>Active Cell mode - the call processing state leaves the idle state</li> <li>Test mode - the test set has noted a base station origination.</li> </ul>
6	64	Call Control Status Changing	This bit is set to a 1 when the call control status change detector has been armed.
5	32	TCH Assignment in Progress	This bit will be a 1 when: <ul style="list-style-type: none"> <li>The channel assignment is successfully completed (when a call is established).</li> <li>The test set notes a change in the TCH ARFCN, cell band, TCH timeslot, or mobile station timing advance.</li> <li>An error message is generated.</li> </ul>
4	16	BCH Changing	This bit will be a 1 when: <ul style="list-style-type: none"> <li>The downlink signal is transmitting on the new broadcast channel.</li> <li>The test set has noted a change in cell band.</li> </ul>

**STATUS:OPERation**

Bit Number	Binary Weighting	Condition	Description
3	8	Call Control Status Alerting	This bit will be a 1 when the test set is in the call alerting state (ringing).
2	4	Call Control Status Connected	This bit will be a 1 when the test set is in the call connected state.
1	2	Call Control Status Idle	This bit will be a 1 when the test set is in the call idle state.
0	1	Extension Bit	This bit will always be 0.

**Program Examples - STATUS:OPERation:CALL:GSM**

```

OUTPUT 714;"STATUS:OPERATION:CALL:GSM:EVENT?" !Queries and clears the Operation
!Call GSM Event Register
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:CONDITION?" !Queries and clears the Operation
!Call GSM Condition Register
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:ENABLE 1024" !Sets the Operation
!Call GSM Enable
!Register for bit 10
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:NTRANSITION 2" !Sets the Operation
!Call GSM Negative Transition
!Filter Register for bit 1
OUTPUT 714;"STATUS:OPERATION:CALL:GSM:PTRANSITION 2" !Sets the Operation
!Call GSM Positive Transition
!Filter Register for bit 1

```

### STATUS:OPERation:NMRReady Condition Register Bit Assignment

The STATUS:OPERation:NMRReady register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary bit for the OPERation:NMRReady:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary bit for the OPERation:NMRReady:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary bit for the OPERation:NMRReady:AMPS register.
2	4	GSM Summary bit	This bit is the summary bit for the OPERation:NMRReady:GSM register.
1	2	COMMon Summary bit	This bit is the summary bit for the OPERation:NMRReady:COMMon register.
0	1	Extension Bit	This bit will always be 0.

## 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 subsystem is not applicable to GPRS.

The STATus:OPERation:NMRReady:COMMon register bits indicate when a measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	Audio Analyzer	This is the summary bit for the STATus:OPERation:NMRReady:COMMon Audio Analyzer register.
0	1	Extension Bit	This bit will always be 0.

## 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 subsystem is not applicable to GPRS.

The STATus:OPERation:NMRReady:GSM register bits indicate when a GSM measurement has been completed and new measurement results are available.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	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 <a href="#">“Triggering of Measurements” on page 219</a> .
10	1024	DPOWER New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219</a> .
9	512	I/Q Tuning New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219</a> .
8	256	BERRor New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219</a> .
7	128	FBERRor New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219</a> .
6	64	DAUDio New Measurement Result Ready	This bit will be a 1 if the measurement has been completed and has produced new results.  This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219</a> .

Bit Number	Binary Weighting	Condition	Description
5	32	AAUDio New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219.</a></p>
4	16	ORFSpectrum New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219.</a></p>
3	8	PFERror New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219.</a></p>
2	4	PVTime New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219.</a></p>
1	2	TXPower New Measurement Result Ready	<p>This bit will be a 1 if the measurement has been completed and has produced new results.</p> <p>This bit will be a zero at power on, after a preset and while a measurement is in Measuring States. See <a href="#">“Triggering of Measurements” on page 219.</a></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**

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["Triggering of Measurements" on page 219](#)

\*\*\*\*\*

## STATus:PRESet

STATus → :PRESet

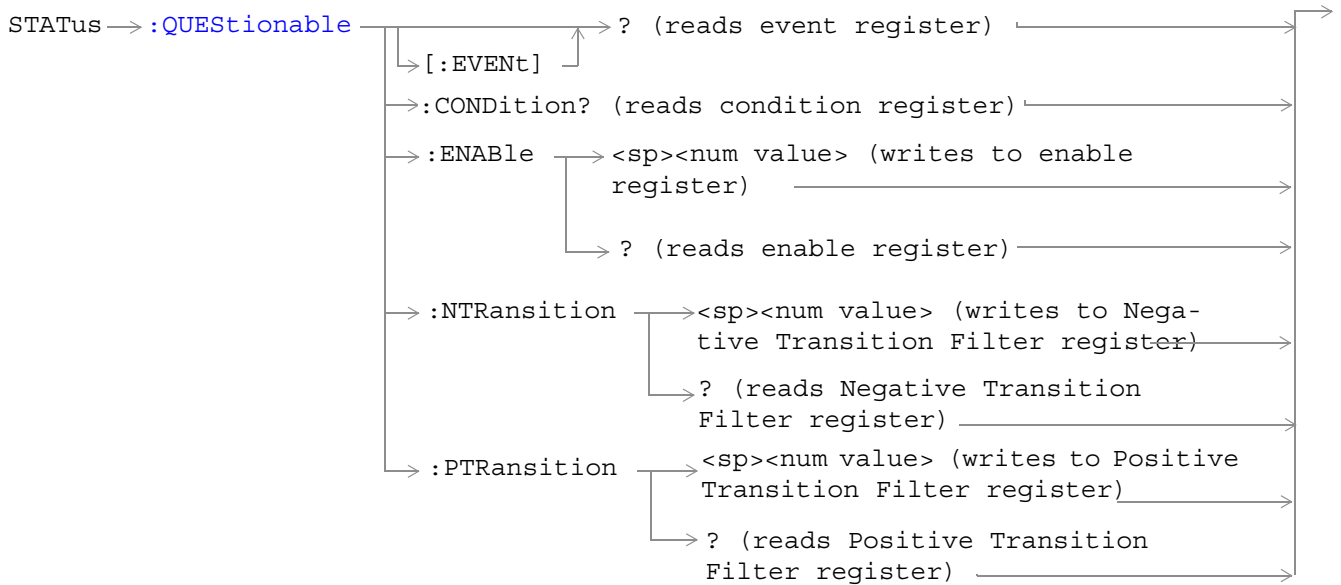
This command is not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

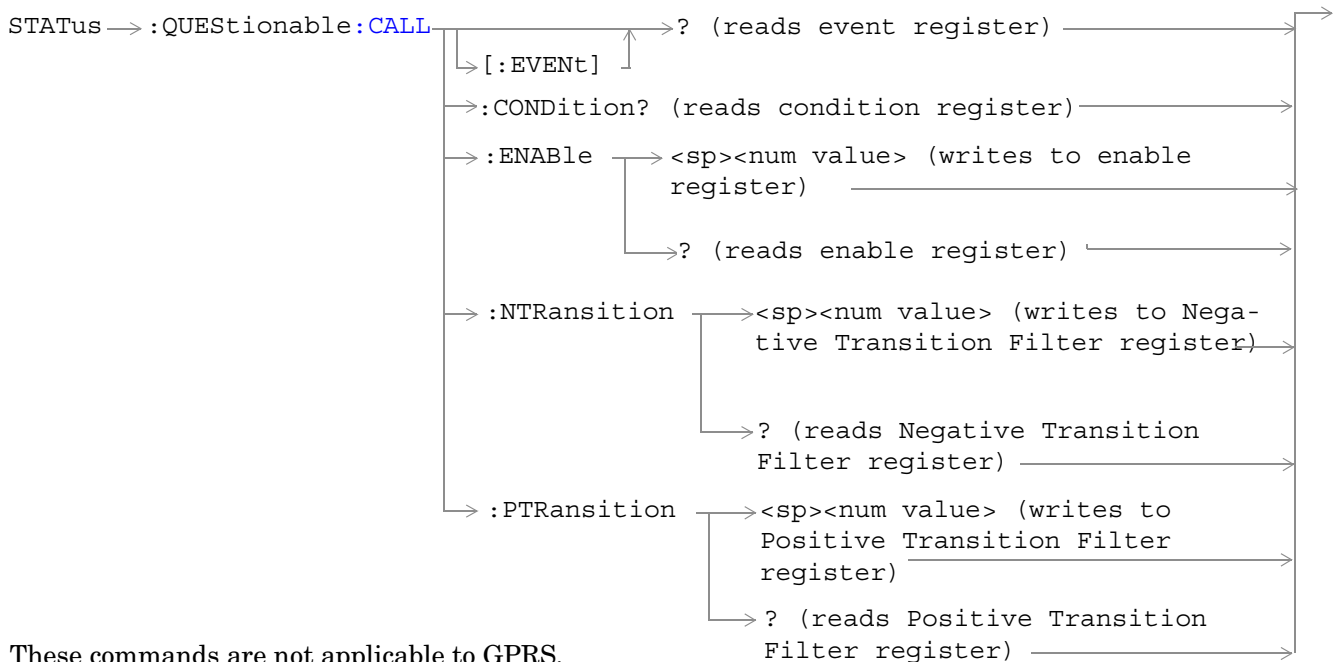
### STATus:PRESet

Function	GSM	Presets the Status Subsystem Sets all Enable Registers to 0 (not enabled). Sets all Positive Transition Registers (PTR) to 1 (positive transitions enabled). Sets all Negative Transition Registers (NTR) to 0 (negative transitions disabled).
	GPRS	This command is not applicable to GPRS.

## STATUS:QUESTIONABLE

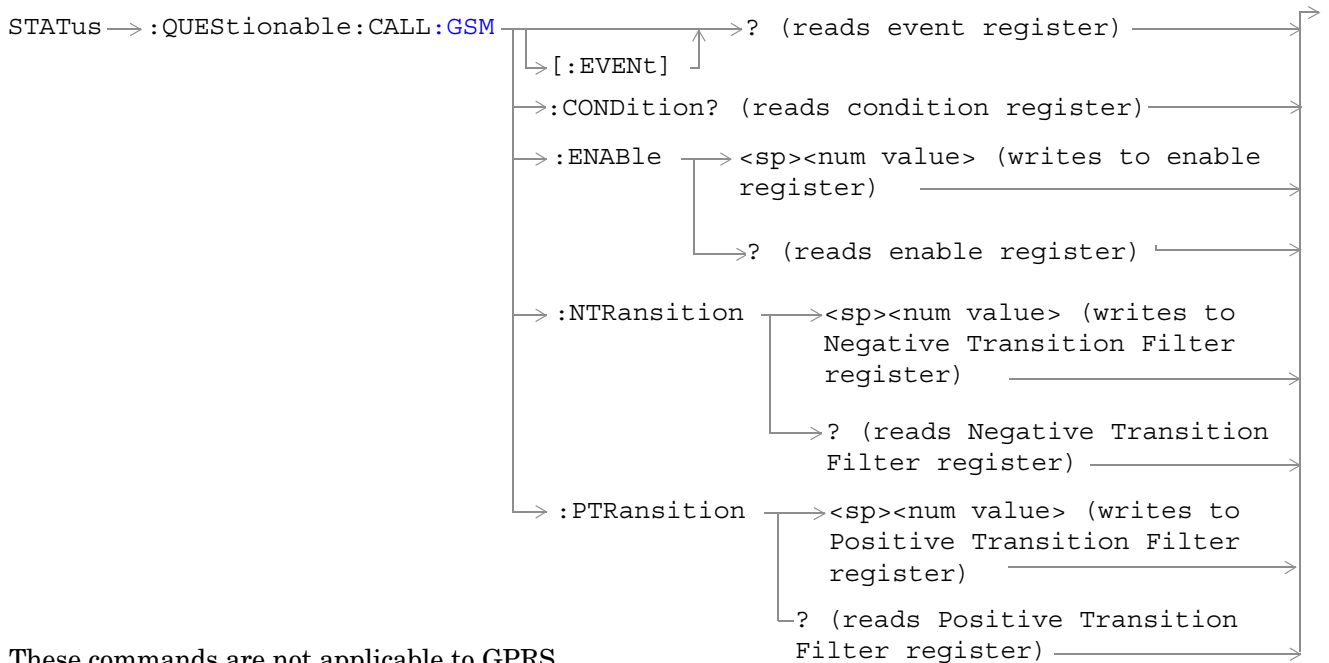


These commands are not applicable to GPRS.

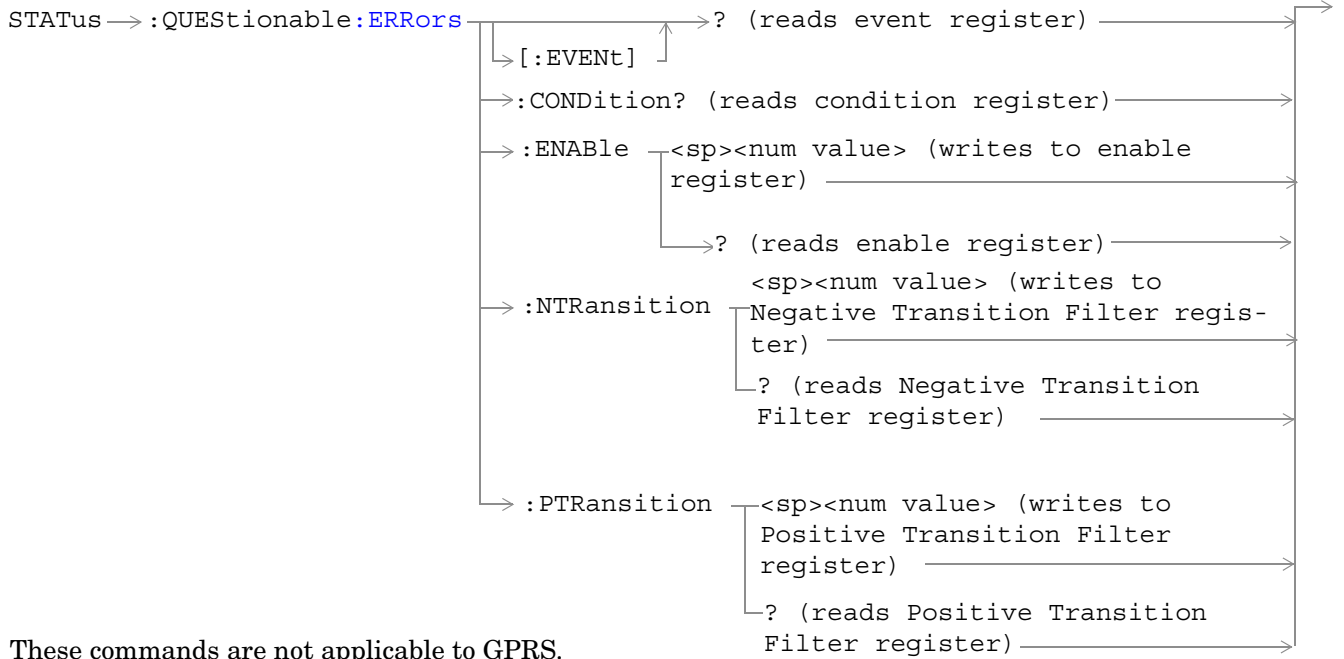


These commands are not applicable to GPRS.

## STATUS:QUESTIONable

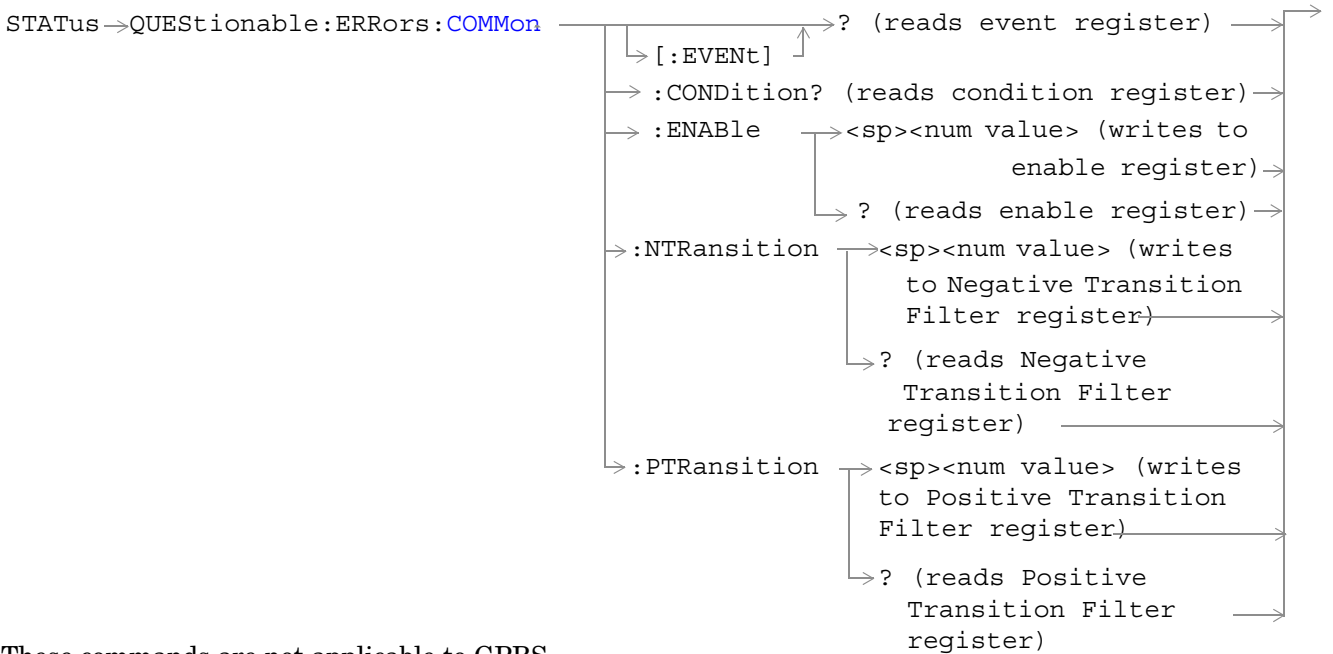


These commands are not applicable to GPRS.

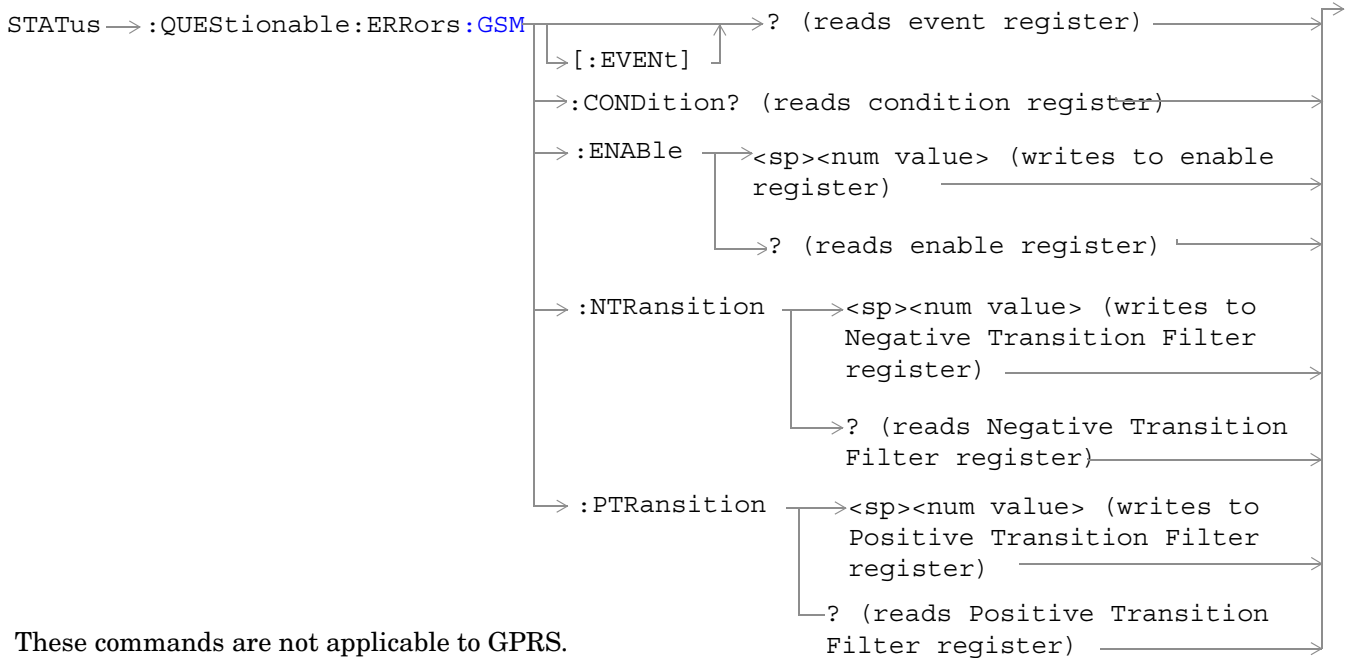


These commands are not applicable to GPRS.

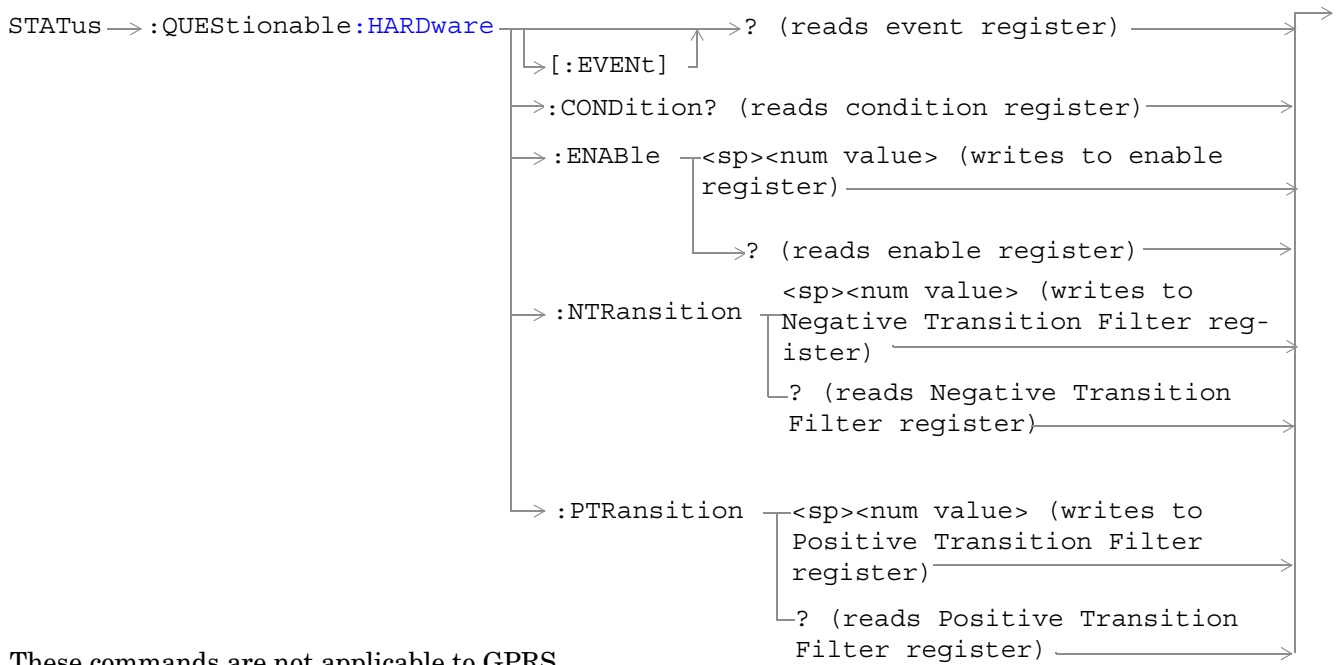
## STATUS:QUESTIONable



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### STATUS:QUESTIONable Condition Register Bit Assignment

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONable register contains bits which give an indication that the data currently being acquired or generated is of questionable quality due to some condition affecting the functionality associated with that bit.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be set to 0.
11	2048	QUESTIONable:HARDware summary	This bit is the summary message bit for the STATUS:QUESTIONable:HARDware register.
10	1024	QUESTIONable:CALL summary	This bit is the summary message bit for the STATUS:QUESTIONable:CALL register.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Reserved for future use.	This bit will always be 0.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	QUESTIONable:ERRors summary	This bit is the summary message bit for the STATUS:QUESTIONable:ERRors register.
0	1	Reserved for future use.	This bit will always be 0.

### Program Example - STATUS:QUESTIONable Condition Register Bit Assignment

```

OUTPUT 714;"STATUS:QUESTIONABLE:EVENT?" !Queries and clears the Questionable Event
!Register
OUTPUT 714;"STATUS:QUESTIONABLE:CONDITION?" !Queries and clears the Questionable Condition
!Register
OUTPUT 714;"STATUS:QUESTIONABLE:ENABLE 1024" !Sets the Questionable Enable Register
!for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:NTRANSITION 2" !Sets the Questionable Negative
!Transition Filter Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:PTRANSITION 2" !Sets the Questionable Positive
!Transition Filter Register for bit 1
    
```



**STATUS:QUESTIONABLE:CALL Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:CALL registers will contain information about which event(s) occurred during call processing that indicate what call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:GSM register.
1	2	COMMON Summary bit	This bit is the summary message bit for the STATUS:QUESTIONABLE:CALL:COMMON register.
0	1	Extension Bit	This bit will always be 0.

## STATUS:QUESTIONable

### Program Example - STATUS:QUESTIONable:CALL Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:EVENT?" !Queries and clears the Questionable
          !Call Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:CONDITION?" !Queries and clears the Questionable
          !Call Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:ENABLE 1024" !Sets the Questionable
          !Call Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:NTRANSITION 2" !Sets the Questionable Call
          !Negative Transition Filter Register
          !for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:CALL:PTRANSITION 2" !Sets the Questionable Call
          !Positive Transition Filter Register
          !for bit 1
```

**STATUS:QUESTIONABLE:CALL:GSM Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:CALL:GSM registers will contain information about which event(s) occurred during GSM call processing that indicate why the call processing procedure failed.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Call disconnected: Channel Mode not supported	This bit is a 1 if the mobile station is not capable of supporting the selected channel mode.
8	256	Identification failure	This bit is a 1 if the identity request timer (T3270) has expired. The timer expires if the mobile does not respond to identity request message, within 5 seconds.
7	128	Channel Assignment exceeded specified number of frames	This bit is a 1 if the channel assignment exceeded the specified number of frames.
6	64	Call disconnected: No Response to Page	This bit is a 1 if the paging timer (T3113) has expired. The timer expires if the mobile does not respond to a paging request message, within 5 seconds.
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:ERRORS Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:ERRORS register bits will be used to indicate information about test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	TA136 Summary bit	This bit is the summary message bit for the QUESTIONABLE:ERRORS:TA136 register.
4	16	DIGital136 Summary bit	This bit is the summary message bit for the QUESTIONABLE:ERRORS:DIGital136 register.
3	8	AMPS Summary bit	This bit is the summary message bit for the QUESTIONABLE:ERRORS:AMPS register.
2	4	GSM Summary bit	This bit is the summary message bit for the QUESTIONABLE:ERRORS:GSM register.
1	2	COMMon Summary bit	This bit is the summary message bit for the QUESTIONABLE:ERRORS:COMMon register.
0	1	Extension Bit	This bit will always be 0.

## STATUS:QUESTIONable

### Program Example - STATUS:QUESTIONable:ERRORs Condition Register Bit Assignment

```
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:EVENT?" !Queries and clears the Questionable
!Errors Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:CONDITION?" !Queries and clears the Questionable
!Errors Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:ENABLE 1024" !Sets the Questionable
!Errors Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:NTRANSITION 2" !Sets the Questionable Errors
!Negative Transition Filter Register
!for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:PTRANSITION 2" !Sets the Questionable Errors
!Positive Transition Filter Register
!for bit 1
```

**STATUS:QUESTIONABLE:ERRORS:COMMON Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:ERRORS:COMMON register bits will be used to indicate information about the COMMON test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	+900 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.

STATUS:QUESTIONable

Bit Number	Binary Weighting	Condition	Description
4	16	+400 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
3	8	+300 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONable:ERRORs:COMMON Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:EVENT?" !Queries and clears the Questionable
!Errors Common Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:CONDITION?" !Queries the and clears the
!Questionable Errors
!Common Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:ENABLE 1024" !Sets the Questionable
!Errors Common Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:NTRANSITION 2" !Sets the Questionable Errors
!Common Negative Transition
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:COMMON:PTRANSITION 2" !Sets the Questionable Errors
!Common Positive Transition
!Register for bit 1

```



**STATUS:QUESTIONABLE:ERRORS:GSM Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:ERRORS:GSM register bits will be used to indicate information about GSM test set device-specific errors (positive error numbers).

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	+900 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +900 to +999 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
8	256	+800 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +800 to +899 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
7	128	+700 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +700 to +799 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
6	64	+600 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +600 to +699 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
5	32	+500 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +500 to +599 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.

STATUS:QUESTIONable

Bit Number	Binary Weighting	Condition	Description
4	16	+400 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +400 to +499 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
3	8	+300 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +300 to +399 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
2	4	+200 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +200 to +299 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
1	2	+100 Errors	The condition bit will be pulsed to a 1 and immediately back to 0 if an error in the +100 to +199 range occurs. After setting the Positive Transition Filter and the Negative Transition Filter you may query the Event Register to find out which of these errors occurred.
0	1	Extension Bit	This bit will always be 0.

**Program Example - STATUS:QUESTIONable:ERRORs:GSM Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:EVENT?" !Queries and clears the Questionable
!Errors GSM Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:CONDITION?" !Queries and clears the Questionable
!Errors Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:ENABLE 1024" !Sets the Questionable
!Errors Enable Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:NTRANSITION 2" !Sets the Questionable Errors
!GSM Negative Transition Filter Register
!for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:ERRORS:GSM:PTRANSITION 2" !Sets the Questionable Errors
!GSM Positive Transition Filter Register
!for bit 1

```

**STATUS:QUESTIONABLE:HARDWARE Condition Register Bit Assignment**

The STATUS subsystem is not applicable to GPRS.

The STATUS:QUESTIONABLE:HARDWARE register bits give an indication that the data/signals currently being acquired or generated are of questionable quality.

Bit Number	Binary Weighting	Condition	Description
15	32768	Not Used. Defined by SCPI.	This bit will always be 0.
14	16384	Reserved for future use.	This bit will always be 0.
13	8192	Reserved for future use.	This bit will always be 0.
12	4096	Reserved for future use.	This bit will always be 0.
11	2048	Reserved for future use.	This bit will always be 0.
10	1024	Reserved for future use.	This bit will always be 0.
9	512	Reserved for future use.	This bit will always be 0.
8	256	Reserved for future use.	This bit will always be 0.
7	128	Reserved for future use.	This bit will always be 0.
6	64	Reserved for future use.	This bit will always be 0.
5	32	Reserved for future use.	This bit will always be 0.
4	16	Power-up Self Test(s) Failed	This bit will be a 1 if the power-up self tests failed.
3	8	Reserved for future use.	This bit will always be 0.
2	4	Reserved for future use.	This bit will always be 0.
1	2	Reserved for future use.	This bit will always be 0.
0	1	Extension Bit.	This bit will always be 0.

**Program Example - STATUS:QUESTIONABLE:HARDWARE Condition Register Bit Assignment**

```

OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:EVENT?" !Queries and clears the Questionable
!Hardware Event Register
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:CONDITION?" !Queries and clears the Questionable
!Hardware Condition Register
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:ENABLE 1024" !Sets the Questionable
!Hardware Enable
!Register for bit 10
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:NTRANSITION 2" !Sets the Questionable
!Hardware Negative Transition Filter
!Register for bit 1
OUTPUT 714;"STATUS:QUESTIONABLE:HARDWARE:PTRANSITION 2" !Sets the Questionable
!Hardware Positive Transition Filter
!Register for bit 1
    
```

## Status Byte Register

### \*STB?

\*STB? 

### NOTE NOTE

The Status Byte Register can also be read with a serial poll. For example, the command “Status\_byte = SPOLL(714)” would perform a serial poll of the Status Byte Register, returning and releasing RQS (bit 6).

### Status Byte Register Bit Assignments

Note that only certain bit numbers in the Status Byte Register are applicable to GPRS as indicated in the “Description” column in the table below.

Bit Number	Binary Weighting	Label	Description
7	128	STATus: OPERation	This bit number is not applicable to GPRS. Summarizes the STATus: OPERation Status Register, which fans out to the NMRReady and CALL Status Registers.
6	64	RQS (SRQ TRUE?)/Master Summary Status	RQS is read by a serial poll (SPOLL). Master Summary Status is read by a *STB? query - defined by IEEE 488.2
5	32	Standard Event Status Register	Summarizes the Standard Event Status Register
4	16	Message Available	SCPI - Defined
3	8	STATus: QUESTionable Status Register	This bit number is not applicable to GPRS. Summary Message comes from the STATus: QUESTionable Status Register, which fans out to the CALL and HARDware Status Registers.
2	4	Error/ Event Queue	SCPI - Defined
1	2	Reserved	
0	1	Reserved	

### Program Example - Status Byte Register Bit Assignments

```
OUTPUT 714;”*STB?” !Queries the Status Byte.
```

---

## Standard Event Status Register

### \*ESR?

\*ESR? → Reads and clears the Std Event Status Register. ↗

### \*ESE?

\*ESE? → Reads the Std Event Status Register Enable Register ↗

### \*ESE

\*ESE → Writes to the Std Event Status Register Enable Register ↗

[“Diagram Conventions” on page 343](#)

## Standard Event Status Register Bit Assignment

Bit Number	Binary Weighting	Condition	Description
15	32768	Reserved by IEEE.	This bit will always be 0.
14	16384	Reserved by IEEE.	This bit will always be 0.
13	8192	Reserved by IEEE.	This bit will always be 0.
12	4096	Reserved by IEEE.	This bit will always be 0.
11	2048	Reserved by IEEE.	This bit will always be 0.
10	1024	Reserved by IEEE.	This bit will always be 0.
9	512	Reserved by IEEE.	This bit will always be 0.
8	256	Reserved by IEEE.	This bit will always be 0.
7	128	Power On	This bit is set to 1 if the power supply has been turned off and on since the last time this register was read or otherwise cleared. Defined in "IEEE Std. 488.2-1992", 11.5.1.1.2
6	64	Reserved for future use.	This bit will always be 0.
5	32	Command Error	This bit is set to 1 if the test set detects an error while trying to process a command. The following events cause a command error: <ul style="list-style-type: none"> <li>• An IEEE 488.2 syntax error. The test set received a message that did not follow the syntax defined by the standard.</li> <li>• A semantic error. For example the test set received an incorrectly spelled command.</li> <li>• The test set received a group execution trigger (GET) inside a program message</li> </ul>
4	16	Execution Error	This bit is set to 1 if the test set detects an error while trying to execute a command. The following events cause a execution error: <ul style="list-style-type: none"> <li>• A &lt;PROGRAM DATA&gt; element received in a command is outside the legal range for the test set, or it is inconsistent with the operation of the test set.</li> <li>• The test set could not execute a valid command due to some test set hardware/firmware condition.</li> </ul>
3	8	Device Dependent Error	This bit is set to 1 if a test set operation does not execute properly due to an internal condition (such as, overrange). This bit indicates that the error was not a command, query, or execution error.

Bit Number	Binary Weighting	Condition	Description
2	4	Query Error	<p>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:</p> <ul style="list-style-type: none"> <li>• An attempt is made to read data from the output queue when no data is present or is pending.</li> <li>• Data in the output queue has been lost. An example of this would be an output queue overflow.</li> </ul>
1	2	Reserved for future use.	This bit will always be 0.
0	1	Operation Complete	This bit is set to 1 when the test set has completed all pending operations and is ready to accept new commands. This bit is only generated in response to the *OPC IEEE 488.2 common command.

### Program Example - Standard Event Status Register

```
OUTPUT 714;"*ESR?" !Queries (reads) the Standard Event Status Register.
```

---

## SYSTEM Subsystem

### Description

The SYSTEM subsystem performs system level configuration functions of the test set.

### Syntax Diagrams and Command Descriptions

[“SYSTEM:APPLication” on page 705](#)

[“SYSTEM:BEEPer” on page 711](#)

[“SYSTEM:COMMunicate” on page 712](#)

[“SYSTEM:CONFigure” on page 715](#)

[“SYSTEM:CORRection” on page 716](#)

[“SYSTEM:CURRent:TA” on page 722](#)

[“SYSTEM:ERRor?” on page 724](#)

[“SYSTEM:FTRigger” on page 725](#)

[“SYSTEM:MEASurement” on page 728](#)

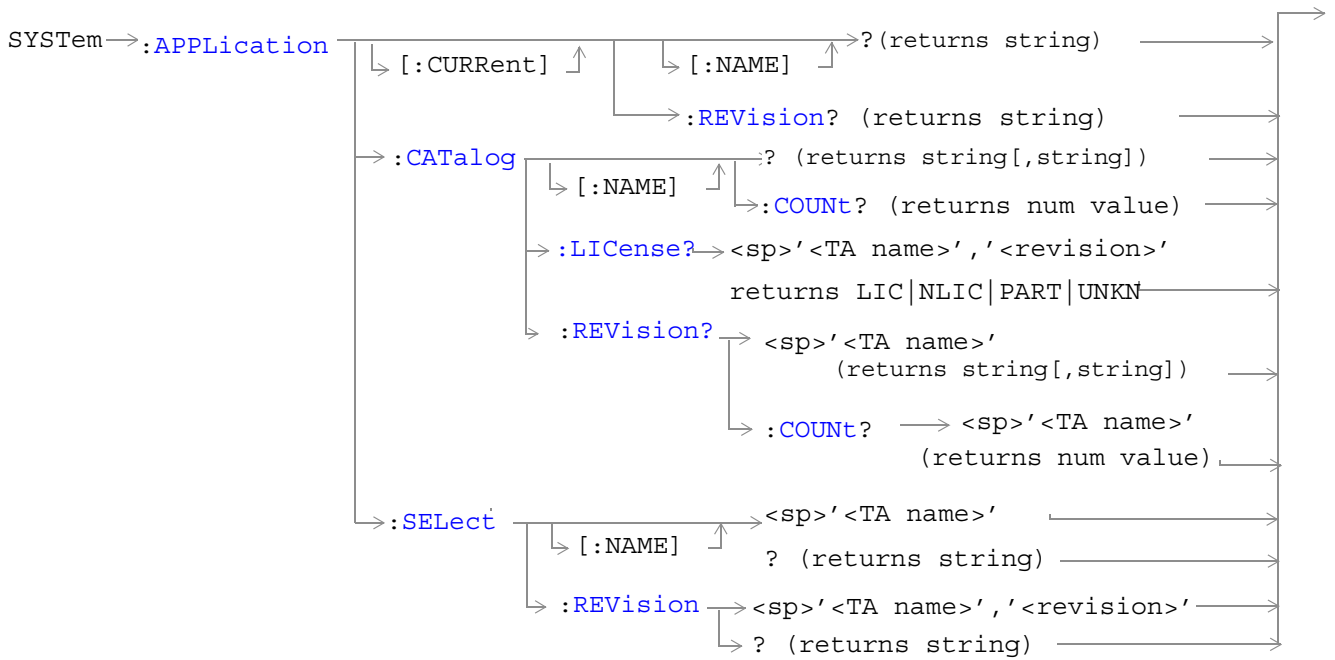
[“SYSTEM:PRESet” on page 729](#)

[“SYSTEM:ROSCillator” on page 731](#)

[“SYSTEM:SYNChronized” on page 732](#)



# SYSTem:APPLication



“Diagram Conventions” on page 343

**SYSTem:APPLication:CATalog:LIcense? '<test application name>','<revision>'**

Function	GSM	Query the license status for a selected revision.
	GPRS	<p>The query must include two strings separated by a comma. The test application name and revision must be entered as they appear in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <p>The returned values are:</p> <ul style="list-style-type: none"> <li>• "LIC" indicates this is a licensed test application.</li> <li>• "NLIC" indicates this is not a licensed test application.</li> <li>• "PART" only part of the test application with multiple radio formats is licensed</li> <li>• "UNKN" indicates that license status is unknown.</li> </ul>
Query		Range: LIC   NLIC   PART   UNKN
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:LICENSE? 'GSM mobile test','A.04.00'"</pre>		

**SYSTem:APPLication:CATalog:REVisIon? '<test application name>'**

Function	GSM	Query the test set for all of the revision numbers stored on the test set's hard drive. You must specify a test application.
	GPRS	<p>The test application name must be entered as it appears in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p>
Query		Range: One or more comma separated strings or a null string
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION? 'AMPS/136 MOBILE TEST'"</pre>		

**SYSTem:APPLication:CATalog:REVision:COUNT? '<test application name>'**

Function	GSM	Query the test set for the number of revisions present on the hard disk for a specified test application. Up to 30 revisions can be stored for a test application.
	GPRS	The test application name must be entered as it appears in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.
Query		Range: 0 through 30
Programming Example		
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:REVISION:COUNT? 'AMPS/136 MOBILE TEST' "		

**SYSTem:APPLication:CATalog[:NAME]?**

Function	GSM	Query the test set for all of the names of the test applications stored on the hard drive.
	GPRS	This query returns one or more strings, each string is separated by a comma.
Query		Range: AMPS/136 Mobile Test CDMA 2000 Mobile Test GSM Mobile Test GSM/GPRS Mobile Test
Programming Example		
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME?"		

**SYSTem:APPLication:CATalog[:NAME]:COUNT?**

Function	GSM	Query the test set for the total number test application names stored on the hard drive. Up to 30 test applications can be stored.
	GPRS	
Query		Range: 0 through 30
Programming Example		
OUTPUT 714;"SYSTEM:APPLICATION:CATALOG:NAME:COUNT?"		

**SYSTem:APPLication[:CURRent][:NAME]?**

Function	GSM	Query the test set for the name of the currently running test application.
	GPRS	
Query		Range: Any string up to 25 characters including null. AMPS/136 Mobile Test CDMA 2000 Mobile Test GSM Mobile Test GSM/GPRS Mobile Test null string
Programming Example OUTPUT 714 ; "SYSTEM:APPLICATION:CURRENT:NAME?"		

**SYSTem:APPLication[:CURRent]:REVision?**

Function	GSM	Query the test set for the currently running test application revision number.
	GPRS	
Query		Range: Any string up to 20 characters including null. A typical example would be A.01.01 for a licensed version.
Programming Example OUTPUT 714 ; "SYSTEM:APPLICATION:CURRENT:REVISION?"		

**SYSTem:APPLication:SElect[:NAME] '<test application name>'**

Function	GSM	<p>Selects a test application and reboots the test set. This will switch the test application to the revision already selected. There is no need to re-select the revision before switching. The reboot process takes about 1 minute.</p> <p>Queries the test set for the test application that is selected and will run after the next reboot of the test set.</p> <p>The test application name must be entered as it appears in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <hr/> <p><b>NOTE</b>           Selecting the correct name and the desired revision of a test application is important. This information should be reviewed before proceeding. The directions for how to determine test application name and revision are found in this document.</p> <hr/>
	GPRS	
Setting	<p>Range:</p> <p>AMPS/136 Mobile Test</p> <p>CDMA 2000 Mobile Test</p> <p>GSM Mobile Test</p> <p>GSM/GPRS Mobile Test</p>	
Query	<p>Range:</p> <p>AMPS/136 Mobile Test</p> <p>CDMA 2000 Mobile Test</p> <p>GSM Mobile Test</p> <p>GSM/GPRS Mobile Test</p> <p>null string</p>	
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME `AMPS/136 MOBILE TEST`"</pre> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:NAME?"</pre>		

**SYSTem:APPLication:SElect:REVision '<test application name>','<revision>'**

Function	GSM	<p>Selects a test application revision and a test application.</p> <p>The revision does not need to be set in order to switch test applications. The only time you select revisions is to change revisions.</p> <p>Queries the test set for the revision of a specified test application.</p> <p>The test application name and revision must be entered as they appear in the test application Setup menu, with the exception that the string is not case sensitive and can be entered in any combination of upper and lower case letters.</p> <hr/> <p><b>NOTE</b> GSM Mobile Test; revisions before A.04.00 did not have test application switching and provide no way to return to revisions that have switching. Users will need to reload a revision that has test application switching following the download process for upgrading firmware.</p> <hr/>
	GPRS	
Setting	Range: A valid test application name and revision number for any licensed test application.	
Query	Range: A string up to 20 characters, or the null string.	
<p>Programming Example</p> <pre>OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION 'GSM MOBILE TEST','A.04.00'" OUTPUT 714;"SYSTEM:APPLICATION:SELECT:REVISION? 'GSM MOBILE TEST'"</pre>		

**Related Topics**

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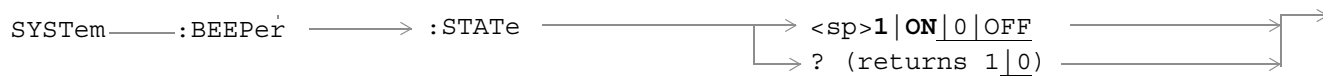
[“Test Application Switching” on page 1](#)

[“Test Application Revisions and Licenses” on page 1](#)

[“Test Application Name” on page 1](#)

\*\*\*\*\*

## SYSTem:BEEPer

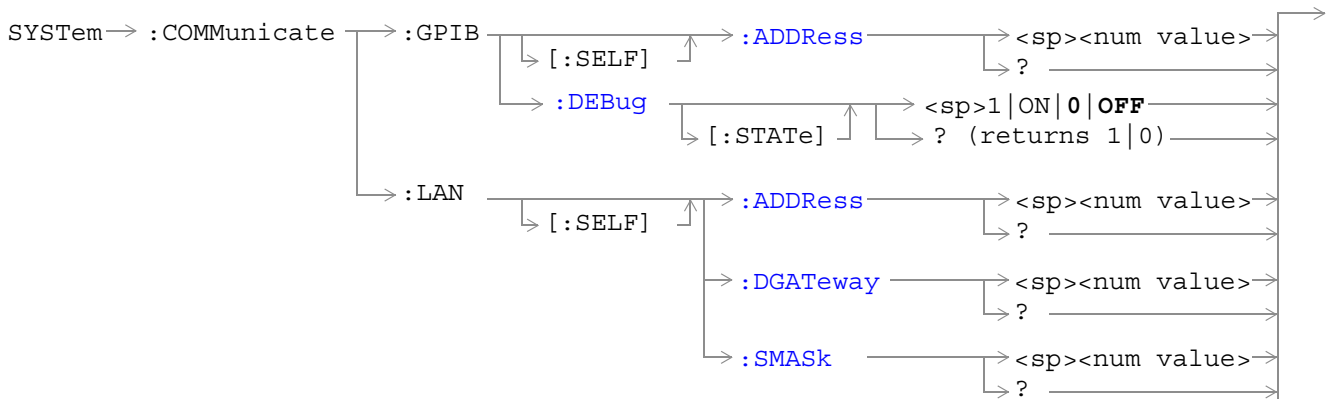


“Diagram Conventions” on page 343

### SYSTem:BEEPer:STATE

Function	GSM	Sets/queries the beeper state of the test set.
	GPRS	
Setting	0   OFF   1   ON	
Query	0   1	
*RST Setting	1   on	
Programming Example		
OUTPUT 714;"SYSTEM:BEEPER:STATE OFF" !Sets beeper state to off.		

## SYSTem:COMMunicate



[“Diagram Conventions” on page 343](#)

### 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	<a href="#">“Configuring the Test Set’s GPIB Address” on page HIDDEN</a>	
Programming Example		
<pre> OUTPUT 714;"SYSTem:COMMunicate:GPIB:SELF:ADDRESS 14" !Sets the GPIB address   !to 14.         </pre>		



**SYSTem:COMMunicate:GPIB:DEBug[:STATe]**

Function	GSM	Sets/queries the test set's SCPI debugger state.
	GPRS	When the state is on, enhanced error messages (generated from GPIB commands with syntax errors) are shown on the test set display.  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 <a href="#">"Error Messages" on page 844</a> 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.
Setting	Range: 0   OFF   1   ON	
Query	0   1	
*RST setting	0   off	
Programming Example		
OUTPUT 714;"SYSTEM:COMMUNICATE:GPIB:DEBUG:STATE ON" !Sets debugger to on.		

**SYSTem:COMMunicate:LAN[:SELf]:ADDRess**

Function	GSM	Sets/queries the test set's LAN IP address. The value of A is used to determine the subnet mask, see <a href="#">"SYSTem:COMMunicate:LAN[:SELf]:SMASK" on page 714</a> .
	GPRS	If the LAN address is changed the subnet mask should be checked to insure that it is set to the proper class for that LAN address.
Setting	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces)	
Query	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces)	
Factory setting	0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access)	
Related Topics	<a href="#">"LAN IP Address" on page 832</a>	
Programming Example		
OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELf:ADDRESS '130.015.156.255'" !Sets the !LAN IP !address.		

**SYSTEM:COMMunicate****SYSTEM:COMMunicate:LAN[:SELF]:DGATeway**

Function	GSM	Sets/queries the LAN IP router/gateway address for the test set.
	GPRS	
Setting	Range: 15 characters formatted as follows: A.B.C.D where A= 0 to 223 B,C,D = 0 to 255 (no embedded spaces), blank field	
Query	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D = 0 to 255 (no embedded spaces). blank field	
Factory setting	blank field, (this parameter is not affected by any reset operation)	
Programming Example		
OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:DGATEWAY '130.2.6.200'"		

**SYSTEM:COMMunicate:LAN[:SELF]:SMASK**

Function	GSM	Sets/queries the subnet mask of the test set based on the LAN IP address selected. The subnet mask changes according to the value of A used for the LAN IP address. If A is less than or equal to 127, the subnet mask is 255.0.0.0. If A is greater than 127 and less or equal to 191, the subnet mask is 222.255.0.0. If A is grater than 191, the subnet mask is 255.255.255.0. If the LAN address is changed the subnet mask should be checked to insure that it is set to the proper class for that LAN address.
	GPRS	
Setting	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D are between = 0 to 255 (no embedded spaces)	
Query	Range: 15 characters formatted as follows: A.B.C.D where A,B,C,D are between = 0 to 255 (no embedded spaces)	
Factory setting	0.0.0.0 (this parameter is not affected by any reset operation and can only be changed by direct user access)	
Programming Example		
OUTPUT 714;"SYSTEM:COMMUNICATE:LAN:SELF:SMASK '255.2.6.200'"		

## SYSTem:CONFigure

SYSTem→:CONFigure→:INFormation→:HARDware→:VERBoSe? → (returns model number, serial number, revision number, board ID and Cal file information) →

“Diagram Conventions” on page 343

### 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 834.
	GPRS	
*RST Setting		Resets have no effect on this information. The information is gathered during the power up cycle.

## Related Topics

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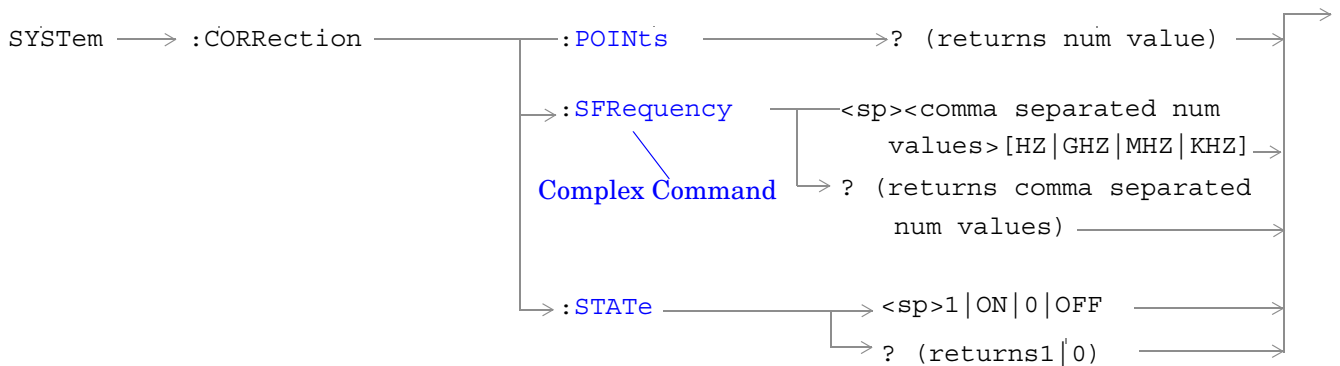
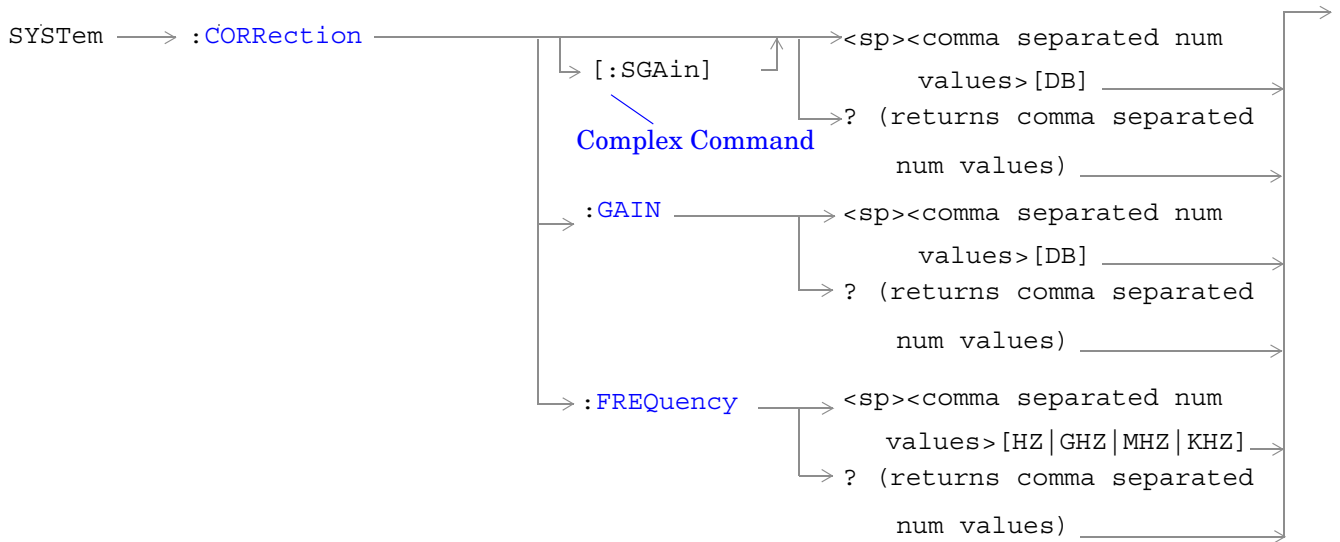
“Hardware Configuration Report” on page 834

“SYSTem:CURRent:TA” on page 722

“Obtaining Identification Information \*IDN?” on page 831

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## SYSTem:CORRection



“Diagram Conventions” on page 343

**SYSTem:CORRection:[:SGain]**

Function	GSM	Sets/queries the up to 20 comma separated offset values in dB. This command sets the state to On.
	GPRS	See <a href="#">“Measurement Related Configuration” on page 836</a> . The units, dB, are optional. If no units are specified then units default to dB. Sending a null list (no values) sets the state of all offsets to Off.
Setting		Range: 0 to 20 values between -100 to +100 Resolution: 0.01
Query		Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37) Resolution: 0.01
Factory Setting		Offsets 1 through 20, are set to 0.00 dB, state is set to Off
<p><b>Programming Example</b></p> <pre> OUTPUT 714;"SYSTEM:CORRECTION:SGAIN -2.55,-3.12,-3.68,-4.23,-4.74,-5.3" !A complex command that sets up to 20 comma separated offsets !and sets the state to On for the frequencies, offsets and !RF IN/OUT Amplitude Offset State  OUTPUT 714;"SYSTEM:CORRECTION:SGAIN" !Sets the state for all frequencies and offsets to Off                     </pre>		

**SYSTem:CORRection:FREQuency**

Function	GSM	Sets/queries up to 20 comma separated frequency values in MHz.
	GPRS	The units, (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to Hz. See <a href="#">“Measurement Related Configuration” on page 836</a> . Sending a null list (no values) sets the state of all frequencies to Off.
Setting		Range: 0 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz Resolution: 1 Hz
Query		Range: 1 to 20 comma separated values ranging from 292.5 MHz to 2700 MHz, and NAN (9.91E+37) Resolution: 1 HZ

## SYSTEM:CORRection

Factory Setting	<ol style="list-style-type: none"><li>1. 800.00 MHz Off</li><li>2. 810.00 MHz Off</li><li>3. 820.00 MHz Off</li><li>4. 830.00 MHz Off</li><li>5. 840.00 MHz Off</li><li>6. 850.00 MHz Off</li><li>7. 860.00 MHz Off</li><li>8. 870.00 MHz Off</li><li>9. 880.00 MHz Off</li><li>10. 890.00 MHz Off</li><li>11. 900.00 MHz Off</li><li>12. 910.00 MHz Off</li><li>13. 920.00 MHz Off</li><li>14. 930.00 MHz Off</li><li>15. 940.00 MHz Off</li><li>16. 950.00 MHz Off</li><li>17. 960.00 MHz Off</li><li>18. 970.00 MHz Off</li><li>19. 980.00 MHz Off</li><li>20. 990.00 MHz Off</li></ol>
<p><b>Programming Example</b></p> <pre>OUTPUT 714;"SYSTEM:CORRECTION:FREQUENCY 1784.8 MHZ,1879.8 MHZ" !Sets up to 20 comma separated frequencies</pre> <pre>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 <a href="#">“Measurement Related Configuration” on page 836.</a> The units, dB, are optional. If no units are specified, units default to dB. Sending a null list (no values) sets the state of all offsets to Off.
Setting		Range: 0 to 20 values between -100 to +100 Resolution: 0.01
Query		Range: 1 to 20 values between -100 to +100, and NAN (9.91E+37) Resolution: 0.01
Factory Setting		Offsets 1 through 20, are set to 0.00 dB, state is set to off
<p>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	Query returns the number of offsets that are in their On state when the RF IN/OUT Amplitude Offset State is also set to On.
	GPRS	See <a href="#">“Measurement Related Configuration” on page 836.</a>
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>		

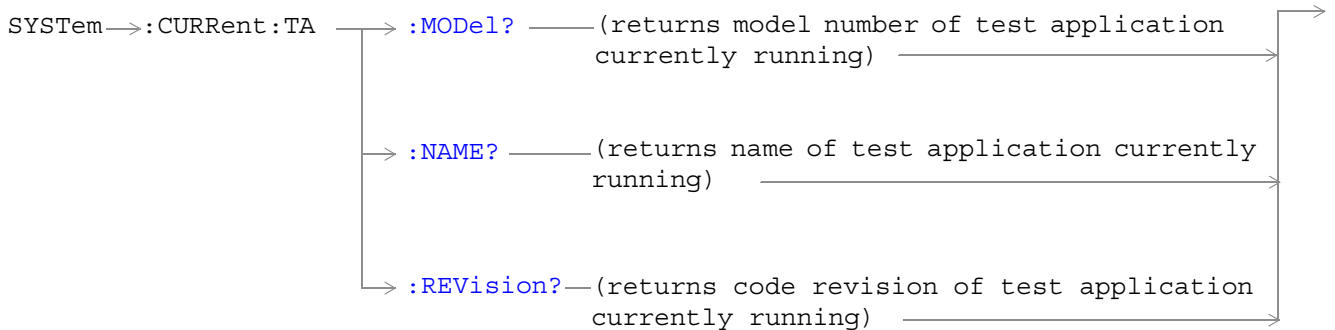
**SYSTem:CORRection:SFRequency**

Function	GSM	<p>Sets/queries up to 20 comma separated frequency values in MHz. This command sets the state to On.</p> <p>The units (GHz, MHz, kHz, Hz) are optional. If no units are specified, units default to MHz.</p> <p>See <a href="#">“Measurement Related Configuration” on page 836</a>.</p> <p>Sending a null list (no values) sets the state of all frequencies to Off.</p>
	GPRS	
Setting	<p>Range: 0 to 20 comma separated values from 292.5 MHz to 2700 MHz</p> <p>Resolution: 1 Hz</p>	
Query	<p>Range: 1 to 20 comma separated values from 292.5 MHz to 2700 MHz, and NAN (9.91E+37)</p> <p>Resolution: 1 HZ</p>	
Factory Setting	<ol style="list-style-type: none"> <li>1. 800.00 MHz Off</li> <li>2. 810.00 MHz Off</li> <li>3. 820.00 MHz Off</li> <li>4. 830.00 MHz Off</li> <li>5. 840.00 MHz Off</li> <li>6. 850.00 MHz Off</li> <li>7. 860.00 MHz Off</li> <li>8. 870.00 MHz Off</li> <li>9. 880.00 MHz Off</li> <li>10. 890.00 MHz Off</li> <li>11. 900.00 MHz Off</li> <li>12. 910.00 MHz Off</li> <li>13. 920.00 MHz Off</li> <li>14. 930.00 MHz Off</li> <li>15. 940.00 MHz Off</li> <li>16. 950.00 MHz Off</li> <li>17. 960.00 MHz Off</li> <li>18. 970.00 MHz Off</li> <li>19. 980.00 MHz Off</li> <li>20. 990.00 MHz Off</li> </ol>	





## SYSTem:CURRent:TA



“Diagram Conventions” on page 343

### SYSTem:CURRent:TA:MODEl?

Function	GSM	Query 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	Query 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 705 for the recommended command.
	GPRS	
Query		Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting		non volatile, read from the test set’s hard disk

**SYSTem:CURRent:TA:REVision?**

Function	GSM	Query the coordinated codeware revision for the test application running. Printable ASCII characters up to a 20 character string. This is not the recommended command, see <a href="#">“SYSTem:APPLication” on page 705</a> for the recommended command.
	GPRS	
Query		Range: ASCII codes 32 - 126 decimal excluding comma and semicolon
*RST Setting		non volatile, read from the test set’s hard disk.

## SYSTem:ERRor?

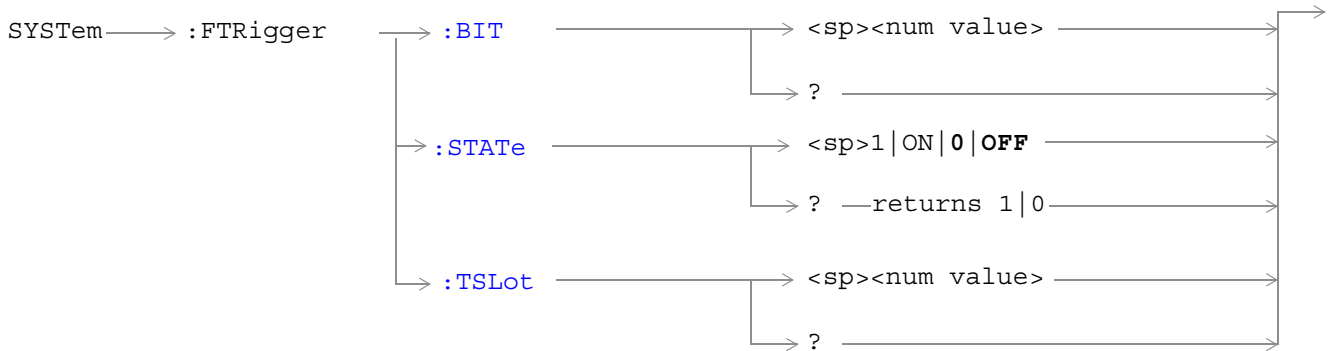
SYSTem → :ERRor? — (returns contents of error/event queue) →

[“Diagram Conventions” on page 343](#)

### SYSTem:ERRor?

Function	GSM	<p>Queries the contents of the Error/Event Queue. The Error/Event Queue may contain one or more messages with an error or event description.</p> <p>Manual users may view the Message Log from the SYSTEM CONFIG screen. The contents of the Error/Event Queue and the Message log may not match. Example, manual user errors are not displayed with SYSTem:ERRor? they are viewed from the Message Log. See <a href="#">“Error Messages” on page 844</a>.</p>
	GPRS	
Query	<p>Error/Event Queue</p> <ul style="list-style-type: none"> <li>Range: 0 to 100 messages up to 255 characters in length</li> </ul>	

## SYSTem:FTRigger



These commands are not applicable to GPRS.

[“Diagram Conventions” on page 343](#)

### SYSTem:FTRigger:BIT

Function	GSM	Selects/queries which bit, after zero, will be used for frame trigger pulse positioning. See <a href="#">“Setting Frame Trigger Parameters” on page 774</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 1250 Resolution: 1
Query		Range: 0 to 1250 Resolution: 1
*RST Setting		zero
Programming Example		
<pre> OUTPUT 714;"SYSTEM:FRTIGGER:BIT 14" !Would cause external frame trigger pulses                                      !to occur 14 bits after bit 0 of the                                      !selected timeslot.                 </pre>		

## SYSTEM:FTRigger

### SYSTEM:FTRigger:STATE

Function	GSM	Sets/queries the frame trigger state. See <a href="#">“Setting Frame Trigger Parameters” on page 774</a>
	GPRS	This command is not applicable to GPRS.
Setting		0 OFF   1 ON
Query		0 1
*RST Setting		0 off

#### Programming Example

```
OUTPUT 714;"SYSTEM:FRTIGGER:STATE ON" !Set frame trigger state to on.
```

## SYSTem:FTRigger:TSLot

Function	GSM	Selects/queries the timeslot for frame trigger pulse positioning. See <a href="#">“Setting Frame Trigger Parameters” on page 774</a>
	GPRS	This command is not applicable to GPRS.
Setting		Range: 0 to 7 Resolution: 1
Query		Range: 0 to 7 Resolution: 1
*RST Setting		zero
Programming Example		
OUTPUT 714;"SYSTEM:FRTIGGER:TSLLOT 5" !Sets the frame trigger timeslot to 5.		

# SYSTem:MEASurement



“Diagram Conventions” on page 343

## SYSTem:MEASurement:RESet

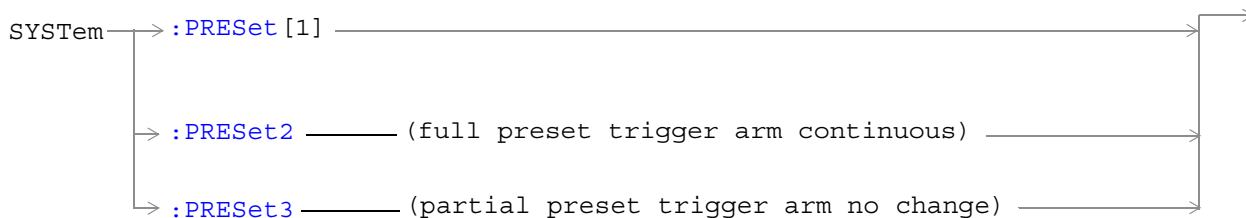
Function	GSM	Sets all measurements to abort, if the trigger arm is set to continuous the measurements will begin a new measurement cycle. See “Trigger Arm (Single or Continuous) Description” on page 221.
	GPRS	Any measurement results are cleared and the Integrity Indicator is set to 1 (No_Result_Available). See “Integrity Indicator” on page 191.
Setting	GSM	<p>These results are set to their default values:</p> <ul style="list-style-type: none"> <li>• RACH Count</li> <li>• Page Count</li> <li>• Missing Burst Count</li> <li>• Corrupted Burst Count</li> <li>• Channel Decoder Error Count</li> <li>• MS TX Level Reported</li> <li>• TCH Timing Advance Reported</li> <li>• RX Level</li> <li>• RX Qual</li> </ul>
	GPRS	<p>These results are set to their default values:</p> <ul style="list-style-type: none"> <li>• Block Error Rate (BLER)</li> <li>• Blocks Tested</li> </ul>

### Programming Example

```
OUTPUT 714;"SYSTEM:MEASUREMENT:RESET" !Resets current measurements.
```



## SYSTem:PRESet



“Diagram Conventions” on page 343

### 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 221.
Related Topics	See “Partial Preset” on page 791 for more details	
Programming Example		
OUTPUT 714;"SYSTem:PRESET" !Partial preset when changing from remote to manual operation.		

### SYSTem:PRESet2

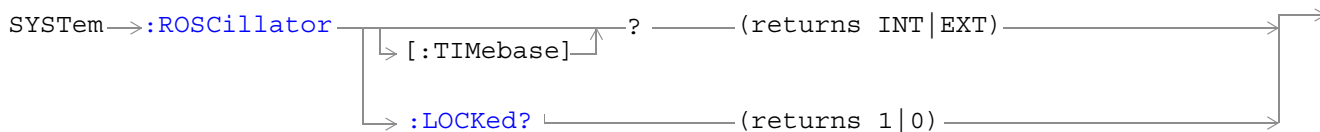
Function	GSM	Performs a full preset of the test set. This is the remote equivalent of pressing the SHIFT Preset keys on the front panel of the test set.
	GPRS	All parameters are set to their default values. All measurements are aborted the trigger arm is set to continuous. See “Trigger Arm (Single or Continuous) Description” on page 221. The *RST command will set the trigger arm to single.
Related Topics	See “Full Preset” on page 791 for more details.	
Programming Example		
OUTPUT 714;"SYSTem:PRESET2" !Full preset.		

## SYSTem: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 <a href="#">“Trigger Arm (Single or Continuous) Description” on page 221</a> .
Related Topics	See <a href="#">“Partial Preset” on page 791</a> for more details.	
Programming Example		
OUTPUT 714; "SYSTEM:PRESET3" !Partial preset when in remote operation.		

## SYSTem:ROSCillator



“Diagram Conventions” on page 343

### SYSTem:ROSCillator[:TIMEbase]?

Function	GSM	Query to indicate if the test set’s internal source or a suitable external source has been chosen to drive the test set’s time base.
	GPRS	A suitable external source must have: <ul style="list-style-type: none"> <li>• an output level of 0 to +13DBM</li> <li>• frequency of 10 MHZ</li> </ul>
Query		Range: INT = internal source EXT = external source

### SYSTem:ROSCillator:LOCKed?

Function	GSM	Query the status of the reference oscillator and indicate if it is locked or unlocked.
	GPRS	
Query		Range: 0 = unlocked 1 = locked



---

## IEEE 488.2 Common Commands

### Description

#### **\*CLS**

The \*CLS, clear status command, is defined in “IEEE Std 488.2-1992”, 10.3. This command will also clear and close the error message screen on the test set’s display.

#### **\*ESE**

The \*ESE, standard event status enable command, is defined in “IEEE Std 488.2-1992”, 10.10.

#### **\*ESE?**

The \*ESE?, standard event status enable query, is defined in “IEEE Std 488.2-1992”, 10.11.

#### **\*ESR?**

The \*ESR?, standard event status register query, is defined in “IEEE Std 488.2-1992”, 10.12.

#### **\*IDN?**

The \*IDN?, identification query, is defined in “IEEE Std 488.2-1992”, 10.14. \*IDN? is used to retrieve information about the test set in ASCII format.

\*IDN?, returns ASCII codes 32 through 126 excluding comma and semicolon in four comma separated fields. Field 1 returns the manufacturer, field 2 returns the instrument model number, field 3 returns the serial number, field 4 returns 0.

#### **\*OPC**

The \*OPC, operation complete command, is defined in “IEEE 488.2-1992”, 10.18. \*OPC causes the test set to continuously sense the No Operation Pending flag. When the No Operation Pending flag becomes TRUE, the OPC event bit in the standard event status register (ESR) is set to indicate that the state of all pending operations is completed. The \*OPC common command is not recommended for use as an overlapped command.

#### **\*OPC?**

The \*OPC?, operation complete query, is defined in “IEEE Std 488.2-1992”, 10.19. The \*OPC? query allows synchronization between the controller and the test set using either the message available (MAV) bit in the status byte, or a read of the output OPC?. The \*OPC? query does not effect the OPC event bit in the Standard Event Status Register (ESR). The \*OPC? common command is not recommended for use as an overlapped command.

#### **\*OPT?**

The \*OPT?, option identification query, is defined in “IEEE Std 488.2-1992”, 10.20. Each option will have a unique name, that name will be returned with the query.

#### **\*RST**

The \*RST, full preset command, is defined in “IEEE Std 488.2-1992”, 10.32. A full preset is also accomplished

## IEEE 488.2 Common Commands

using the SYStem:PRESet2 command. A full preset restores the majority of settings to their default values and sets measurement trigger arm to single.

### **\*SRE**

The \*SRE, service request enable command, is defined in “IEEE Std 488.2-1992”, 10.34. The parameter range for this command is 0 through 255.

### **\*SRE?**

The \*SRE?, service request enable query, is defined in “IEEE Std 488.2-1992”, 10.35. Values returned by this query range from 0 through 255.

### **\*STB?**

The \*STB?, read status byte query, is defined in “IEEE Std 488.2-1992”, 10.36. Values returned by this query range from 0 through 255.

### **\*WAI**

The \*WAI, wait-to-continue command, is defined in “IEEE Std 488.2-1992”, 10.39. The \*WAI command prevents the test set from executing any further commands or queries until all pending operation flags are false. The \*WAI common command is not recommended for use as an overlapped command.

## Related Topics

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[“Call Processing Event Synchronization” on page 38](#)

[“Preset Descriptions” on page 791](#)

[“Obtaining Identification Information \\*IDN?” on page 831](#)

\*\*\*\*\*

## 9 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 740](#)).

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 184](#)) 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 736](#)
- [“GPRS Frequency Banded Parameters” on page 738](#)

## GSM Frequency Banded Parameters

The following table lists the frequency banded parameters for GSM.

Parameter	GPIB Command
Broadcast Channel (ARFCN)	<a href="#">“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370</a>
BA Table	<a href="#">“CALL[:CELL]:BA:TABLE[:SElected]” on page 361</a>
BA Table Points	<a href="#">“CALL[:CELL]:BA:TABLE:POINTs[:SElected]?” on page 366</a>
Traffic Channel (ARFCN)	<a href="#">“CALL:TCHannel[:ARFCn][:SElected]” on page 462</a>
MS TX Level	<a href="#">“CALL:MS:TXLevel[:SElected]” on page 406</a>
Manual Channel	<a href="#">“RFANalyzer:MANual:CHANnel[:SElected]” on page 580</a>
Expected Power	<a href="#">“RFANalyzer:EXpected:POWer[:SElected]” on page 577</a>
RF Generator Channel	<a href="#">“CALL[:CELL]:RFGenerator:CHANnel[:SElected]” on page 437</a>



## GSM Programming Example

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

The following procedure assumes that an active link is established between the test set and the mobile station. See [“Establishing an Active GSM Link with the Mobile Station” on page 36](#).

```

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

```

## GPRS Frequency Banded Parameters

The following table lists the frequency banded parameters for GPRS.

Parameter	GPIB Command
Broadcast Channel (ARFCN)	“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370
BA Table	“CALL[:CELL]:BA:TABLE[:SElected]” on page 361
Packet Data Traffic Channel (ARFCN)	“CALL:PDTCH   PDTChannel[:ARFCn][:SElected]” on page 418
Uplink Burst TX Level	“CALL:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1   2]” on page 421

### Programming Example

The following procedure assumes that a data connection has been established between the test set and the mobile station (connection status is Transferring). See “[Step 4: Make a connection](#)” on page 289.

```

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

```

## Related Topics

\*\*\*\*\*

[“Band Selection Parameters” on page 740](#)

[“How the Test Set Performs a Dualband Handover” on page 184](#)

[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

[“Configuring the Traffic Channel \(TCH\)” on page 766](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 769](#)

[“Receiver Control” on page 776](#)

\*\*\*\*\*

## 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 740](#)
- [“GPRS Band Selection Parameters” on page 741](#)

### GSM Band Selection Parameters

Parameter	GPIB Command
Cell Band	<a href="#">“CALL[:CELL]:BAND” on page 368</a>
Traffic Band	<a href="#">“CALL:TCHannel:BAND” on page 465</a>
Manual Band	<a href="#">“RFANalyzer:MANual:BAND” on page 580</a>
RF Generator Band	<a href="#">“CALL[:CELL]:RFGenerator:BAND” on page 436</a>

### 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 389](#).
- 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 184](#).
- 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 389](#).

### 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 760](#).

## GPRS Band Selection Parameters

Parameter	GPIB Command
Cell Band	<a href="#">“CALL[:CELL]:BAND” on page 368</a>
Packet Data Traffic Channel Band	<a href="#">“CALL:PDTCH   PDTChannel:BAND” on page 420</a>

## Operating Considerations for GPRS

### Cell Band Parameter

- When the data connection status is *not* transferring (see [“Data Connection Processing State Synchronization” on page 58](#)), 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 58](#)), 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 58](#)), 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 387](#).

## Related Topics

\*\*\*\*\*

### GSM:

[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

[“Configuring the Traffic Channel \(TCH\)” on page 766](#)

[“Receiver Control” on page 776](#)

[“CALL:CONNeCted\[:STATe\]?” on page 374](#)

[“Programming the Agilent Technologies 8960 Series 10 for GSM Mobile Testing in Active Cell Operating Mode” on page 224](#)

### GPRS:

[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 769](#)

[“CALL:STATus\[:STATe\]:DATA?” on page 457](#)

[“Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

\*\*\*\*\*



## 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 425
Downlink Burst Power Reduction Selection	"CALL:PDTCH   PDTChannel:PREduction:BURSt[1   2   3   4]" on page 425
Manual Receiver Power Level	"RFANalyzer:MANual:POWer[:SElected][:SElected]:BURSt[1   2]" on page 585
Uplink Burst TX Level	"CALL:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1   2]" on page 421



## Operating Considerations

The following bursted parameters are also frequency banded parameters (see [“Frequency Banded Parameters” on page 736](#)):

- Uplink Burst TX Level
- Manual Receiver Power Level

## Related Topics

\*\*\*\*\*

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 769](#)

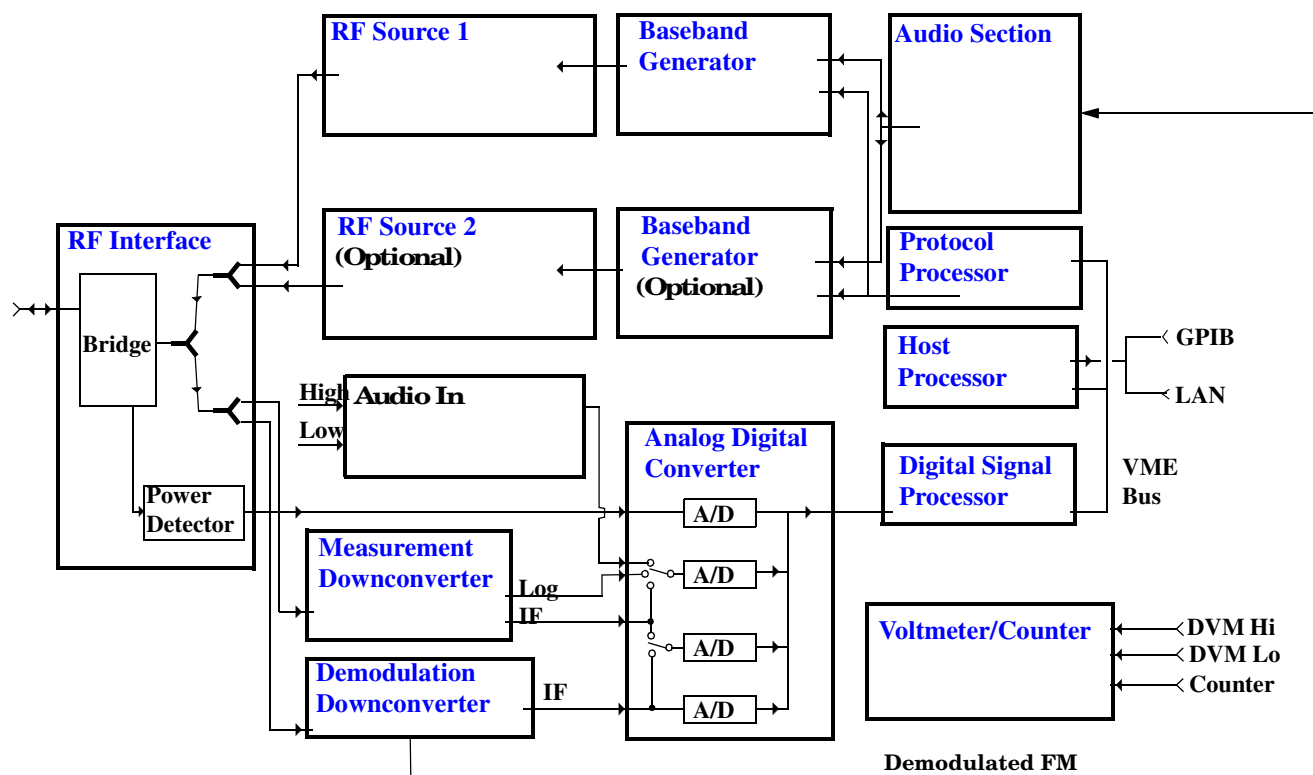
[“CALL:PDTCH|PDTChannel” on page 416](#)

\*\*\*\*\*

## 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 187.

## Description



### RF Interface Module

Input and output signals are routed through the RF Interface module. The RF Interface module consists of a directional bridge for sampling incoming power and hybrid power splitters which create 4 bidirectional ports, (two receiver ports and two source ports), RF amplifiers, video gain circuits, and fast and slow power detectors.

The sampled input power from the directional bridge is routed to a fast power detector or a slow detector. The fast power detector has a response time of several microseconds and can measure power during the bursts of TDMA systems.

The RF Interface module provides two identical RF Source path connections to the In/Out port of the instrument. There is about 25 dB of isolation between the two source paths. There is about 35 dB of isolation between the source paths and either receiver path. The RFIO module has nominally 23 dB of insertion loss in the source path. A temperature sensing circuit facilitates compensation for path loss variation with

temperature.

The sampled input power from the directional bridge can be amplified by as many as two 18 dB range amplifiers and then can be directed to the fast detector, or the slow detector. The input power to the fast detector is detected by a diode detector that is part of a feedback loop. The input to the slow detector is measured in a bridge using a pair of RMS thermal detectors in a feedback loop. Signals from the fast and slow power detectors are calibrated with Gain DAC's. Video gain can be applied in 6 dB and 1.5 dB steps.

### Signal Downconversion

The test set's downconversion receiver section has two downconversion modules; a high performance Measurement Downconversion Module for making measurements, and a Demodulation Downconversion Module for maintaining the radio link.

**Measurement Downconverter Module** The Measurement Downconverter module is a part of the receiver, it provides high quality (wide dynamic range, spurious free) signals to the Analog To Digital Converter module's measurement sampler input. These signals are:

- 10 KHz - 6 MHz Intermediate Frequency signal
- detected envelope of the Intermediate Frequency signal

The Measurement Downconverter module is designed for very high performance operation to ensure accurate and repeatable measurement results. The Measurement Downconverter module contains two downconversion stages, two local oscillators, and a logarithmic IF envelope detector . Both first and second LO synthesizers are tunable. The first LO is used when tuning to the RF input frequency, and the second LO is used when setting second IF frequency, which is fed to the measurement sampler on the Analog To Digital Converter module.

**Demodulation Downconverter Module** The Demodulation Downconverter module is used as part of the demodulation receiver to maintain the radio link of a given TA. The IF signal from the Demodulation Downconverter is sent to the Analog to Digital Converter, the digital data then goes to the protocol subsystem. That data allows the Protocol Processor module to set up a call with the DUT so that testing can be performed on the radio.

The Demodulation Downconverter module is also used as part of the BER testing path. For bit error ratio measurements the bits tested by the Protocol Processor module are taken from this path. The demodulated bits provided to the Protocol Processor contain the data that will be checked for errors.

### Analog To Digital Converter Module

Following the Measurement Downconverter and Demodulation Downconverter modules is the Analog to Digital Converter module. The purpose of the Analog to Digital Converter module is to convert the downconverted analog signals into digital data streams which can be processed by the Digital Signal Processing module.

In order to maintain the radio link of a given TA, the downconversion path through the Demodulation Downconverter module has a dedicated A/D conversion path.

In order to optimize measurement throughput, the fast RF power detector also has a single dedicated A/D path. This allows power measurements, in many cases, to be made concurrently with other measurements. The two outputs from the Measurement Downconverter module, and the Audio In signal share a single multiplexed A/D path.

The outputs of the various analog to digital converters on the Analog to Digital Converter module share a common data bus to the Digital Signal Processing module.

## Block Diagram

### Digital Signal Processing Module

The Digital Signal Processing (DSP) module is responsible for a variety of tasks within the overall test set architecture. These tasks are:

- demodulating data from the radio under test (data received from the Demodulation Downconverter module) and sending the demodulated data bits to the Protocol Processor module
- for some systems, perform audio measurements using audio information sent to the DSP module from the Protocol Processor module
- execute a variety of signal processing algorithms to perform measurements on the radio system of the currently loaded TA (data received from the power detector ADC, the measurement ADC and, in some cases, data received from the Demodulation Downconverter ADC)

The DSP processor communicates with the Host Processor and the Protocol Processor, as well as controlling the configuration and synchronization of the Analog To Digital Converter module.

### Protocol Processor Module

The Protocol Processor module is responsible for maintaining the radio link between the test set and the mobile station under test. The primary tasks of the Protocol Processor module are:

- generating the protocol messaging necessary for the forward channel and sending that protocol stream to the test set's RF source for transmission to the mobile station
- decoding the protocol messaging received from the mobile station under test on the reverse channel
- computing measurement results which are associated with data bits contained within the mobile stations messaging, such as bit error ratio

### Host Processor Module

The Host Processor module is responsible for a variety of tasks within the overall test set architecture. These tasks include:

- control of the manual user interface (MUI)
- executing commands and processing data received from the LAN interface
- executing commands and processing data received from the GPIB interface
- controlling disk access
- control of all RF and audio hardware modules
- routing measurement results received from the Digital Signal Processing and Protocol Processor modules to the appropriate output device (display, GPIB, LAN, serial, etc.)

### Voltmeter/Counter

**Voltmeter** The voltmeter is primarily used to measure external DC & AC voltages. A secondary purpose is to measure internal voltages for instrument self-diagnostics.

The external voltmeter is capable of measuring DC voltages up to + 50 VDC and AC voltages up to 50 Vpk. A true RMS detector is used for measuring AC voltages. For internal measurements, a switch routes the diagnostic MUX output to the Voltmeter 1 path.

**Frequency Counter** The Frequency Counter is used to measure external frequencies from the front panel Audio IN, High or Low BNC connectors, and to measure internal signals for diagnostics. The external input can receive a signal between 20 Hz and 50 MHz, with a level from 25 mV to 8 V rms.

The counter circuit is based on the METRON IC. This IC contains a reciprocal counter. A reciprocal counter functions by counting the input signal and a reference signal simultaneously during a selected gate period. At the end of this period, the counting is stopped and the values of the signal and reference counters are read. The ratio of these values is used to calculate the input signal frequency.

## Audio Section

**Audio Analysis Path** Externally applied audio signals can be analyzed through the test set's DSP module for such characteristics as AC level, SINAD, or distortion.

The audio signal to be analyzed is input to the test set using the front panel Audio IN High and Low connectors. The signal is then routed to the Analog To Digital Converter module's measurement sampler for analysis by the DSP module.

The Audio In connector accepts signals from 20 Hz to 15 KHz, at input levels from 10 mV to 20 Vpk.

**Audio 1 Path** The Audio 1 path provides analog baseband signals used for frequency modulation of the test set's RF sources. Up to four separate audio sources may be summed together in any combination to provide the composite Audio 1 output. These include the external FM input, internal direct digital synthesis (DDS,) regenerated SAT, and audio echo input.

The external FM input accepts an externally supplied audio signal with a peak voltage between 0.25 and 2 Vpk.

The internal DDS generates low distortion audio signals from DC to 20 KHz with 0.1 Hz resolution. One to four signals may be generated and internally summed, with independent level control of each waveform.

The SAT regeneration circuit outputs a signal which is phase-locked to a received SAT signal. This is useful for testing situations where the test set needs to emulate a mobile station.

The audio echo input is used for retransmitting the received audio after a selectable time delay, to check both radio transmit and receive paths simultaneously.

For most applications, only one or two of these Audio 1 path sources are enabled at any given time.

**Audio 2 Path** The Audio 2 path provides a secondary means for sending analog baseband signals to the FM modulator. Audio 2 contains only one source, a DDS similar to that used for Audio 1.

Typically, the Audio 2 path DDS is used for cases where multiple signals must be summed together with the lowest possible distortion. Another potential use of Audio 2 would be to obtain higher output levels than Audio 1 is capable of (up to twice as much), assuming the two outputs are set to the same frequency and phase, and then summed together at the Baseband Generator module.

Audio 2 is rarely used in practice because the DDS used for Audio 2 is the same DDS that is used for the front panel audio output.

**Audio Out Path** Any one of four inputs may be coupled to the front panel audio output connector. These include a 4 channel DDS (shared with Audio 2), receiver discriminator audio from the Demodulation Downconverter module, audio echo from the Analog To Digital Converter module, and audio vocoder.

The front panel output is capable of providing signal levels up to 9 Vpk into > 600 ohm loads, and up to 0.8 Vpk into an 8 ohm load (e.g. speaker). The output level is calibrated for all modes except discriminator audio,

## Block Diagram

The discriminator audio has an uncalibrated volume control provided due to the high tolerances involved.

Typically the DDS mode is used to feed the MIC input of a radio, or it may simply be used as a general purpose low distortion function generator.

Demodulated audio can be selected from either of two Demodulation Downconverters. 300 - 3000 Hz BPF, 750 usec de-emphasis, and expandor circuits can be individually applied to the receiver audio, or bypassed.

Audio echo can be selected to route the received audio to the front panel audio output connector.

## RF Sources

The test set can contain two identical RF sources. The RF sources are used to provide analog or digitally modulated RF carriers for use in parametric testing of mobile stations encompassing a variety of cellular radio formats. In general, the sources have a frequency range of 45 MHz to 2.7 GHz and an amplitude range of -13 dBm to -135 dBm.

The RF sources consist of a Synthesized Signal Generator module followed by a Vector Output module and an RF Attenuator module. Baseband modulation information is supplied to the RF sources from a Baseband Generator module preceded by an Audio Section module. The various components which make up the test set source system are described in the following sections.

## Baseband Generators

The purpose of the Baseband Generator module is to provide, for the modulation type currently in effect, properly formatted baseband signals to the modulation circuits on the RF Source modules.

The Baseband Generator performs several functions related to the generation and processing of these base-band modulation signals. These are:

- Transform data and clock signals from the Protocol Processor module into base-band analog I-Q modulation signals for the I-Q modulator in the Vector Output module
- Transform data from the Protocol Processor module into baseband FSK modulation for the FM modulator in the Signal Generator module
- Provide baseband FM path source selection, gain adjustment and summing node for analog FM signals from the Audio module and internally generated baseband FSK signals which are output to the FM modulator in the Signal Generator module
- Transform burst and adjacent timeslot signals from the Protocol Processor module into baseband burst modulation signals for the burst modulator in the Vector Output module

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## Active Cell Operating Mode

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

For GSM, the test set can operate in two different operating modes, active cell mode or test mode (see [“Test Mode Operating Modes” on page 753](#)).

For GPRS, active cell is the only operating mode currently available.

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

- [“Active Cell For GSM” on page 751](#)
- [“Active Cell For GPRS” on page 752](#)

### 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 753](#).

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

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

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

For a list of basic features provided by active cell operating mode for GSM, see [“Active Cell Features” on page 228](#).

### 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 411](#).

### Setting the Cell Activated State Parameter

The cell activated state parameter is set using [“CALL\[:CELL\]:ACTivated\[:STATe\]” on page 359](#).

## 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 120](#).
- Transmit Power (TXP) - see ["Transmit Power Measurement Description" on page 166](#)
- Phase and Frequency (PFER) - see ["Phase and Frequency Error Measurement Description" on page 128](#)
- Power versus Time (PVT) - see ["GPRS Power versus Time Measurement" on page 142](#)
- 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 785](#).

## Related Topics

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For GSM:

["Configuring the Broadcast Channel \(BCH\)" on page 763](#)

["CALL:OPERating" on page 410](#)

["Configuring the Traffic Channel \(TCH\)" on page 766](#)

For GPRS:

["Configuring the Broadcast Channel \(BCH\)" on page 763](#)

["Configuring the Packet Data Traffic Channel \(PDTCH\)" on page 769](#)

["Testing a GPRS Mobile Station" on page 785](#)

["Programming Example for testing GPRS Mobile Stations with the Agilent Technologies 8960" on page 282](#)

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## Test Mode Operating Modes

### GSM Test Mode Operation

The test set can operate in two different GSM operating modes (active cell mode or a test mode). Active cell mode is the default operating mode and is used when emulating a normal GSM cell. You use Test mode (see [“CALL:OPERating” on page 410](#) for GPIB syntax) when it is not possible, or not desired, to communicate via over-the-air signalling with the mobile station, but downlink stimulus and uplink measurements are still needed. When test mode is selected, the choices of downlink stimulus (Test Function) are:

- BCH (broadcast channel) (see [“BCH Test Function Behavior” on page 755](#))
- BCH + TCH (broadcast channel + traffic channel) (see [“BCH + TCH Test Function Behavior” on page 758](#))
- CW (continuous wave) (see [“CW Test Function Behavior” on page 760](#))

See [“CALL:FUNCTION” on page 387](#) 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 219](#).

The test set’s receiver remains on the uplink frequency determined by the broadcast channel see [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 370](#) as long as receiver control is set to auto. If you require manual control of the receiver parameters, receiver control should be set to manual. This gives access to the receiver parameters of manual band, manual channel and manual frequency. See [“Receiver Control” on page 776](#).

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**NOTE**      [“Setting the Cell Activated State Parameter” on page 751](#) has no effect while the test set is in test mode.

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### Receiver Control - Auto

If the receiver control field is set to auto (see [“RFANalyzer:CONTrol:AUTO” on page 577](#)), the test set’s receiver frequency is set according to the fields or GPIB commands in the following table.

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

Test Function	Receiver Frequency Fields	GPIB Command
BCH	Broadcast Chan (1)	<a href="#">“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370</a>
BCH + TCH	Traffic Channel (2)	<a href="#">“CALL:TCHannel[:ARFCn][:SElected]” on page 462</a>
CW	RF Gen Channel	<a href="#">“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370</a>

### 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 577](#)), the test set’s receiver frequency is set according to the fields or GPIB commands in the following table.

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

Test Function	Receiver Frequency Fields	GPIB Command
Don't Care	Manual Channel (1)	<a href="#">“RFANalyzer:MANual:CHANnel[:SElected]” on page 580</a>
	Manual Frequency	<a href="#">“RFANalyzer:MANual:FREQuency” on page 583</a>

### 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 373](#). (If you are using the test set manually, the Expected Burst field is in the Call Parm's 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 429](#) 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 17. 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 18. 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 580

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 429 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 19. 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 20. 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 580

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

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

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

## CW Test Function Behavior

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

- The test set generates an unmodulated CW downlink signal.
- The RF generator's power is set using the `"CALL[:CELL]:RFGenerator:POWER[:SAMPLitude]"` on page 440 command.
- The RF generator's band is set using the `"CALL[:CELL]:RFGenerator:BAND"` on page 436 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 437 command.
- The RF generator's frequency is set using the `"CALL[:CELL]:RFGenerator:FREQUENCY"` on page 440 command, in this mode the user has direct control of the output frequency without making a channel selection.
- By default, the test set's receiver is configured to receive the mobile station's signal at the current RF generator channel setting. The test set's receiver frequency can be set manually, which decouples the automatic setting.
- No uplink demodulation or channel decoding is available. BER and uplink audio measurements will not return any results.

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

### Example 21. 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 418 and “[CALL:PDTCH | PDTChannel:MSLot:CONFiguration](#)” on page 424. 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.

## Related Topics

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[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

[“Configuring the Traffic Channel \(TCH\)” on page 766](#)

[“CALL:OPERating” on page 410](#)

[“Receiver Control” on page 776](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 769](#)

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## 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 358](#).

### GSM Broadcast Channel Parameters

Parameter	GPIB Command
Cell Band	<a href="#">“CALL[:CELL]:BAND” on page 368</a>
Cell Power	<a href="#">“CALL[:CELL]:POWER[:SAMPLitude][:SElected]” on page 430</a>
Cell Power State	<a href="#">“CALL[:CELL]:POWER:STATE[:SElected]” on page 433</a>
Broadcast Channel (ARFCN)	<a href="#">“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370</a>
Mobile Country Code	<a href="#">“CALL:MCCode” on page 394</a>
Mobile Network Code	<a href="#">“CALL:MNCode” on page 395</a>
Location Area Code	<a href="#">“CALL:LACode” on page 393</a>
Network Color Code	<a href="#">“CALL:NCCode” on page 409</a>
Base Station Color Code	<a href="#">“CALL:BCCode” on page 369</a>
Paging IMSI	<a href="#">“CALL:PAGing:IMSI” on page 413</a>
Repeat Paging	<a href="#">“CALL:PAGing:REPeat[:STATE]” on page 414</a>
Paging Mode	<a href="#">“CALL:PAGing:MODE” on page 414</a>
Paging Multiframe	<a href="#">“CALL:PAGing:MFRames” on page 415</a>
Auto IMEI Request	<a href="#">“CALL:IMEI” on page 392</a>
TX Level FACCH Signaling	<a href="#">“CALL:SIGNaling” on page 455</a>
BA Table	<a href="#">“CALL[:CELL]:BA:TABLE[:SElected]” on page 361</a>
3 Digit MNC for PCS	<a href="#">“CALL:PMNCode” on page 427</a>

## GPRS Broadcast Channel Parameters

Parameter	GPIB Command
Cell Band	“CALL[:CELL]:BAND” on page 368
Cell Power	“CALL[:CELL]:POWer[:SAMPlitude][:SElected]” on page 430
Broadcast Channel (ARFCN) - Selected band	“CALL[:CELL]:BCHannel[:ARFCn][:SElected]” on page 370
Broadcast Channel (ARFCN) - DCS band	“CALL[:CELL]:BCHannel[:ARFCn]:DCS” on page 371
Broadcast Channel (ARFCN) - EGSM band	“CALL[:CELL]:BCHannel[:ARFCn]:EGSM” on page 371
Broadcast Channel (ARFCN) - PCS band	“CALL[:CELL]:BCHannel[:ARFCn]:PCS” on page 372
Broadcast Channel (ARFCN) - PGSM band	“CALL[:CELL]:BCHannel[:ARFCn]:PGSM” on page 372
Set PCS 3 digit MNC state	“CALL[:CELL]:PMNCode:STATe” on page 428

## 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 766](#)) 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 359](#).

If the test set is in test mode (see [“Test Mode Operating Modes” on page 753](#)) 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 191](#).

### GPRS

For GPRS, there are a number of BCH parameters which are currently set to fixed values. See [“Fixed Parameters” on page 790](#).

## Related Topics

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[“Frequency Banded Parameters” on page 736](#)

[“Band Selection Parameters” on page 740](#)

\*\*\*\*\*

## 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 461](#).

### TCH Parameters

Parameter	GPIB Command
Traffic Channel Band	<a href="#">“CALL:TCHannel:BAND” on page 465</a>
Traffic Channel (ARFCN) - Selected band	<a href="#">“CALL:TCHannel[:ARFCn][:SElected]” on page 462</a>
Traffic Channel (ARFCN) - DCS band	<a href="#">“CALL:TCHannel[:ARFCn]:DCS” on page 463</a>
Traffic Channel (ARFCN) - EGSM band	<a href="#">“CALL:TCHannel[:ARFCn]:EGSM” on page 463</a>
Traffic Channel (ARFCN) - PCS band	<a href="#">“CALL:TCHannel[ARFCN]:PCS” on page 464</a>
Traffic Channel (ARFCN) - PGSM band	<a href="#">“CALL:TCHannel[:ARFCn]:PGSM” on page 464</a>
Timeslot	<a href="#">“CALL:TCHannel:TSLot” on page 467</a>
Mobile Loopback	<a href="#">“CALL:TCHannel:LOOPback” on page 466</a>
Speech	<a href="#">“CALL:TCHannel:DOWNlink:SPEech” on page 466</a>
Max Frames Allowed for Assignment	<a href="#">“CALL:COUNT:TDMA:FRAMES” on page 380</a>
Channel Mode	<a href="#">“CALL:TCHannel:CMODE” on page 465</a>

## Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see [“CALL:BCHannel” on page 370](#)) 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 184](#). 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 389](#)) = 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 44](#)), or when in test mode with downlink function set to BCH+TCH.

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

There are 5 different settings for the downlink speech source. See [“CALL:TCHannel:DOWNlink:SPEech” on page 466](#).

- Echo retransmits the uplink speech frames back to the downlink with a non-selectable delay of about 1 second.
- PRBS15 the 260 speech frame bits (prior to channel coding) are generated using a pseudo random bit sequence.
- SIN300 the sequence of 260 speech bit frames represent a sine wave at 300 Hz.
- SIN1000 the sequence of 260 speech bit frames represent a sine wave at 1000 Hz.

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

The Max Frames Allowed for Assignment parameter, is used to specify the maximum number of TDMA frames the mobile station is allowed to take for a channel assignment. This is only applicable to changes in TCH band, traffic channel, or TCH timeslot. Changes to any other TCH parameter will not cause an error to be generated if, the number of frames taken to perform the change exceeds the setting of the maximum frames allowed for assignment. If the mobile station does not complete the channel assignment within the specified number of frames, the test set will generate an error message, but this will not cause a call to drop. If the mobile DTX state (discontinuous transmission) parameter is on (see [“CALL:MS:DTX\[:STATE\]” on page 398](#)), 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

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[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

[“Configuring Mobile Station Operating Parameters” on page 772](#)

[“Receiver Control” on page 776](#)

[“Traffic Band Parameter” on page 740](#)

[“CALL:TCHannel” on page 461](#)

[“Fast Bit Error Measurement Description” on page 113](#)

\*\*\*\*\*



## 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 358](#).

## Packet Data Traffic Channel Parameters

Parameter	GPIB Command
Packet Data Traffic Channel Band	“CALL:PDTCH   PDTChannel:BAND” on page 420
Packet Data Traffic Channel (ARFCN)	“CALL:PDTCH   PDTChannel[:ARFCn][:SElected]” on page 418
Packet Data Traffic Channel (ARFCN) DCS band	“CALL:PDTCH   PDTChannel[:ARFCn]:DCS” on page 418
Packet Data Traffic Channel (ARFCN) EGSM band	“CALL:PDTCH   PDTChannel[:ARFCn]:EGSM” on page 419
Packet Data Traffic Channel (ARFCN) PCS band	“CALL:PDTCH   PDTChannel[ARFCN]:PCS” on page 419
Packet Data Traffic Channel (ARFCN) PGSM band	“CALL:PDTCH   PDTChannel[:ARFCn]:PGSM” on page 420
Downlink Burst Power Reduction Selection	“CALL:PDTCH   PDTChannel:PREduction:BURSt[1   2   3   4]” on page 425
Downlink Power Reduction Level (dB)	“CALL:PDTCH   PDTChannel:PREduction:LEVel[1   2]” on page 426
Data Connection Type	“CALL:FUNCTion:DATA:TYPE” on page 388
Downlink PDTCH burst absolute power level	“CALL:PDTCH   PDTChannel:POWer[:AMPLitude]:BURSt[1   2   3   4]?” on page 425
PDTCH Coding Scheme	“CALL:PDTCH   PDTChannel:CSCHEME” on page 421
Multislot Configuration	“CALL:PDTCH   PDTChannel:MSLot:CONFiguration” on page 424
P0 for downlink PDTCH	“CALL:PDTCH   PDTChannel:PZERo:LEVel” on page 426
Query burst level	“CALL:PDTCH   PDTChannel:POWer[:AMPLitude]:BURSt[1   2   3   4]?” on page 425
<b>Deferred Parameters</b>	
Deferred Packet Data Traffic Channel Band	“CALL:SETup:PDTCH   PDTChannel:BAND” on page 447
Deferred Packet Data Traffic Channel (ARFCN)	“CALL:SETup:PDTCH   PDTChannel[:ARFCn][:SElected]” on page 443
Deferred Packet Data Traffic Channel (ARFCN) EGSM band	“CALL:SETup:PDTCH   PDTChannel[:ARFCn]:DCS” on page 444
Deferred Packet Data Traffic Channel (ARFCN) EGSM band	“CALL:SETup:PDTCH   PDTChannel[:ARFCn]:EGSM” on page 445
Deferred Packet Data Traffic Channel (ARFCN) PCS band	“CALL:SETup:PDTCH   PDTChannel[:ARFCn]:PCS” on page 446

Parameter	GPIB Command
Deferred Packet Data Traffic Channel (ARFCN) PGSM band	<a href="#">“CALL:SETup:PDTCH   PDTChannel[:ARFCn]:PGSM” on page 447</a>
Deferred PDTCH Coding Scheme	<a href="#">“CALL:SETup:PDTCH   PDTChannel:CSCHEME” on page 448</a>
Deferred Multislot Configuration	<a href="#">“CALL:SETup:PDTCH   PDTChannel:MSLot:CONFIguration” on page 453</a>
Deferred P0 for downlink PDTCH	<a href="#">“CALL:SETup:PDTCH   PDTChannel:PZERo:LEVel” on page 454</a>

### Using Deferred Parameters

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

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

### Operating Considerations

When configuring the base station emulator you must configure the broadcast channel (see [“CALL:BCHannel” on page 370](#)) 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 736](#)).

### Related Topics

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[“Configuring the Broadcast Channel \(BCH\)” on page 763](#)

[“Configuring Mobile Station Operating Parameters” on page 772](#)

[“Packet Data Traffic Channel Band Parameter” on page 741](#)

[“CALL:PDTCH|PDTChannel” on page 416](#)

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## Configuring Mobile Station Operating Parameters

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

For a complete list of GPIB commands in the call processing subsystem, refer to [“CALL Subsystem” on page 358](#).

### GSM Mobile Station Operating Parameters

Parameter	GPIB Command
Mobile station TX Level	<a href="#">“CALL:MS:TXLevel[:SElected]” on page 406</a>
Timing Advance	<a href="#">“CALL:MS:TADVance” on page 405</a>
Mobile DTX State	<a href="#">“CALL:MS:DTX[:STATe]” on page 398</a>

### GPRS Mobile Station Operating Parameters

Parameter	GPIB Command
Uplink Burst TX Level for selected PDTCH band	<a href="#">“CALL:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1   2]” on page 421</a>
Uplink Burst TX Level for DCS band	<a href="#">“CALL:PDTCH   PDTChannel:MS:TXLevel:DCS:BURSt[1   2]” on page 422</a>
Uplink Burst TX Level for EGSM band	<a href="#">“CALL:PDTCH   PDTChannel:MS:TXLevel:EGSM:BURSt[1   2]” on page 422</a>
Uplink Burst TX Level for PCS band	<a href="#">“CALL:PDTCH   PDTChannel:MS:TXLevel:PCS:BURSt[1   2]” on page 423</a>
Uplink Burst TX Level for selected PGSM band	<a href="#">“CALL:PDTCH   PDTChannel:MS:TXLevel:PGSM:BURSt[1   2]” on page 423</a>
Deferred Uplink Burst TX Level for selected band	<a href="#">“CALL:SETup:PDTCH   PDTChannel:MS:TXLevel[:SElected]:BURSt[1   2]” on page 448</a>
Guard Band Period Length	<a href="#">“CALL:MS:TX:BURSt:GPLength” on page 406</a>

## Operating Considerations

### GSM

There are a number of parameters for the broadcast channel (see [“Configuring the Broadcast Channel \(BCH\)” on page 763](#)) and the traffic channel (see [“Configuring the Traffic Channel \(TCH\)” on page 766](#)) 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 577](#).

### GPRS

For details on the parameters you can use to configure the PDTCH, see [“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 769](#).

## 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 725.

- “[External Trigger State \(on or off\)](#)” on page 774
- “[External Trigger Timeslot \(0 to 7\)](#)” on page 774
- “[External Trigger Bit \(0 to 1250\)](#)” on page 774

### Programming Examples

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

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

would set the external frame trigger ON.

#### External Trigger Timeslot (0 to 7)

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

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

#### External Trigger Bit (0 to 1250)

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

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

### Operating Considerations

Each frame is made up of 8 time slots. Time slots are defined in “ETSI GSM 05.10 Ver. 4.9.0 Section 5. Time slots 0 and 4 are 157 bit periods long, time slots 1, 2, 3, 5, 6, 7 are 156 bit periods long, the average time slot is 156.25 bits in duration. The external trigger timeslot can be set to any time slot 0 through 7, the external trigger bit position can be set from 0 through 1250. If the trigger bit position is set to 1250, that is one full frame beyond the setting of the external trigger timeslot, ( $156.25 * 8 = 1250$ ).

When the cell activated state is OFF, the frame trigger output is disabled (set to 0 volts) since there is no reference downlink TDMA frame structure available. However, the frame trigger state is not affected when there are changes to cell activated state.

The frame trigger can be set manually from the system configuration screen by pressing the External Trigger Setup soft key.

### Related Topics

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[“SYSTem:FTRigger” on page 725](#)

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## Receiver Control

Receiver Control is applicable to both GSM and GPRS. This topic contains the following sections:

- [“GSM Receiver Control” on page 776](#)
- [“GPRS Receiver Control” on page 779](#)

### 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 577](#).

**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 736](#) 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 776](#) 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 776](#) 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 580 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 462 traffic channel details and "[CALL:TCHannel:BAND](#)" on page 465 for traffic band details. See "[CALL\[:CELL\]:BAND](#)" on page 368 for cell band details. See "[CALL:BCHannel](#)" on page 370 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 836](#) 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 579](#) or [“CALL:MS:TXLevel\[:SElected\]” on page 406](#).

## Related Topics

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[“Active Cell Operating Mode” on page 751](#)

[“Test Mode Operating Modes” on page 753](#)

[“Frequency Banded Parameters” on page 736](#)

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## 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 574 for a listing of all receiver control syntax. (Note that some of the commands described in “[RFANalyzer](#)” on page 574 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

## Receiver Control

**Expected Power Control** The expected power from the mobile is set manually using the following settings (see “Expected Power” on page 778):

- To set the test set receiver’s expected power setting to manual use “[RFANalyzer:CONTRol:POWer:AUTO](#)” on page 584.

```
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 586. 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 584.

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

**Uplink Frequency** Uplink Frequency sets the test set’s demodulation receiver frequency, used to demodulate information from the mobile’s uplink transmission:

- To set the receiver to manual mode and set the demodulation receiver frequency use “[RFANalyzer:MANual:UPLink\[:MFRequency\]](#)” on page 586.

```
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 587.

```
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 424.

## 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 421](#)
  - [“CALL:PDTCH | PDTChannel:MS:TXLevel:DCS:BURSt\[1 | 2\]” on page 422](#)
  - [“CALL:PDTCH | PDTChannel:MS:TXLevel:EGSM:BURSt\[1 | 2\]” on page 422](#)
  - [“CALL:PDTCH | PDTChannel:MS:TXLevel:PCS:BURSt\[1 | 2\]” on page 423](#)
  - [“CALL:PDTCH | PDTChannel:MS:TXLevel:PGSM:BURSt\[1 | 2\]” on page 423](#)
- 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 418](#)
  - [“CALL:PDTCH | PDTChannel\[:ARFCn\]:DCS” on page 418](#)
  - [“CALL:PDTCH | PDTChannel\[:ARFCn\]:EGSM” on page 419](#)
  - [“CALL:PDTCH | PDTChannel\[ARFCN\]:PCS” on page 419](#)
  - [“CALL:PDTCH | PDTChannel\[:ARFCn\]:PGSM” on page 420](#)

## 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 780](#) 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 836](#) 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 753](#)

[“Active Cell Operating Mode” on page 751](#)

[“RFANalyzer” on page 574](#)

\*\*\*\*\*

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## Testing a Mobile for Enhanced Full Rate Speech Channel Mode

This test is *not* applicable to GPRS.

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

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

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

You can initiate a Decoded Audio (DAUDio) measurement in enhanced full rate speech mode. However, this measurement is not supported in this channel mode and the integrity indicator will report that the results are questionable (see [“Decoded Audio \(DAUDio\) Troubleshooting” on page 96](#)).

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 466](#)), you may hear momentary unpleasant audio bursts from the mobile.

---

## Related Topics

\*\*\*\*\*

[“Programming a Channel Mode Change” on page 182](#)

\*\*\*\*\*



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## Testing a GPRS Mobile Station

This section is *not* applicable to GSM.

This section provides a description of how you may want to use the test set to test a GPRS mobile station which supports a single uplink timeslot or two adjacent uplink timeslots. The section contains:

- [“Test Overview” on page 785](#)
- [“Procedure” on page 785](#)
- [“Operating Considerations” on page 788](#)

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 Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#).

### 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 785](#)
2. [Switch on the GPRS mobile station, perform an attach and establish a data connection” on page 787](#)
3. [Make measurements and obtain results” on page 787](#)
4. [Reconfigure the data connection and make more measurements \(if required\)” on page 787](#)
5. [Disconnect the Mobile Station from the base station emulator” on page 788](#)

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 368](#))
  - Broadcast Channel (ARFCN) (see [“CALL\[:CELL\]:BCHannel\[:ARFCn\]\[:SElected\]” on page 370](#))
  - Cell Power (see [“CALL\[:CELL\]:POWER:AMPLitude\[:SElected\]” on page 432](#))

- Packet data traffic channel (PDTCH) parameters:
  - Packet Data Traffic Channel Band (see [“CALL:PDTCH | PDTChannel:BAND”](#) on page 420)
  - Packet Data Traffic Channel (ARFCN) (see [“CALL:PDTCH | PDTChannel\[:ARFCn\]\[:SElected\]”](#) on page 418)
  - Packet Data Traffic Channel Coding Scheme (see [“CALL:PDTCH | PDTChannel:CSCHEME”](#) on page 421)
  - Downlink Packet Data Traffic Channel Power Control:
    - Downlink Power Reference Level (dB) (see [“CALL:PDTCH | PDTChannel:PZERo:LEVel”](#) on page 426)
    - Downlink Power Reduction Level (dB) (see [“CALL:PDTCH | PDTChannel:PREduction:LEVel\[1 | 2\]”](#) on page 426)
    - Downlink Burst Power Reduction Selection (see [“CALL:PDTCH | PDTChannel:PREduction:BURSt\[1 | 2 | 3 | 4\]”](#) on page 425)
  - 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 388)
  - Multislot Configuration (see [“CALL:PDTCH | PDTChannel:MSLot:CONFiguration”](#) on page 424)

Note that some BCH and PDTCH parameters are fixed parameters. This means that their values cannot be changed (see [“Fixed Parameters”](#) on page 790).

- Mobile station operating parameters:
  - PDTCH MS TX Level (see [“CALL:PDTCH | PDTChannel:MS:TXLevel\[:SElected\]:BURSt\[1 | 2\]”](#) on page 421)
  - Guard Band Period Length (see [“CALL:MS:TX:BURSt:GPLength”](#) on page 406)
- 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 588. For a more detailed description of measurement execution parameters along with programming examples, see [“Step 3: Set Measurement Parameters”](#) on page 288.
- 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 391. For a list of the deferred parameters see [“Configuring the Packet Data Traffic Channel \(PDTCH\)”](#) on page 769. For more details on using deferred parameters see [“Using Deferred Parameters”](#) on page 771.

## 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 387 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 58).

## 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 473.

The query `“CALL:STATus:PDTCH | PDTChannel:BLERror?”` on page 458 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 788). If you require more details on BLER, see [“BLER Report Measurement Description”](#) on page 89.

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 587). 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 424.

For more details on the process of making measurements and gathering results, see [“Step 5: INITiate and FETCh Measurements”](#) on page 291.

## 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 391. 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 294.

## 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 388](#)) and then initiate the GPRS detach procedure from the mobile station. If you require more details, see “[Step 7: End Connection](#)” on [page 296](#). 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.

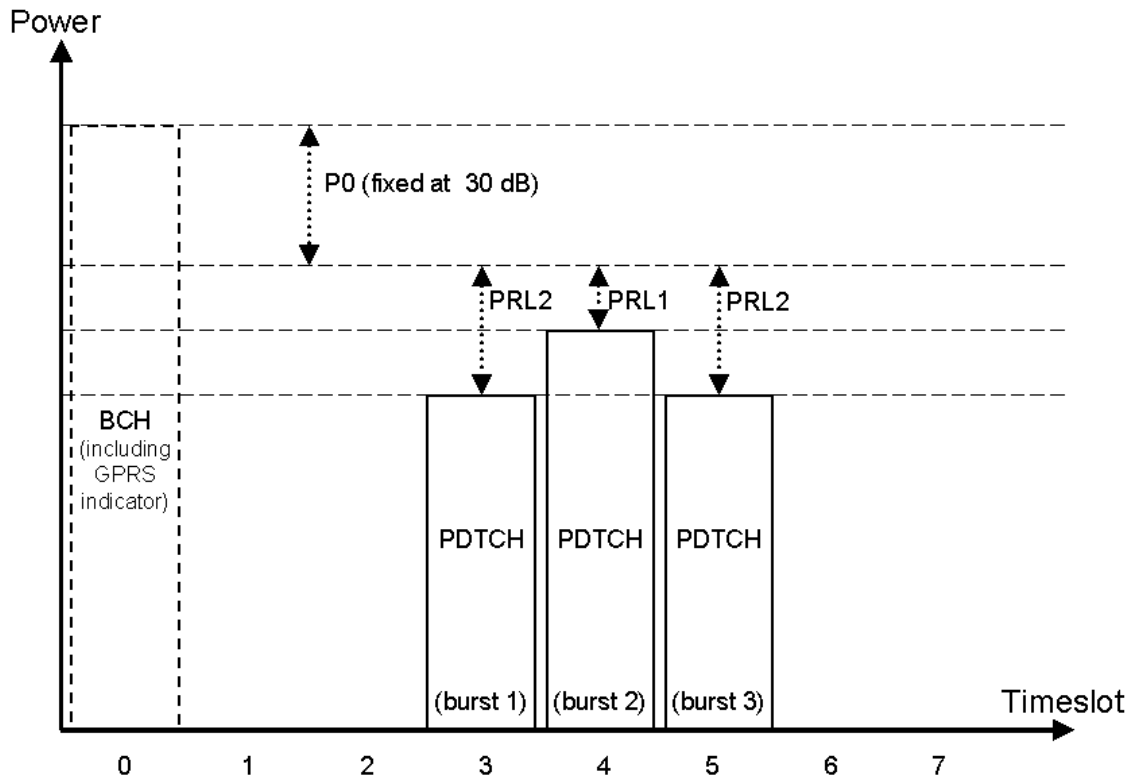
## Operating Considerations

### 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 specified as a power reduction level (for each burst) from the reference level for the current connection. ETSI refers to these power reduction levels as PR values, and the reference level is known as P0. In the test set, the power reduction levels are implemented as 2 values (PRL1 and PRL2) which can be mapped to any downlink burst.

P0, PRL1, and PRL2 are shown in the figure below. 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 7. 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 432.
- To set the P0 Reference Level, use `CALL:PDTCH | PDTChannel:PZERo:LEVel` on page 426.
- To set the Downlink Power Reduction Level (dB) for PRL1 and PRL2, use `CALL:PDTCH | PDTChannel:PREduction:LEVel[1 | 2]` on page 426.
- 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 425.

### Fixed Parameters

A number of GPRS parameters currently have fixed values. These fixed parameters are shown in the following table.

**Table 1. 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 Example for testing GPRS Mobile Stations with the Agilent Technologies 8960” on page 282](#)

[“Active Cell For GPRS” on page 752](#)

[“GPRS Broadcast Channel Parameters” on page 764](#)

[“Configuring the Packet Data Traffic Channel \(PDTCH\)” on page 769](#)

\*\*\*\*\*

## Preset Descriptions

### Description

The test set is capable of accepting several different preset commands.

At no time during a preset operation, will transmit power exceed the last user setting of the transmit power. The input power will not be set to any value lower than the last user setting of the input power. This is to avoid power spikes on the output and possible receiver damage on the input during transitions associated with preset operations.

### Partial Preset

```
OUTPUT 714;"SYSTEM:PRESET3" !Command for a partial preset when user in
!remote operation.
```

SYSTEM:PRESET3 is the recommended command for a partial preset operation. The SYSTEM:PRESET[1] command is not recommended for use at this time.

### Full Preset

A full preset requires you to setup new measurements and their parameters. If new setup parameters are not needed, use a partial preset to save time.

### Example

```
OUTPUT 714;"*RST" !Recommended command for a full preset, sets trigger arm to single.
```

```
OUTPUT 714;"SYSTEM:PRESET2" !Command for a full preset, sets trigger arm to continuous.
```

The \*RST common command is the recommended command for a full preset operation.

---

**NOTE** Transmit power is not set to OFF during a full preset, transmit power will be set to the default value.

---

\*RST gives the same results as partial preset with the exception of Trigger Arm and the measurement parameters.

**Table 2. Full Preset Behavior**

Function	Result
Trigger Arm	Continuous (manual operation full preset or SYSTEM:PRESET2 command)
Trigger Arm	Single (remote operation full preset, *RST command)
Measurement Parameters	all set to defaults

## Preset Descriptions

**Table 2. Full Preset Behavior**

Function	Result
Maskable Message Display State	On (manual operation full preset)
Maskable Message Display State	Off (remote operation full preset)

### Status Preset

The STATUS:PRESET command will set the status system as defined in “SCPI 1995 Volume 2: Command Reference” section 20.7. All of the enable registers will be set to 0, all PTR registers will be set to 1, and all NTR registers will be set to 0.

#### Example

```
OUTPUT 714;"STATUS:PRESET" !Presents the STATus subsystem.
```

### Related Topics

\*\*\*\*\*

[“SYSTem:PRESet” on page 729](#)

[“\\*RST” on page 733](#)

\*\*\*\*\*

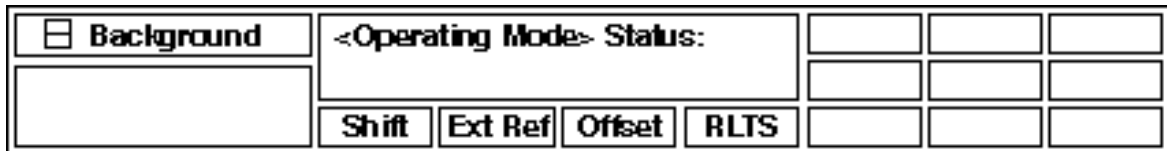


## Instrument Status Area

### Description

The Instrument status area is found on the bottom center of the test set's display.

**Figure 8. Status Area of the Test Set Display**



### Background

Users are able to initiate more than one measurement at a time with the test set. The test set's display will show a maximum of 2 measurements. When 3 or more measurements are initiated, or the MEASUREMENT screen is not displayed, the Background annunciator reminds you that measurements are active but not displayed.

### <Operating Mode> Status

The call processing status and the operating modes are displayed in this area. This area may change (depending on the TA that is active) in order to provide TA specific information.

### Shift

This annunciator indicates that the blue SHIFT key has been pressed, and that the next key you press will perform the shifted function indicated, also in blue.

### Ext Ref

When a suitable external time base is connected to the rear panel 10MHz REF IN connector, this annunciator will turn on.

### Int Ref

When a suitable external time base is not connected to the rear panel 10MHz REF IN connector, this annunciator will turn on.

### Offset

Indicates that the Amplitude Offset state is set to On.

### RLTS

This annunciator indicates the state of four different conditions of the test set:

- Remote annunciator. 'R' turns on when the test set is operated remotely.

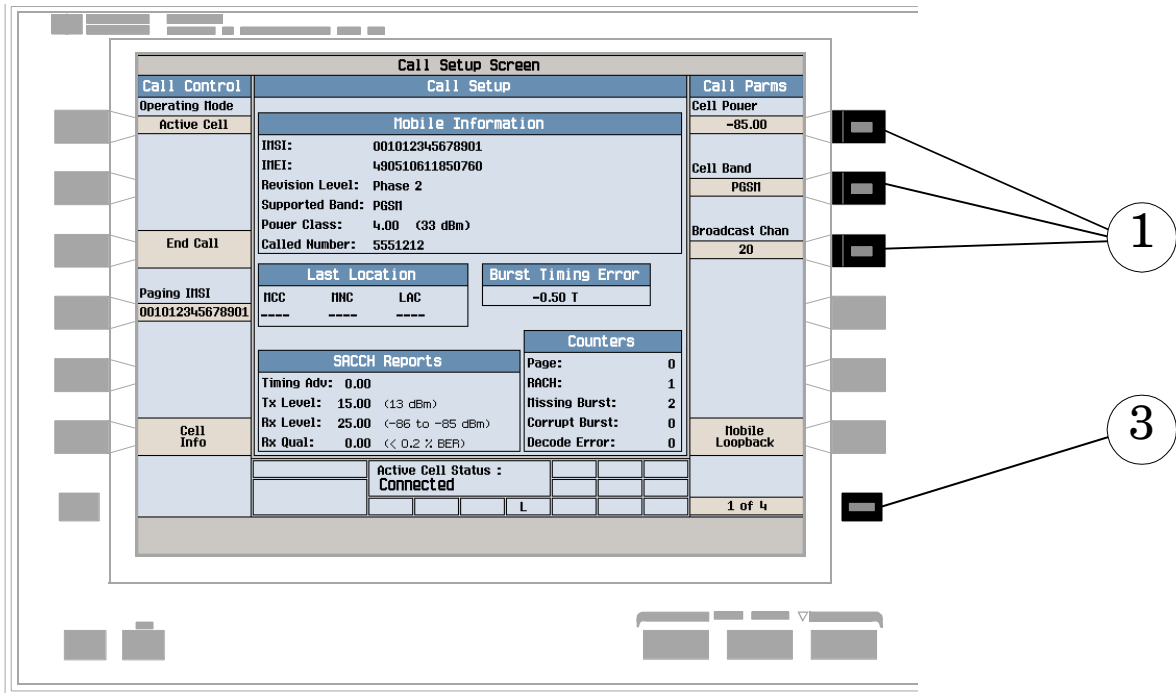
## Instrument Status Area

- 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.

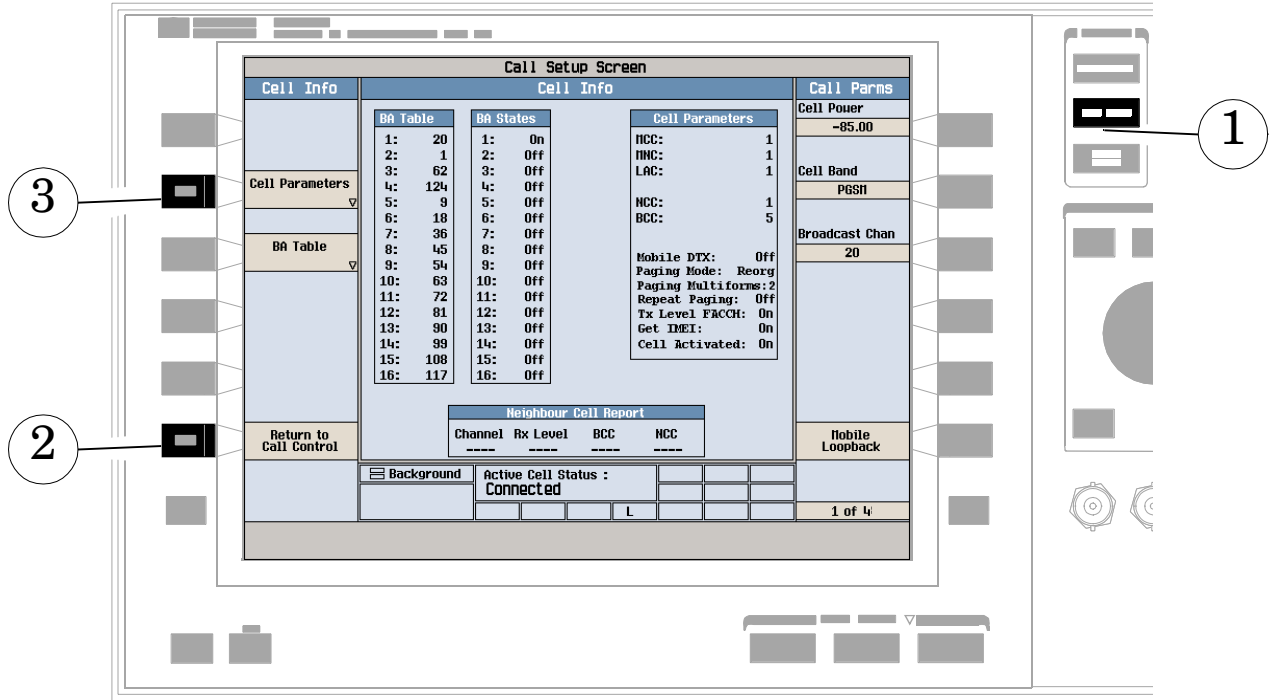


1. Press **F7**, **F8**, or **F9**.
2. Enter a value or highlight a selection and press the knob.
3. Press the **MORE** key for additional call parameters (**Call Params**). Note: For a dual-band handover, change **Traffic Band** selection (**F7**, **Call Params** menu 2 of 4).

## How Do I Change Cell Parameters?

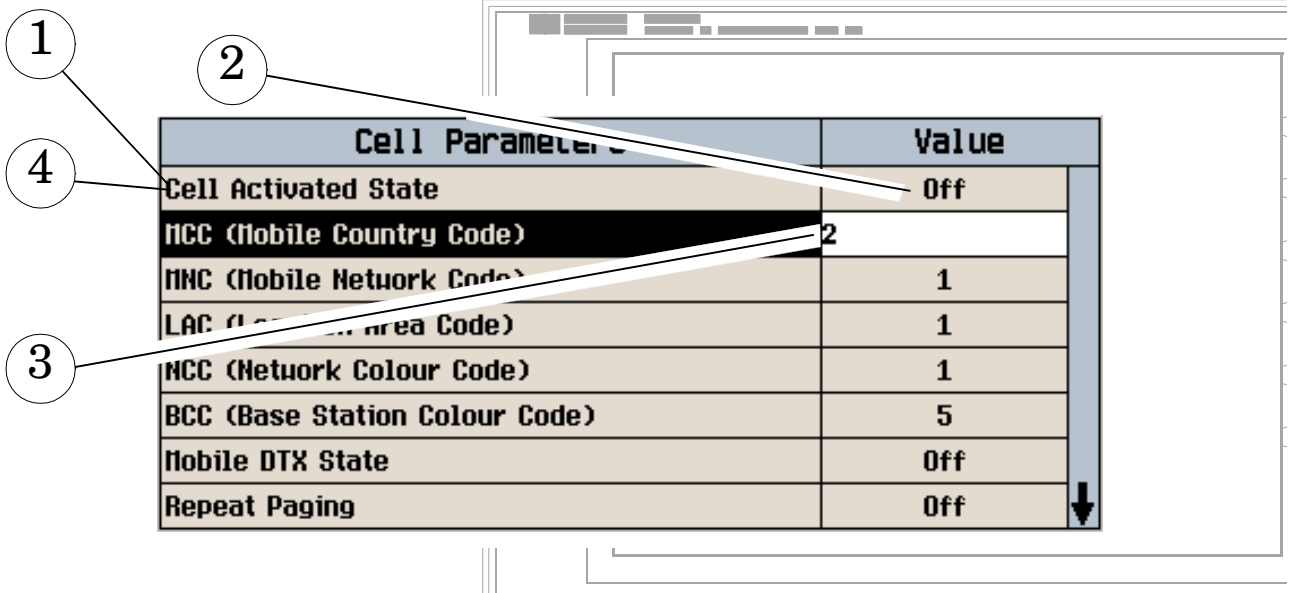
This section is *not* applicable to GPRS.

### A. Select the cell parameters menu.



1. Press the **CALL SETUP** key.
2. Press **Cell Info (F6)**.
3. Press **Cell Parameters (F2)**.

**B. Set a cell parameter.**



To Change “Network” cell parameters follow the instructions below. For all other cell parameters:

Highlight the parameter, press the knob, enter a value, and press the knob.

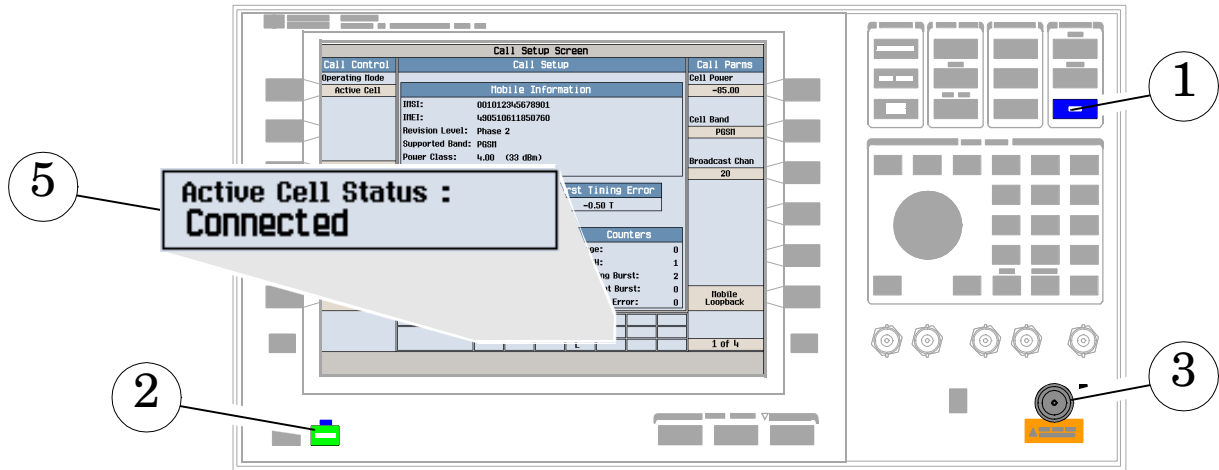
To Change “Network” cell parameters:

1. Highlight **Cell Activated State** and press the knob.
2. Set **Cell Activated State** to **Off**. (Highlight **Off** and press the knob.)
3. Set “Network” cell parameter to the desired value. (Highlight the parameter, press the knob, enter a value, and press the knob.)
4. Set **Cell Activated State** to **On**.

## How Do I Make Measurements on a Mobile?

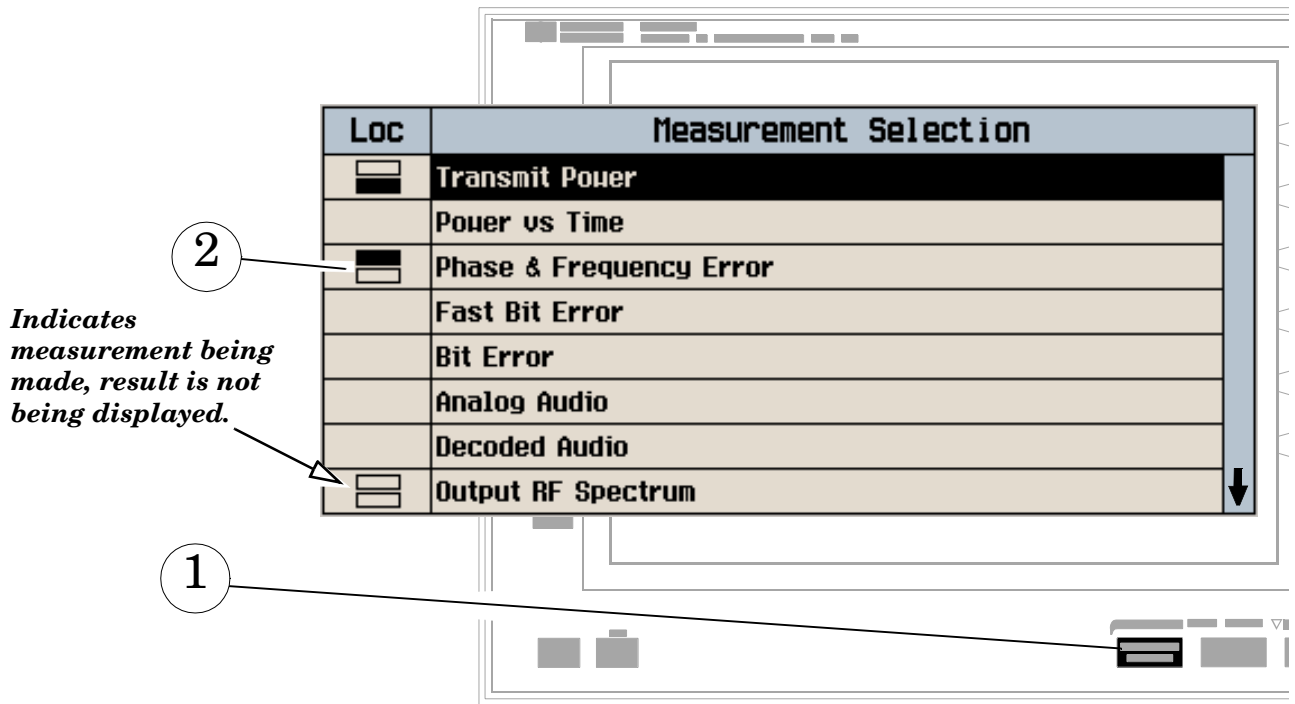
This section is *not* applicable to GPRS.

### A. Establish a call.



1. Press the blue **SHIFT** key.
2. Press the green **Preset** key.
3. Connect the mobile. Note: Is the mobile camped? PGSM is default Cell Band setting.
4. On the mobile press 1, 2, 3, and then press send.
5. Check for **Connected** in the **Active Cell Status**: field.

## B. Select measurements.



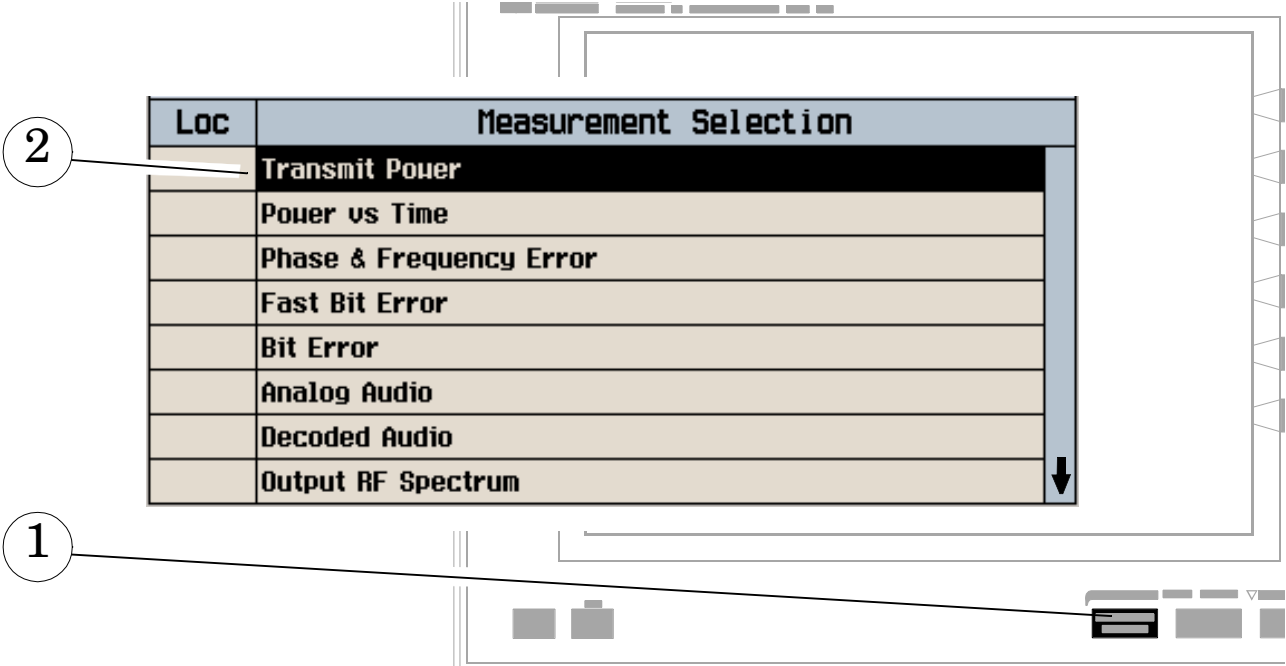
1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.



# How Do I Change Measurement Setup?

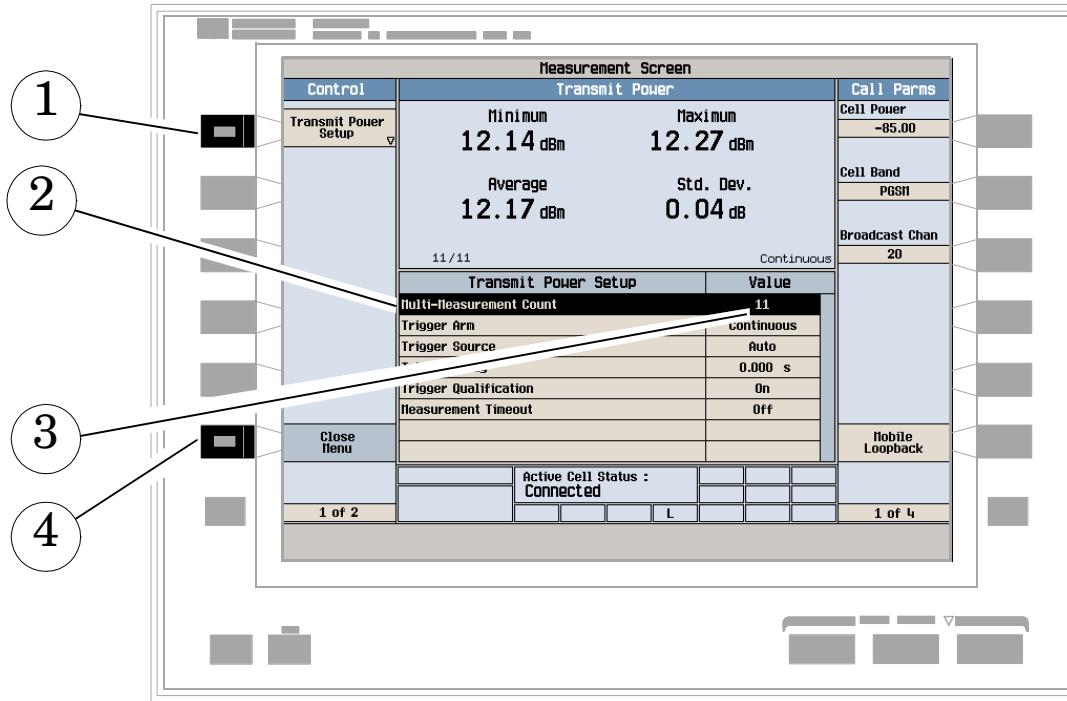
This section is *not* applicable to GPRS.

## A. Select a measurement.



1. Press the **Measurement selection** key.
2. Highlight a measurement to setup and press the knob.

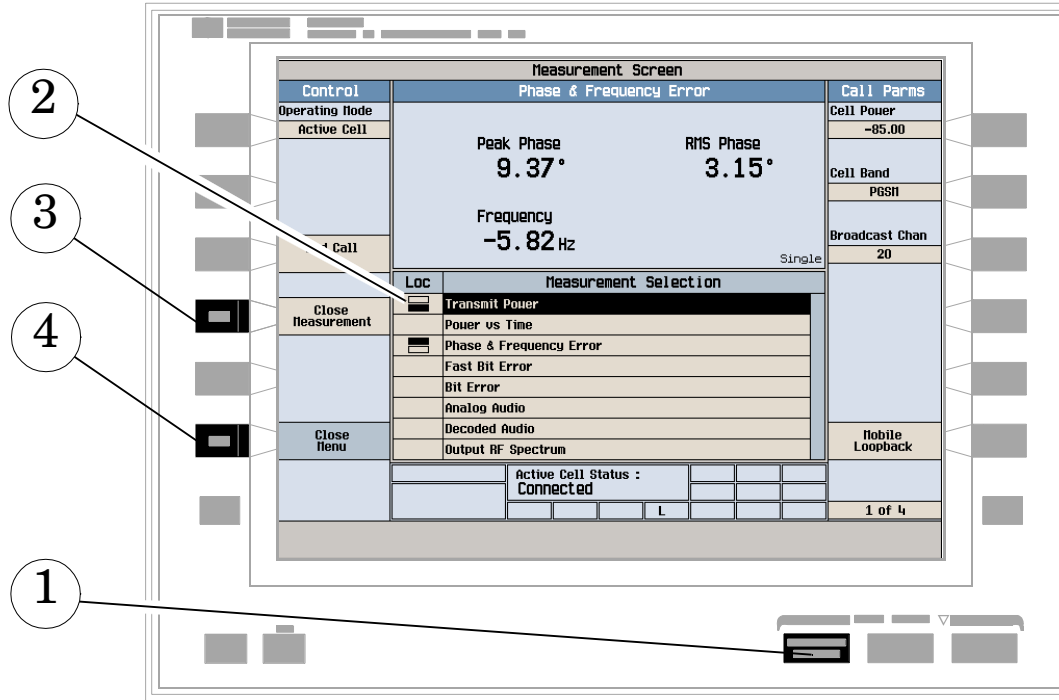
## B. Set up the measurement.



1. Press the measurement's **Setup (F1)** key.
2. Highlight a parameter and press the knob.
3. Enter a value or make a selection and press the knob. Note: For statistical measurement results, change the **Multi-Measurement Count** parameter from **Off** to a number **>1**.
4. Press **Close Menu (F6)**.

## How Do I Turn Off a Measurement?

This section is *not* applicable to GPRS.



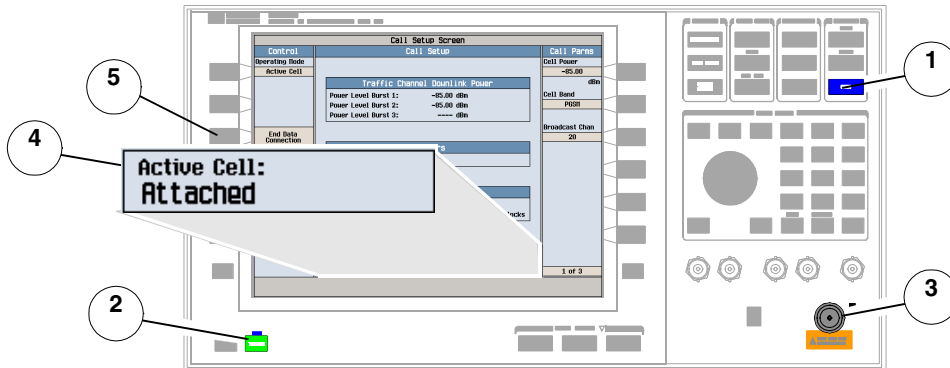
1. Press the **Measurement selection** key.
2. Highlight the measurement you want to turn off.
3. Press **Close Measurement (F4)**.
4. Press **Close Menu (F6)**.

# 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 **SHIFT** key.
2. Press the **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.

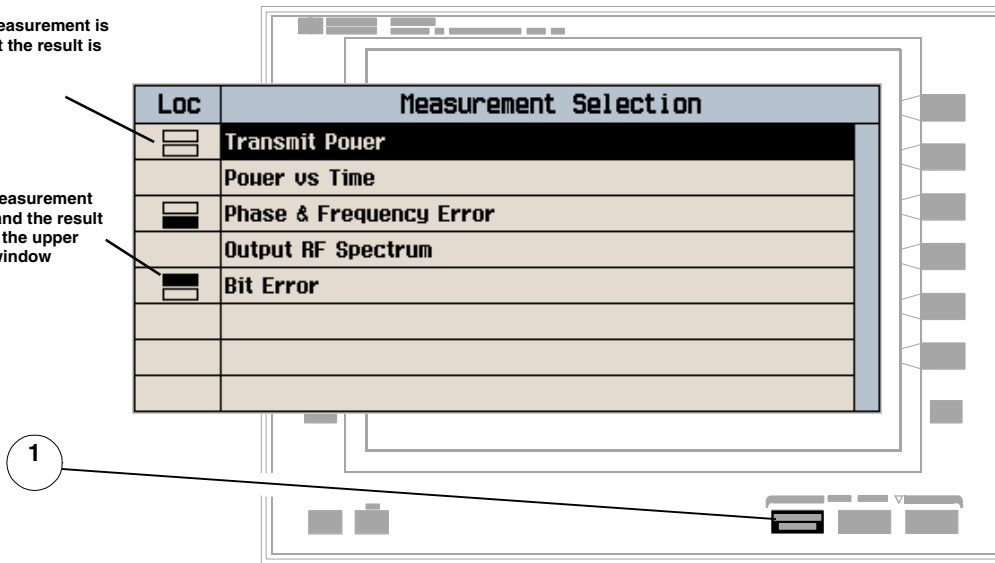
---

5. Press **Start Data Connection (F3)** and watch for the **Active Cell:** field changing to **Transferring**.

## B. Select Measurements.

Indicates the measurement is being made, but the result is not being displayed.

Indicates the measurement is being made and the result is displaying in the upper measurement window

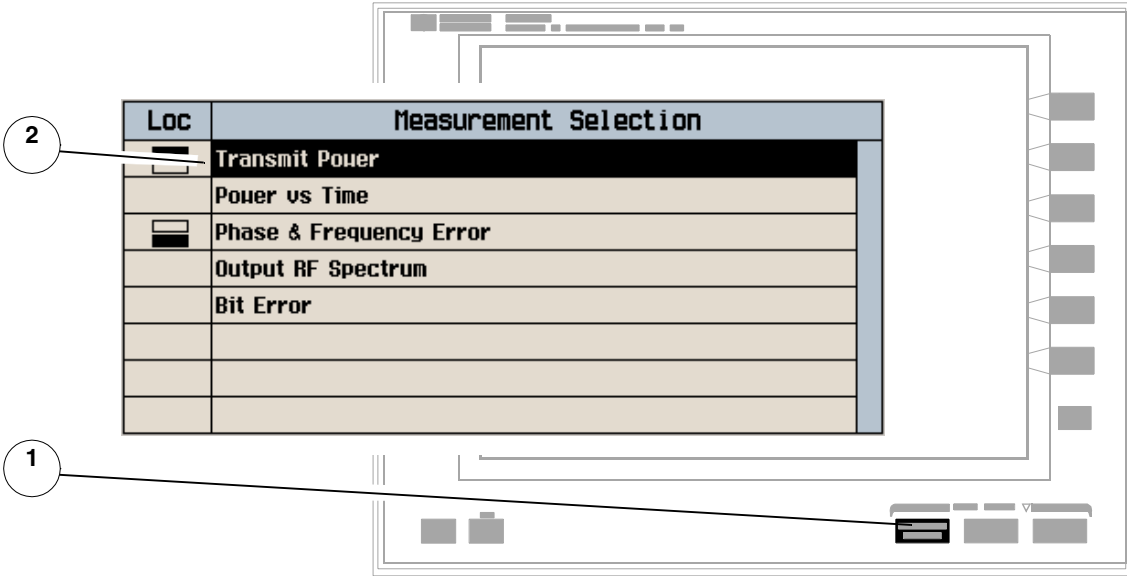


1. Press the **Measurement selection** key.
2. Highlight a measurement and press the knob.
3. Repeat steps 1 and 2 to add measurements.

# How Do I Change Measurement Setup?

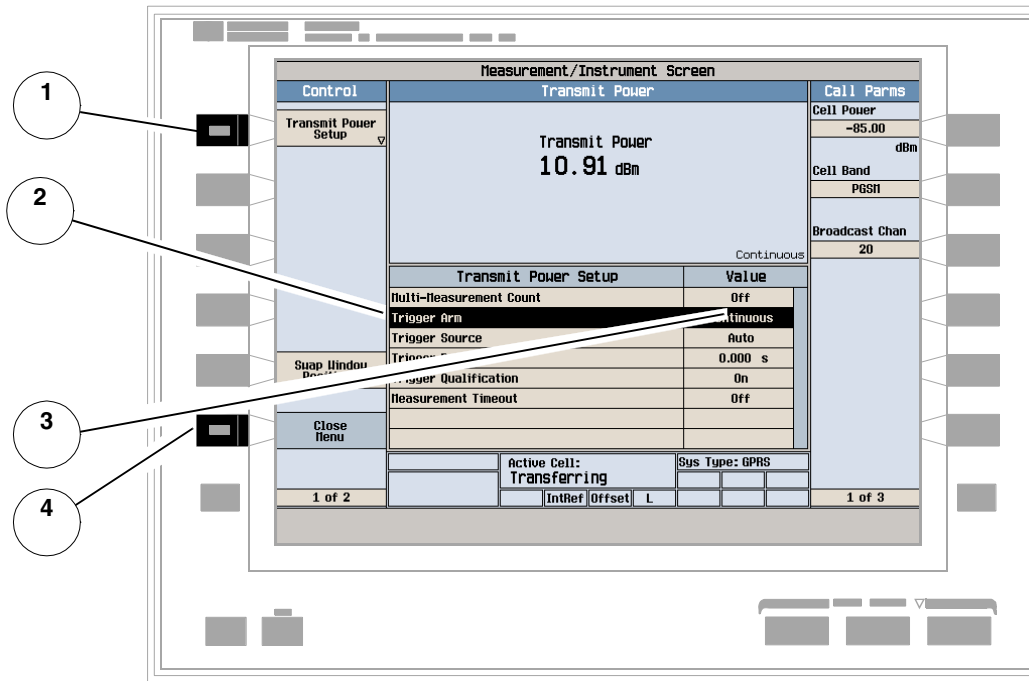
This section is *not* applicable to GSM.

## A. Select a Measurement.



1. Press the **Measurement selection** key.
2. Highlight a measurement to setup and press the knob.

## B. Set Up a Measurement.



1. Press the measurement's **Setup (F1)** key.
2. Highlight a parameter and press the knob.
3. Enter a value or make a selection and press the knob.

---

**NOTE** For Statistical measurement results, change the **Multi-Measurement Count** parameter from **Off** to a number >1.

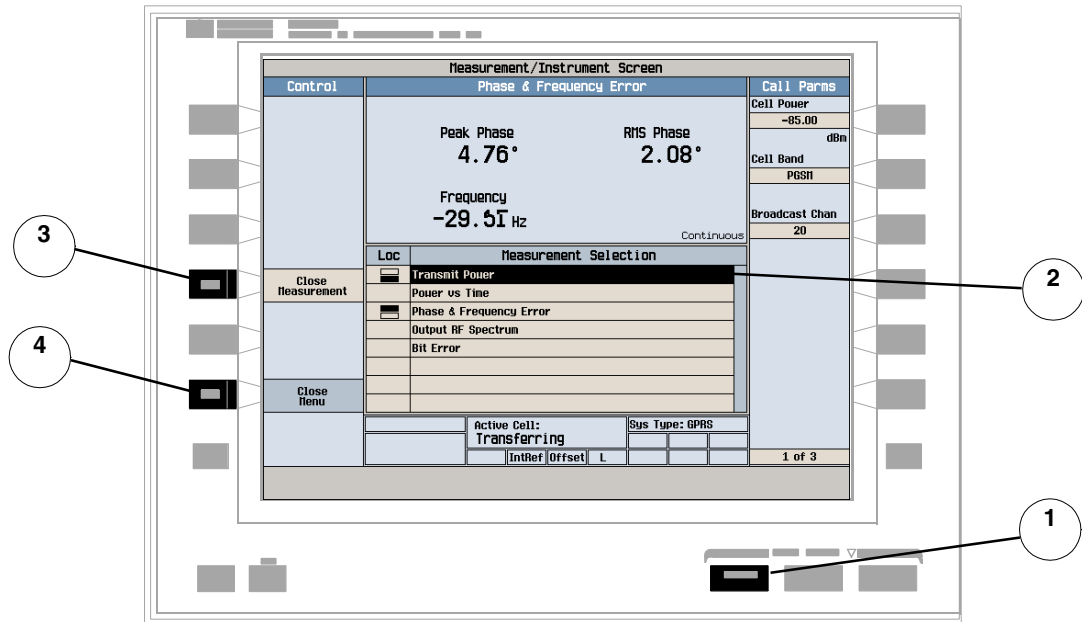
---

4. Press **Close Menu (F6)**.



## How Do I Turn Off a Measurement?

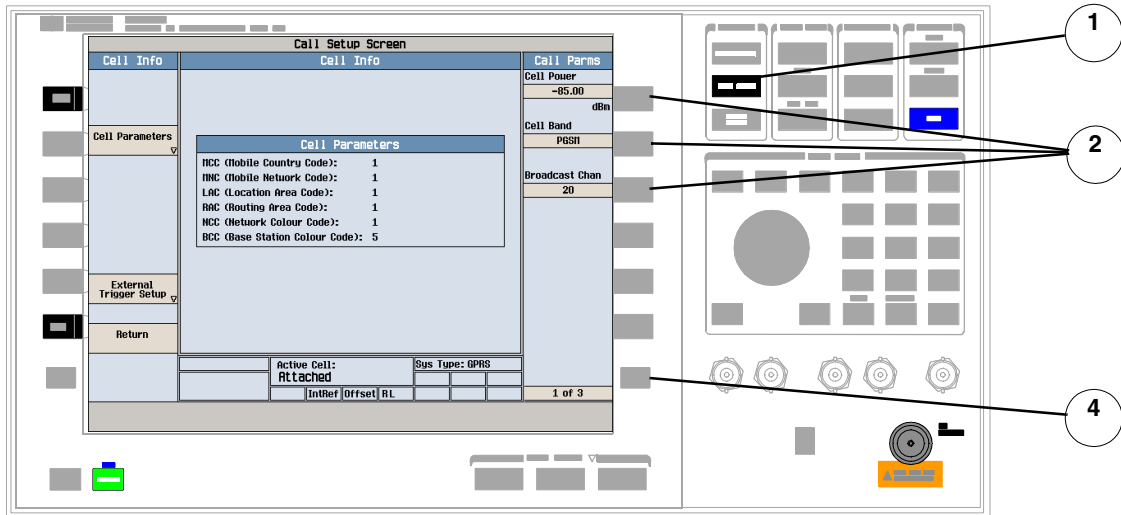
This section is *not* applicable to GSM.



1. Press the **Measurement selection** key.
2. Highlight the measurement you want to turn off.
3. Press **Close Measurement (F4)**.
4. Press **Close Menu (F6)**.

## 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.

---

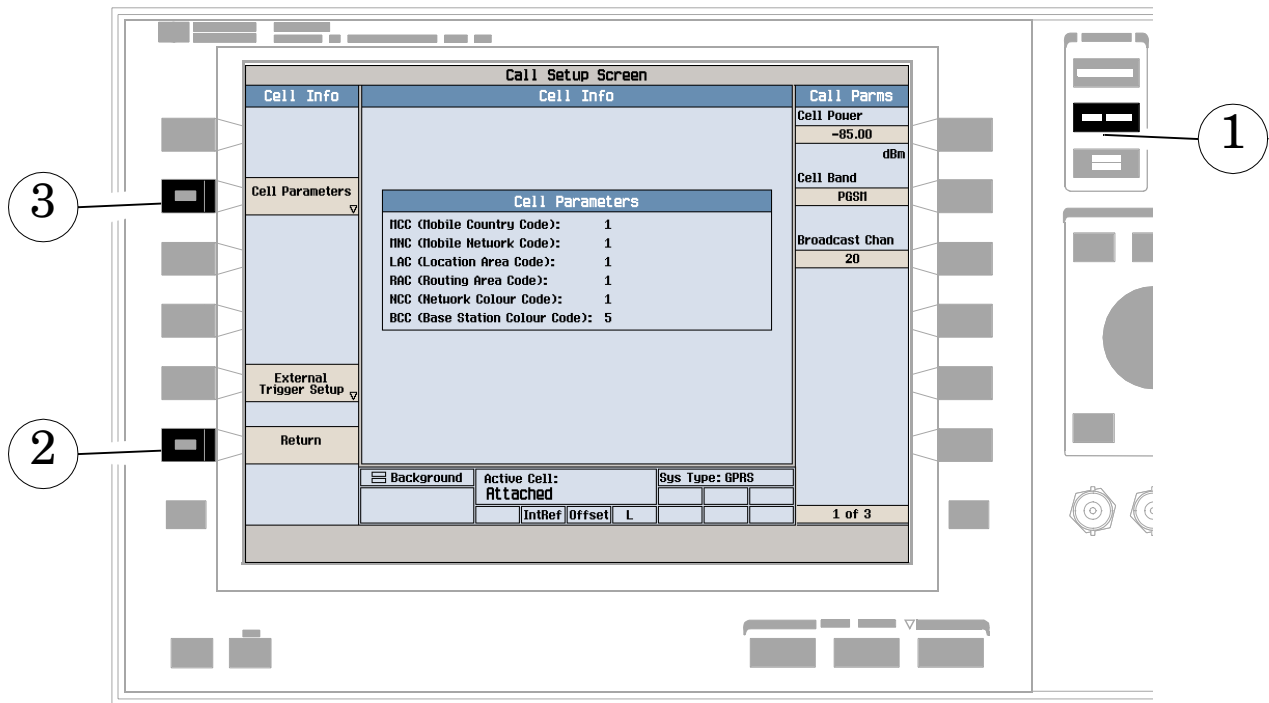
2. On the **Call Params** menu (1 of 3) press **F7**, **F8** or **F9**.
3. Enter a value or highlight a selection and press the knob.
4. Press the **More** key for additional Call Parameters.

## 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, **Operating Mode (F1)** and selecting **Cell Off**

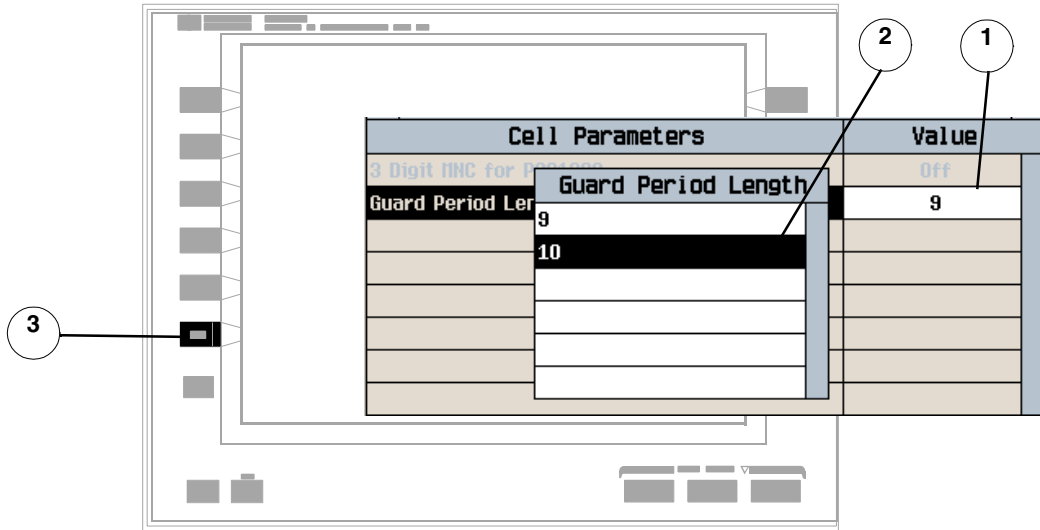
### A. Select the Cell Parameters Menu.



1. Press the **CALL SETUP** key.
2. Press **Cell Info (F6)**.
3. Press **Cell Parameters (F2)**.

## How Do I Change Cell Parameters?

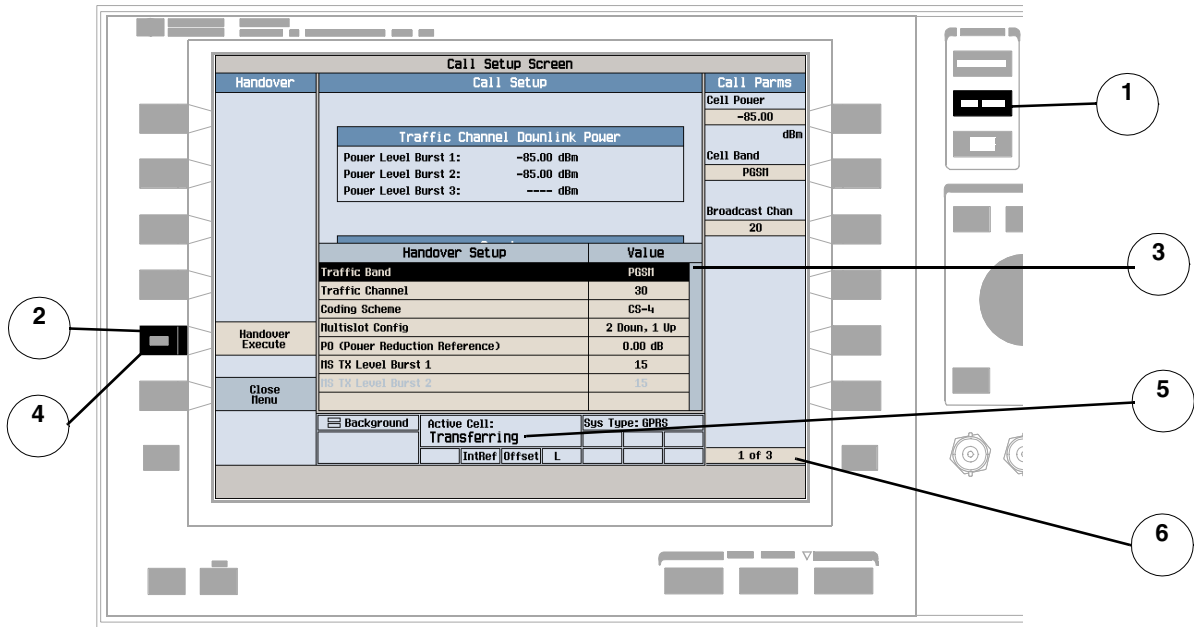
### B. Set a Cell Parameter.



1. Highlight a parameter and press the knob.
2. Enter a value or selection and press the knob.
3. Press **Close Menu (F6)**.

## How Do I Perform a Handover?

This section is *not* applicable to GSM.



1. Press the **CALL SETUP** key.
2. Press **Handover Setup (F5)**.
3. Change the various parameters, for example Traffic Band.
4. Press **Handover Execute (F5)** to complete the handover, or **Close Menu (F6)** to abort the handover.
5. Check for **Transferring** in the **Active Cell:** field.
6. Check the changes have been implemented on the **Call Params** menus (2 of 3) and (3 of 3).

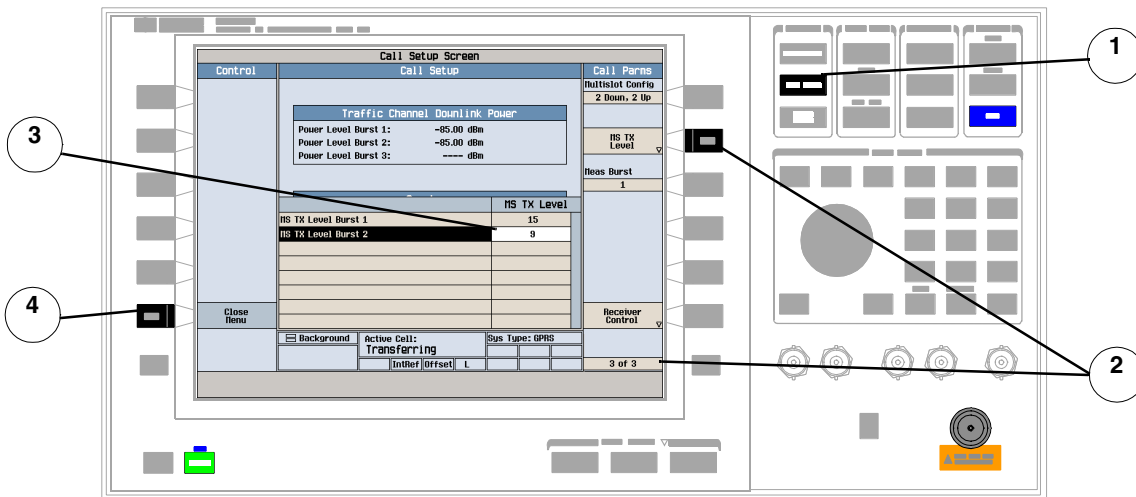
## How Do I Change the MS TX Level?

This section is *not* applicable to GSM.

There are two ways to change the MS TX Level:

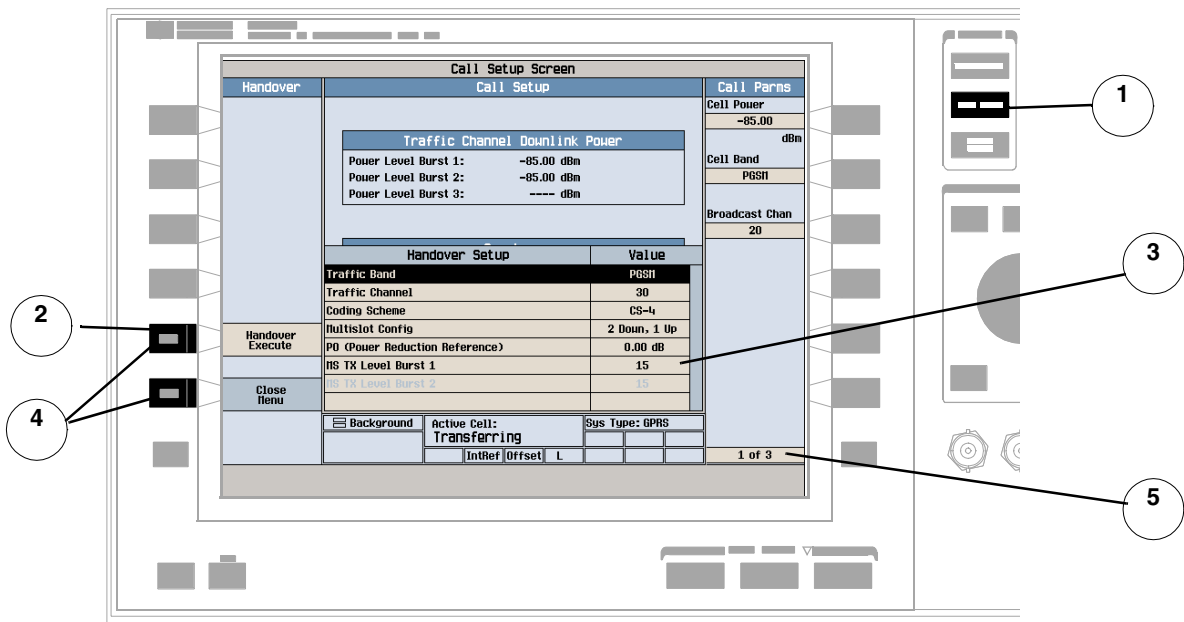
1. Change Level Immediately
2. Change level during a handover

### 1. Change the MS TX Level Immediately.



1. Press the **CALL SETUP** key.
2. On the **Call Params** menu (3 of 3) press **MS TX Level (F8)**.
3. Select a new **MS TX Level** and press the knob.
4. Press **Close Menu (F6)**.

## 2. Change the MS TX Level During a Handover.

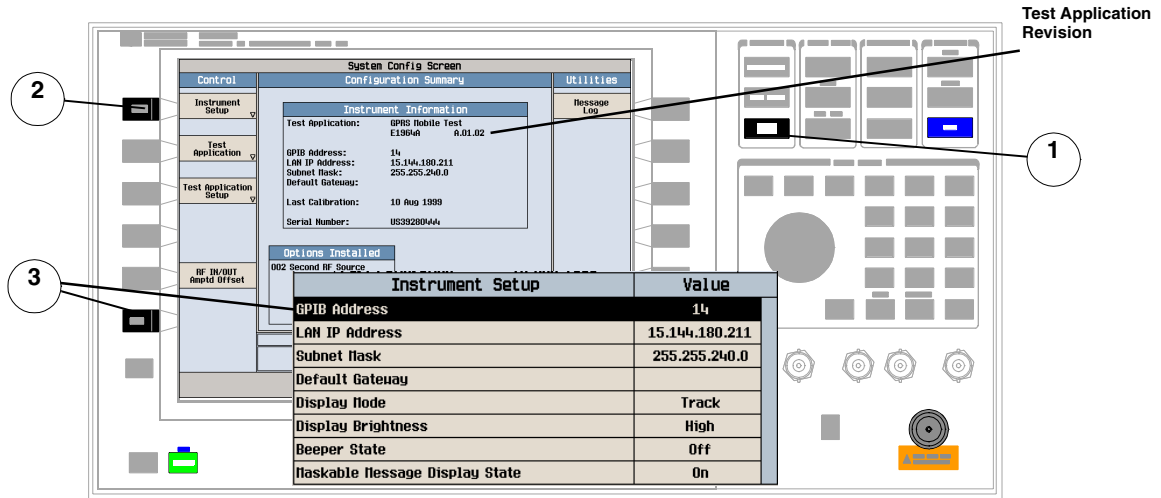


1. Press the **CALL SETUP** key.
2. On Control menu, press **Handover Setup (F5)**.
3. Select and change the MS TX Level.
4. Press **Handover Execute (F5)**, to change the MS TX Level, or **Close Menu (F6)** to leave the level unchanged.
5. Check the MS TX Level has been changed on the **Call Params** menu (3 of 3).

## How Do I Configure the Test Set for my test system?

This section is *not* applicable to GSM.

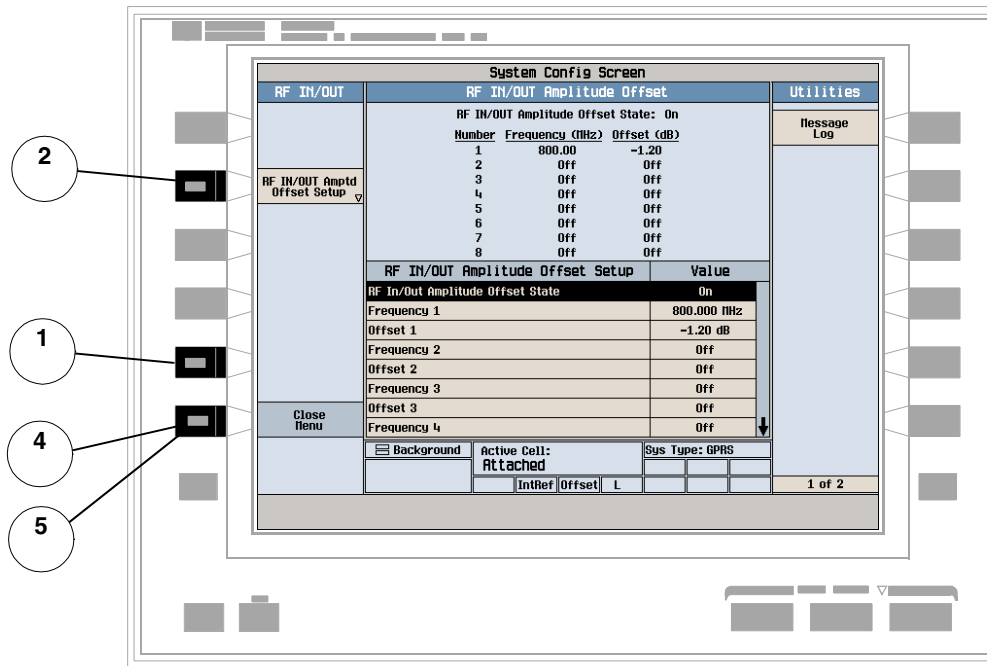
### A. Instrument Information and Setup.



1. Press the **SYSTEM CONFIG** key.
2. Press **Instrument Setup (F1)**.
3. Adjust an instrument setting and then press **Close Menu (F6)**.



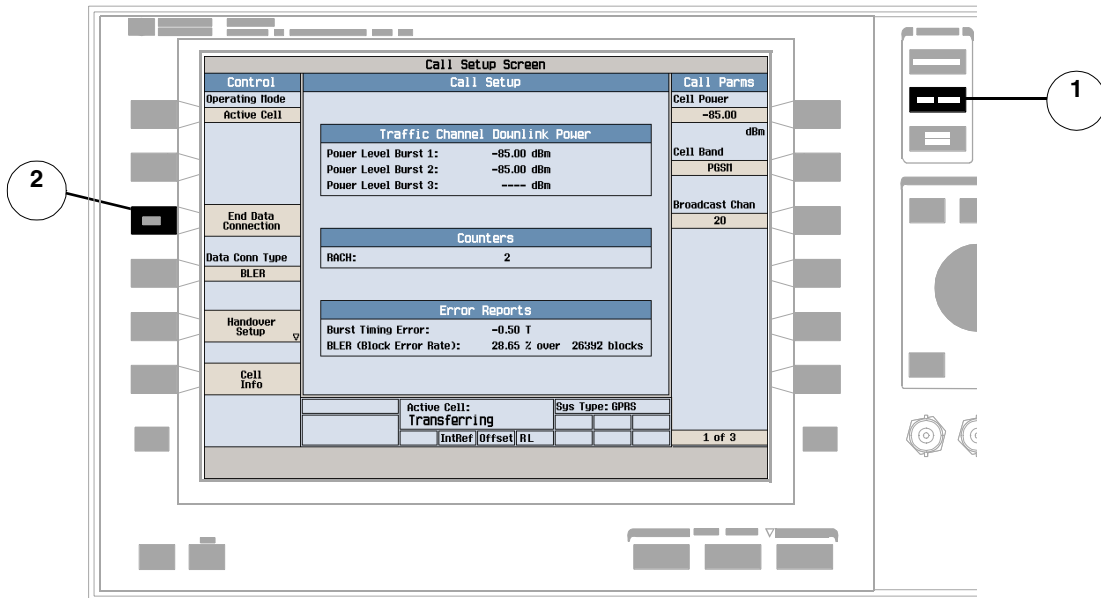
## B. Amplitude Offset.



1. On the Configuration Summary screen, press **RF IN/OUT Amptd OFFset (F5)**.
2. On the **RF IN/OUT Amplitude Offset** screen, press **RF IN/OUT Amptd Offset Setup (F2)**.
3. Enter the amplitude offsets for the test frequencies you use.
4. Press **Close Menu (F6)**.
5. Press **Return (F6)** to return to the **Configuration Summary** screen

## How Do I End the Data Connection?

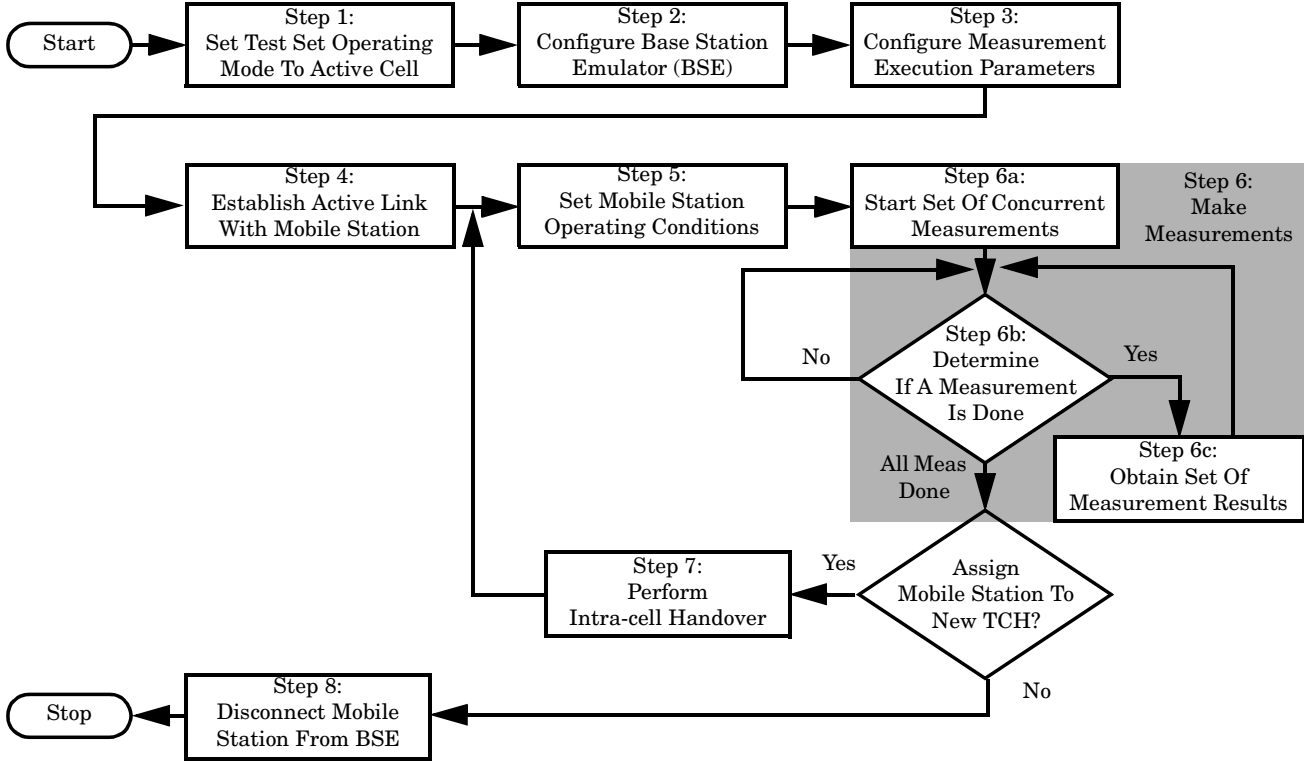
This section is *not* applicable to GSM.



1. Press the **CALL SETUP** key.
2. Press **End Data Connection (F3)**, 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 9. Typical Flow Of Tasks Performed By Control Program



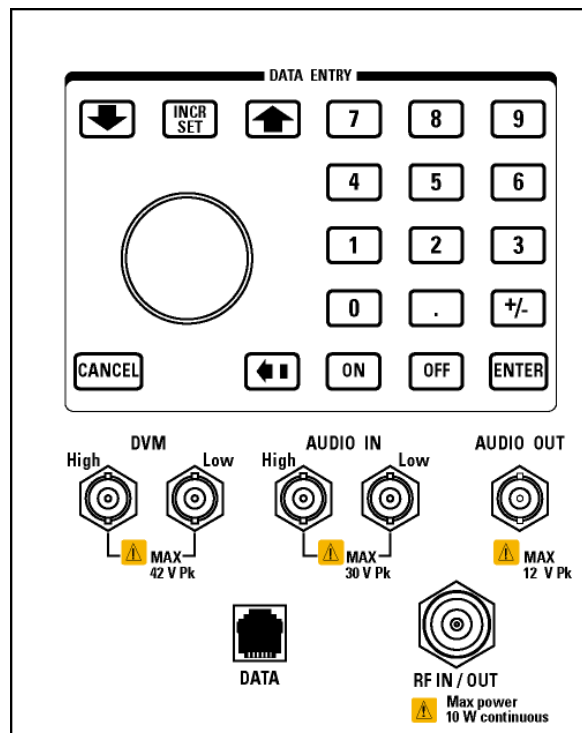
## Related Topics

- \*\*\*\*\*
- [“Programming a Phase and Frequency Error Measurement” on page 132](#)
- [“Programming a Transmit Power Measurement” on page 169](#)
- [“Programming an Output RF Spectrum Measurement” on page 123](#)
- [“Programming a Power versus Time Measurement” on page 148](#)
- [“Programming a Fast Bit Error Measurement” on page 116](#)
- [“Establishing an Active GSM Link with the Mobile Station” on page 36](#)

\*\*\*\*\*

## 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](#)

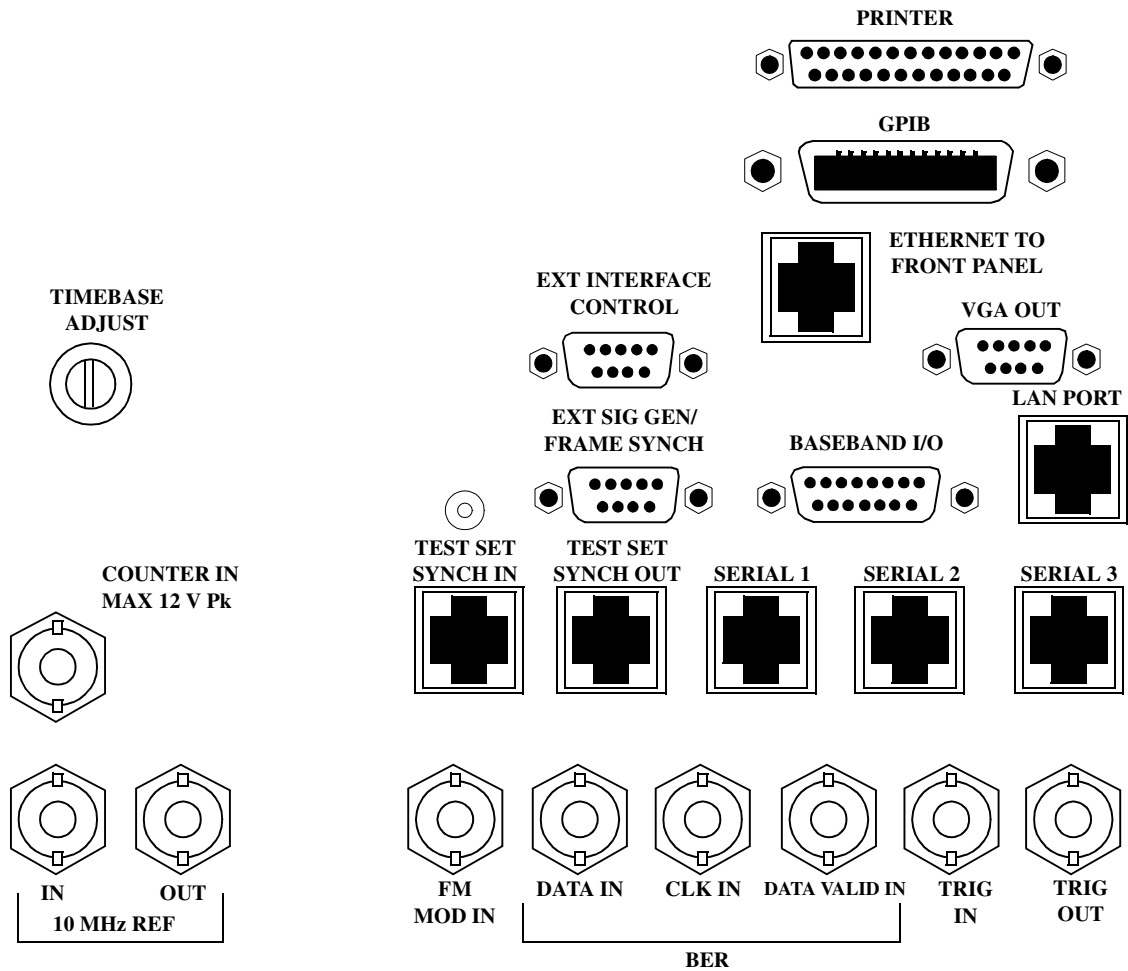
[“AFGenerator” on page 350](#)

[“Configuring the Test Set’s LAN” on page 832](#)

\*\*\*\*\*

# 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

## Rear Panel Connectors

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 774](#)

[“Timebase Description/Configuration” on page 841](#)

[“SYSTEM:ROSCillator” on page 731](#)

[“Configuring the Test Set’s GPIB Address” on page HIDDEN](#)

[“Configuring the Test Set’s LAN” on page 832](#)

\*\*\*\*\*

---

## 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.

# 10 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 471](#)

\*\*\*\*\*

---

# 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 711](#)

["Error Messages" on page 844](#)

\*\*\*\*\*

---

## 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:\[:SELF\]:ADDRes” on page 712](#)

\*\*\*\*\*

---

## 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 733](#)

["CALibration:DATE" on page 356](#)

["SYSTem:CURRent:TA" on page 722](#)

["SYSTem:COMMunicate" on page 712](#)

\*\*\*\*\*

---

# Configuring the Test Set's LAN

## Description

### LAN IP Address

The LAN address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223, and B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN address can be set/queried using the SYSTem subsystem.

The LAN address is a non-volatile parameter. The LAN address is not affected by any reset operation and can only be changed by direct access to the parameter itself.

---

**NOTE** If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

---

For convenience the DATA port on the front panel may be configured as a LAN port. When a RJ45 jumper cable, (part number E5515-61160) is connected from the LAN PORT on the rear panel, to the ETHERNET TO FRONT PANEL port also on the rear panel, the user has LAN access from the front panel of the test set. Without the RJ45 jumper cable, the test set connection to a LAN is the rear-panel, LAN PORT connector.

### LAN Default Gateway

The LAN router, (default gateway), is a character string with a maximum of 15 characters and a format of A, B, C, D, where A is between 0 and 223 , and B, C, and D are between 0 and 255, no embedded spaces are allowed. If the default gateway is set to a format not allowed with the LAN address or the subnet mask that have been selected, the default gateway will be set to a null string, indicated by a blank field on the test set display. The address may be manually set/viewed in the system configuration screen. The LAN default gateway can be set/queried using the SYSTem subsystem.

The LAN default gateway is the address of a router that routes messages between networks and or subnets. If this value is not specified, LAN communications will be limited to the network and subnet specified by the LAN IP address and the subnet mask. Your network administrator will know if a default gateway is needed and if so, the address of the router. If the default gateway address is not needed by your network, it may be disabled by entering any of the following values: "0" (zero), "" (null string), "0.0.0.0"

The LAN default gateway is a non-volatile parameter. The LAN default gateway is not affected by any reset operation and can only be changed by direct access to the parameter itself.

### LAN Subnet Mask

The LAN subnet mask address is a character string with a maximum of 15 characters and a format of A, B, C, D, where A , B, C, and D are between 0 and 255. No embedded spaces are allowed. The address may be manually set/viewed in the system configuration screen. The LAN subnet mask address can be set/queried using the SYSTem subsystem.

The subnet mask number combined with the IP address identifies which network and subnet your computer is on. Contact your system administrator for the correct subnet mask for your network.

The subnet mask determines the boundaries between the subnet ID and the host ID.



The LAN subnet mask is a non-volatile parameter. The LAN subnet mask is not affected by any reset operation and can only be changed by direct access to the parameter itself.

---

**NOTE**        If the LAN address is set to a different network class, the subnet mask will change to the default net mask for the new network class.

---

The subnet mask number is obtained from your network administrator.

## Related Topics

\*\*\*\*\*

[“SYSTem:COMMunicate:LAN\[:SELF\]:ADDRess” on page 713](#)

[“SYSTem:COMMunicate:LAN\[:SELF\]:DGATeway” on page 714](#)

[“SYSTem:COMMunicate:LAN\[:SELF\]:SMASK” on page 714](#)

\*\*\*\*\*

# Hardware Configuration Report

## Description

You can generate a list of the test set's hardware configuration over the LAN or GPIB.

The LAN query is the easiest and most direct way to query the test set's hardware configuration. This method uses your web browser to display a formatted report.

The GPIB query returns an unformatted character string that must be buffered and saved to an HTML file to provide formatted text.

## LAN Query

1. Refer to the SYSTEM CONFIG screen to determine the LAN address.
2. Open a web browser and enter <LAN address>/iconfig. For example, if your LAN address is 130.2.2.147, you would enter:  
130.2.2.147/iconfig
3. The web browser will then display formatted text. A partial list of the hardware configuration information is shown below:

### Agilent Technologies 8960 Series 10 E5515A

**Serial Number: US00000097**

**Current Test Application:** E1960A, GSM Mobile Test, A.04.01

**Instrument Options Installed:** RF Source 2

**HOST BOOT ROM REV:** A.02.03\_BOOT

**PROTOCOL BOOT ROM REV:** MOM\_PROTOCOL\_BSP\_1.7

**DSP BOOT ROM REV:** A.00.01

## GPIB Query

Use the following Basic example as a model to store the test set's configuration as an HTML file.

### GPIB Example:

```

10  DIM Buf1$[20000],Buf2$[20000] ! This is the minimum space for the arrays
20  OUTPUT 714;"SYSTEM:CONFIGURE:INFORMATION:HARDWARE:VERBOSE?"
30  ENTER 714;Buf1$,Buf2$
40  CREATE "HW.htm",1           ! Create an HTML file
50  ASSIGN @File TO "HW.htm"
60  OUTPUT @File;Buf1$,Buf2$
70  END

```

In the future, the hardware configuration report may increase in length. More space would then need to be allocated for the arrays.

Display the HTML file using a web browser or HTML text editor.

## Related Topics

\*\*\*\*\*

[“SYSTEM:CONFigure” on page 715](#)

[“SYSTEM:CURRENT:TA” on page 722](#)

[“SYSTEM:APPLICATION” on page 705](#)

[“Obtaining Identification Information \\*IDN?” on page 831](#)

[“Rear Panel Connectors” on page 822](#)

\*\*\*\*\*

## 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.

## Measurement Related Configuration

- 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
```

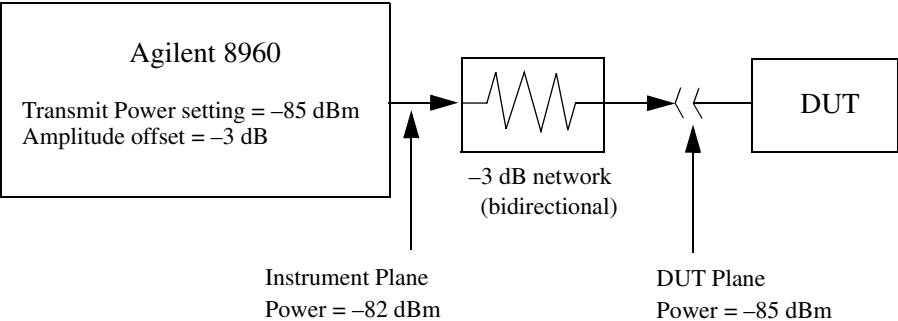
### RF IN/OUT Amplitude Offset

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 10. Amplitude Offset Transmitter Example

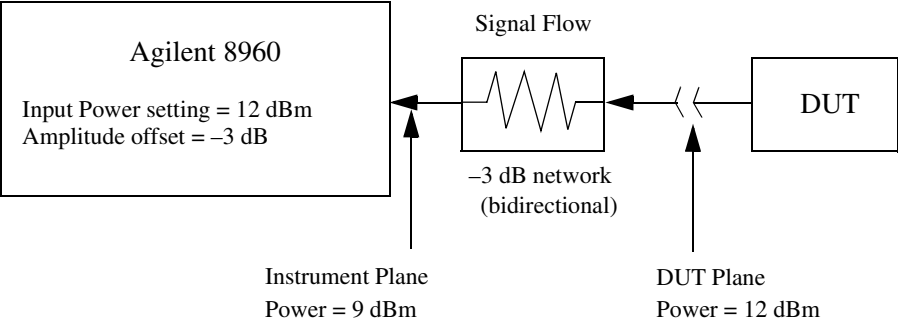


The transmit power setting reflects the power at the DUT plane.

**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 11. Amplitude Offset Receiver Example



The input power setting reflects the power at the DUT plane.

**Related Topics**

\*\*\*\*\*

[“SYSTEM:CORREction” on page 716](#)

\*\*\*\*\*

---

## 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 471](#)

\*\*\*\*\*



## 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 731](#)

["Rear Panel Connectors" on page 822](#)

\*\*\*\*\*



# 11 Error Messages

## Error Messages

### Error Message Descriptions

[“Fixed Timer Messages” on page 847](#)

[“Manual User Error Messages” on page 850](#)

[“-400 to -499 Query Errors” on page 861](#)

[“-300 to -399 SCPI Specified Device-Specific Errors” on page 859](#)

[“-200 to -299 Execution Errors” on page 856](#)

[“-100 to -199 Command Errors” on page 852](#)

[“+100 to +199 Core Device-Specific Error” on page 862](#)

[“+200 to +299 Call Processing Device-Specific Error” on page 865](#)

[“+300 to +399 Link Control Device-Specific Error” on page 868](#)

[“+400 to +499 Core Hardware Device-Specific Error” on page 869](#)

[“+500 to +599 Test Application Hardware Device-Specific Error” on page 872](#)

[“+600 to +699 Instrument Device-Specific Error” on page 873](#)

[“+700 to +799 Test Application Measurement Device-Specific Error” on page 874](#)

[“+800 to +899 Core Measurement Device-Specific Error” on page 875](#)

## Description

### Reading Error Messages

Each error message that is generated is recorded in either the error/event queue or the message log or both. Error messages are shown in a message window at the center of the test set's display.

When an error message is displayed an audio beep occurs, the beeper state of the test set can be set to on or off.

The error/event queue is read remotely using the SYSTem:ERRor? query. The error/event queue is able to hold 100 messages. To read the entire error/event queue use the following program.

```
10 DIM Err_msg$(255)
20 REPEAT
30 OUTPUT 714;"SYSTEM:ERROR?"
40 ENTER 714; Err_num,Err_msg$
50 PRINT Err_num,Err_msg$
60 UNTIL Err_num = 0
```

The message log may be viewed on the test set's display by pressing the SYSTEM CONFIG screen's Message Log key. The message log can display up to 24 entries over two pages.

Error messages can be cleared from the test set's display using the DISPlay:WINDow:ERRor:CLear command. Pressing any functional front panel key, i.e. the LOCAL key, will clear an error message for the test set's display.

### Classes of Errors

Error messages are divided into classes, each class of error is handled differently by the test set. The message log is cleared when the test set is power cycled.

**Measurement Integrity Indicators** These messages occur as a result of a measurement, they indicate the validity of the measurement. Measurement integrity indicators are read with the FETCh command.

**Non-Persistent Errors** These messages are generated when a condition occurs that is incorrect, but has no serious or long lasting effect on the test set's operation. Examples could include an out of range value to a parameter, or an invalid GPIB mnemonic. The message window is cleared when any front panel key is pressed.

**Persistent Errors** These errors are generated when a non-transitory error condition exists. Persistent errors occur when a hardware failure is found, or when damage or injury to a person or the test set may occur.

The test set displays these errors in the error message window and as a prompt at the bottom of the display screen where it remains until the error condition no longer exists.

**Fatal Errors** When these errors occur no further operation of the test set is possible without cycling the power switch. Fatal errors are not saved in the error message log. The test set display will provide the user with information about what to do next and some details about what the test set was doing when the fatal error occurred.

**Maskable Messages** These messages are intended to inform the user of a condition within the test set. They are generally meant to provide information to the user. The user will need to decide if this condition is undesirable and if they want the message to appear.

**Maskable Message Display State** The Maskable Messages Display State found in the Instrument Setup menu gives

## Error Messages

users a way to block these messages and the associated beep from ever happening. When the state is Off these messages and their associated beep will be blocked. The Maskable Message Display State can be set manually or with the following GPIB command:

```
OUTPUT 714;"DISPLAY:MESSAGE:MASKABLE:STATE OFF" !Prevents certain messages from appearing on the display.
```

### Instrument Maskable Messages

- Instrument warning: Audio Generator instrument has been closed.
- Instrument warning: Audio Analyzer instrument has been closed.
- Instrument warning: Analog Audio instrument has been closed.

### GSM Mobile Test Maskable Messages

- GSM measurement warning; TX Power measurement has been closed.
- GSM measurement warning; Power vs Time measurement has been closed.
- GSM measurement warning; Phase Frequency Error measurement has been closed.
- GSM measurement warning; Output RF Spectrum measurement has been closed.
- GSM measurement warning; Fast Bit Error measurement has been closed.
- GSM measurement warning; Decoded Audio measurement has been closed.
- GSM measurement warning; IQ Tuning measurement has been closed.

## Related Topics

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[“SYSTEM:COMMunicate:GPIB:DEBug\[:STATe\]” on page 713](#)

[“Test Set Beeper” on page 829](#)

[“SYSTEM:ERRor?” on page 724](#)

[“DISPlay:WINDow:ERRor:CLEar”](#)

[“DISPlay:MESSage:MASKable:STATe” on page 471](#)

[“Integrity Indicator” on page 191](#)

[“FETCh? Subsystem” on page 473](#)

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## Fixed Timer Messages

### Description

This is the list of fixed timers with a brief explanation and their values. A timer expiry message appears in its own window, on the test set display. The user has no access to these values and can not change them. None of the fixed timers are active when operating mode is Test Mode.

Timer Name	Description	Value
T100 RADIO-LINK-TIMEOUT	Detects the presence of the radio link by detecting SACCH frames every 480 ms.	4 SACCH multiframes. That is 1.92 seconds if the SACCH is completely absent.
T200 Data link timer	Used for re-transmission on the data link. The value varies depending on the message type.	155 ms for FACCH
T301 Alerting (ringing) timer	Timer used to limit the amount of time a user has to answer a call.	20 seconds
T303 Mobility Management connection timer	Time the network waits after sending a CM SERVICE REQUEST until receiving a response. This occurs before initiating call clearing procedures towards the MS.	10 seconds
T305 Release timer	Time the network waits after transmitting a DISCONNECT message until receiving a RELEASE message.	10 seconds
T306 In-band tones release timer	Time the network waits after transmitting a DISCONNECT message while in-band tones/announcements are provided, until receiving a RELEASE message.	10 seconds
T308 Release timer	Time the network waits after sending a RELEASE message until receiving a RELEASE COMPLETE message. This occurs before re-transmitting the RELEASE or releasing the Mobility Management connection.	10 seconds
T310 Call proceeding timer	Time the network waits after receiving a CALL CONFIRMED message until receiving a ALERTING, CONNECT, or DISCONNECT message before initiating clearing procedures towards the MS.	10 seconds

## Fixed Timer Messages

Timer Name	Description	Value
T313 Connect acknowledge timer	Time the network waits after transmitting a CONNECT message until receiving the CONNECT ACKNOWLEDGE message before performing clearing procedures with the MS.	10 seconds
T323 Modify complete timer	Time the network waits after sending a MODIFY message during call mode changes, until receiving a MODIFY COMPLETE or MODIFY REJECT message before initiating call clearing procedures.	10 seconds
T3101 Immediate assignment timer	Time the network waits after sending the IMMEDIATE ASSIGNMENT or IMMEDIATE ASSIGNMENT EXTENDED message until the main signalling link is established before releasing the newly allocated channels.	1 second
T3103 Handover timer	Time the network waits after transmitting a HANOVER COMMAND message until receiving HANOVER COMPLETE or HANOVER FAILURE or the MS re-establishes the call before the old channels are released. If the timer expires and the network has not received a correctly decoded L2 (format A or B) or TCH frame, then the newly allocated channels are released.	2 seconds
T3105 Physical information repetition timer	Time the network waits after sending the PHYSICAL INFORMATION message until receiving a correctly decoded L2 (format A or B) or TCH frame. This occur before re-transmitting the PHYSICAL INFORMATION message or releasing the newly allocated channels.	50 ms
T3107 Channel assignment timer	Time the network waits after transmitting an ASSIGNMENT COMMAND message until receiving the ASSESSMENT FAILURE message or the MS re-establishes the call before releasing the old and the new channels.	3 seconds
T3109 Signalling disconnection timer	Time the network waits after sending the CHANNEL RELEASE message before disconnecting the signalling link.	5 seconds
T3111 Channel deactivation after disconnection timer	Time the network waits after disconnecting the signalling link before deactivating the channel.	500 ms



Timer Name	Description	Value
T3113 Paging timer	Time the network waits after transmitting the PAGING REQUEST message until receiving the PAGING RESPONSE message. This occurs before re-transmitting the PAGING REQUEST (if the maximum number of re-transmissions have not been exceeded).	5 seconds
T3212 Location update timer	The location update timer is set to zero, periodic location update by the MS are disabled. If the MS camps to the BCH and decodes a new MCC or MNC from the one it last camped on, it should perform a location update.	zero = infinite time
T3250 TMSI reallocation timer	Time the network waits after sending the TMSI REALLOCATION COMMAND until receiving TMSI REALLOCATION COMPLETE. This occurs before aborting the procedure and releasing the Radio Resource connection.	5 seconds
T3260 Authentication response timer	Time the network waits after an AUTHENTICATION REQUEST until receiving AUTHENTICATION RESPONSE. This occurs before aborting the procedure and releasing the Radio Resource connection.	5 seconds

## Manual User Error Messages

### Description

These messages are intended to be displayed on the manual user interface only, and are not entered into the Error/Event Queue.

Error Message	Description
The function you requested is not yet available.	The test set does not have this capability.
IQ Calibration completed successfully for modulator <N>	<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 844.

**Table 3.**

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, and END message was received before the end length was satisfied.
-168 Block data not allowed	Indicates a legal block data element was encountered, but not allowed by the device at this point in parsing.
-170 Expression error	This error, as well as errors -171 through -179, are generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error.
-171 Invalid expression	Indicates the expression data element was invalid, see IEEE 488.2, 7.7.7.2. For example, unmatched parentheses or an illegal character.
-178 Expression data not allowed	Indicates a legal expression data was encountered, but was not allowed by the device at this point in parsing.
-180 Macro error	This error, as well as error -181 through -189, are generated when defining a macro or execution a macro. This particular error message is used if the device cannot detect a more specific error.
-181 Invalid output macro definition	Indicates that a macro parameter place holder was encountered outside of a macro definition.
-183 Invalid inside macro definition	Indicates that the program message unit sequence, sent with a *DDT or a *DMC command, is syntactically invalid, see IEEE 488.2, 10.7.6.3.

Error Message	Description
-184 Macro parameter error	Indicates that a command inside the macro definition had the wrong number or type of parameters.

## Related Topics

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[“Standard Event Status Register” on page 701](#)

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## -200 to -299 Execution Errors

### Description

These errors are generated when something occurs that is incorrect in the current state of the instrument. These errors may be generated by a user action from either the remote or the manual user interface.

Error Message	Description
-200 Execution error	This event bit (Bit 4) indicates a PROGRAM DATA element following a header was outside the legal input range or otherwise inconsistent with the device's capabilities, see IEEE 488.2, 11.5.1.1.5.
-203 Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-220 Parameter error	Indicates that a program data element related error occurred.
-221 Setting conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state.
-222 Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range defined by the devices
-223 Too much data	Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.
-224 Illegal parameter value	Indicates that the value selected was not part of the list of values given.
-225 Out of memory	The device has insufficient memory to perform the requested operation.
-226 Lists not the same length	Attempted to use LIST structure having individual LIST's of unequal lengths.
-230 Data corrupt or stale	Indicates invalid data, a new reading started but not completed since the last access.
-231 Data questionable	Indicates that measurement accuracy is suspect.
-233 Invalid version	Indicates that a legal program data element was parsed but could not be executed because the version of the data is incorrect to the device. For example, a not supported file version, a not supported instrument version.



Error Message	Description
-240 Hardware error	Indicates that a legal program command or query could not be executed because of a hardware problem in the device.
-241 Hardware missing	Indicates that a legal program command or query could not be executed because of missing device hardware. For example, an option was not installed.
-250 Mass storage error	Indicates that a mass storage error occurred. The device cannot detect the more specific errors described for errors -251 through -259.
-251 Missing mass storage	Indicates that a legal program command or query could not be executed because of missing mass storage.
-252 Missing media	Indicates that a legal program command or query could not be executed because of missing media. For example, no disk.
-253 Corrupt media	Indicates that a legal program command or query could not be executed because of corrupt media. For example, bad disk or wrong format.
-254 Media full	Indicates that a legal program command or query could not be executed because the media is full. For example, there is no room left on the disk.
-255 Directory full	Indicates that a legal program command or query could not be executed because the media directory was full.
-256 File name not found	Indicates that a legal program command or query could not be executed because the file name was not found on the media.
-257 File name error	Indicates that a legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to read or copy a nonexistent file.
-258 Media protected	Indicates that a legal program command or query could not be executed because the media was protected. For example, the write-protect switch on a memory card was set.
-270 Macro error	Indicates that a macro related execution error occurred.
-271 Macro syntax error	Indicates that a syntactically legal macro program data sequence, according to IEEE 488.2, 10.7.2, could not be executed due to a syntax error within the macro definition.
-272 Macro execution error	Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition, see IEEE 488.2, 10.7.6.3.

**-200 to -299 Execution Errors**

<b>Error Message</b>	<b>Description</b>
-273 Illegal macro label	Indicates that the macro label was not accepted, it did not agree with the definition in IEEE 488.2, 10.7.3
-274 Macro parameter error	Indicates that the macro definition improperly used a macro parameter placeholder, see IEEE 488.2, 10.7.3.
-275 Macro definition too long	Indicates that a syntactically legal macro program data sequence could not be executed because the string of block contents were too long for the device to handle, IEEE 488.2, 10.7.6.1.
-276 Macro recursion error	Indicates that a syntactically legal macro program data sequence count not be executed because it would be recursive, see IEEE 488.2, 10.7.6.6.
-277 Macro redefinition not allowed	Indicates that redefining an existing macro label, see IEEE 488.2, 10.7.6.4.
-278 Macro header not found	Indicates that a legal macro label in the *GMS?, see IEEE 488.2, 10.13, could not be executed because the header was not previously defined.

## -300 to -399 SCPI Specified Device-Specific Errors

### Description

A device-specific error indicates that the instrument has detected an error that occurred because some operations did not properly complete, possibly due to an abnormal hardware or firmware condition. For example, an attempt by the user to set an out of range value will generate a device specific error. When one of these errors is generated, the device specific error bit in the event status register is set.

Error Message	Description
-300 Device specific error	This event bit (Bit 3) indicates that a device operation did not properly complete due to some condition, such as overrange see IEEE 488.2, 11.5.1.1.6.
-311 Memory error	Indicates some physical fault in the devices memory, such as a parity error.
-312 PUD memory lost	Indicates protected user data saved by the *PUD command has been lost, see IEEE 488.2, 10.27.
-313 Calibration memory lost	Indicates that nonvolatile calibration data used by the *CAL? command has been lost, see IEEE 488.2, 10.2.
-314 Save/recall memory lost	Indicates that the nonvolatile data saved by the *SAV command has been lost, see IEEE 488.2, 10.33.
-315 Configuration memory lost	Indicates that nonvolatile configuration data saved by the device has been lost.
-320 Storage fault	Indicates that the firmware detected a fault when using data storage. This is not an indication of physical damage or failure of any mass storage element.
-321 Out of memory	An internal operation needed more memory than was available
-330 Self test failed	Indicates a problem with the device that is not covered by a specific error message. The device may require service.
-340 Calibration failed	Indicates a problem during calibration of the device that is not covered by a specific error.
-350 Queue overflow	Indicates that there is no room in the queue and an error occurred but was not recorded. This code is entered into the queue in lieu of the code that caused the error.
-360 Communication error	This is the generic communication error for devices that cannot detect the more specific errors described for error -361 through -363.

## -300 to -399 SCPI Specified Device-Specific Errors

Error Message	Description
-361 Parity error in program message	Parity bit not correct when data received for example, on a serial port.
-362 Framing error in program message	A stop bit was not detected when data was received for example, on a serial port (for example, a baud rate mismatch).
-363 Input buffer overrun	Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing.

## Related Topics

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[“Standard Event Status Register” on page 701](#)

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## -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>&lt;message1&gt; will appear as:</p> <p>If the DSP generated the assert:</p> <p style="padding-left: 40px;">;P:DSP T:&lt;task ID&gt; E:&lt;error code&gt; C:&lt;error classif.&gt; F1:&lt;flag 1&gt; F2:&lt;flag 2&gt;</p> <p>If the Protocol processor generated the assert:</p> <p style="padding-left: 40px;">;P:Protocol T:&lt;task ID&gt; L:&lt;line number&gt; F:&lt;file name&gt;</p> <p>If the Host processor generated the assert:</p> <p style="padding-left: 40px;">;P:Host T:&lt;task ID&gt; L:&lt;line number&gt; F:&lt;file name&gt;</p>
+102 Exception; Cycle power. Exception message<message2>	<p>&lt;message2&gt; will appear as: T:&lt;task ID&gt; or V:&lt;vector number&gt; or PC:&lt;program counter&gt; or DA:&lt;data adrs reg value&gt;.</p> <p>Vector number, program counter and data address register values are hexadecimal format.</p>
+103 Failure; No measurements or settings can be made	Indicates none of the VT's are operational because a serious problem exists.
+104 Failure; No settling operations will take place	Indicates none of the VT'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 VT'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)	<a href="#">“Fixed Timer Messages” on page 847</a>
+202 GSM call disconnected; Immediate assignment failure (Timer T3101 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+203 GSM call disconnected; Handover failure (Timer T3103 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+204 GSM call disconnected; Channel assignment failure (Timer T3107 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+205 GSM call disconnected; No response to page (Timer T3113 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+206 GSM call disconnected; No answer (Timer T301 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+207 GSM call disconnected; No response to setup (Timer T303 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+210 GSM call disconnected; No response to release 2 times (Timer T308 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+211 GSM call disconnected; No alert from mobile (Timer T310 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+212 GSM call disconnected; No response to connect (Timer T313 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+213 GSM call disconnected; Data link failure (Timer T200 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+214 GSM call disconnected; Physical information repetition failed (Timer T3105 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+217 GSM call disconnected; TMSI (Temporary Mobile Subscriber Identity) reallocation failed (Timer T3250 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+218 GSM call disconnected; Authentication failed (Timer T3260 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>

**+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)	<a href="#">“Fixed Timer Messages” on page 847</a>
+251 GSM protocol failure; No response to release (Timer T308 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+252 GSM protocol failure; Channel release failed (Timer T3109 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+253 GSM protocol failure; (Timer T3270 expiry)	<a href="#">“Fixed Timer Messages” on page 847</a>
+254 GSM protocol failure; Unknown identity type received from mobile	Indicates that an identity type other than 1, 2, 3 or 4 was received from the MS.
+255 GSM protocol failure; Unexpected identity type received from mobile	Indicates that the MS has responded with an unexpected identity type. Example MS returned IMSI when IMEI was queried. See <a href="#">“CALL:MS:REPorted:IMEI?” on page 398</a> .
+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 701](#) for information on this register.

Error Message
+303 GSM data link failure; Unsolicited DM response, multiple frame established state
+309 GSM data link failure; N(R) sequence error

## +400 to +499 Core Hardware Device-Specific Error

### Description

These errors are generated when a problem occurs in one of the test set's hardware modules that is part of the test set's core instrument.

When one of these errors is generated, the '+400 errors' bit in the questionable error status register is set.

Error Message	Description
+400 Hardware failure; Hardware is not available	
+401 Hardware failure; Protocol processor hardware is not responding	
+402 Hardware failure; Demod receiver hardware is not responding	
+403 Hardware failure; Measurement receiver hardware is not responding	
+404 Hardware failure; RF source 1 hardware is not responding	
+405 Hardware failure; RF source 1 digital modulation hardware is not responding	
+406 Hardware failure; RF source 1 level hardware is not responding	
+407 Hardware failure; DSP demod control hardware is not responding	
+408 Hardware failure; 2nd demod receiver hardware is not responding	
+409 Hardware failure; Base station emulator trigger hardware is not responding	
+410 Hardware failure; Audio source hardware is not responding	
+411 Hardware failure; RF source 2 hardware is not responding	
+412 Hardware failure; Internal voltmeter hardware is not responding	
+413 Hardware failure; Fixed timebase input is not responding	
+414 Hardware failure; Fixed external reference output is not responding	

**+400 to +499 Core Hardware Device-Specific Error**

Error Message	Description
+415 Hardware failure; Instrument reference is not responding	
+416 Hardware failure; Bit clock A is not responding	
+417 Hardware failure; RF source 2 frequency hardware is not responding	
+418 Hardware failure; RF source 2 digital modulation hardware is not responding	
+419 Hardware failure; RF source 2 level hardware is not responding	
+420 Hardware failure; RF source hopping hardware is not responding	
+421 Hardware failure; Digital demod hopping hardware is not responding	
+422 Hardware failure; Misc VI hardware is not responding	
+423 Hardware failure; Unable to access networking information	
+424 Hardware failure; Bit clock B is not responding	
+425 Hardware failure; Invalid EEPROM checksum <EEPROM board ID>	See the list of EEPROM board ID names below.
+426 Hardware failure; Unable to write to EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+427 Hardware failure; Unable to read from EEPROM <EEPROM board ID>	See the list of EEPROM board ID names below.
+428 Hardware failure; Board not identified <board ID>	See the list of board ID names below.
+429 Hardware failure; Could not create board identification <board ID>	See the list of board ID names below.
+430 Hardware failure; Control version not compatible with FW <board ID>	See the list of board ID names below.
+431 Hardware failure; RF IO DAC cannot be calibrated due to present temperature	
+432 Hardware failure; RF hardware is not responding	
+433 Hardware failure; RF source FM hardware is not responding	
+434 Hardware failure; Audio source FM hardware is not responding	

Error Message	Description
+460 Hardware failure; Hardware doesn't support requested operation	This error occurs when a setting is attempted that is not possible with the test set's hardware. The current firmware needs new hardware in order to work.

**<board ID> names**

3 GHZ ATTENUATOR 1 | ;3GHZ ATTENUATOR 2 | ;AUDIO BD | ;ROM BASEBAND GENERATOR 1 | ;ROM BASEBAND GENERATOR 2 | ;DEMOD DOWNCONVERTER | ;VECTOR OUTPUT BOARD 1 | ;VECTOR OUTPUT BOARD 2 | ;IVF MEASUREMENT | ;MEASUREMENT DOWCONVERTER | ;RF POWER DETECTORS | ;REFERENCE MODULE | ;SYNTH DOUBLER 1 | ;SYNTH DOUBLER 2 | ;TIMING REF | ;MOMENTUM INSTRUMENT | ;RF MOTHER BOARD | ;JUMPER BOARD | ;DIGITAL MOTHER BOARD | ;FLAT PANEL ADAPTER | ;REAR PANEL BOARD

**<EEPROM board ID> names**

Instrument Eeprom ID State | ;Atten 1 Eeprom ID State | ;Atten 2 Eeprom ID State | ;Audio Eeprom ID State | ;BaseBandGen 1 Eeprom ID State | ;BaseBandGen 2 Eeprom ID State | ;Demod DC Eeprom ID State | ;Digital Mother Board Eeprom ID State | ;IQ Output 1 Eeprom ID State | ;IQ Output 2 Eeprom ID State | ;IVF Meas Eeprom ID State | ; Jumper Board Eeprom ID State | ; Meas DC Eeprom ID State | ;RF Mother Board Eeprom ID State | ;RF Interface Eeprom ID State | ; Ref Mod Eeprom ID State | ;Sig Gen 1 Eeprom ID State | ; Sig Gen 2 Eeprom ID State | ;Time Ref Eeprom ID State | ;Display Interface Eeprom ID State | ;Rear Panel Eeprom ID State

**Related Topics**

\*\*\*\*\*

[“Standard Event Status Register” on page 701](#)

\*\*\*\*\*

## +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 4. Test Application Hardware Device Specific Errors**

Error Message
+500 to +599 No errors currently defined

### Related Topics

\*\*\*\*\*

[“Standard Event Status Register” on page 701](#)

\*\*\*\*\*



## +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 701](#)

\*\*\*\*\*

## +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 701](#) 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 701](#)

\*\*\*\*\*

## 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 844](#)

\*\*\*\*\*

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## GSM Revision Information

This document describes features and functionality that are part of the E1960A GSM Mobile Test Application releases. This document contains the original features, as well as enhancements that have been added over time.

Select the appropriate link below to view the required release.

- [“A.06 Release February 2001” on page 878](#)
- [“A.05 Release May 2000” on page 879](#)
- [“A.04 Release - March 2000” on page 880](#)
- [“A.03 Release - December 1999” on page 881](#)
- [“A.02 Release - July 1999” on page 882](#)
- [“A.01 Release - March 1999” on page 882](#)
- [“A.00 Initial Release - January 1999” on page 883](#)

## 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 836](#).
- 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 101](#).
- 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 709.

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**NOTE** It is not recommended that you switch to a GSM Test Application that has a revision earlier than A.04. Earlier revisions did not have the capability to select Test Applications.

There may be up to a three second delay between the time the Test Application is selected and it being implemented in the test set.

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- Options installed display is now active  
The Options Installed display on the System Configuration screen has been activated to allow for the optional second source. Although the second source has been optional since the A.03 release, the Options Installed display has remained blank until this current release.
- Usability enhanced through gray fields  
Non-enabled menu items are now denoted as gray text, versus enabled menu items that are a standard black text. Currently there are no GSM Test Application menu items that use this feature.
- Measurement time-out resolution increased  
The measurement time-out resolution has been increased from 1 second to 0.1 seconds. The minimum time-out has also been reduced from 1 second to 0.1 seconds.
- Warning messages can be masked from the display  
A new command is available in the DISPlay subsystem which allows you to set whether or not the test set displays and beeps warning messages. For further information on this command refer to `"DISPlay:MESSAge:MASKable:STATe"` on page 471. 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 472](#).
- **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 834](#).
- 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

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## 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 884](#)

### 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 388](#).
- 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 424](#).
- 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 421](#).
- 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 391](#).
- 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 410](#).

## 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 120.](#)
- Power versus Time multi-uplink mask  
For more information on this measurement refer to [“GPRS Power versus Time Measurement” on page 142.](#)
- 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 166.](#)
- Multislot tolerant Phase and Frequency Error  
For more information on this measurement refer to [“Phase and Frequency Error Measurement Description” on page 128.](#)

## 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.



## Symbols

\*IDN?, 831

## Numerics

3 Digit MNC for PCS 1900, 427  
3GPP standards, adherence to, 173

## A

### AAUDIO

troubleshooting, 71  
abort measurements, 346  
active cell operating mode, 751  
Active Cell Status, 456  
active cell, setting, 410  
active link  
GSM, 36  
active versus inactive  
measurements, 221

### address

GPIB, 830  
LAN, 832

adherence to 3GPP, GSM and  
GPRS standards, 173

adherence to ETSI, GSM and  
GPRS standards, 173

Amplitude, 350

Amplitude Offset, 716

analog audio (AAUDIO)  
measurement, 68

Analog Audio Setup, 589

analog audio setup, 589

### ARFCN

BCH, 737, 738  
PDTCH, 416, 738  
TCH, 737

arithmetic mean, 203

arming triggering, 221

Attached state, 357

Attached state query, 59

### Audio Analyzer

Audio Frequency, 475

Audio Frequency, 475

audio frequency measurement, 72

audio frequency measurement,  
programming, 73

AUDIO IN connectors, 68

audio level measurement,  
program example, 76

audio level measurements, 75

### Audio Measurement

Block Diagram, 70

automatic (auto) trigger source,  
219

averaging, 236

averaging measurements, 203

averaging parameters, 236

## B

BA Table, 360, 737, 738

Band Pass Filter Frequency  
AAUD, 589  
DAUD, 613

band selection parameters, 740

base station colour code, 369

base station originated call  
GSM, 36

BCC (Base Station Colour Code),  
369

BCH + TCH test function, 758

BCH number, 370

BCH parameters, 763

BCH test function, 755

Beeper State, 711

### bit

frame trigger, 774

Bit Error (BER) measurement  
programming example for  
GPRS, 85

programming example for GSM,  
83

Bit Error measurement, 78

troubleshooting, 88

Bit Error Setup, 598

GPRS, 622

### BLER

data connection type, 387

BLER Reports, 89

programming example, 89

Block Delay, 622

block diagram, audio

measurements, 70

Block Error Rate, 89, 456

broadcast allocation table, 737,  
738

Broadcast Chan, 370, 737, 738

broadcast channel

selecting frequency band, 740

selecting frequency band,

GPRS, 741

*See also* BCH

broadcast channel parameters,  
763

Burst Synchronization

PFER, 642

Burst Synchronization

PVT, 647

burst synchronization, 238

burst synchronization parameter,  
238

Burst Timing Error, GPRS, 456

Burst Timing Error, GSM, 456

burst type

selecting manually, 755

burst parameters, 744

## C

calibrate IQ modulators, 355

calibration date, querying, 355

CALL, 455

### call

base station originated (GSM),  
36

mobile station originated, 37

call connected query, 374

call parameters, 796

Call Params, 796

call processing error, 865

call state detector, 374, 381

Call Status, 456

Cell Activated State, 359, 751,  
753

changing manually, 797

Cell Band, 368

Cell Band parameter

GPRS, 741

GSM, 740

Cell Off, 761

cell parameters, 797

Cell Params, 797

Cell Power, 429

Cell Power State, 429

### channel

selecting manually, 776, 780

channel decode error counter, 377

channel number

selecting manually, 737

Coding Scheme, 416

command error, 852

### commands

call processing, 38, 48

data connection processing, 61

GPRS data connection

processing, 55

overlapped, 38, 48, 55, 61

synchronization, call processing  
events, 38, 48

synchronization, call processing  
states, 44

synchronization, data

connection processing

events, 61

synchronization, GPRS data

connection processing

events, 55

synchronization, GPRS data

connection processing

states, 58

compound queries, 185

concurrent measurements, 187

- restrictions, 187
  - configure measurement execution parameters, 235
  - Configuring the test set (GPRS), 816
  - Configuring the Test Set's LAN, 832
  - connected/idle query, 44
  - connection
    - GPRS, 54
  - continuous triggering, 221
  - corrupt burst counter, 377
  - corrupt burst, zeroing counter, 377
  - Corrupted Bursts, 357, 377, 390, 468
  - counters, 377
  - CW test function, 760
- D**
- data connected query, GPRS, 381
  - Data Connection, 805
  - data connection
    - ending, 387
    - GPRS, 54
    - starting, 387
  - data connection state
    - attached, 357
    - transferring, 468
  - Data Connection State Change Detector, 59
  - Data Connection Status, 456
  - Data Connection Type, 387
  - data connection types, 387
  - data types
    - mixed, problems with, 185
    - query response, 185
  - date of calibration, querying, 355
  - debug feature, 344
  - Decode Errors, 357, 377, 390, 468
  - decoded audio (DAUDIO)
    - measurement, 92
    - programming example, 94
  - Decoded Audio Setup, 613
  - de-emphasis, selecting, 69
  - default settings
    - full preset, 791
    - measurement timeouts, 195
    - partial preset, 791
    - status preset, 792
  - Deferred Parameters, setup, 442
  - delay, trigger, 222
  - detector, audio, 68
  - determine if a measurement is done, 257
  - device specific error, 859, 862
  - discontinuance reception mode, 414
  - discontinuous transmission, 398
  - Display Brightness, 828
  - Display mode, 470
  - distortion measurement, enabling, 68
  - distortion (AAUD DIST) measurement, 97
  - distortion measurement, programming, 98
  - downlink
    - BCH, 755
    - BCH + TCH, 758
    - CW, 760
  - downlink configuration, 387
  - downlink speech source, control of, 187
  - Downlink Traffic Power, 417
  - DRX, 414
  - dualband handover, 184, 740
  - Dynamic Power measurement, 101
    - programming example, 103
    - using to measure GSM mobile power control levels, 103
  - dynamic power setup, 618
- E**
- End Call, 384
  - End Data Connection, 387
  - error message log, how to access, 876
  - establish a data connection
    - GPRS, 54
  - establish an active link
    - GSM, 36
  - ETSI standards, adherence to, 173
  - ETSI Type A, data connection type, 387
  - ETSI Type B, data connection type, 387
  - execution error, 856
  - expander reference level, setting, 69
  - Expected Audio Amplitude, 589
  - Expected Burst, 373, 755
  - Expected Maximum Difference Dynamic Power, 618
  - Expected Peak Audio Amplitude, 589
  - expected peak voltage, audio, 69
  - Expected Power, 574, 737, 778, 781
  - Expected Power Control (receiver control), 575
  - External Trigger Bit, 774
  - External Trigger Bit Position, 725
  - external trigger source, 219
  - External Trigger State, 774
  - External trigger state, 725
  - External Trigger Timeslot, 774
  - External trigger Timeslot, 725
  - external trigger timeslot, 774
- F**
- FACCH signaling, 455
  - fast bit error rate (FBER)
    - measurement
      - programming example, 117
    - fast bit error rate measurement, 113
  - fast bit error results, 497
  - FBER Setup, 605
  - filters, audio, 68
  - flowchart for control programs, 819
  - for call connection, 374, 381
  - frame trigger
    - bit, 774
    - external, 774
    - parameters, 774
    - timeslot, 774
  - Frequency, 350
  - frequency
    - selecting manually, 776, 780
  - frequency band
    - selecting manually, 776
  - frequency band of mobile, 403
  - frequency banded parameters, 736
  - frequency bands
    - DCS, 737, 738
    - EGSM, 737, 738
    - PCS, 737, 738
    - PGSM, 737, 738
  - frequency error, 128
  - frequency error measurement, 132, 134
  - frequency error results, 516
  - full preset, 791
- G**
- Get IMEI at Call Setup, 392
  - GPB address, 830
  - GPRS
    - ending a data connection, 387
    - setting the type of data connection, 387
    - starting a data connection, 387
  - GPRS Bit Error Setup, 622
  - GPRS Manual Operation, 804
  - GPRS mobile testing, 785



- GPRS standards, adherence to, 173
- GSM Manual Operation, 795
- GSM standards, adherence to, 173
- Guard Period Length, 397
- Guard period length asymmetric, 406
- H**
- handover
  - dualband, 740
- Handover Execute, 390
- Handover Setup, GPRS, 442
- handover, dualband, 184
- handover, making a, 390
- hardware error, 869
- how to configure, 235, 236, 237, 238, 239
- how to determine if complete, 257
- HP-IB Address, 712
- I**
- I/Q Tuning measurement, 107
  - programming example, 103, 109
- I/Q Tuning Setup, 627
- idle measurement state, 221
- IMEI, 392, 398
- immediate trigger source, 219
- IMSI, 399
- inactive measurement state, 221
- initiate measurements, 555
- instrument error, 873
- integrity indicator
  - programming example, 194
  - timeout, 195
  - values (0-16) explained, 191
- IQ Tuning results, 504
- L**
- LAC (Location Area Code), 393
- LAC, last reported, 399
- LAN address, 832
- LAN IP Address, 712
- level
  - mobile station transmit, 737, 738
- license, 706
- link control error, 868
- location area code, 393
- M**
- make a base station originated call
  - GSM, 36
- make a call, 799
- make a data connection
  - GPRS, 54
- make a measurement, 799
- make a mobile station originated call, 37
- Manual Band, 574, 737, 776
- manual band parameter, 741
- Manual Channel, 574, 737, 776, 780
- manual channel
  - selecting frequency band, 741
- Manual Freq, 776
- Manual Frequency, 574
- Manual Operation (GPRS), 804
- Manual Operation (GSM), 795
- Max Frames Allowed for Assignment, 357, 377, 390, 468
- maximum value, 203
- MCC (Mobile Country Code), 394
- MCC, last reported, 399
- measurement, 257
- measurement averaging, 203
- Measurement Burst, selecting for GPRS, 576
- measurement error, 875
- measurement execution, 235
- Measurement Frequency
  - Auto (receiver control), 575
  - manual (receiver control), 575
- Measurement Log, 724
- Measurement Offsets
  - PVT, 647
  - PVT, GPRS, 648
- measurement progress report, 198
- Measurement selection, 806
- Measurement setup, 807
- measurement statistics, 203, 802, 808
- Measurement Timeout, 239
  - AAUD, 589
  - BERR, 598, 622
  - DAUD, 613
  - Dynamic Power, 618
  - FBER, 605
  - I/Q Tuning, 627
  - ORFS, 634
  - PFER, 642
  - PVT, 648
  - TXP, 657
- measurement triggering, 219
- Measurement Type, 598
- Measurement Unit, 490
- measurements, 235, 236, 237, 238, 239, 256, 257
  - active versus inactive, 221
- analog audio, description, 68
- audio level, description, 75
- bit error rate, 78
- concurrent, 187
- decoded audio (DAUDIO)
  - programming example, 94
- decoded audio, description, 92
- distortion, description, 97
- Dynamic Power, 101
- fast bit error rate (FBER)
  - programming example, 117
- fast bit error rate, description, 113
- how to change measurement setup, 801, 807
- how to make a measurement, 799
- how to select a measurement, 800
- how to turn off measurements, 803
- I/Q Tuning, 107
  - programming example, 103, 109
- initiate, 555
- Output RF Spectrum (ORFS), 120
- output RF spectrum (ORFS)
  - programming example, 123, 125
- Phase and Frequency Error, 128
- phase and frequency error (PFER)
  - programming example, 132, 134
- power versus time (PVT)
  - programming example, 148, 150
- power versus time (PvT), description, 137, 160
- SINAD, description, 163
- starting, 555
- stopping, 346
- Transmit Power (TXP), 166
- transmit power (TXP)
  - programming example, 169, 170
- measuring (continuous)
  - measurement state, 221
- measuring (single) measurement state, 221
- message log, how to access, 876
- minimum value, 203
- missing burst count, 379
- Missing Bursts, 357, 377, 390, 468

- mixed data types, problems with, 185
- MNC, 427
- MNC (Mobile Network Code), 395
- MNC, last reported, 400
- mobile compliance, 401
- mobile country code, 394
- mobile frequency band, 403
- Mobile Loopback, 462
- mobile network code, 395, 427
- mobile station operating parameters, 772
- mobile station originated call, 37
- Modulation Offset
  - ORFS, 633
- Modulation Offset #
  - ORFS, 633
- MS TX Level, 737, 738
- MS TX Level, GPRS, 416
- Multi-Measurement Count
  - I/Q Tuning, 627
  - ORFS, 633
  - PFER, 642
  - PVT, 647
  - TXP, 657
- Multi-Measurement Count (Modulation)
  - ORFS, 633
- Multi-Measurement Count (Switching)
  - ORFS, 633
- Multi-measurement Count
  - Decoded Audio, 613
- multi-measurements, 203
- count, 198
- multiple queries using semicolon separator, 185
- Multislot Configuration, 416
- N**
- NCC (Network Colour Code), 409
- network colour code, 409
- newlink CALLSIGNFACCH, 455
- newlink progAUDIOFreq, 73
- Number of bits to test
  - BERR, 598, 622
  - FBER, 605
- Number of Bursts
  - Dynamic Power, 618
- O**
- Operating Mode, 410
- operating modes
  - active cell, 751
  - GPRS test modes, 761
  - GSM test mode, 753
- ORFS due to modulation, 120
- ORFS due to ramping.
  - See ORFS due to switching
- ORFS due to switching, 121
- ORFS results, 508
- ORFS Setup, 633
- Originate Call, 412
- originated number, 400
- Output RF Spectrum (ORFS)
  - measurement, 120
  - programming example for GPRS, 125
  - programming example for GSM, 123
- output RF spectrum (ORFS)
  - measurement
  - programming example, 123, 125
- overlapped commands, 38, 48, 55, 61
- P**
- Packet Data Traffic Channel, 416, 738
- packet data traffic channel
  - selecting frequency band, 741
- packet data traffic channel parameters, 769
- page count, 379
- Pages, 357, 377, 390, 468
- paging
  - IMSI, 413
  - mode, 414
  - multiframes, 415
  - repeat, 414
- Paging IMSI, 413
- parameters, 235
  - band selection, 740
  - bursting, 744
  - Cell Band, GPRS, 741
  - Cell Band, GSM, 740
  - frequency banded, 736
  - how to change call parameters, 796
  - how to change cell parameters, 797
  - manual band, 741
  - PDTCH Band, 741
  - receiver control, 776, 779
  - signal generator band, 741
  - TCH Band, 740
- partial preset, 791
- PDTCH
  - Absolute Downlink Power, 417
  - ARFCN, 416
  - Band, 416
  - downlink power control, 417
  - MS TX Level, 416
  - P0 reference level, 417
- PDTCH Band parameter, 741
- PDTCH parameters, 769
- peak phase error, 128
- Phase & Freq Setup, 642
- Phase and Frequency (PFER)
  - measurement
  - programming example for GPRS, 134
  - programming example for GSM, 132
- phase and frequency error (PFER)
  - measurement
  - programming example, 132, 134
- Phase and Frequency Error
  - measurement, 128
  - troubleshooting, 136
- phase and frequency error results, 516
- power class, 401
- power level
  - mobile station transmit, 737, 738
- power level setting, 406
- Power versus Time (PVT)
  - measurement
  - programming example for GPRS, 149
  - programming example for GSM, 148
  - troubleshooting, 152
- power versus time (PVT)
  - measurement
  - programming example, 148, 150
- power versus time (PvT)
  - measurement, 137, 160
- power versus time results
  - GPRS, 525
  - GSM, 523
  - mask error code for GPRS, 524
- Power vs Time Measurement Setup, 647
- power, expected, 737, 778, 781
- preset, 682
- preset states
  - full preset, 791
  - partial preset, 791
  - status preset, 792
- program control flowchart, 819
- programming, 235, 256, 257
- programming overview, 819
- programming, audio frequency
  - measurement, 73
- programming, debug feature, 344
- progress report, measurement, 198
- protocol trigger source, 219
- Pulse, 350

## Q

qualifier, trigger, 222  
query error, 861  
query response data types, 185  
  problems with mixed data types, 185

## R

RACH count, 380  
RACH count, GPRS, 377  
RACH count, zeroing, 377  
RACH measurements, 154  
  troubleshooting, 159  
RACH page, zeroing counter, 379  
RACHs, 357, 377, 390, 468  
reading results, 560  
received signal level, 401, 402  
received signal quality, 402, 403  
Receiver Control, 573, 574  
  Expected Power Control, 575  
  Measurement Frequency  
    Auto, 575  
    manual, 575  
  Uplink Frequency  
    Auto, 575  
    manual, 575  
receiver control  
  automatic or manual control of, 776  
Receiver Control, GPRS, 575  
Reference Offset Frequency  
  I/Q Tuning, 627  
Repeat Paging, 413  
response unit message separator (RMUS), 185  
results  
  fast bit error, 497  
  GPRS power versus time, 525  
  GSM power versus time, 523  
  IQ Tuning, 504  
  ORFS, 508  
  phase and frequency error, 516  
  READ, 560  
  transmit power, 550  
revisions, 706  
RF generator, 435  
RF generator calibration, 355  
RF rise trigger source, 219  
rms phase error, 128  
RX level, 401, 402  
RX quality, 402, 403

## S

SAACH report clearing, 398  
select a measurement, 800

semicolon, use of in compound queries, 185  
service request (SRQ), 46  
set up a measurement, 801, 807  
setup  
  analog audio, 589  
  dynamic power, 618  
signal generator band parameter, 741  
signal generator channel  
  selecting frequency band, 741  
signalling control, 359  
SINAD (AAUD  
  SINAD) measurement, 163  
SINAD measurement, programming, 164  
SINAD measurement, enabling, 68  
single triggering, 221  
Speech, 462  
Speech Frames Delay, 598  
standard deviation, 203  
Start Data Connection, 387  
start measurements, 555  
starting, 256  
starting measurements, 256  
statistical measurement results, 802, 808  
statistics, 203  
status byte, 700  
status operation subsystem, 663  
status preset, 792  
stop measurements, 346  
Switching Offset  
  ORFS, 633  
Symmetry of uplink bursts, 405  
synchronization, 257, 373  
  call processing events, 38, 48  
  call processing states, 44  
  data connection processing events, 61  
  GPRS data connection processing events, 55  
  GPRS data connection processing states, 58  
  INIT:DONE, 199  
  measurement event, 199  
  service request (SRQ), 46  
  STAT:OPER:CALL, 46

## T

table, broadcast allocation, 737, 738  
TCH Band parameter, 740  
TCH parameters, 766  
TDMA Frames Delay, 605  
test application, 710  
test application error, 874

test application hardware error, 872  
test applications installed, 707  
Test Function, 387  
test functions  
  BCH, 755  
  BCH + TCH, 758  
  CW, 760  
test mode operating mode, GSM, 753  
test mode operating modes, GPRS, 761  
test modes, setting, 410  
Test Set Beeper, 829  
Test set configuration (GPRS), 816  
Time Offset  
  PVT, 647  
Time Offset for each burst  
  PVT, GPRS, 648  
timeout, 374, 381  
  for call connection, 374  
  for data connection, 381  
timeout parameter, 239  
timeouts, 195  
  changing time units, 195  
Timeslot, 462  
timeslot  
  frame trigger, 774  
timing advance, 403, 404, 405  
Traffic Band, 461  
Traffic Band, GPRS, 416  
Traffic Channel, 461, 737  
traffic channel  
  selecting frequency band, 740  
traffic channel parameters, 766  
Traffic Channel, GPRS, 416  
Transferring state, 468  
Transferring state query, 59  
transmit level, 404, 405  
Transmit Power (TXP)  
  measurement, 166  
  programming example for GPRS, 170  
  programming example for GSM, 169  
transmit power (TXP)  
  measurement  
  programming example, 169, 170  
Transmit Power measurement  
  troubleshooting, 172  
transmit power results, 550  
transmitted carrier power  
  *See also* power versus time measurement, 137, 160  
trigger  
  frame, 774

- frame bit, 774
  - frame timeslot, 774
  - frame, external, 774
  - Trigger Arm
    - AAUD, 589
    - BERR, 598, 622
    - DAUD, 613
    - FBER, 605
    - I/Q Tuning, 627
    - ORFS, 633
    - PFER, 642
    - PVT, 647
    - TXP, 657
  - Trigger Delay
    - I/Q Tuning, 627
    - ORFS, 634
    - TXP, 657
  - Trigger Qualifier
    - PFER, 642
    - TXP, 657
  - Trigger Source
    - I/Q Tuning, 627
    - ORFS, 634
    - PFER, 642
    - PVT, 648
    - TXP, 657
  - trigger source, 219
    - audio analog measurements, 69
    - decoded audio measurement, 93
    - ORFS measurement, 122
    - PFER measurement, 130
    - power versus time
      - measurement, 139, 145
    - transmit power measurement, 167
  - triggering, 237, 612
    - arming, 221
    - continuous, 221
    - delay, 222
    - qualifier, 222
    - SETup command, 220
    - single, 221
  - triggering parameters, 237
  - troubleshooting
    - Analog Audio
      - , 71
    - Bit Error measurement, 88
    - Phase and Frequency Error
      - measurement, 136
    - Power versus Time
      - measurement, 152
    - Transmit Power measurement, 172
  - turn off measurements, 803
  - Turning of a measurement, 809
  - TX level, 404, 405
  - TX Power Setup, 657
- U**
- Uplink Frequency
    - Auto (receiver control), 575
    - manual (receiver control), 575
  - uplink speech level measurement.
    - See decoded audio measurement
  - Use 3 Digit MNC for PCS 1900, 427
- W**
- waiting for trigger measurement state, 221